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Soybean Seedling Diseases

The University of Kentucky and forty-seven other land grant universities and USDA research stations are members of the Crop Protection Network, a collaboration of extension specialists and researchers of crop diseases and fungicide efficacy studies. The CPN builds on the national cooperative extension structure to coordinate research and information sharing across multiple states and regions of the country. The following discussion on soybean seedling diseases is just one result of their effort. Taken from publication CPN-1008, this article on soybean diseases is very timely as the effort to plant soybeans earlier each year predisposes soybeans to seedling diseases. The soybean seedling diseases that are most observed on soybean are fusarium root rot, rhizoctonia seedling blight, phytophthora root rot, and pythium seedling blight.

Many fusarium species reside in the soil and can infect soybeans. Infected plants may be stunted and spindly with brown or black lesions on the roots and poorly developed root systems. In severe cases, seedlings may die before emerging. Species of fusarium can infect plants under a wide variety of environmental conditions. Fusarium root rot is often associated with stressed plants.

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Rhizoctonia seedling blight is caused by the fungus *Rhizoctonia solani*. The characteristic symptom of rhizoctonia seedling blight is a reddish-brown lesion on the lower stem or hypocotyl, usually at the soil level. This disease can occur over a wide range of soil conditions. Affected plants typically appear in patches or in rows in a field. Temperature and moisture requirements for infection and disease progression vary, although this disease tends to be common in warm and moist, but not saturated, soil. Stressed seedlings may be more vulnerable.

Phytophthora root rot of soybean is caused by the oomycetes *Phytophthora sojae* and *P. sansomeana*. Infected plants appear alone or in patches. The stems of phytophthora-infected seedlings are typically mushy and water-soaked. Overall, infected seedlings will be wilted and stunted. These symptoms resemble those of many other seedling disease pathogens.

Phytophthora sojae can also cause a stem rot of mature plants, characterized by chocolate brown stem lesions. *Phytophthora* root rot occurs across many environments but is most common in warm and wet conditions.

Pythium seedling blight, another group of oomycetes, contains multiple species that can cause soybean seedling blight and seed rot. Species of *Pythium* cause symptoms similar to *Phytophthora* species. *Pythium* seedling blight symptoms include rotten, mushy seeds or seedlings with poorly developed roots. Water-soaked lesions may be present on the hypocotyl or cotyledons. *Pythium* seedling blight can occur across a range of temperatures, but high soil moisture increases the likelihood of disease and disease severity. Consequently, symptoms are most severe in poorly drained soils and areas prone to flooding.

Seedling diseases are difficult to correctly diagnose in the field and are easily mistaken for other problems such as herbicide or environmental damage. In addition, seedlings may be

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affected by more than one seedling disease in a field at the same time. For these reasons, we recommend sending injured soybean seedlings to a diagnostic lab to confirm the cause before implementing a disease management program. Obtaining an accurate diagnosis is the first step in determining a management strategy.

Frost or freeze damage is evident several days after occurring and will result in a brown-purple, water-soaked appearance on the hypocotyl and cotyledon. Soil crusting may prevent or slow seedling emergence, causing the seedling to die before it can emerge. Seedlings may exhibit above-ground injury from a frost event, but roots should appear healthy. Planting issues will result in gaps or patchy emergence, but seedlings present will appear healthy. Seedlings that are crusted over and die prematurely may be difficult to distinguish in the field from those that die due to seedling blights and therefore require laboratory diagnosis.

Fungicide seed treatments vary in efficacy, and products that control *Pythium* and *Phytophthora* diseases (such as ethaboxam, metalaxyl (-M), mefenoxam, and oxathiapiprolin), do not control *Rhizoctonia* and *Fusarium* species. Similarly, fungicides that are active against *Rhizoctonia* and *Fusarium* have little effect on oomycetes. Therefore, it is important to accurately diagnose the seedling blights present in a particular field, if possible, down to the species level, and choose fungicide seed treatments accordingly.

Fungicide seed treatment efficacy guides are updated annually and available through the NCERA-137 soybean disease working group. For a current list, see Fungicide Efficacy for Control of Soybean Seedling Diseases (CPN-1020) on my website at <https://daviess.ca.uky.edu/anr>.

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