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White Mold of Beans
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WHITE MOLD OF BEANS

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WHITE MOLD FUNGUS DISEASE is frequently found in Michigan bean fields. Greatest damage ordinarily occurs in fields with heavy vine growth under conditions of high humidity and abundant rainfall—the same conditions that favor a good bean crop. The disease was especially destructive to the Robust and Michelite Navy bean varieties. These varieties developed very heavy intertwining vine growth forming a solid leaf canopy over the entire field—an ideal environment for plant infection.

Attempts in the 1950's to control white mold with fungicides failed. Instead, the heavy losses sustained by the vine-type varieties were reduced through hybridization by developing varieties that would escape severe injury from white mold through a structurally designed growth habit. The upright, bush habit with exposed floral structures of the, Sanilac, Seaway, Gratiot and Seafarer varieties were the result of this development. But even these varieties are subject to damage when plant growth is heavy.

The Pathogen

White mold is caused by the fungus *Whetzelinia sclerotiorum* (Lib.) Korf and Dumnot (*Sclerotinia sclerotiorum* (Lib.) DeBary). This fungus is widely distributed throughout the United States and attacks practically all vegetable crops, soybeans and some ornamentals.

The fungus produces small, black bodies (sclerotia) on and in the stems and pods of infected plants. At harvest time, the sclerotia scatter over the land; those that are buried by plowing may lie dormant for several years. Under favorable conditions, small fruiting structures (apothecia) are produced on the surface of the soil. Ascospores discharged from the apothecia are carried by air currents to the bean plant.

The sclerotia are believed to be the primary overwintering structures of the fungus, and the ascospores the primary source of inoculum of beans in Michigan. Initial infections occur in the canopy on either older flowers or on leaves and stems that have died from other causes. Direct infection of healthy pods and leaves generally results from an infected older flower that has fallen onto healthy plant tissues.

Symptoms

White mold appears first as small, water-soaked spots on the leaves and stems. These spots enlarge rapidly under cool, moist conditions. In a day or two, white masses of mold appear on the infected spots. The mold soon turns gray or brown, and small black sclerotia appear within and on the infected plant. The fungus may girdle the main stem or its branches and cause the plant or plant parts to wilt and die. The leaves often turn bright yellow and later brown. Infected pods become soft and mushy. Later the pods dry out, becoming light and shrivelled. If the plant is attacked early, no pods may be set.

Environmental Factors

In Michigan, white mold epidemics have occurred after exposure to several continuous days of high humidity or wet weather and above-average seasonal temperatures. The sclerotia germinate and produce apothecia under a wide range of temperature conditions (50° to 77° F is optimal). Abundant rainfall during June and July is conducive to apothecial production because water saturation of the soil is necessary.

Ascospores can survive for a long time on plants in the field. Free moisture is required on the plants for ascospore germination and the infection process to take place. A 48-hour period of continued wetness is required for infection and establishment of the disease in air tempera-

tures from 59° to 68° F, but only 9 hours of continued wetness is required at 77° F.

Resistance

All bean varieties are susceptible to white mold. Observation indicates a greater tolerance in the Sanilac and Gratiot varieties than in Seaway and Seafarer. This difference may be related to the earlier maturity of Seaway and Seafarer which could be flowering and maturing at a time more favorable for ascospore germination, plant infection and disease development.

Control

Allow at least 3 years between bean crops, and plow under all infected debris. Use corn, small grains and hay crops in the rotation.

To provide conditions that will allow wet plants to dry out rapidly, maintain proper spacing between the rows, and avoid crowding the plants in the row.

If necessary, apply a chemical control. However, use chemicals only to prevent or control disease development if you are certain that white mold is or will be a problem.

Chemical Control

Until we can accurately predict when to apply chemicals for disease control, we suggest the bean grower answer the following questions:

1. Does the farm have a past history of white mold?
2. Has the field been worked but not plowed since the last crop of beans?
3. Is there another source of inoculum nearby such as a neighbor's bean field or a woodlot where apothecia may be produced?
4. Has the soil in the field been continuously moist during June and July?

5. Have the plants been exposed to continued wetness and air temperatures between 59° and 68° F for more than 48 hours, or have the plants been exposed for shorter periods at air temperatures above 70° F (fewer hours of exposure are needed for infection at the higher temperature)?

6. Are the plants in early bloom to full bloom?

If you answer yes to the above questions, or if there is a prediction for several days of wet weather and seasonally high temperatures (item 5), then plan to spray for disease control immediately.

Be on the lookout for disease alerts from your Cooperative Extension Service. Programs are being developed to predict more accurately when to apply chemicals to control white mold. Your county Extension agricultural agent can supply the latest information on EPA approved chemicals for the control of white mold.



Early symptoms of white mold.



White mold on a bush bean. Note the dead leaves and stems.



White mold. Note sclerotia on pods; control on left.



White mold on beans in row.



White mold infected bean (left); healthy (right).



White mold infected leaves and pods; leaf infection resulted from an infected blossom that fell on leaf.

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