CROP FOCUS

Soybean Seed and Seedling Diseases

Disease Facts

- Pathogens that attack soybean seeds and seedlings (*Phytophthora, Pythium, Rhizoctonia, and Fusarium)* survive in diseased plant material and in the soil.
- These diseases are most common when soil is very wet in the first few weeks after planting; especially in heavy, poorly drained, compacted, or high-residue fields.
- Diagnosing soybean seedling diseases can help in understanding later symptoms and final yields, and managing these diseases in future years.
- *Pythium* and *Fusarium* are more likely to occur when soil temperatures are cooler, < 59ºF (15ºC). *Phytophthora* and *Rhizoctonia* are more likely to be the culprit if soils are warmer, 68 to 81ºF (20 to 27 ºC).
- Commercial soybean varieties vary little for resistance to seedling pathogens (except for *Phytophthora,* covered in a separate *Crop Focus*). DuPont Pioneer does not rate varieties for resistance to these other diseases.

Table 1. Summary of seed and seedling disease symptoms*.

Disease / Growth Stage	Pathogen	Symptoms
Seed rot / V0-VE	*Pythium* *Phytophthora* *Phomopsis*	Soft decay of seed; missing seedlings in row.
Seedling mortality (damping off, seedling blight) / VE-V4	*Phytophthora* *Rhizoctonia* *Pythium*	Wilting, yellow leaves. Necrotic lesions on stems. Death of seedlings can occur quickly. Leaves remain attached to stem.
Root and lower stem decay / VE-V6	*Rhizoctonia* *Fusarium* *Phytophthora*	Reddish-brown lesions on taproot and hypocotyl; often superficial. *Phytophthora* causes brown lesions on stem above soil line.

Management

- Management of seed and seedling disease is best achieved through sound planting practices to minimize stress, and through use of fungicide seed treatments.
- Because of earlier planting and higher levels of crop residue on fields, soils are often colder and wetter at planting, and seedling diseases have increased as a result. Consequently, more growers are seeing an advantage for fungicide seed treatments. Adding an insecticide to the treatment helps prevent insect feeding that provides an entry port for disease infection.
- The Pioneer Premium Seed Treatment product offering includes DuPont™ Lumisena™ fungicide seed treatment (oxathiapiprolin) paired with EverGol® Energy fungicide seed treatment (prothioconazole, penflufen, metalaxyl) and Gaucho® insecticide seed treatment (imidacloprid).
- Lumisena™ fungicide seed treatment is a new proprietary technology providing protection against *Phytophthora* and downy mildew pathogens.
- EverGol Energy fungicide seed treatment contains three fungicides providing activity against *Pythium* seedling damping off, *Fusarium* root rot and *Rhizoctonia* root rot.

Pythium

- Prefers cold soil temperatures of < 59ºF (15 ºC); may be the first soybean disease found in a growing season.
- High-residue fields and heavy or compacted soils are at higher risk because of cooler, wetter conditions.
- Pathogen may attack seeds before or after germination; seeds killed before germination are soft and rotted with soil adhering to them.
- Plants may be killed by "damping off" before or after emergence. On infected plants, the hypocotyl becomes narrow and is commonly "pinched off" by the disease.

- Emerged plants may be killed before the first true leaf stage. These plants have a rotted appearance.
- Diseased plants may easily be pulled from the soil because of rotted roots.

*Table 1 adapted from: University of Wisconsin Field Crops Plant Pathology - Plant Health Initiative
http://fyi.uwex.edu/fieldcroppathology/soybean_pests_diseases/seedling_diseases_soybean/

Rhizoctonia

- Is more common in wet soils or moderately wet soils where germination is slow or emergence is delayed.
- Infection is characterized by a shrunken, reddish-brown lesion on the hypocotyl at or near the soil line.
- Infection may be superficial, causing no noticeable damage, or may girdle the stem and kill or stunt plants.
- Normally appears as the weather becomes warm, around 81ºF (27 ºC); more often seen in late-planted soybean fields.
- Causes loss of seedlings (damping-off) in small patches or within rows; is usually restricted to the seedling stage.

Reddish-brown lesion on soybean hypocotyl near the soil line is characteristic of *Rhizoctonia* infection.

Stand loss due to *Rhizoctonia* infection. Microenvironments favorable for disease development may lead to losses in patches or in sections of rows.

Fusarium

- Infection is caused by a complex of different species that prefer different conditions; some prefer warm and dry soils, while others prefer cool and wet soils.
- Some species attack corn, wheat and other host plants.
- Causes light- to dark-brown lesions on soybean roots that may spread over much of the root system.
- May attack the taproot and promote adventitious root growth near the soil surface, and may also degrade lateral roots, but usually does not cause seed rot.

Dead plant due to *Fusarium* infection, with healthy plants in background. Less severe infections may degrade roots without resulting in plant death.

Stand loss due to *Fusarium* infection. Note the patchy nature of infection occurring in a specific area of the field.