

## *Phytophthora Root Rot of Soybean*

**Phytophthora root rot (PRR) is common in soybean fields and causes a wet, soft rot of the seed or seedling tissue.**

### **What to Consider**

The disease can affect soybean from the seedling stage to near maturity. Stands may be reduced when the pathogen, *Phytophthora sojae*, infects plants at the seedling stage and causes seed rot and damping off. Infection of older plants causes wilting and browning of leaves and eventual death (Figure 1). Rapid development can occur when soil is high in moisture or there is a periodic rainfall pattern with continued availability of moisture. Soil temperatures above 60° F, and air temperatures between 70 and 77° F favor the disease.<sup>1,2</sup> It is common in soils that are -

- low lying,
- poorly drained,
- compacted, and/or
- high in clay content.

The chocolate brown discoloration of the stem starts below the ground and extends up the plant. Roots are highly degraded. Later in the season, infected plants yellow and have wilting leaves that remain attached.<sup>3</sup> Close attention to symptom development helps distinguish Phytophthora from other diseases such as sudden death syndrome or effects of saturated soils.

### **Yield Impact**

Incidence of PRR has become more common with increased use of no-tillage and reduced tillage residue management systems. There are several specific races of the soilborne fungus *P. sojae*, and fields with tolerant soybean products may maintain yield potential when Phytophthora is present. Some growing seasons present high disease pressure with conditions favoring Phytophthora. The disease may cause an 8 to 11 percent yield loss depending on spring precipitation.<sup>1</sup> Soybeans infected with *P. sojae* are not curable, and management of PRR depends on preventing infections.<sup>3</sup>

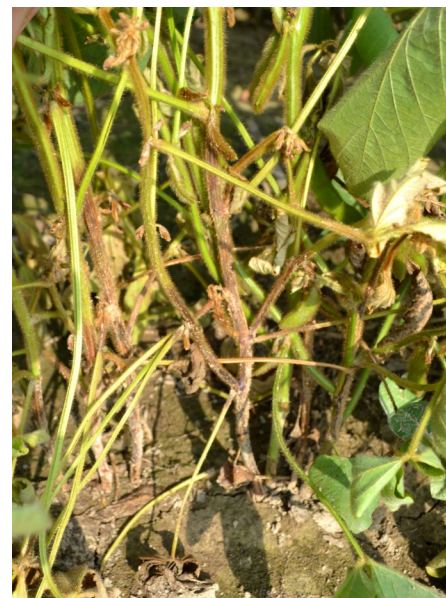


Figure 1. Older plants with wilting and browning of leaves from Phytophthora. Leaves remain attached in Phytophthora-infected plants.



Figure 2. Plot comparison showing susceptible soybean product.

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## Management

Genes conferring race-specific resistance to *Phytophthora* are called Rps genes. In some cases, soybean products have more than one Rps gene (race specific) and good field tolerance (race non-specific), which provides the highest levels of protection from PRR. In order for these products to become susceptible to PRR, a novel variant of *Phytophthora* would have to become present and widespread.

*Phytophthora* outbreaks can occur in wet conditions in June. However, upon a closer look at the weather, field conditions, plant symptoms, and genetics, the symptoms may be caused by flooding, another disease such as sudden death syndrome, or other environmental sources and not *Phytophthora*.

Determining if you have *Phytophthora*:

- *Phytophthora*-infected plants are more often found as circular patches in low spots or scattered within fields (Figure 3).
- The stem is chocolate-brown colored from the roots and up passed the soil line through the lower stem.
- Infection of older plants causes wilting and browning of leaves with drooping petioles.
- Plants will have missing lateral roots and the tap root, if present, will be rotted with dark brown to black discoloration throughout and soft, wet tissues that will collapse easily when pinched. This is different than symptoms of soybeans with flooding injury. The outside cortical tissue of roots can be easily stripped in flooded soybean plants. Rhizobium nodules of flooded soybean plants are usually dead instead of displaying a pink 'functioning' color.<sup>4</sup> Soybeans infected with *P. sojae* are not curable, and management of PRR depends on preventing infections.<sup>3</sup>

Seed treatments can help protect against early-season infections of PRR for two to three weeks after planting and reduce the risk of a replant situation. Resistance genes (Rps genes) can help protect against specific races of *Phytophthora* throughout the entire season. Field tolerance is an important tool when there are multiple races of *P. sojae* in a field. However, field tolerance does not become highly active until plants are approximately at the V1 to V3 growth stage.

In summary, fields should be scouted for PRR and other seedling diseases. Correct identification of this disease is key to management as there are several specific races of *P. sojae*, and soybean products are identified as having Rps genes that offer protection from this disease.



Figure 3. *Phytophthora* affects patches of soybeans fields.

## Sources

<sup>1</sup> Dorrance, A.E. and Mills, D. 2009. *Phytophthora* damping off and root rot of soybean. AC-17-09. The Ohio State University Extension. <http://ohioline.osu.edu>.

<sup>2</sup> Roberston, A. and Yang, X.B. 2004. *Phytophthora* root rot and stem rot of soybean. PM914. Iowa State University Extension. Web sources verified 07/11/2018.

<sup>3</sup> Groves, C. and Smith, D. 2013. *Phytophthora* root and stem rot. XGT1014. University of Wisconsin Extension. <http://fyi.uwex.edu>.

<sup>4</sup> Dorrance, A. 2018. Is it *Phytophthora* stem rot? Is it flooding injury? Or is it both? Ohio State University Extension. C.O.R.N. Newsletter. Agronomic Crops Network. Web sources verified 06/03/18.

**Performance may vary**, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields. **ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** 180712110021 071218SEK 060218SEK

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