White Mold on Beans

Symptoms

Sclerotinia white mold attacks a very wide range of host plants, more than 360 species of dicotyledons. Symptoms are usually first visible about one week after full bloom because blossoms generally are the first part of the plant to be colonized by the fungus. Leaves, stems, and pods in contact with the colonized blossoms can then become infected, provided moisture is present. Initial symptoms on these tissues are pale colored, water-soaked lesions. These lesions enlarge and within a few days, become covered with a white, cottony fungal growth. Leaves of severely diseased plants become yellow and eventually turn brown and fall off. As the disease progresses, the infected plants wilt and the leaf canopy opens. The fungus may eventually invade and kill all above ground parts of the plants.

The fungus can attack all parts of the plant via ascospores, or via direct infection from germination of sclerotia on the roots or next to leaves at the soil surface. In wet humid growing seasons, losses in yield and quality in the bean crop can be extensive.

Pods, when they touch the soil, may be infected directly by germinating sclerotia or pod infection may result from ascospore infection of the dead flower on the tip of the pod (Figure 1).

Following main stem infection by *Sclerotinia*, the whole bean plant may collapse and yield loss could be total for that plant (Figure 2).

Under very humid conditions, the white mold of the fungus can be seen growing on the outside of the pod. Large quantities of irregularly shaped hard black sclerotia are produced in and on the pods and stems in the bean crop.

Fig. 1. Lesions on pods are initially dark green and water-soaked and rapidly increase in size, become slime and kill the entire organ.

Fig 2. Entire plants killed by white mold.

Prepared by Dr. Rosa M. Muchovej[1] and Dr. Ronald D. French[2]
[1]Field Crop Agronomist (Fort Myers, Florida) [2]Assistant Professor and Extension Plant Pathologist (Amarillo, TX)
Texas A&M AgriLife Extension Service; The Texas A&M System December 7, 2016

Causal Agent

A fungus named *Sclerotinia sclerotiorum* is the causal agent of white mold of beans. Mycelium is clear, septate, and branched. It produces sclerotia, or compact forms of mycelia, that serve as a survival structure as well as a "reproductive structure" for the fungus, once the conditions are appropriate for mycelial growth. Sclerotia are globose and cylindric, with a black outer rind and a white inner cortex.

Inoculum Source and conditions

These sclerotia can last for up to 5 years in the soil and may be particularly destructive to following sunflower, safflower and canola crops under favorable disease conditions of temperature, light, and moisture. Sclerotia can germinate and produce apothecia, containing asci from which ascospores are released by a "puffing' action. Ascospores, in turn, germinate and colonize surrounding tissue. Infected tissues are rapidly killed and become dry and bleached. The fungus continues spreading by mycelia growth which then produces more sclerotia, perpetuating the source of inoculum.

Dissemination of *Sclerotinia sclerotiorum* occurs mainly by aerial transport of ascospores. Irrigation water can spread mycelium, ascospores, and sclerotia. The pathogen may also be transmitted by infected seed.

Senescent bean flower are usually a common source of exogenous energy for ascospores to invade intact healthy tissue. Therefore, bean plants normally only become infected after flowering is initiated.

Ascospores can survive on plant surfaces for up to 2 weeks, and mycelium in infected blossoms may remain viable for up to a month.

Control

There are some cultivars that are less susceptible to the disease, such as Ex Rico 23; disease is also avoided by upright cultivars with open architecture. The common bean is not known to be immune to white mold.
Successful control of white mold with fungicides depends upon spraying at the proper time and completely covering the plants with the chemical, especially inside the plant canopy. Applied in this way, benomyl has proved superior to other commercially available, registered fungicides. Application of fungicides, such as benomyl, is recommended during the flowering period. Spray applications before (during lush, viny growth) or after flowering are generally not effective.
Rotation with non-host crops, such as cereals and corn may alleviate disease incidence. Weed control is recommended. Practices that dry the canopy or the soil, such as planting rows parallel to the prevailing wind, and wider row spacing, as well as adequate irrigation and nitrogen fertilization are recommended. Timely harvest, with subsequent rapid cooling and storage of healthy pods at 7-10C, can provide simple and effective control of white mold in snap beans.

Prepared by Dr. Rosa M. Muchovej[1] and Dr. Ronald D. French[2]
[1]Field Crop Agronomist (Fort Myers, Florida) [2]Assistant Professor and Extension Plant Pathologist (Amarillo, TX)
Texas A&M AgriLife Extension Service; The Texas A&M System December 7, 2016