Bacterial Blight of Beans
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4 pages

# BACTERIAL BLIGHT OF BEANS

*Blighted area in Navy bean field.*

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*Extension Specialist and USDA-SEA/AR-Research, respectively*

## What is Bacterial Blight?

Bacterial blight is a collective term used to describe the symptoms on beans caused by one or more species of bacteria. The species of concern to Michigan bean growers are *Xanthomonas phaseoli*, *X. phaseoli* var. *fuscans* and *Pseudomonas phaseolicola*, which cause common blight, fuscous blight, and halo blight respectively (Figures 1-7). All are seed-transmitted and spread from plant to plant by rain, hail, and wind. All are believed to survive in plant debris in the soil for at least one year.

Plant infection occurs through natural leaf openings, or through wounds created by hail, blowing soil particles, sucking insects, or mechanical injury. Pod infection can occur rapidly, after which developing seeds are invaded by the bacteria. Such infected seed, if planted, will almost certainly transmit blight to the resulting bean crop. All Michigan bean varieties are susceptible to common and fuscous bacterial blights.

## Common and Fuscous Bacterial Blight

The first disease symptoms of Common and Fuscous bacterial blight are brown necrotic lesions surrounded by a bright yellow halo at the leaf margin or interior of the leaf (Figures 1, 2). Under warm, wet conditions, the lesions rapidly enlarge to cover most of the leaf, giving the plants a "burned" appearance. Pod lesions appear as small, brown "scabby" spots (Figure 5). Common and fuscous blights cannot be distinguished on symptoms alone.

The diseases ordinarily begin early in the development of the plant but symptoms are not obvious until about blossom. Spread from plant to plant is then very rapid.

Internal seed infection occurs when the pods become infected, and this seed then serves as a source of infection the following season (Figure 7).

## Halo Bacterial Blight

Halo bacterial blight develops more rapidly during the cooler temperatures early in the growing season. Only the colored bean types such as red kidney, cranberry, and yelloweye are susceptible, although Montcalm dark and Mecosta light red kidney varieties are halo blight tolerant. This disease appears early in the field and remains active throughout the growing season. The characteristic symptoms (Figures 3-4) of plant infection are necrotic lesions surrounded by prominent greenish-yellow zones or halos on the leaves. In later stages of disease development, systemic chlorosis (yellowing) of the entire plant may occur. Pod infections develop rapidly under cool, wet conditions, causing circular dark green "greasy" lesions to appear. Such lesions often have glistening

bacterial ooze on their surfaces. Bacteria may then invade the developing seeds (Figure 6). If contaminated seeds are planted, they produce infected seedlings that serve as sources of secondary inoculum in the field. Although the application of copper-containing sprays effectively reduces the secondary spread of halo blight in the field, the sprays do not prevent the initial establishment of the disease that results from planting of infected seed. For this reason, only blight-free seed should be planted.

## Selecting Blight-free Seed

You can substantially reduce the risk of planting blighted seed if you follow three simple, but effective practices:

1. Purchase certified seed — A list of growers is available from the Michigan Crop Improvement Association, MSU, East Lansing, MI 48824.
2. Know the history of your seed — If certified seed is not available, be sure that the seed came from bacterial blight-free fields. Do not buy seed from fields known to have contained blight.
3. Have your seed lots tested for blight contamination — Submit samples to the Michigan Department of Agriculture Laboratory, 1615 S. Harrison, East Lansing, 48823. Approximately 5 pounds of bean seed is needed for this test. This test is for detecting the presence of bacterial blight organisms inside the seed. All seed should be chemically treated before planting as explained below. There is a small charge for this service.

## Seed Treatment

Seed treatment materials for controlling bacterial blight producing organisms on the surface of seed, are relatively inexpensive and easy to apply. Seed treatment does not eliminate internal bacterial infections. A water solution containing a bactericide should be used to prepare a standard seed treatment slurry containing fungicide and insecticide. Planter-box applications of these chemicals should be used only in plate planters, and only if slurry-treated seed cannot be obtained for planting. Do not use planter box seed treatment material in air planters.

The bactericide, streptomycin, must be present to kill the blight bacteria on the seed surface and in cracks of damaged seeds; the fungicides, captan or thiram, protect the seed from damping-off and seed decay pathogens; and the insecticides, diazinon or lindane, protect the seed and seedling from the seed corn maggot.

### *Slurry Preparation*

Step 1 — Prepare a 5% (active ingredient) solution of streptomycin by adding 13.3 oz. of either Agri-strep 500 (Merck) or AS-50 (Pfizer) to 1 gallon of water.

