UW Madison Department of Plant Pathology
1630 Linden Drive
Madison, WI 53706

January 2006

White Mold of Soybean

Adapted from: *Soybeans: Improvement, production, and uses*
Dr. Craig Grau, Dept. of Plant Pathology, Univ. of WI-Madison

White mold, or Sclerotinia stem rot of soybean, is a chronic to epidemic disease of soybean grown throughout the world. White mold was reported first in the USA in 1924, but it was not until 1948 that the disease was observed in central Illinois, a major soybean production area. Beginning in 1990, white mold became widespread in each of the Great Lakes States and by 1992, was prevalent throughout the North Central Region of the USA. White mold has progressed from a sporadic disease of localized importance, to an annual threat to soybean production throughout the upper North Central Region.

Pathogen
White mold is caused by *Sclerotinia sclerotiorum*, a long-lived soil borne fungus. The fungus is easily recognized by the presence of the fluffy white mycelium that develops on the surface of stem lesions. Sclerotia, or fruiting bodies, range in diameter (1/16 to 3/16 inch) and length (1/8 to 1½ inches) and are observed internally and externally associated with stems and pods.

White mold infects many broadleaf plants although varying degrees of susceptibility are found among these potential hosts. Common hosts include green bean, cabbage, sunflower, and a number of other cultivated crops as well as many broadleaf weed species. Examples of non-host crops are corn, small grains, and all forage grasses. White mold is frequently most severe when soybean is grown in rotation with other susceptible crops.

Symptoms and Losses
Symptoms and signs of white mold normally do not appear until early reproductive stages. Wilt and eventual death of upper leaves at growth stages R3 to R4 are the first canopy level symptoms of white mold. Leaves become grayish green as necrosis begins and eventually turn brown and frequently remain attached to stems even past maturity. At harvest, diseased stems are characterized by differing degrees of pod development. Pods have a white appearance, are smaller, and form fewer seeds that are frequently moldy seeds and shriveled. Diseased plants stand out at harvest as “bleached white” stems in contrast to normal plants especially if the soybean cultivar has a tawny stem phenotype.

Management
White mold is best managed by an integrated approach of selecting soybean cultivars with the highest level of resistance and adjusting cultural practices to minimize environmental factors that favor disease development. This approach requires a coordinated plan that matches the level of resistance in a soybean cultivar to expected disease potential and cropping practices that influence 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.

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 a wide row spacing.

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. Rotation with nonhosts such as small grains resulted in fewer of apothecia formed under the soybean canopy. The population density of apothecia was greatest 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 chemical fungicide options exist for control of white mold. Thiophanate - methyl (Topsin® M) will reduce the incidence of white mold if applied during flowering and early pod formation and the product penetrates into the lower regions of the canopy to protect pod tissues. Thiabendazole, (TBZ) applied to seed, is effective against seed borne inoculum of *S. sclerotiorum*. The use of chemical 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.

White mold infected plants in the soybean canopy

Closeup of sclerotia (black structures) and white mycelium on necrotic stem tissue.

More information on soybean diseases and production can be found at:
http://www.plantpath.wisc.edu/soyhealth
http://soybean.uwex.edu
Pest Management in WI Field Crops-2006 http://cecommerce.uwex.edu

Contacts:Craig Grau, cg6@plantpath.wisc.edu 608-262-6289
John Gaska, jmgaska@wisc.edu 608-262-8273