SEEDLING DISEASES

Soybean Diseases









Overview

Seedling health can be compromised by soilborne plant pathogenic fungi that cause seed rot, seedling death, or root decay. Seedling-infecting fungi are common in all soybean fields.

Poor stands may be the first indication of a pathogen problem. Damping-off, or seedling blight, is a general name for infections that occur at or just below the soil surface, toppling the seedlings at the base.

Diseased seedlings are often weak and less vigorous, and severe stand loss may require replanting. Seedling diseases are often more prevalent when wet weather follows planting. They are generally more common in compacted and poorly drained soils.

Causal pathogens

Soilborne fungi

- *Phytophthora sojae*, numerous species of *Pythium*, and *Rhizoctonia solani* are the most important seedling pathogens of soybeans. As an example, plant pathologists at Iowa State University found that *Pythium, Phytophthora,* and *Rhizoctonia* account for nearly 90% of disease-related stand reduction problems in Iowa.
- Other plant pathogens can actively invade plants from growth stages VE to V4 as well, including Fusarium (*Fusarium spp*.), charcoal rot (*Macrophomina phaseolina*), sudden death syndrome (Fusarium verguliforme), and brown stem rot (*Phialophora gregata).*Seedling infection by these pathogens may cause chronic symptoms, or the infection can remain latent and cause premature decline of foliage and stems later in the growing season if weather becomes favorable.

Seedborne fungi

- Seedborne pathogens can also affect germination. Seed infected with *Phomopsis longicola* (*Diaporthe spp*.), *Cercospora spp., Aspergillus spp.*, or *Fusarium spp.* may rot or die during the germination or emergence phase.

Plant health assessment is important in the seedling stage

Frequently, seedling health is ignored because plant populations are acceptable, and stem and leaves do not express symptoms during early vegetative growth. However, notes taken about plant health in the seedling phase can be used to make adjustments to crop management in subsequent years and may help diagnose symptoms or explain less than anticipated yield later in the season.

Conditions that favor Pythium and Phytophthora

- Poorly drained and compacted soils
- Very early planting, especially if followed by periods of cold stress
- Periods of heavy rainfall
- No-till
- Poor quality seed
- Plant stress

Conditions that favor Rhizoctonia

- Delayed emergence
- Moist soil but not necessarily saturated
- Herbicide injury
- Soil types with high amounts of organic matter
- Warm, wet soils in late May and June

Scouting

Several fungi can cause stand establishment problems either before or after emergence. When digging in the seed bed, look for rotted or mushy seed. As seedlings emerge, scout for discolored roots, damping-off symptoms, or sunken reddish cankers on stems. Plant death can be rapid. Often, there can be an uneven distribution of plant loss in the field or the poor stands may be limited to especially wet areas of the field.

In addition to plant symptoms, gather the following information on the field conditions:

- soil temperatures – above or below what is considered ideal
- soil moisture – saturated, wet, dry
- variety resistance or tolerance to Phytophthora
- plant growth stage

Poor emergence caused by wet, rotted, mushy seed is favored by wet soils immediately after planting. Phytophthora, Pythium, Rhizoctonia and Phomopsis disease are all capable of causing rotted seed before or at germination.

Damping-off is a symptom characterized by a “pinching” of the stem at or just below the soil line. Plants infected at the seedling stage will show the typical “damping-off” symptom. Plants frequently collapse and die. Also commonly referred to as seedling blight, Pythium, Phytophthora and Rhizoctonia can all produce damping-off symptoms.

Stem decay may occur at the seedling stage or may not be apparent until later in the vegetative stages. In seedlings and older plants, reddish-brown, sunken lesions on the stem are a characteristic symptom of Rhizoctonia infection. Unlike infection caused by Phytophthora, or Pythium, the infected stems remain firm and dry.

Seedling diseases are difficult to correctly diagnose in the field and it is easy to mistake them for other problems such as herbicide damage. In addition, seedlings may be affected by more than one seedling disease. For these reasons, we recommend sending injured or diseased soybean seedlings to a University Extension diagnostic lab (along with all relevant field information) to confirm the cause before implementing a disease management program. Obtaining an accurate diagnosis will allow you to determine the best management strategies for your soybean field for the current season and in future years.

