UNIVERSITY OF KENTUCKY College of Agriculture, Food and Environment

COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Plant Pathology Fact Sheet PPFS-VG-16

# Bean Diseases

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## Anthracnose

Anthracnose can reduce bean quality, as well as yield. Losses can be severe during cool, rainy weather.

### Cause, Symptoms, and Signs

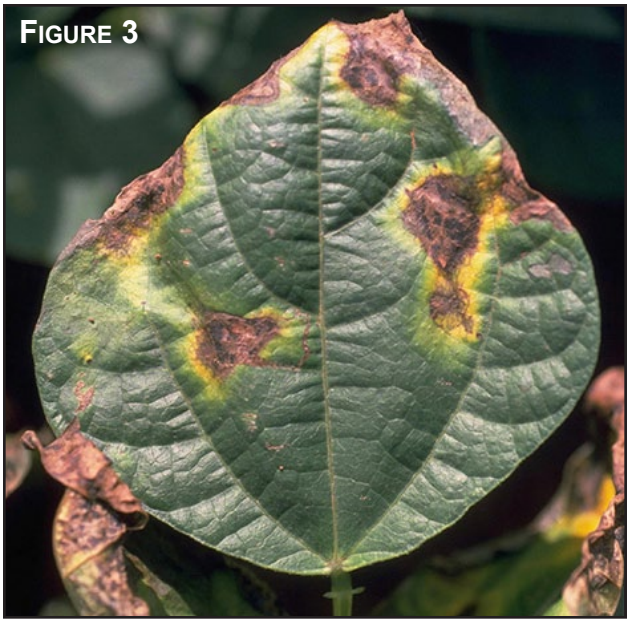
Anthracnose is caused by the fungus *Colletotrichum lindemuthianum*. This disease appears on all aboveground parts of the plant but rarely on roots. Lesions generally are dark brown and may contain pink spore masses during moist weather. Elongate, angular spots appear on lower leaf veins. As the fungus spreads into surrounding tissue, lesions eventually appear on the upper side of veins. Affected seeds become discolored. Plants grown from infected seed may develop lesions on the cotyledons.

The most striking phase of the disease occurs on pods. Small brown spots appear and rapidly enlarge into dark sunken lesions (Figure 1). Often lesion margins will be dark brown while lesion centers remain light in color.

**Figure 1**. Dark, sunken anthracnose lesions on bean pods.

### Disease Management

- Rotate 2 years or longer to non-legume crops.
- Plant only disease-free seed since the fungus can be carried on seed. Do not save seed from diseased plants.
- Follow a good weed control program.
- Deeply incorporate (plow under) or remove plant residue promptly after harvest to reduce overwintering of the fungus at the site.
- Do not work in plantings while foliage is wet.
- Fungicide sprays can also be helpful. Refer to one of the following UK Extension publications for current fungicide recommendations: ID-36 (commercial growers) or ID-128 (home gardeners).



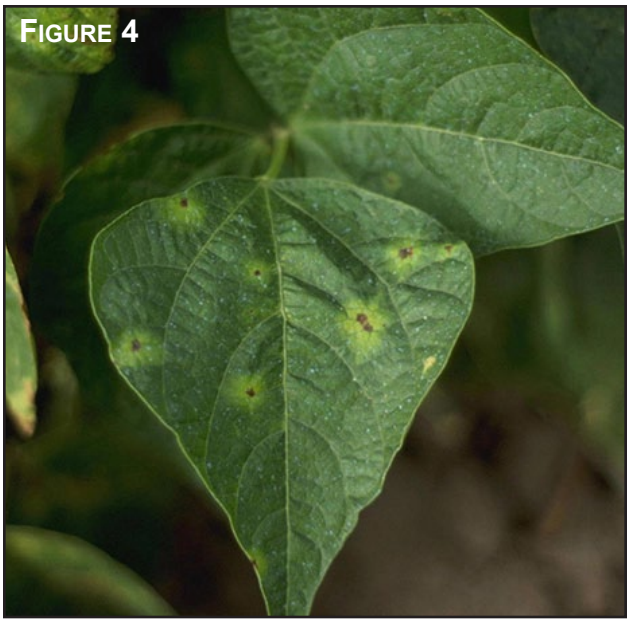




**Figure 2.** Bacterial brown spot lesions turn brown and drop out, giving leaves a shot-hole appearance. **Figure 3**. Common bacterial blight lesions are initially water-soaked, turning brown with a narrow yellow border as the disease progresses. **Figure 4.** Halo blight spots are often surrounded by a large yellow halo.

