Early Season Hazards to Soybean Seed

Seedbed Conditions in Early-Spring

A greater harvest of sun energy can lead to greater potential yield. Earlier soybean planting dates have become a common cultural practice to increase the number of pods for high-yield soybean production. Reduced tillage and narrow row spacing are also key practices for obtaining maximum yield potential. However, these potential gains in soybean yield can be compromised early in the season by environmental stresses and a complex of soil-borne pathogens that can negatively affect root health and seedling vigor.

Germination and emergence are rapid at temperatures above 77°F, but seeds can germinate at lower temperatures.[1] Cool (less than 60°F) and moist soil conditions can slow germination and establishment of soybean seeds, making them more susceptible to soil-borne seed and seedling pathogens such as *Pythium, Phytophthora*, and *Fusarium*. Warm, moist soil environments favor the pathogen *Rhizoctonia*. These pathogens can invade plant roots causing tissue decay, pre-emergence damping off, and early post-emergence seedling death.

Soybean Seedling Diseases

Soybean seedling diseases can be hard to detect and a challenge to distinguish from one another (Figure 1). Prior to emergence, seeds are exposed to indigenous pathogens. Some of these pathogens, like *Phytophthora*, can live up to 10 years in the soil.[2] *Pythium* "lays in wait" to begin the infection cycle until soybean seed is detected during a time of excess soil water.[3] Further complicating the fight to protect soybeans against disease is the tendency for different races or strains of disease species to thrive in certain conditions. For example, Fusarium seed and seedling blight is caused by several species; some prefer warm and dry, while others prefer wet and cool soils.

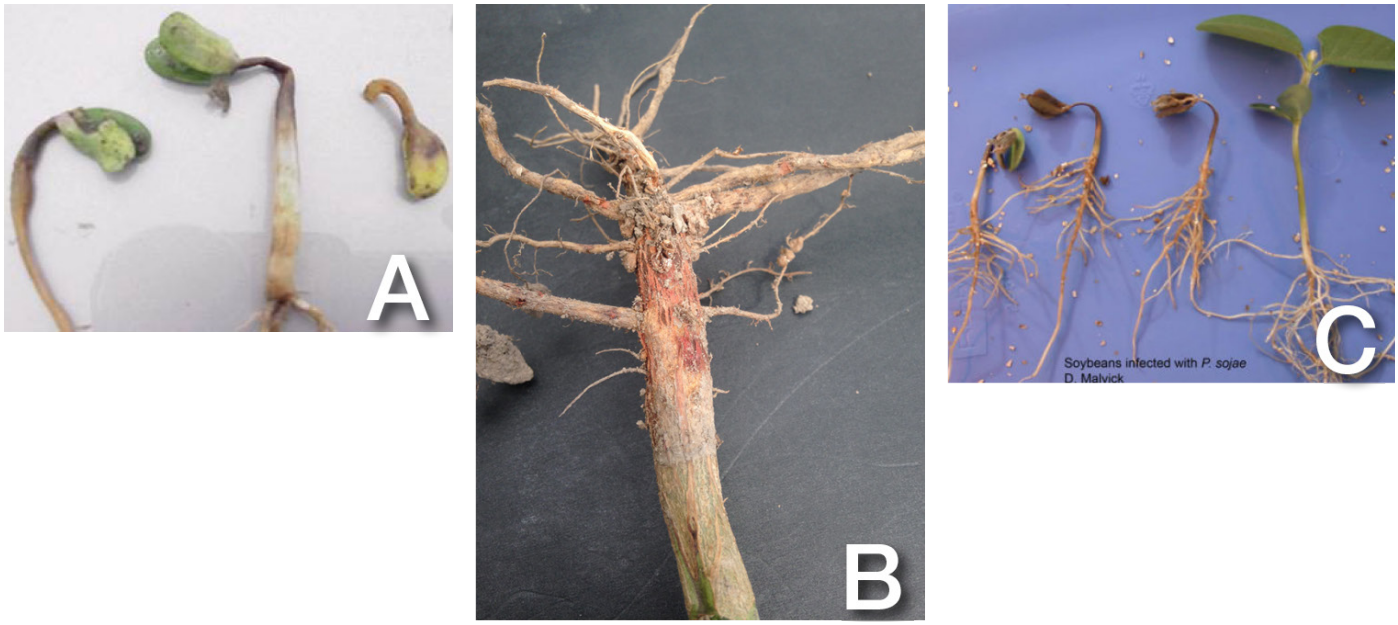

Figure 1. Soybean seedling diseases are hard to distinguish from one another. From left to right, seedlings are being affected by (A) Pythium, (B) Rhizoctonia, and (C) Phytophthora. A look at seedlings affected by chilling injury, water-logged soils, or disease can leave a scout with more questions than answers.

Photo C courtesy of Dean Malvick, University of Minnesota.

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Figure 2. Early-season diseases can cause symptoms later in the growing season. Wilting caused by an earlier Fusarium infection.

Photo courtesy of Daren Mueller, Iowa State University. Bugwood.org.

- *Pythium* is a fungal-like species causing decay before germination, and seeds become soft and rotten. Infected seedlings may die prior to emerging from the soil or shortly thereaftelr.
- *Rhizoctonia solani* is a true fungus and infections appear on seedlings as dry, dark reddish-brown lesions just above the soil surface.
- *Phytophthora sojae* is also a fungal-like species causing a wet, soft rot of the seed or seedling tissue similar to that of Pythium.
- *Fusarium* may infect soybean plants early in the growing season, but plants do not display symptoms until later in the growing season when soil moisture is limited. Symptoms include brown to black colored taproot and lateral roots.

Seed Treatment Products for Soybean

Seed treatments can help minimize the effects of unfavorable early-season planting conditions typical with earlier planting dates. Seed treatments with multiple modes of action provide broad spectrum control of diseases and insects and promote plant health through increased emergence of seedlings under suboptimal soil conditions. Active ingredients in soybean seed treatments can protect soybean seeds and seedlings from certain diseases and insects for up to 30 days after planting. Protecting soybean plants against attack by early-season soybean aphids and bean leaf beetles can help prevent soybean mosaic virus and been pod mottle virus infection that can be transmitted by these pests.

The greatest payback from seed treatments can occur in early planting situations, reduced tillage, poorly drained, or high clay content soils in fields with tight crop rotations, or in fields with a history of disease. Seed treatments are intended to protect emerging seedlings for two to three weeks until they become established. Knowledge of any specific pathogen races prevailing in the soil can be helpful when selecting seed products for an additional line of defense against early-season diseases. The value of a robust seed treatment in combination with the appropriate seed products gives seedlings a fighting chance against variable, and sometimes harsh, early-spring conditions. For more information on seed treatments visit: http://www.acceleronsas.com/Pages/default.aspx

Sources

[1] Soybean planting date can have a significant impact on yield. Iowa State University Extension and Outreach. https://crops.extension.iastate.edu/encyclopedia/soybean-planting-date-can-have-significant-impact-yield

[2] Malvick, D. 2018. Soybean seed and seedling diseases. University of Minnesota Extension.

[3] Pythium- an early season pain in corn and soybeans. Illinois Field Crop Disease Hub. http://cropdisease.cropsciences.illinois.edu/?p=1071.

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