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NebGuide

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Sclerotinia Stem Rot of Soybeans

Life cycle, symptoms, and control measures of sclerotinia stem rot of soybeans is discussed.

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- Life Cycle
- Symptoms
- Control

Sclerotinia stem rot of soybeans is caused by the fungus *Sclerotinia sclerotiorum*. This pathogen has an extremely wide host range and can affect more than 400 plant species, including oilseed, vegetable and forage legume crops. *S. sclerotiorum* has caused a disease known as white mold on dry edible beans in western Nebraska for 40 years, but it did not become a problem in soybeans until the 1990s. This fungal pathogen can be found on soybeans in Illinois, Iowa, Michigan, Ohio, Minnesota, Wisconsin, and North Dakota.

Stem rot outbreaks in soybeans recently have become more frequent in eastern Nebraska. In other states, outbreaks usually occur in fields which have previously been rotated with a susceptible crop such as sunflower, dry bean or potato. Cereals such as corn and wheat and other monocots are not hosts for this fungus, but weeds such as pigweed and wild sunflower can become infected. In Nebraska the current increase in disease severity can be explained by the recent cool, wet summers which favored disease development in susceptible crops and weeds, leaving more inoculum to infect the soybean crop. Continuous soybeans would enhance inoculum and subsequent infection.

Life Cycle

The fungal pathogen survives from year to year as hard dark structures called sclerotia. Sclerotia are variously shaped bodies of tightly packed white mycelium covered with a dark, melanized protective coat. Sclerotia range from 1/16 to 3/4 inch in length (*Figure 1*), depending on whether they are produced within a stem or pod or on the plant surface.

Figure 1. (Left) Sclerotia, which range from 1/16 to 3/4 inch long, are tightly packed white mycelium covered with a dark, melanized protective coat. Sclerotia survive the winter and produce either apothecia (right) or mycelium. Apothecia are mushroom-like bodies ranging from 1/8 to 3/8 inch in diameter on the soil surface. They can produce millions of airborne spores which can infect plants a few feet from the apothecia.

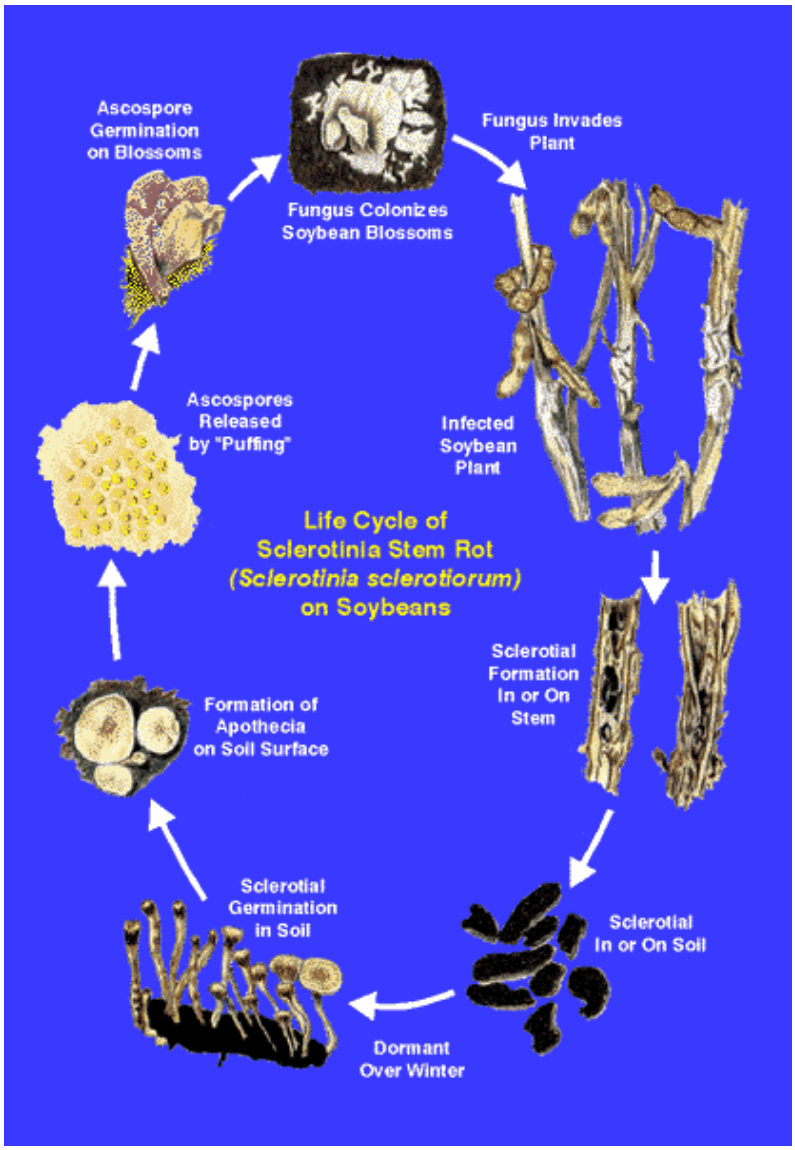

Figure 2.