## Bacterial Blights

Bean blights, caused by various species of bacteria, occur in most of the bean growing areas of the world. Under favorable weather conditions, these bacteria can spread rapidly through a field causing defoliation and pod damage.

### Cause and Symptoms

***Bacterial Brown Spot***

This disease, caused by *Pseudomonas syringae* pv. *syringae*, is more common on lima beans than other bean types. Small, watersoaked spots on leaves become red-brown in color. Spot centers dry out, turn grey, and may fall away (Figure 2). Veins on the underside of the leaves may turn red-brown. Spots on stems and pods are more elongated than those on leaves.

***Bacterial Wilt***

The symptoms of bean bacterial wilt, caused by *Curtobacterium flaccumfaciens* (=*Corynebacterium flaccumfaciens*), are similar to those of common blight. In addition, plants are stunted, and leaves droop and appear wilted.

***Common Bacterial Blight & Fuscous Blight***

Common bacterial blight, caused by *Xanthomonas campestris* pv. *phaseoli* (=*Xanthomonas phaseoli*), and fuscous blight, caused by *X. phaseoli* var. *fuscans,* have similar symptoms. Lesions on leaves first appear as small, watersoaked, light green areas. Leaf spots become dry and brown with a narrow yellow halo (Figure 3). As the disease progresses, spots may expand, eventually killing leaves. Similar watersoaked spots form on pods and can develop into broad irregular blotches. In humid weather, a yellow bacterial crust covers the surface of the diseased area. The margin of the spot or the entire spot may be red-brown in color. In severe attacks, pods may shrivel and seeds may not develop.

***Halo Blight***

This blight, caused by *Pseudomonas syringae* pv. *phaseolica* (=*Pseudomonas phaseolicola*), is similar to common blight, except there may be a large yellow halo (up to 1/2 inch in diameter) surrounding the leaf spot (FIGURE 4). Newly developing leaves may show yellowing due to systemic infection and ,plants can die rapidly. Leaf symptoms without halos may develop if temperatures are relatively high. Symptoms on pods are also similar to those of common blight; however, the bacterial crust on the surface of the spots may be white (halo blight) instead of yellow (common bacterial blight).

## Disease Development

These bacteria overwinter in seed, plant debris, and susceptible weeds. When infested seeds are planted, an early outbreak may occur on the new crop. The bacteria can spread to healthy plants via splashing rain, wind-blown soil particles, or on tools and implements moving through wet fields. The bacteria enter through natural openings (e.g. leaf stomates) or through wounds (e.g. those caused by chewing insects and blowing soil particles). The brown spot bacterium can overwinter in other plants such as lilac or members of the *Prunus* group. Once introduced, these bacteria can colonize leaves without causing symptoms, and then cause sudden crop damage following heavy rains. Therefore, disease management will be centered around keeping the population of bacteria low and out of the field.

## Disease Management

- Use commercially grown, certified disease-free seed. Planting locally saved seed is very risky because the seed could harbor bacterial pathogens.
- Commercial growers should purchase seed that has been treated with streptomycin.
- Rotate beans to non-legume crops leaving 2 to 3 years between bean crops.
- Do not work in bean plantings when plants are wet.
- Spray bean plants at the first sign of disease with a fixed copper bactericide. Refer to Extension publications ID-36 (commercial growers) or ID-128 (home gardeners) for current recommendations.

# Stem and Root Rots

The pathogens that decay lower stems and roots of green beans are present in almost all soils, but they build to higher levels with continuous cropping of beans in the same site. These organisms can survive for long periods of time in the soil and may spread from place to place via movement of soil. Most root rots are favored by cold or wet soils. If plants are strong and vigorously growing, stem and root rot pathogesn are generally less problematic. Virus-infected garden beans may be damaged more by root rot pathogens than beans without a virus.

## Cause and Symptoms

***Rhizoctonia Root Rot***

*Rhizoctonia solani* is a soil-borne fungus that attacks plants of almost any age. This fungus causes seed rot and damping-off of seedlings, as well as stunting, yellowing, and death of older plants. Elongate, sunken, red-brown lesions develop on roots and stems at or below the soil line (FIGURE 5). Lesions may enlarge to girdle the stem, killing roots and weakening the top of the plant. Infected plants may be stunted and leaves may turn yellow and die.

