White Mold in Soybeans

Sclerotinia Facts

- White mold, also known as Sclerotinia stem rot, is caused by the fungus *Sclerotinia sclerotiorum*.
- Soybean is just one out of hundreds of known hosts for this soilborne plant pathogen.
- White mold can infect soybeans across a wide geography with favorable climatic conditions for disease establishment, including several northern and near-northern states in the U.S. and Ontario and Quebec in Canada.
- Infection is favored by wet and cool conditions during flowering. Dense canopies with high moisture and temperatures ranging from 68-78 °F (20-25 °C) are conducive for disease development.

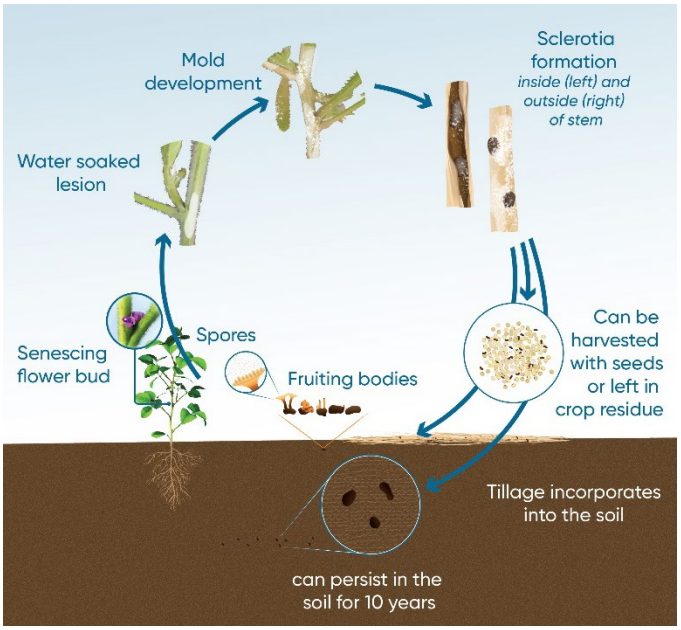

Figure 1. White mold life cycle in soybeans.

Pathogen Life Cycle

- White mold can persist for years in soil via structures of hardened mycelial masses called sclerotia, which function like seeds.
- Apothecia germinate from the sclerotia and produce millions of spores that colonize dead plant tissue, particularly senescing soybean flowers.
- Infection can then spread via contact with this moldy material, which is favored in dense canopies with high moisture and minimal airflow.
- The next generation of sclerotia form outside of the plant, surrounded by the white mold on the infected plant, or internally within the soybean stem.

Figure 2. White mold development on soybean, formation of sclerotia. *Photo courtesy of Madeline Henrickson, Agronomy Sciences Intern.*

Identification and Symptomology

- Infection begins with water soaked lesions at infection sites.
- Cottony white moldy masses form on stems (Figure 2).
- Sclerotia can develop both outside and inside the stem (Figures 3 and 4). Sclerotia appear as dark, irregularly shaped bodies ¼ to ¾ inches long, similar in appearance to seeds.
- Infection can lead to lodging due to weakened stems.

Figure 3. White mold sclerotia on outside of soybean stems among moldy tissue, appearance is more rounded.

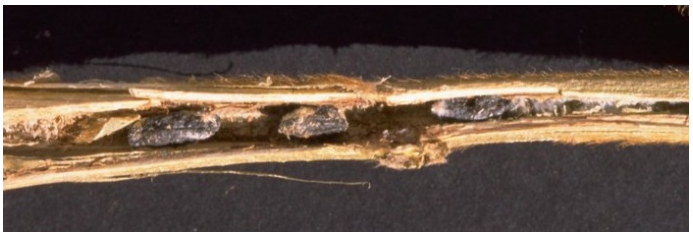

Figure 4. White mold sclerotia within soybean stems, appearance more cylindrical.

Management Considerations

Variety Selection

- No variety is completely resistant to white mold, particularly under severe disease pressure, but differences in tolerance exist among varieties.
- Pioneer® brand soybean varieties are rated on a scale of 1 to 9 (9 = most tolerant) for genetic tolerance to white mold.
- Ratings are determined by analyzing data from multiple locations and evaluating infection development rate as well as the extent of damage caused by the pathogen.
- Selecting varieties with high tolerance ratings is a good management practice in locations that often encounter white mold. Consult your Pioneer sales professional for help selecting suitable varieties for your farm.

Production Practices

- Early planting, narrow row width and high plant populations encourage early canopy formation and white mold risk. These practices also increase yield.
- Abandoning practices that increase yield most years to reduce white mold (which does not occur every year) may not be a favorable economic trade-off.

Figure 5. High density canopies with cool and moist conditions favor disease development. *Photo courtesy of Madeline Henrickson, Agronomy Sciences Intern.*

Crop Rotation

- *Sclerotinia sclerotiorum* has a wide host range including alfalfa, clover, sunflower, canola, edible beans, and more.
- Non-host crops that can be utilized in a rotation include corn, sorghum, and small grains.
- Because sclerotia persist in the soil for up to ten years, rotation is only a partial solution for reducing disease pressure. More than one year away from soybeans may be required to see a benefit.

Weed Management

- Weeds are also alternate hosts for white mold in fields.
- Lambsquarters, ragweed, pigweed, and velvetleaf are some common weeds that can be infected by *Sclerotinia sclerotiorum*.

Figure 6. Soybeans that have lodged due to loss of structural integrity as a result of white mold infection. *Photo courtesy of Madeline Henrickson, Agronomy Sciences Intern.*

Tillage

- Sclerotia germinate from the top two inches of soil, but can persist at lower depths for up to ten years.
- Buried sclerotia can be resurfaced by tillage and germinate.
- If a severe outbreak has occurred in a field that is new to white mold, deep tillage followed by zero tillage in subsequent season may help.

Fungicide Treatments

- Fields that are at high risk of white mold infestation may benefit from foliar treatments used in tandem with cultural practices that disfavor the pathogen.
- Products labeled for white mold control or suppression:
    - Synthetic fungicides - DuPont™ Aproach® fungicide, Quadris® fungicide, Topguard® fungicide, Proline® fungicide, Domark® fungicide, Topsin® fungicide, and Endura® fungicide.
    - Biological fungicide - Contans® fungicide.
- In 2017 on-farm trials, DuPont Aproach fungicide increased soybean yield by an average of 7-9 bu/acre with a single application and 13 bu/acre with sequential applications in fields with heavy white mold pressure (Wessel et al., 2017).
- Herbicides containing lactofen (Cobra® herbicide and Phoenix® herbicide) can also reduce white mold incidence.

Foliar Fungicide Application Timing

- Applications must be made prior to infection because they have little activity on the established pathogen.
- Optimum application timing for fungicides for white mold control in soybeans is approximately the R1 growth stage when blooms are vulnerable to the initial infection and canopies are still open.
- Soybean susceptibility for white mold lasts as long as the crop is flowering, often 30 days or more, so a second application may be necessary if environmental conditions favorable to infection persist into mid-summer.
- Later fungicide applications have the potential for reduced canopy penetration, particularly in narrow-row soybeans, which can reduce their effectiveness.
- Always read and follow all label directions and precautions for use when applying fungicides.

Wessel, J, S. Butzen, and M. Jeschke. 2017. Integrated Management of White Mold in Soybean Production. Pioneer Crop Insights Vol. 27 No. 12.

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