COLLEGE OF FOOD AGRICULTURE AND ENVIRONMENTAL SCIENCES

Phomopsis Seed Rot of Soybeans

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Phomopsis seed decay is most commonly found when growers use highly susceptible varieties and warm, wet conditions arise in the late season. When these two factors are combined with the pathogen, disease presence may be severe. Severely diseased seeds appear moldy and may be graded lower, which leads to dockage at the elevator. This fact sheet outlines the nature of the causal agent, what signs and symptoms to look for in the field, and how the disease cycle can be interrupted to effectively manage this disease and reduce yield loss.

Causal Organism

Phomopsis seed rot along with Diaporthe pod and stem blight are caused by a number of different fungi in the *Diaporthe-Phomopsis* complex, but *Phomopsis longicolla* is the most commonly isolated from seed. Conidia, or the asexual spores of the fungus, are unicellular, hyaline, and ellipsoidal to fusiform in shape.

Figure 1. Symptoms of Phomopsis seed rot. Note the chalky white appearance of severely infected seed.

Symptoms and Signs

White, chalky-textured seed is the most common symptom of Phomopsis seed rot. Seed can be heavily colonized or small amounts of the fungal mycelium may be barely visible on the seed (Figure 1). Additionally, affected seeds are usually cracked and shriveled. Pycnidia, the dark fruiting structures that contain fungal spores, may be visible on the seed surface. Severely infected seeds rarely germinate when planted. Less severely infected seed may germinate, but seedlings could develop brown to reddish colored lesions or streaks on the cotyledons or lower stems.

Symptoms of Phomopsis seed rot, pod and stem blight are most visible after the plants reach physiological maturity. Pod and stem blight is recognizable by small, black raised specks, usually arranged in parallel rows along the mature stem. These are the pycnidia, or fungal reproductive structures. During less favorable weather conditions, pycnidia may be confined to small areas of the stem near the soil surface or around lower nodes. Pycnidia can also be found scattered over the surface of discolored and poorly developed pods. Pycnidia of *Phomopsis* spp. can be confused with microsclerotia of *Macrophomina phaseolina,* the causal agent of charcoal rot.

Disease Cycle

These fungi overwinter as pycnidia on soybean residue that were infected the previous season. In the spring, spores ooze from the pycnidia and are splashed by rain onto the plants where they infect stems and developing pods. When infected seeds are planted, stands will suffer from poor emergence and seedling death. Higher soil temperature favors the development of seed rot and seedling blight phase.

Pods may become infected at any time during their development, but most seed infection occurs after the yellow pod stage (R7). Prolonged wet periods after flowering and pod set favor the infection and development of pod and stem blight. As pods mature, the fungus grows from the wall of the pod to the seed. Seed infection is greatly increased if harvesting of the crop is delayed during warm wet weather. Excessive lodging in dense stands of

Figure 2. Pods and stems will show blighted areas with tiny dark spots, pycnidia, embedded in plant tissue.

soybeans may increase the incidence of seed infection. The percentage of seeds infected with Phomopsis significantly declines after a year or more in storage. This indicates that fungus cannot survive long dry conditions in storage.

Disease Management

While this disease is most common in the Southeast United States, it can occur in Ohio during warm, wet late seasons. There are several management strategies that can be implemented to reduce disease development.

Host Resistance: The most economical approach for disease management is to plant resistant varieties. There are plenty of varieties available with resistance to this disease that will provide a higher germination rate and decreased symptom development when compared to susceptible varieties.

Quality Seed: Plant high-quality, disease-free seed, with at least 80% germination or better. If soybean seed with 70-80% germination must be planted, a seed treatment fungicide is recommended. Proper seed-treatment fungicides will increase germination of poor-quality seed if the low quality is the result of fungal infection, but seed treatment will not increase germination more than 20%. Do not plant seed from lots with less than 70% germination.

Timing of Harvest: Harvest when seed reaches 13% - 16% moisture regardless of stem conditions. Delaying harvest can result in higher disease occurrence, especially with warm, wet conditions.

Crop Rotation: Rotating with non-hosts like wheat or corn reduces the survival of the fungus by inhibiting the reproductive cycle. This prevents build-up of infectious material in the field.

Tillage: Fields with high incidence of Phomopsis seed rot, pod and stem blight should bury soybean straw residue to promote decay of infected material. This material serves as the overwintering location for the fungus, therefore, if it is not buried and soybeans are planted in the next growing season, disease may occur.

Chemicals: Fungicides applied to pods at mid-flowering to late pod stage may reduce incidence of Phomopsis seed rot, however yield is rarely increased. This would only be economical for seed or food grade producers. Consult a local extension educator or the soybean disease webstie or fungicide recommendations.

Useful References

Crop Protection Network

http://cropprotectionnetwork.org/soybean/pod-and-stem-blight-phomopsis-seed-decay/