White Mold, also called Sclerotinia stem rot, can substantially reduce soybean yields, especially when climatic conditions and management practices favor high yield potential. This disease is particularly problematic in fields with dense canopies during the reproductive growth stages, coupled with rain, fog, or dew. Cool temperatures (below 85°F) and moist environmental conditions help create a microclimate where the development of white mold can thrive.

### White Mold Identification and Disease Cycle

White mold is a relatively easy disease to identify. It is so named because the fungal disease produces a white, fluffy, cottony growth on the outside of the stem and on the pods (Figure 1). Other symptoms also include wilted leaves, 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.

The disease cycle of white mold is complicated. Favorable environmental conditions and soybean growth stages must intersect for the disease to occur. The fungus overwinters in the soil as sclerotia that can survive in the soil for many years. Under wet conditions, sclerotia within the top two inches of soil germinate and form small mushroom-like structures called apothecia (Figure 2). Airborne spores (ascospores) are discharged from the apothecia and carried by the wind to soybean plants. Ascospores that land on the senescing petals of soybean flowers are the most likely to cause infection. The ascospores germinate, grow, and infect the stems of the soybean plant. If cool and wet conditions continue, the disease can develop throughout the plant. Eventually, sclerotia will form on and inside the affected soybean plants. Sclerotia are similar in size and density to soybean seed and can be found mixed with the soybean seed after harvest (Figure 3). Sclerotia can also be blown out the back of the combine during harvest, adding more inoculum to the field.

### White Mold Management

White mold management is challenging when environmental conditions favor the disease. Management plans should be based on field history and integration of several management tactics that include soybean product tolerance, cultural practices, and chemical control options.

- **Crop Rotation.** White mold has a wide host range and sclerotia have the ability to survive in the soil for several years. However, most sclerotia die over a three to four year period between soybean crops, so rotation to non-host crops like small grains and cereals can help reduce the sclerotia load in the soil over the long term.

- **Tillage.** In a growing season, only sclerotia in the top two inches of the soil surface germinate and release spores. 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 during the corn or other rotational crop years.
White Mold in Soybean

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 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.²

Product Selection. No soybean products are completely resistant to white mold, but tolerant products can be effective in managing the disease. For fields with a history of white mold, tolerant products should be planted. Planting susceptible products should be avoided in fields with a history of white mold, low-lying areas, or areas with natural barriers to wind movement, 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 generally results in a decrease in the amount of white mold, but does not necessarily correspond with an increase in yield.

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.

Chemical Control Options. Especially in fields where white mold has been an issue previously, it is critical to use management options such as variety 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 1 lists pesticides currently registered for suppression or control of white mold on 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 susceptible soybean products (Figure 4)³. 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

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 helping to maximizing soybean yield potential.

Table 1. Products currently registered for suppression or control of white mold on soybean.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Active Ingredient</th>
<th>Product Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fungicide</td>
<td>Thiophanate methyl</td>
<td>Topsin®, M, and others</td>
</tr>
<tr>
<td>Fungicide</td>
<td>Boscalid</td>
<td>Endura®</td>
</tr>
<tr>
<td>Fungicide</td>
<td>Tetraconazole</td>
<td>Domark®</td>
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<tr>
<td>Fungicide</td>
<td>Prothioconazole</td>
<td>Proline®</td>
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<td>Fungicide</td>
<td>Flutriatol</td>
<td>Topguard®</td>
</tr>
<tr>
<td>Herbicide</td>
<td>Lactofen</td>
<td>Cobra®, Phoenix™</td>
</tr>
<tr>
<td>Biocontrol</td>
<td>Coniothyrium minitans</td>
<td>Contans® WG</td>
</tr>
</tbody>
</table>


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.
³ Personal communication. Valent Corporation.


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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. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Channel® and the Arrow Design® and Seedsmanship At Work® are registered trademarks of Channel Bio, LLC. Cobra® and Phoenix™ are trademarks of Valent U.S.A. Corporation. All other trademarks are the property of their respective owners. ©2015 Monsanto Company. 130627060134 070615AMH