

Seedling Diseases of Corn

- Stress from wet, cool soil conditions can predispose corn seedlings to disease.
- Field diagnosis of seedling disease can be difficult because multiple pathogens are often involved and symptoms caused by these pathogens can appear similar.
- Planting when soil conditions are favorable for germination and using a broad spectrum fungicide seed treatment can minimize the risk of plants developing seedling diseases and root rots.

Favorable Environment

Wet and cool soil (temperatures less than 50° to 55° F) can delay seed germination and emergence and predispose corn seedlings to disease. Seedlings become more susceptible to infection the longer a seed is in the ground before emergence and the more stress germinating corn endures.

Symptomology and Identification

Typical belowground symptoms of seedling disease include rotted seed that is soft and brown, seminal roots that have a wet and slimy appearance, and a mesocotyl with brown lesions or soft and water-soaked tissue. Aboveground symptoms include damping-off after emergence and seedlings that turn yellow, wilt, and die.

Identification of specific seedling blights and root rots based on symptomology can be difficult because different pathogens often cause similar symptoms. Fungi, bacteria, nematodes, and root-feeding insects can all play a role in causing disease and complicating diagnosis. Often multiple species of fungi can be isolated from a single plant sample. In addition to some common soilborne fungi listed below, fungi such as *Aspergillus*, *Nigrospora*, and *Trichoderma* may also cause seedling diseases in corn.¹ Microscopic examination at a plant diagnosis clinic is the most reliable way to confirm a specific disease diagnosis.

Common Pathogens

Several common soilborne fungi such as *Fusarium*, *Penicillium*, *Pythium*, and *Rhizoctonia* are often isolated from infected seedlings and roots.

***Fusarium*.** At least six *Fusarium* species have been identified that cause seedling diseases and root rots in corn.² *Fusarium* root rot can move into the base of the corn plant, resulting in crown and stalk rot (Figure 1). Infected plants can have tan to reddish brown lesions and the root or mesocotyl may shrivel. Root symptoms range from very slight brown discoloration to dark black, completely rotted roots. This disease can occur under a wide range of temperature and moisture conditions. Plant susceptibility to root rot increases when plants are under



Figure 1. Symptoms of *Fusarium* crown rot including slight discoloration. Courtesy of R.L. Croissant, Bugwood.org.



Figure 2. Rotted mesocotyl due to *Penicillium* root rot. Courtesy of William M. Brown, JR., Bugwood.org.

stress or injured by herbicide applications. Root rots occurring after the seedling stage are often caused by *Fusarium*.

***Penicillium*.** The roots and mesocotyl of infected plants may be discolored and rotted (Figure 2). Sometimes a blue-green fungal growth can be seen on infected seeds. Symptoms of this seedling blight include browning of leaf tips. Entire infected plants may turn yellow and die, or remain discolored and stunted the remainder of the growing season. *Penicillium* tends

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to infect plants that have yet to develop their nodal root systems. This fungus is favored by high temperatures, which can inhibit other fungi.

***Pythium*.** This is one of the most common fungi associated with seed rot and seedling blight of corn. Several species of *Pythium* can rot the seed prior to germination or infect young seedlings before or after emergence. Symptoms include dark, slimy lesions that cause the root or mesocotyl to shrivel (Figure 3). The outer cortex of the root may be rotted while the inner part, or stele, remains white and intact. This fungus is favored by high moisture and low temperatures and requires wet soils to produce infecting spores. Strains of *Pythium* that are more adapted to warmer, wet conditions have developed in some locations.³ *Pythium* can infect anytime between planting and midseason, but is primarily a seedling problem.

***Rhizoctonia*.** Initial symptoms are brown lesions on the mesocotyl and roots of seedlings and young plants. Plants may be stunted or chlorotic, but often there are no aboveground symptoms. The most distinctive symptoms are reddish brown sunken cankers, which form on the roots, crown, and brace roots of large plants. Older plants may lodge due to a poor root system. *Rhizoctonia* can infect corn roots between 46° to 82° F and can also cause crown rot and brace root rot on older plants. This disease tends to be more severe in irrigated corn.

Disease Management

Cultural Practices. To help minimize seedling diseases, plant high quality seed at the appropriate planting depth and soil conditions to promote rapid germination and emergence. Fields that have good drainage and dark soils, which tend to warm quickly, should be targeted for earlier planting. Fields that have a tendency to stay wet or have a history of seedling disease should be planted slightly later in the season when soil temperatures are more favorable for plant growth. Avoid mechanical injury to the seed and herbicide injury, as these may influence the occurrence of seedling diseases.⁴



Figure 3. Darkening of mesocotyl due to infection by *Pythium*.

Seed Treatments. Most corn seed is treated with at least one seed treatment fungicide, often containing multiple active ingredients. Seed treatments can provide a level of protection against seedling blight pathogens, but may not eliminate all threats under severe environmental conditions that favor infection. All seed treatments have a limited period of activity, which is the first 30 days after planting. Broad-spectrum seed treatments, such as Acceleron® Seed Treatment Products, can help minimize the risk of developing corn seedling diseases.

Sources:

¹ Robertson, A. and G. Munkvold. 2009. Check general root and mesocotyl health when assessing corn stands. Iowa State University Extension. <http://www.extension.iastate.edu> (verified 3/10/14); ² Jackson-Ziems, T. and K. Korus. 2013. Seedling diseases appearing in corn. University of Nebraska. <http://cropwatch.unl.edu> (verified 3/10/14); ³ Robertson, A. 2014. Personal communication. Associate professor/extension field crops pathologist, Iowa State University; ⁴ Sweets, L. and S. Wright. 2008. Corn diseases. University of Missouri. <http://ipm.missouri.edu> (verified 6/27/13); Compendium of Corn Diseases. 1999. APS Press.

For additional agronomic information, please contact your local seed representative.

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