



# Agronomic Spotlight

## White Mold Management in Soybean

- Sclerotinia stem rot, or white mold, is a disease that can infect high yield potential soybeans; it thrives under moist conditions and below average temperatures.
- Additional factors that favor white mold include 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.

### Identification

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

### 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 crop rotation to non-host crops like small grains and cereals can be effective in minimizing pathogen buildup over time.

**Tillage.** Sclerotia within the top two inches of soil surface germinate and produce spores to infect the plants. Deep tillage to bury infected residue can prevent germination of sclerotia, but additional tillage brings sclerotia to the surface where they can germinate.<sup>1</sup> In no-till fields, sclerotia remain on the surface and a large number germinate during the corn or other rotational crop years. This reduces the amount of viable sclerotia left to germinate when soybeans are planted again. 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 soybean 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.<sup>2</sup>

**Product Selection.** No soybean products are completely resistant to white mold, but tolerant products can be effective in managing white mold. Planting highly susceptible products should be avoided in fields with a history of white mold, and low-laying areas or with natural barriers to wind, such as tree lines.

**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

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

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

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

Source: Plant Health Initiative.<sup>4</sup>

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generally results in a decrease in the amount of white mold, but does not necessarily correspond with an increase in yield potential.

**Plant Population.** High plant populations contribute to dense, closed canopies. Higher populations (175,000 plants per acre or greater) have been associated with increased white mold incidence. In fields with a history of white mold, consider decreasing plant populations; however, be sure populations maintain yield potential.

**Weed Control.** Many broadleaf weed species such as lambsquarters, pigweed, velvetleaf, ragweed, nightshade, Canada thistle, and mustard are hosts for 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.

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



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

susceptible soybean products (Figure 2).<sup>3</sup> A 2009 multi-location study by Valent in Ohio showed an average yield increase of 13.6 bu/acre when Cobra was used.

*Always read and follow pesticide label directions.*

## Summary

Fields with high disease pressure and ideal environmental conditions, such as cool and wet weather during flowering, can lead to the development of white mold in soybean. Symptoms include white, fluffy, cotton growth on the outside of the stem. Management tools include product selection, weed management, crop rotation, reduce tillage, and fungicide applications.

**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®
Fungicide	Flutriafol	Topguard®
Herbicide	Lactofen	Cobra®, Phoenix™
Biocontrol	<i>Coniothyrium minitans</i>	Contans® WG

### Sources:

- <sup>1</sup> Dorrance, A. E. and Mills, D. Sclerotinia stem rot (white mold) of soybean. The Ohio State University Extension Fact Sheet AC-45-08.
- <sup>2</sup> Smith, D., Wise, K., Chilvers, M., Bradley, C., and Mueller, D. 2014. Managing white mold in soybean. Wisconsin Field Crops Pathology. University of Wisconsin Extension. <http://fyi.uwex.edu>.
- <sup>3</sup> Westphal, A., Abney, T.S., and Shaner, G. 2006. Diseases of soybean: white mold. Purdue University Extension. BP-43-W.
- <sup>4</sup> White Mold. Plant Health Initiative. <http://www.planthealth.info>.
- <sup>5</sup> Mueller, D. and A. Sisson. 2012. Scouting white mold in soybean. Iowa State University Extension.
- <sup>6</sup> Personal communication. Valent Corporation. Fungicide efficacy for control of soybean foliar diseases. 2014. Purdue University, Web sources verified 6/30/15.

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development, & Agronomy by Monsanto.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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