Sclerotia can survive the winter in debris or soil and germinate in late spring or early summer by producing either apothecia or mycelium (*Figure 2*). For sclerotia to produce apothecia, they must undergo a cool, wet period. Apothecia are mushroom-like bodies that produce millions of airborne spores almost daily over a 7- to 10-day period (*Figure 1*). These spores are released during favorable weather conditions and can travel to other fields in air currents. However, sources of spores under the plant canopy exert the most influence on disease severity. Spores infect plants like soybean primarily through colonized blossoms (*Figure 2*), but they can also infect through injured plant tissue. Free moisture must be present on the plant surface for infection to occur. Flowers on the tips of small pods provide a common entrance for the fungus. Invasion of the pod and eventually the stem may lead to lesions covered with sclerotia. During harvest these structures are scattered back onto the soil. Thus, inoculum for the next three or more seasons has been distributed.

Symptoms

Initial symptoms are visible during pod development. In most instances, leaves will wilt and turn gray-green before turning brown, curling and dying. These symptoms can be confused with late season root rot or brown stem rot. It is important to observe stems

and pods for white mycelium and sclerotia to differentiate Sclerotinia stem rot from other diseases.

Figure 3. Soybean stems infected with Sclerotinia stem rot turn from brown to tan to a bleached color.

Since blossoms are infected first, early stem or pod water-soaked symptoms often result from colonized flowers. In a few days diseased stem areas are killed and become tan and eventually bleached (*Figure 3*). This bleached stem will have a pithy texture and will shred easily. Infected plant parts generally will have signs of the fungal pathogen as white, fluffy mycelium during humid conditions, and sclerotia on the surface of (*Figure 4*) or embedded in the stem tissue. Although stem and pod infection usually occurs about 6 to 14 inches above the soil line, some basal infection also may be found.

Figure 4. Symptoms of the disease usually appear as white, fluffy mycelium during humid periods and then as sclerotia on the surface or embedded in the plant tissue in the later development.

Control

No single disease management strategy effectively prevents infection; however, various measures can reduce disease severity and minimize yield losses.

1. Using a row spacing wider than 15 inches will increase air circulation between rows and promote more rapid drying of the plant canopy. This spacing minimizes the humid conditions necessary for infection, especially where irrigation is used. Overwatering should be avoided, especially during flowering when ascospores are produced and infection occurs. To avoid excess canopy development, fertilize only at recommended rates.

2. Planting cultivars resistant to Sclerotinia stem rot would be useful, but no varieties show complete resistance. Some varieties, however, are less susceptible to stem rot. These include Dassel, Northrup King NK S 1990, Corsoy 79, Vinton 81 (grown for specialty markets), Asgrow A-2506 and DSR-173. For a given production region, earlier-maturing varieties tend to be less susceptible to Sclerotinia stem rot than later-maturing varieties. All of the above varieties except Asgrow A-2506 are group I maturity, which are short-season beans in Nebraska. Asgrow A-2506 is group II. Environmental factors such as humidity and temperature will affect how a specific variety reacts to the disease year to year. Check with your local Extension educator to identify which varieties are less susceptible to Sclerotinia stem rot.

3. The pathogen can be transported within infected seeds or as sclerotia in contaminated seedlots (*Figure 5*). Therefore, it is important to plant only cleaned seed that has had sclerotia and poor quality seeds removed.

Figure 5. Sclerotia are similar in size to soybeans but can be distinguished by their dark color and also often by shape. It is important to clean seed carefully to reduce spread of the stem rot.

4. Crop rotation is not an effective control method because the sclerotia can survive for years in the soil. Also, *S. sclerotiorum* has a wide host range and can infect many other crops as well as some broadleaf

weeds. Crop rotation however is a beneficial control strategy to reduce the incidence of other diseases and should be practiced. Monocots such as corn, sorghum or wheat are good choices for rotation crops. Soybeans should not follow sunflowers or dry beans. Avoid continuous cropping of soybeans in a field with a history of stem rot.

5. Chemical sprays have been used to help manage the disease in dry beans, however none are labeled to control Sclerotinia stem rot of soybean. Check with local Extension educators for any label updates.

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