

Managing Soybean Diseases In Reduced Tillage Systems

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Soybean is plagued by many diseases affecting the foliage, stems, pods, and roots. If not properly managed, these diseases reduce yield and seed quality. Reduced-tillage is a popular practice in many production systems in the Mid-South. However, plant debris that was once turned under is now left to decompose on the soil surface. This debris provides refuge for some disease-causing organisms and increases the risk of disease.

To manage this risk, producers need an effective disease management strategy. The foundation of this strategy should contain of the following components: disease identification, cultural practices, genetic resistance, and fungicides.

DISEASE IDENTIFICATION:

Aerial Blight can spread rapidly within fields during periods of warm temperatures and high relative humidity, or free moisture. Initial symptoms appear as water-soaked greasy blotches on the leaves (usually in the mid to lower canopy). The disease can be evident during the early reproductive stages of growth and later in the season. If favorable conditions persist, pods will have reddish-brown lesions and can abort from the plant.

Anthraxnose is favored by periods of high relative humidity. Infection occurs throughout the growing season, and can cause pre- and post-emergence "damping-off". Symptoms include petiole cankers, leaf rolling, necrosis of the laminar veins, and premature defoliation. The fungus produces acervilli (fruiting bodies that appear as raised black specks) on the stems and pods. If the disease continues to develop on the pods, seed quality will be compromised.

Cercospora Blight/Purple Seed Stain is a serious problem when plants are stressed and temperatures are between 75-80oF. The pathogen can be carried on seed and live on debris in the soil. Foliar symptoms are usually not evident until soybean is in the mid to late reproductive stages of growth. Initial symptoms are small chocolate brown lesions on the petioles near the leaflets. As the disease progresses, leaves are leathery in color and reddish, brown to tan in color on the upper surface. When disease is severe, premature defoliation can occur. The seed phase of this disease is evidenced by discolored pods and purple-stained seed.

Frogeye Leaf Spot development is favorable during warm, humid weather. The pathogen overwinters on seed or plant debris in the soil. Symptoms are predominantly on the foliage; however, the stems, pods, and seeds can also be affected. Foliar symptoms begin on the upper leaf surface as small water-soaked spots. As the leaf spots mature the centers become light tan surrounded by a dark reddish, brown margin. Premature defoliation can occur when disease is severe. Stem lesions are elongated with red centers and dark brown to black margins. Symptoms on pods are small, circular, sunken lesions similar in color to those the foliage.

Pod and Stem Blight develops best during warm, wet weather. Infection can occur early in the season; however, signs (pycnidia) of the disease are not evident until late season (R7). Pycnidia (fruiting bodies / raised black specks or dots) occur in linear rows on the stems and

pods. If favorable conditions persist, seed quality will be compromised.

Soybean Rust develops best at temperatures between 59-77oF and leaf wetness periods ranging from 6 to 10 hours. Symptoms initiate in the lower canopy during R3 to R6 and begin as small brown to tan raised pustules on the lower leaf surface. Spores resemble sand and are tan in color when young. Older spores are darker in color. As the disease progresses premature defoliation can occur.

Sudden Death Syndrome usually occurs mid to late season. Cool, wet growing seasons optimize disease development. Initial symptoms appear 2 to 3 weeks before flowering in the southern region and around flowering in the northern region of occurrence. Foliar symptoms begin as interveinal chlorotic spots or blotches on the leaflets. As symptoms continue to develop, spots become necrotic and coalesce. Leaflets either drop from the plants or remain attached and curl upward during advance stages of development. Root symptoms precede foliar symptoms. Tap and lateral roots, as well as nodules are deteriorated; however, the pith of the stem remains white.

CULTURAL PRACTICES, GENETIC RESISTANCE, AND FUNGICIDES:

Plant when conditions favor rapid germination and seedling establishment. A healthy plant is the first step toward optimizing yields and preventing disease. Improved drainage within the field will help reduce the risk to some soil borne diseases. Practices promoting air movement within the canopy will reduce the leaf wetness period and lessen the risk of some foliar diseases.

Always use high-yielding, disease-resistant varieties when possible. When genetic resistance is not available, fungicides can be utilized for managing diseases. There are several fungicide classes to choose from. The type of disease will dictate which class is needed. Three classes of chemistries are available to producers: strobilurins (Headline and Quadris), benzimidazoles (Topsin M or thiophanate methyl), and triazoles (soybean rust fungicides). The strobilurins have the broadest spectrum activity compared to the other classes. This class is effective against Aerial Blight and Pod Diseases, slightly effective against Cercospora Blight, and suppressive against Soybean Rust. Topsin M is moderately effective against Cercospora Blight and Pod Diseases. However, Topsin M is not effective against Soybean Rust. Triazole fungicides are used for managing Soybean Rust. Some of these fungicides may confer activity against other diseases, but more evaluations are needed to make this determination.

Other factors to consider when applying a fungicide are timing and sprayer setup. Applications are typically made when soybeans are between the R3 (pod initiation) and R5 (seed initiation) stages. Early applications (R3) will provide better efficacy against Cercospora Blight, and later applications (R5) will provide better efficacy against Pod Diseases. Earlier applications may be justified if Soybean Rust or Aerial Blight is present. Ideally, sprays should be made in 15 gallons of solution per acre by ground and 5 gallons of solution per acre by air. Spray nozzles that deliver large droplets DO NOT provide good coverage relative to nozzles delivering medium to small droplets. Δ