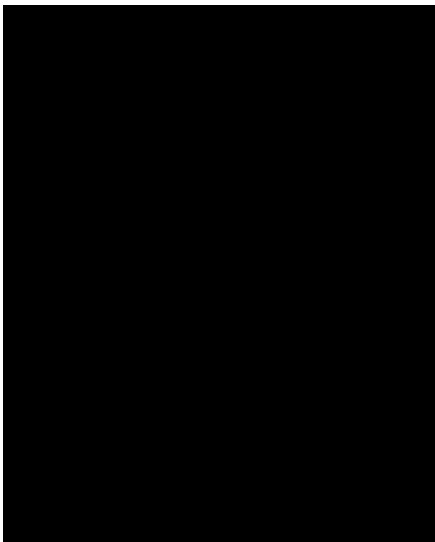
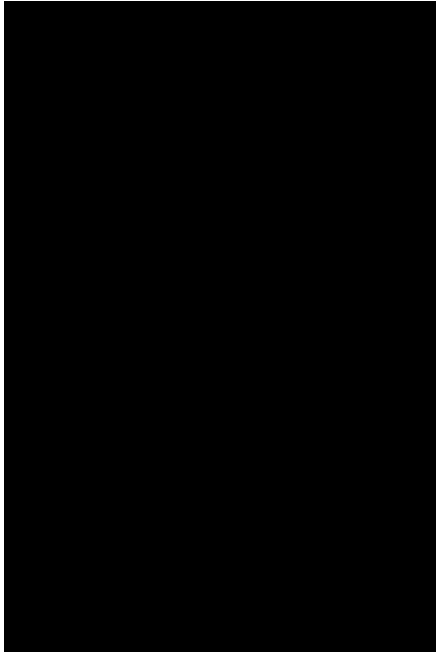


# PHYTOPHTHORA ROOT & STEM ROT



Soybean Diseases



## Overview

*Phytophthora sojae* is one of the most destructive soybean pathogens in the northern growing regions and a major cause of stand establishment problems. Seeds and seedlings can be infected and killed at any time after the seed has absorbed moisture.

- The fungus also infects plants later in the season following periods of heavy rain, causing stem rots or chronic root rot.
- Phytophthora root & stem rot develops quickly in warm, saturated soil.
- *Phytophthora sojae* belongs to a group of organisms called *Oomycetes*, also commonly known as “water molds”. This group includes some of the most damaging plant diseases including Pythium seedling blight, Aphanomyces root rot of peas, downy mildews and late blight.
- Warm soil and periodic rains at weekly intervals are ideal conditions for Phytophthora diseases. Optimum conditions for infection are warm soils at a temperature greater than 60°F, and soils that are flooded or saturated.
- Phytophthora diseases are most common in fields or parts of fields with poor drainage. They can also occur in well-drained fields when the pathogen is present, and the soils are saturated for 7 to 14 days due to heavy rain or irrigation.

### **The disease cycle is adapted to saturated soil.**

Phytophthora root and stem rot has a disease cycle unique to fungi that are adapted to saturated soils. Towards the end of the disease cycle, the organism produces reproductive structures called oospores that can survive for many years in the soil after plant residues decompose. Oospores germinate when soil moisture is high. Germinated oospores then produce sporangia, another type of reproductive structure. Sporangia release tiny, swimming spores, known as zoospores, that are released when soils are flooded or saturated. Soybean seeds and young roots produce chemicals that are released into the soil and serve as an attractant to the newly released zoospores.

## **Scouting**

For disease scouting, you are most likely to find the disease in the following places:

*Phytophthora* more active in warm soils. Recent research, however, has shown that some *Phytophthora* species from the more southern area of the growing region are adapted to causing disease in warmer soils.

### **Stem rot and root rot phase**

Spring-off is a problem in the spring, be on the lookout for *Phytophthora* infection during rainy periods later in the season. The stem rot phase is easily recognizable by the presence of a distinct chocolate-brown lesion moving up the stem from the soil line. Initially, the upper stem of the plant may remain green, but eventually the plant will wilt, turn yellow and then die with leaves remaining attached.

Bean stem canker can sometimes be confused with the stem rot phase of *Phytophthora*. It produces slightly sunken dark cankers at the nodes. Typically, the stem remains green between the nodes, but in severe instances, the cankers may completely girdle the stem and lead to the point where there is little green tissue visible on the stem making it hard to distinguish between the two diseases. An identifying diagnostic feature between the two diseases is that roots of stem canker infected plants will still look healthy.

The root rot phase of *Phytophthora* is not as readily recognized as the stem rot phase. Infected plants can be stunted and less vigorous, although this is hard to spot unless the infected plants are near a healthy comparison. A close inspection of the root system will reveal a significant reduction in the number of secondary roots and fine root hairs that help the plant take up moisture and nutrients. Plants with the root rot phase may mature a week or so earlier than healthy plants in the field.

## **Management**

*Phytophthora* root and stem rot can affect soybeans at any stage of development but is often most damaging when it occurs early in the season.

### **Factors for *Phytophthora* losses are:**

- Field history of *Phytophthora* or a history of stand establishment problems
- Years in soybean production – risk increases with more years in soybean production
- Heavy rains following planting; disease development is most rapid at soil temperatures above 60°F when soils are saturated
- Poorly drained fields due to flooding, low spots, compacted soils, or a high clay content

genetic resistance available in soybean varieties.

Single-gene resistance is a complete resistance to a specific pathotype (formerly known as race) of *P. sojae*, in which the fungus is unable to colonize the plant tissue. Many soybean varieties have resistance genes. The most common group of genes are known as Rps genes ("Resistant to *Phytophthora sojae*

diseases. Look for products with active ingredients including metalaxyl, mefenoxam, ethaboxam or oxathiapiprolin.

**Improve soil aeration, drainage and structure**

Wet and waterlogged soils provide a favorable environment for many soilborne pathogens including *P. sojae*. Use good soil management practices. Improve soil drainage through tiling or till s F1 12.00 whenill s Fithll comptichrosoil d. Comptic soils nd wapo tiils nstructure

<https://www.apsnet.org/edcenter/intropp/lessons/fungi/Oomycetes/Pages/PhytophthoraSojae.aspx>

**Integrated Management Strategies for Phytophthora sojae Combining Host Resistance and Seed Treatments**

*Plant Disease* 93:893-882, 2009

[https://soybeanresearchinfo.com/wp-content/uploads/2019/03/PRR\\_PD\\_2009.pdf](https://soybeanresearchinfo.com/wp-content/uploads/2019/03/PRR_PD_2009.pdf)

**Population Structure Among and Within Iowa, Missouri, Ohio, and South Dakota Populations of Phytophthora sojae**

*Plant Disease*, 2016

<https://soybeanresearchinfo.com/wp-content/uploads/2019/03/pdis-04-15-0437-re.pdf>

**Scouting for Phytophthora Root and Stem Rot in Soybean**

*Crop Protection Network CPN1002*, 2015

<https://soybeanresearchinfo.com/wp-content/uploads/2020/05/CPN-1014-Scouting-for-Phytophthora-Root-and-Stem-Rot.pdf>

**Scouting for Soybean Stem Diseases**

*Crop Protection Network CPN 1002*, 2015

[https://soybeanresearchinfo.com/wp-content/uploads/2019/03/CPN1002\\_ScoutingSoybeanStemDiseases051515.pdf](https://soybeanresearchinfo.com/wp-content/uploads/2019/03/CPN1002_ScoutingSoybeanStemDiseases051515.pdf)

