AGRONOMIC Spotlight
Technology Development by MONSANTO

Managing White Mold in Soybeans

Sclerotinia stem rot, or white mold, is a disease of high yield potential soybeans and thrives under moist conditions and below average temperatures. The occurrence of white mold depends on many factors (Table 1). Management practices can be implemented to help reduce the risk of white mold in the future.

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. 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 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.

Variety Placement

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

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

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 varieties 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 variety: 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: White mold risk assessment. Plant Health Initiative. http://www.planthealth.info. 9/20/09.

Canopy Management

Planting date, row spacing and plant population are important components to canopy management.

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

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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.

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.

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.

There is some evidence that herbicides that shorten plant height are associated with a lower incidence of white mold. The application of 6 fl oz/A of Cobra® herbicide just prior to R1 has been shown to suppress white mold in moderately susceptible soybean varieties (Figure 1). A 2009 study by Valent in Ohio showed an average yield increase of 13.6 bu/A when Cobra was used. A temporary crop response, such as bronzing or speckling of open leaves or cupped or crinkled leaves on emerged but unopened trifoliates, should be expected following a postemergence application of Cobra.

Chemical Options

Several options exist for combating white mold during the season. Outbreaks may be prevented or minimized by applying fungicide during flowering. This requires accurate application timing and prediction of disease onset.

Domark® fungicide can be used to suppress white mold when applied alone at 4 to 5 fl oz/A at R1 or when applied at a rate of 4 to 5 fl oz/A at R3 when following an application of Cobra herbicide at 6 to 8 fl oz/A. If white mold symptoms are visible, Domark can be used to limit further spread of the disease. Studies conducted by Valent in 2008 in Illinois showed a decrease in disease incidence and increased yields when Domark was applied.

Endura® fungicide can be used to suppress white mold when applied prior to disease development or when conditions are conducive for disease development. Applications should be at a rate of 5.5 to 11 oz/A and no more than two applications should be made per season. A 2009 study conducted by the University of Illinois at the Northern Illinois Agronomy Research Center showed that disease incidence and severity decreased and yield increased from 23.9 bu/A to 38.8 bu/A with two applications of Endura when compared to the untreated check.

Figure 1. 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).

Topsin® M is another fungicide option for controlling white mold. Applications should be made at early bloom (R1 to R2 stage) at a rate of .75 to 1.0 lb/A. A follow up application can be made 7 to 14 days later if environmental conditions favor continued disease pressure.

Contans® is a biological control agent shown to be effective in controlling white mold in many crops. Contans can be applied before or at planting, but should be applied no less than three months prior to an anticipated white mold outbreak. Applying Contans after harvest helps give the biological agent time to degrade sclerotia before the next crop is planted. Application rates for ground to be planted to soybeans is 1 to 2 lbs/A, unless it will be incorporated deeper than two inches in which case the application rate should be 2 to 6 lbs/A.

Always read and follow pesticide label directions.

Effectively managing the risk of white mold can be a complicated process. Implementing some of the above practices can help reduce the effect of white mold while also maximizing soybean yield potential.

Sources: A. E. Dorrance & D. Mills. Sclerotinia Stem Rot (White Mold) of Soybean. The Ohio State University Extension Fact Sheet AC-45-08. C.R. Grau and J.E. Kurle. White Mold in Soybean. University of Wisconsin-Madison. A3695. A. Westphal et al. Diseases of Soybean: White Mold. Purdue University Extension. BP-43-W. White mold. Plant Health Initiative. http://www.planthealth.info. 9/20/09. Soybean White Mold Fungicide Trial Results form the Northern Illinois Agronomy Research Center. Univ. of IL Extension. The Bulletin. Dec. 4, 2009. http://ipm.illinois.edu. 12/8/09. Personal communication. Valent Corporation.