AGRONOMIC Spotlight

Technology Development & Agronomy by MONSANTO

White Mold Management in Soybean

- Sclerotinia stem rot, or white mold, is a disease of high yield potential soybeans and thrives under moist conditions and below average temperatures.
- Additional factors that favor white mold include weather, a high yield potential soybean crop with a dense canopy, susceptible soybean product, and a field history of white mold.
- Management practices can be implemented to help reduce the risk of white mold in the future.

White Mold Identification

White mold is a relatively easy disease to identify. It is so named because the fungal disease produces white, fluffy, cottony growth on the outside of the stem and on the pods (Figure 1). Other symptoms include wilted leaves and stems that appear "bleached" and shredding of stem tissue. Sclerotia, small black structures that resemble mouse or rat droppings, can be found on and inside plants that have been affected by white mold.[1]

Figure 1. Soybean stem affected by white mold, also known as Sclerotinia stem rot.

White Mold Management

Crop Rotation. Short crop rotations, such as a soybean-corn rotation, can eventually lead to a buildup of sclerotia. Most sclerotia die over a three- to four-year period between soybean crops. Thus a sufficiently long crop rotation with a non-host such as corn or wheat can be effective in minimizing pathogen buildup over time. Avoid growing other host crops such as canola, common bean, and sunflower in rotation with soybean.

Tillage. Sclerotia within the top two inches of soil germinate and produce spores to infect plants.[1] Sclerotia can survive deep in the soil for up to seven years. Deep tillage to bury infected residue can prevent germination of sclerotia, but additional tillage brings sclerotia to the surface where they can germinate. In no-till fields, sclerotia remain on the surface and a large number germinate under corn or other rotational crop. This reduces the amount of viable sclerotia left to germinate when soybeans seeds are again planted. Tillage may spread sclerotia within the field. Therefore, in no-till fields sclerotia may remain confined to hot spots. If white mold occurs for the first time in fields, tillage can be used to bury the sclerotia. Tillage in subsequent years should be avoided. Reduced tillage and no-till are preferable for fields with a history of white mold infestation.

Table 1. Seasonal and long-term risk factors associated with the development of white mold.

Seasonal Risk Factors	Long-term Risk Factors
Weather: cool temperatures (< 85° F), normal or above normal precipitation, above normal soil moisture, leaf wetness during flowering and early pod development.	**Field history:** other host crops are grown in rotation with soybean, one to two year interval between soybean crops, susceptible products are grown.
Early canopy closure: due to early planting, high plant populations, narrow rows, excessive plant nutrition.	**Weed management:** poor control of broadleaf weeds that are also hosts of white mold.
History of white mold: density and distribution of pathogen, presence of apothecia at flowering.	**Field topography:** low areas, tree lines and other barriers that impede air movement.
Soybean product: reaction to white mold depends on plant structure and physiological functions.	**Pathogen introduction:** contaminated and infected seed, movement of infested soil, wind-borne spores.

Source: Plant Health Initiative. [4]

Product Selection. Product selection is important in determining the efficacy of other control measures. No soybean products are completely resistant to white mold, but tolerant products can be effective in managing white mold and maintaining yield potential. Plant products that are short and do not tend to lodge. Avoid planting highly susceptible products in fields with a history of white mold.

Target partially resistant products for fields with a history of significant white mold. Susceptible or moderately susceptible products can be planted in fields with little history of the disease. Susceptible products should be avoided in fields containing low lying areas or with natural barriers to wind movement such as tree lines.

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Planting date. Research at the University of Wisconsin demonstrates that in fields where white mold has been severe, late planting can provide some control. This may be due to a delay in canopy closure.

Row spacing. In low to moderate disease pressure environments, white mold increases as row spacing narrows. Under high disease pressure, white mold severity is similar between wide and narrow rows. Increased row spacing generally results in a decrease in the amount of white mold, but does not necessarily correspond with an increase in yield. The University of Wisconsin recommends planting 15-inch rows to help maximize yield potential while minimizing the effect of white mold.[2]

Plant population. Avoid high populations of 200,000 plants per acre in the presence of white mold. Instead populations of 125,000 to 150,000 plants per acre are recommended.[3]

Weed Control. Many broadleaf weed species such as lambsquarters, pigweed, velvetleaf, ragweed, nightshade, Canada thistle, and mustard are hosts of white mold. It is important to control these weeds, especially in crops grown in rotation with soybeans.

Chemical Control Options. Especially in fields where white mold has been an issue previously, it is critical to use management options such as product selection, crop rotation, and reduced tillage. However, several options exist for combating white mold in-crop. Outbreaks may be reduced by applying fungicide during flowering. This requires accurate application timing and prediction of disease onset. Fungicides are most effective if applied as preventative measure; results are typically inconsistent when applications are made after symptoms have already developed. Table 2 lists pesticides currently registered for suppression or control of white mold in soybean.

Figure 2. Soybeans treated with Cobra herbicide at 6 fl oz/A plus glyphosate at R1 had 6% white mold infection (left) compared with 25% white mold infection in soybeans treated with glyphosate only (right) (Valent Corporation, Morrison, IL).

Table 2. Products currently registered for suppression or control of white mold on soybean.

Product Type	Active Ingredient	Product Name
Fungicide	Thiophanate methyl	Topsin® M, and others
Fungicide	Boscalid	Endura®
Fungicide	Tetraconazole	Domark®
Fungicide	Prothioconazole	Proline®
Herbicide	Lactofen	Cobra®, Phoenix™
Biocontrol	*Coniothyrium minitans*	Contans®

Source: Iowa State University Extension.[5]

There is some evidence that herbicides that shorten plant height and a thin plant canopy are associated with a lower incidence of white mold, especially when used in an environment that favors white mold development. The application of 6 fl oz/acre of Cobra® herbicide just prior to R1 has been shown to suppress white mold in moderately susceptible soybeans (Figure 2).[6] A 2009 multi-location study by Valent in Ohio showed an average yield increase of 13.6 bushels per acre when Cobra was used. *Always read and follow pesticide label directions.*

Sources:
[1] Dorrance, A. E. and D. Mills. Sclerotinia Stem Rot (White Mold) of Soybean. The Ohio State University Extension Fact Sheet AC-45-08.
[2] Grau, C. R. and J.E. Kurle. White Mold in Soybean. University of Wisconsin-Madison. A3695.
[3] Westphal, A. et al. Diseases of Soybean: White Mold. Purdue University Extension. BP-43-W.
[4] White Mold. Plant Health Initiative. http://www.planthealth.info. (verified 6/27/2013).
[5] Mueller, D. and A. Sisson. 2012. Scouting White Mold in Soybean. Iowa State University Extension.
[6] Personal communication. Valent Corporation.

For additional agronomic information, please contact your local representative