Nov 29th, 12:00 AM

Soybean White Mold: What Have We Learned Since 1992?

Craig Grau
University of Wisconsin-Madison, cg6@plantpath.wisc.edu

Soybean white mold: What have we learned since 1992?

Craig Grau, Professor, Plant Pathology, University of Wisconsin-Madison

White mold, sometimes called *Sclerotinia* stem rot, remains an important disease of soybean in the midwest. Although other pathogens and pests are more consistent problems, management of white mold usually entails an integrated and often complicated integration of management practices. A white mold management system may fail if one weak link in chain exists. White mold causes direct yield loss, but yield potential may be lost in the absence of the disease if growers have made management adjustments that result in lower yield potential. White mold is best managed by an integrated approach of selecting soybean varieties with the highest level of resistance and adjusting cultural practices to minimize environmental factors that favor disease development. An alternative approach entails a coordinated crop management plan that matches the level of resistance in a soybean cultivar. Most crop management tactics for white mold are linked to speed and extinct of crop canopy closure. No single tactic will completely control white mold.

White mold is a disease of high yield potential soybean production. Although several factors are believed responsible for the increased occurrence of white mold, none may be more important than management practices or environmental conditions that promote rapid and complete crop canopy closure. White mold is particularly favored by dense soybean canopies created by plantings in narrow row widths, high plant populations, early planting, high soil fertility, or other management practices that promote rapid and complete canopy closure. Ironically, white mold often develops due increased canopy development when soybean cyst nematode resistant varieties are planted or the soybean aphid is controlled by insecticides.

The effect of row width on incidence of white mold and subsequent yield can vary by year and is strongly controlled by annual climatic conditions. Frequently, the yield advantage of narrow row widths, compared to wide widths, is expressed even though the incidence of white mold may be greater in narrow row systems. Increasing row width from a narrow row spacing (6-8”) to a medium spacing (15”) can reduce white mold infections without compromising yields. Lowering seeding rates in narrow row systems is preferable to increasing row widths to achieve crop canopies less conducive to white mold.

The incidence of white mold is influenced significantly by other crops used in rotation with soybean. Susceptible crops such as green bean, dry beans, lima beans, carrots and cabbage, in rotation with soybean, greater increase the risk of white mold. Examples of non-host crops are corn, small grains, and all forage grasses. Crop rotations that employ nonhosts result in a reduced the incidence of white mold, but some honhosts are better than others. A preceding crop of small grain, in contrast to corn, has a greater impact on reducing the incidence of white mold. Research has shown that nonhosts such as small grains reduce the density of sclerotia in soil and result in fewer of apothecia formed under the soybean canopy. Tillage system will modify the effects of rotation crops. Greater numbers of spore producing apothecia will develop in moldboard plow systems compared to no-tillage systems. Fewer apothecia in no-tillage systems is a partial explanation why lower incidence of white mold is observed in no-till fields compared to fields receiving some degree of tillage.

Several fungicide options exist for control of white mold. Thiophanate - methyl (Topsin® M) applied to foliage will reduce the incidence of white mold if applied during flowering and early pod formation. However, the greatest limitation of foliar applied fungicides is the inability of the product to penetrate into the lower regions of the canopy to protect pod tissues. Fungicides recently registered for brown spot and soybean rust are not registered for white mold control. Seed treatment forumations of thiabendazole (TBZ) are effective against seed borne inoculum of the white mold pathogen. The use of fungicides to control white mold is more feasible for seed production rather than grain production because of economic factors.

Biological control of white mold has also been researched. Sclerotia can be parasitized by several fungi and these fungi have been investigated as candidates for commercialization. Contans® WG is a commercial biological control product labeled for the control of Sclerotinia sclerotiorum in agricultural soils. Contans® has shown promise as a biological control agent and a potential alternative for chemical fungicides to control white mold. In Wisconsin, the best and most economical times for application are during preplanting or post-harvest on the stubble of a previously diseased crop. The time between the application of Contans® WG and the typical onset of disease should be as long as possible.

Many seed companies are marketing soybean varieties that express various forms of partial resistance. Both physiological resistance and disease escape traits are responsible for how varieties respond in a high disease potential environment. Soybean breeders have had difficulty combining a high and dependable form white mold resistance with high yield potential. Breeding for white mold resistance has remained problematic despite numerous source of physiological resistance in older varieties and ancestral varieties. Research on white mold resistance remains a priority among numerous plant pathologists and soybean breeders. DNA based selection methods hold significant promise for the future.

More information on soybean diseases and production can be found at:

http://www.planthealth.info

http://www.plantpath.wisc.edu/soyhealth

http://soybean.uwex.edu

Pest Management in WI Field Crops-2006 http://cecommerce.uwex.edu

Table 1. The risk of white mold development in a specific field will depend on both seasonal and more long-term factors.

Seasonal risk factors	Long-term risk factors
Weather: cool temperatures (<85 F), normal or above normal precipitation, field capacity or above soil moisture; and prolonged morning fog and leaf wetness (high canopy humidity) at and following flowering into early pod development.	Field/cropping history: inoculum of pathogen will gradually increase if: other host crops are grown in rotation with soybean; interval between soybean crops is shortened; and white mold susceptible varieties grown.
Early canopy closure: due to early planting, high plant population, narrow rows, excessive plant nutrition and optimal climatic conditions. Dense canopy increases apothecia density.	Weed management systems: some broadleaf weeds are hosts; herbicides used in rotation systems may be suppressive to white mold.
History of white mold: population density of white mold pathogen; apothecia present on soil surface at flowering; distribution of pathogen/disease in field.	Topography of field: pockets of poor air drainage; tree lines and other natural barriers to impede air movement.
Soybean variety planted: physiological resistance and plant structure govern reaction.	Pathogen introduction: contaminated and infected seed; movement of infested soil with equipment; wind-borne spores from apothecia from area outside fields. Application of Contans for biological control is a viable option.