Step 2 — Add a recommended fungicide and insecticide to the 5% streptomycin solution in the amount required for your slurry treater so that it will deliver:

Fungicide — captan, 1½ oz.-active ingredient/100 lbs. seed or thiram, 1½-2 ozs.-active ingredient/100 lbs. seed; and

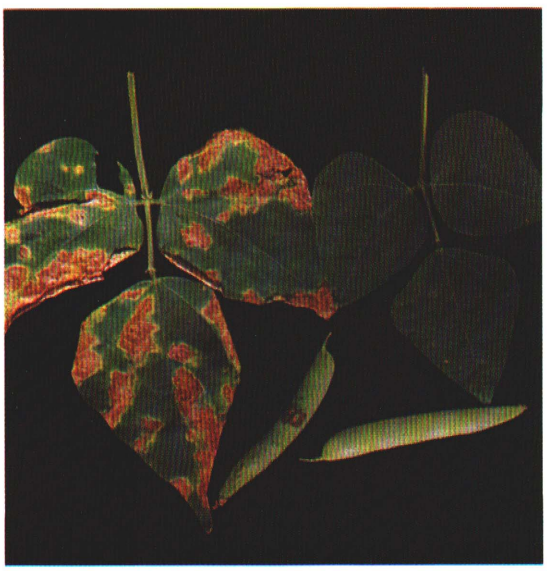
Insecticide — diazinon, 3 oz.-active ingredient/100 lbs. seed or lindane, 1 oz.-active ingredient/100 lbs. seed.

Step 3 — Keep slurry agitated in the supply tank to maintain a uniform mixture.

Combination fungicide-insecticide chemicals for slurry seed treatment are available commercially. When purchasing a commercially prepared mixture, make certain the proper amount of active ingredients are applied to the seed.

***Figures 1-7. Bacterial blight symptoms. (1) Common or fuscous blight-infected Navy bean plant. (2) Common or fuscous blight on leaves and pods. (3) Halo blight-infected red kidney bean plant. (4) Halo blight-infected leaves. (5) Bacterial blight-infected pods. (6) Dark red kidney bean seeds: left — healthy; right — infected. (7) Common or fuscous blight-infected Navy bean seed: left — infected; right — healthy.***

1.



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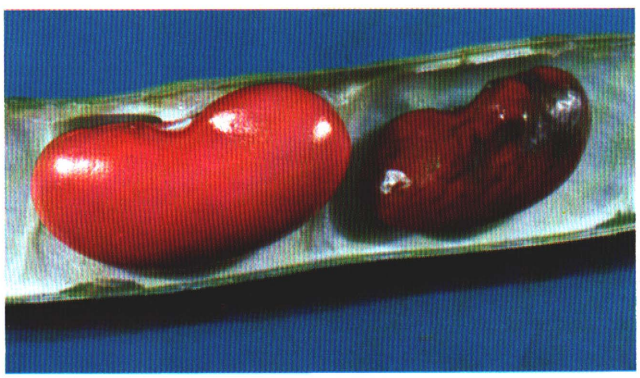

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## Management Practices to Eliminate and/or Prevent Bacterial Blight

Blight-free field beans can be grown by following these recommended farming practices. Elimination of any one recommendation increases the chances of bacterial blight in the field. Seed producers should pay particular attention to the following recommendations:

**1. Plant high-quality disease-free seed**

Use only the best quality seed, free of internal blight infection.

**2. Treat seed with a bactericide**

Chemically treat all bean seed prior to planting with a slurry containing a bactericide, a fungicide, and an insecticide. This combination of chemicals should protect the plant from infection by blight-causing bacteria present on the surface of the bean, prevent seed decay and damping-off, and protect seed and seedlings from the seed corn maggot. Do not use treated seed for food or feed.

**3. Do not plant beans after beans**

Practice a 2- to 3-year crop rotation, not only to protect the seed from blight organisms that are believed able to survive in the soil for 18 months or more, but also to protect the plant from other disease-producing organisms that build up in the soil when beans follow beans too closely in rotation.

**4. Plow down all bean refuse after harvest**

Fields with infected bean straw should be deep-plowed as soon as possible after harvest to prevent contaminated plant leaf tissue and straw from being carried by strong winds and water to other parts of the farm where beans may be planted the following year. This practice is especially important if a 2- to 3-year crop rotation cannot be followed. Fields subject to wind and water erosion should be planted with a cover crop before winter.

**5. Prevent field infection by isolation**

Beans grown for seed should not be planted adjacent to neighboring commercial bean fields because blight may spread from the adjacent field by wind, water, man, or animals. They should also not be grown where water runoff from last year's contaminated bean field can contaminate the new (unused) field. Because westerly winds prevail in Michigan, greater separation should be made to the west side of fields. The more isolated the field, the greater the chances of avoiding this infection. By all means avoid unnecessary traffic in bean fields.

**6. Use good herbicides to control weeds**

Weed-free fields permit aeration around the plants so that they dry off more quickly. The shorter the exposure to continued wetness, the shorter the blight infection periods and consequently the less infection in plants. In addition, some weeds may actually harbor bean blight bacteria.

**7. Stay out of fields as much as possible**

Never work in fields while the plants are wet with dew or rain, since bacteria spread and infection takes place easiest under these conditions. Furthermore, every time you enter a field, there is a chance of disease spread by movement of animals, humans, or equipment in the field.

**8. Copper spray for halo blight only**

A chemical spray program should not be necessary if the preceding recommendations are followed. Only in the case of halo bacterial blight is there evidence that a copper spray will help prevent the spread of blight. We do not have sufficient evidence to recommend spraying for control of common and fuscous blight on beans.

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