Diaporthe/Phomopsis Fungi Complex in Soybeans

CROP BULLETIN

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FUNGI FACTS

- *Phomopsis (P. longicolla)* and *Diaporthe (D. phaseolorum var. sojae)* are fungi that function as a complex and infect soybeans.
- The fungi cause diseases to form in the plant which can reduce yield. Some of these diseases include:
  - » Pod and stem blight
  - » Phomopsis seed decay
  - » Stem canker
- Mature plants that are split longitudinally may show signs of zone lines on lower stems as seen in Figure 1. This was previously often mistaken for symptoms of charcoal rot.
- *Diaporthe/Phomopsis* can infect the plant at any time in the growing season but may not be visible until later in the growing season.
- This fungus complex and diseases associated with it can be found throughout most soybean producing areas in North America.

Figure 1. Dark zone lines in the longitudinal section of the lower stem are an indicator of *Diaporthe* fungal infection.

CONDITIONS FAVORING INFECTION

Hosts of the Fungus

- *Diaporthe/Phompsis* fungi complex overwinters in soybean residue for several years after an infected crop was present. Repeatedly planting soybeans will increase the risk of a field being infected.
- Early season rainfall can splash spores onto the growing plant.
- Plants with infected pods will produce infected seeds. Chances for severe pod infection increase when the pod begins maturing, especially around R5 and R6. When the pods are infected, seeds are susceptible to seed decay.
- Several weeds, such as velvetleaf, morning glories, and pigweed can host the *Diaporthe/Phomopsis* fungi complex and will not show symptoms.

Life Cycle

- The plants can be infected at any time in the growing season, but are most often infected early in the season. When the leaves are wet for extended periods early in the growing season, the diseases are more likely to occur in the field.
- There is an increased chance of infection when the weather is warm and humid close to maturity.
- Wet weather that delays harvest will increase the chance and severity of seeds being infected. Rainfall during pod fill can also splash fungi spores from residue onto pods.
- High winds, hail, and other events that rip the plant tissue give the pathogen an entry way into the plant.
- Chance for infection decreases at R7 and when the seed moisture is below 19 percent.

POTENTIAL DISEASES

Pod and Stem Blight

- Leaves may have water soaked margins that are grey in color, and/or small black specks called pycnidia. The black dots may be more prevalent on leaves and petioles that have fallen on the ground. It is also possible that no symptoms are visible.
- Stems have parallel rows of pycnidia on mature plants (Figure 2). These black dots are often mistaken for anthracnose stem blight and charcoal rot, which have unorganized black specks on the stems (Figure 3 and 4).
- Pycnidia on pods will not be in organized rows and will begin to occur near the end of the reproductive stages around R6 and R8.
- If the plant is infected, there is a possibility that all of the seeds that are produced are also infected. The seeds will produce seedlings with orange lesions on the cotyledon, and red/brown mark on the hypocotyl. This looks similar to *Phomopsis* seed decay.

Figure 2. Soybean infected with pod and stem blight disease have black specks that are in linear rows.

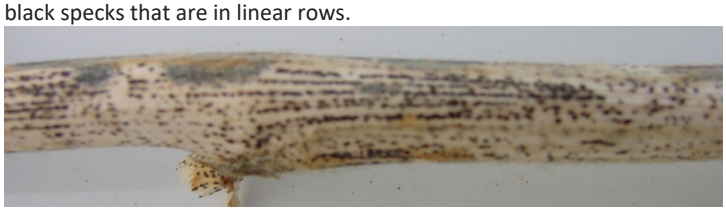

Figure 3. Anthracnose infected soybean stem with black lesions in an unorganized pattern.

Figure 4. Black, dusty microsclerotia in an unorganized pattern on the outer stem are a characteristic symptom of charcoal rot.

Figure 5. Dark zone lines on the lower stem are an indicator of Diaporthe fungal infection.

Figure 6. Stem canker in soybeans caused by the fungus *Diaporthe.*

PHOMOPSIS SEED DECAY

- Seeds appear shriveled, cracked, elongated, and may be covered with a thin white layer of mold. Seeds with a critical amount of infection may not germinate.
- Infections are not always visible and may be on the inside on the seed coat.
- Infected seeds have symptoms that look similar to the symptoms of white mold and downy mildew.
- Pods are more likely to be infected if they are near the bottom of the plant.
- Seedlings develop orange and red-brown lesions on the cotyledons and streaks on the lower part of the stem near the soil.
- Small black specks of pycnidia may occur on the seeds.

STEM CANKER

- Infection most often occurs during the early season, but cankers do not begin forming until after flowering.
- Nodes near the bottom of the plant will have gray/brown lesions with red/brown margins and sunken cankers around R1. These lesions can wrap the stem, or grow up the stem several nodes (Figure 6).
- Leaves may begin to wilt and interveinal chlorosis and necrosis are present. Leaves do not drop, but stay attached after the plant dies. Plants often die when they are infected with this disease.
- Stem canker may be present in small areas throughout a field, or an entire field can be infected.
- Stem canker is often confused with phytophthora, anthracnose, brown stem rot, charcoal rot, sudden death syndrome, and herbicide, frost, and lightning damage.
- If the taproot of the plant is split and the inside on the root displays a color that is not normal, the plant most likely has brown stem rot or sudden death syndrome, not stem canker.
- Stem canker is more likely to infect fields with high fertility and organic matter.

MANAGEMENT PRACTICES

Before Planting

- Rotate from soybeans to corn or a non-legume that is not a host for the fungi complex. Alfalfa is a potential host for stem canker.
- Fertilize to maintain sufficient levels of potassium. Seed infection increases when potassium is deficient.
- Tillage will reduce the amount of residue on the surface and lower the chances of spores splashing on to future crops.
- *Diaporthe/Phomopsis* fungi complex is more likely to occur in soybeans that mature early. Planting soybeans with a late relative maturity will decrease the chance of humid conditions in the late stages of reproduction.

During the Growing Season

- Strive to achieve a full, even stand. Extensive branching due to gaps in the stand can result in lodged plants with broken branches. Broken branches give the fungi a means of entry into the plant.
- Fungicides can be used in field that have low to moderate disease pressure and in areas that favor severe disease pressure.
  - » To mitigate pod and stem blight, apply fungicides between R3 and R5.
  - » The amount of disease may diminish in the field, but this does not necessarily mean that the yield will improve.
- Do not delay in harvesting the crop. The longer soybean seeds remain in the field after maturity, the greater the chances of the seeds being infected.