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Rhizoctonia Damping-off and Root Rot of Soybeans

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Rhizoctonia damping-off and root rot is caused by the soilborne fungus *Rhizoctonia solani*, which is present in all Ohio soils. Rhizoctonia damping-off and root rot of soybeans can cause early season stand losses as well as premature yellowing in soybeans. Infections for the root rot phase can occur at any time during the growing season but generally causes less damage than the seedling damping-off phase.

Symptoms of *Rhizoctonia* infection

Losses from *Rhizoctonia* result from stand reduction in newly planted fields, premature death of diseased plants, and production of smaller seed. Symptoms of this disease are usually noticed by early summer, where wilted or dead seedlings are found scattered throughout the field or in small concentrated areas. *Rhizoctonia solani* can cause seed rot, root rot, and lesions on hypocotyls. Damping-off occurs when germinating seedlings are infected prior to emergence. Reddish-brown, sunken lesions form on hypocotyls of young seedlings. The resulting firm, dry canker can girdle the seedling and cause it to collapse. Older plants or seedlings that survive seedling infection will



Figure 1. Symptoms of young seedlings infected with *Rhizoctonia* in a field study. Seedlings are yellowed and stunted.

exhibit similar symptoms: characteristic sunken, reddish-brown cankers on the lower stem near the soil surface and irregular or stunted growth (Figure 1). Older diseased plants become chlorotic and closely resemble plants with nitrogen deficiency (Figure 2).



Figure 2. Premature yellowing or early senescence caused by *Rhizoctonia* root rot.

It is difficult to identify the pathogen that causes preemergence damping-off because the symptoms caused by *Rhizoctonia* are very similar to those for *Pythium* and *Phytophthora*. *Rhizoctonia*-infected plants have distinct reddish-brown, sunken, dry cankers on the lower stem or hypocotyl. Root damage caused by *Pythium* or *Phytophthora* has light tan to darker brown, water soaked lesions. Older plants with *Phytophthora* stem rot typically have chocolate-brown lesions that extend from below ground up the stem several nodes.

Disease Cycle

Rhizoctonia can infect a wide range of hosts including other legume crops, sugar beets, some vegetable crops, corn and numerous weeds. The pathogen can survive for years in the field either as mycelium associated with crop residue or as sclerotia in the soil. Damping-off and stem rot phases of the disease can occur in light, well drained soils as well



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Figure 3. Characteristic reddish-brown sunken cankers on the soybean hypocotyl caused by *Rhizoctonia solani*.

as in heavy, poorly drained soils. This pathogen generally prefers warm and wet conditions; however, *Rhizoctonia solani* collected in Ohio can infect soybeans across a wide temperature range (60°-95°F) and wide range of soil moisture (25% to fully saturated conditions).

It should be noted that two types of *Rhizoctonia solani* can also cause other diseases on soybeans that are NOT found in Ohio: *Rhizoctonia* aerial blight (also known as *Rhizoctonia* foliar blight) and *Rhizoctonia* web blight. These diseases are known to occur on soybeans in tropical and subtropical areas, including the Mississippi River Delta regions of the US. *Rhizoctonia* AG 1-IA (*Rhizoctonia* aerial blight) and AG 1-IB (*Rhizoctonia* web blight) cause gray-green lesions on leaves and coat seed pods in white mycelium, but are not known to cause damping-off or root rot.

Disease Management

- 1) Plant **high quality seed** combined with fungicide seed treatments with efficacy for true fungi.
- 2) Plant varieties with **partial resistance** to *Rhizoctonia*.
- 3) **Rotate** with wheat and corn to allow soybean residue to degrade.
- 4) **Improve soil drainage.**
- 5) **Test soil** to ensure proper pH and fertility. Be careful to not over-fertilize, as this will encourage *Rhizoctonia* growth.

Useful References

Soybean Research and Information Initiative

<http://soybeanresearchinfo.com/diseases/rhizoctonia.html>

Crop Protection Network

<https://cropprotectionnetwork.org/encyclopedia/soybeans/stem-diseases/rhizoctonia-seedling-blight-and-root-rot/>