Management

What to do if seedling diseases are present

- If dead plants are scattered more or less randomly throughout the field, and no significant stand reduction is apparent, then no action is necessary because of the soybean plants ability to compensate for fewer plants by producing more branches.
- If the disease is Phytophthora damping-off and it occurs on a Phytophthora-resistant variety, then your resistance has been defeated by the fungus. Consider using a variety with a better resistance gene for the next soybean crop.
- Although replanting is not always needed with stand reduction, be aware that root rot, especially Rhizoctonia root rot and Phytophthora stem decay may appear later in the season.
- Take good disease notes and use preventive measures such as seed treatments or resistant varieties to reduce the likelihood of a disease problem in the next soybean crop.

If replanting is necessary

- If poor stands are due to diseases, seed treatments with fungicides can be used in replanting to avoid further problems, especially for Rhizoctonia and Phytophthora. If poor stands are due to a low germination rate or herbicide injury from a Group 14 (PPO) herbicide, then a seed treatment cannot improve seed vigor or seed germination rate.
- Select chemicals according to the fungi that cause the seedling blight.
- Consider if a better seed bed could be prepared.
- Consider if soil drainage could be improved, or if low areas of fields could be avoided.

Cultural practices for healthy seedlings

The first 10 to 14 days following soybean planting is the window of opportunity for Pythium and other soil fungi to infect the plant. Implement practices that promote quick germination and seedling emergence to prevent infection:

- Plant high quality seed
- Plant seed that has resistance to Phytophthora. In addition to Rps resistance, select varieties with high field resistance (also called partial resistance or qualitative resistance) when possible.
- Where no-till is not practiced, prepare a good seedbed.

- Place seed at the proper planting depth.
- Do not expose seedlings to herbicides.
- Plant where drainage is adequate or improve drainage if possible. Avoid low areas of fields, especially if a field has a history of seedling or root rot problems.
- Consider that germination will be quickest when soil temperatures are greater than 65°F.
- Damage by Rhizoctonia and Phytophthora beyond the seedling stages can be reduced by mid-season cultivation. Cultivation mounds the soil around the base of soybean plants, which promotes additional root growth.

When to treat seed with fungicides
Use of a seed treatment will not guarantee an improved stand or increased yield in every field, every year. The benefit of a seed treatment will most frequently be seen in fields planted early before ideal soil temperatures are reached, poorly drained fields, fields with a history of stand establishment problems, or in seasons where frequent rains make getting soybeans planted on time difficult and growers may be forced to plant into less than ideal soil conditions.

Which seed treatment product to use?
As chemical and seed companies continue to merge, the decision of which seed treatment products to use is often taken out of the grower's hands. Where seed is treated by a seed conditioning facility, price and availability of products in the region may determine what can be offered. Generally, it is best to use products that contain multiple active ingredients with differing modes of action in order to obtain broad spectrum disease control. For instance, if Pythium or Phytophthora diseases are being targeted, then a product that contains metalaxyl, mefenoxam, ethaboxam or oxathiapiprolin should be used. Where Rhizoctonia is being targeted, products containing sedexane or fluxapyroxad would be desirable. It is increasingly common for companies to market products with two, three or even four active ingredients in the same product. Because of the high price of GMO seed, some growers are using seed treatments as "insurance", even when stand counts or yields are not necessarily improved.

Distribution

Factors to Consider Before Using a Soybean Seed Treatment, *Crop Protection Network*, CPN-4003-W, 2018

Fungicide Efficacy for Control of Soybean Seedling Diseases, *Crop Protection Network*, CPN-1020-W, 2020 (updated annually)

Rhizoctonia Damping-off and Root Rot of Soybeans, Ohio State University Extension Online, 2017

Scouting for Soybean Seed Diseases, *Crop Protection Network*, CPN-1001B, 2015

Scouting for Soybean Seedling Diseases and Disorders, *Crop Protection Network*, CPN-1009B, 2015

Seed Treatments: Questions that Emerge When Plants Don't, *Crop Protection Network*, CPN-1016, 2016

Soybean Seed and Seedling Diseases, University of Minnesota, 2108

Soybean Seedling Diseases, *Crop Protection Network*, CPN-1008, 2020

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