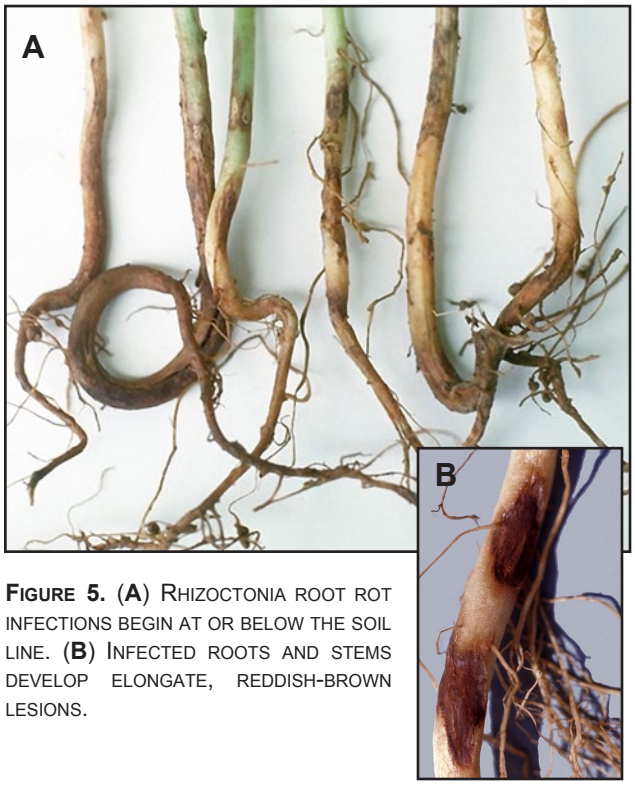



**FIGURE 5.** (**A**) RHIZOCTONIA ROOT ROT INFECTIONS BEGIN AT OR BELOW THE SOIL LINE. (**B**) INFECTED ROOTS AND STEMS DEVELOP ELONGATE, REDDISH-BROWN LESIONS.

**Figure 6.** Fusarium root rot. Note the red discoloration of the taproot and lateral roots typical of this disease.

***Fusarium Root Rot***

*Fusarium solani* f. sp. *phaseoli* prefers warm soils so this fungus attacks beans later in the growing season. Plants are stunted or yellowed but not usually killed. The taproot and lower stem show reddish lesions, which later turn brown to black. The red-colored taproot tip and lateral roots may decay, shrivel, and die. Rootlets may develop above the lesion, enabling the plant to survive.

***Pythium Root Rot***

Pre-emergence damping-off and seedling wilt of beans is often caused by one or more species of the fungus-like organism, *Pythium* (a water mold). Water-soaked lesions may appear on the stem and branches where the affected tissue becomes soft and slimy. When the stem is girdled, the plant wilts suddenly and dies. Older plants may develop dark brown lesions instead of soft rot, and may be stunted or die prematurely.

## Disease Management

- Plow under cover crops 4 to 6 weeks prior to planting in order to promote thorough decomposition prior to planting beans.
- Avoid planting seed when soil temperatures are below 65° F, if possible.
- Avoid planting beans in the same site year after year; long rotations may help reduce the build-up of these decay pathogens in the soil.
- Plant fungicide-treated bean seed, especially when planting into cool soils (below 65° F).
- A fungicide applied immediately before planting (e.g., a band or furrow treatment) can reduce losses to some seedling diseases.
- Shallow planting may be helpful so plants emerge more quickly.
- Most bean varieties are susceptible to root rots, but some can be more susceptible than others. For example, 'Kentucky Wonder' pole beans and 'White Half-Runner' beans are among the most susceptible.

# Rust

Bean rust is more important on dry beans and pole snap beans, but it can also affect bush snap and lima beans. In Kentucky, bean rust normally occurs in late summer.

## Cause, Symptoms, and Signs

Bean rust is caused by the fungus *Uromyces appendiculatus*. Rust fungal structures or pustules tend to occur most numerously on leaf undersides, less abundantly on pods, and sparingly on stems. Infection is first evident as tiny, almost white, slightly raised pustules that later become the distinct, reddish-brown, tiny circular "cushions" typical of rust fungi (Figure 7). Each pustule is comprised of a powdery mass of rust-colored spores. When leaves become heavily infected, they shrivel and fall from plants.

**Figure 7.** Reddish-brown pustules typical of bean rust. Pustules are comprised of masses of powdery, rust-colored fungal spores.

## Disease Development

The rust fungus exists between crops in the form of spores, which initiate infections in the subsequent crop. Cloudy, humid days with temperatures between 60° and 75° F are favorable for disease development. Under these conditions, an infection of bean rust can produce new spores in 10 to 15 days. *Uromyces* spores may blow long distances and infect plants where beans have not been previously grown. However, it has been shown that continuously planting beans in the same field results in higher rust inoculum levels and result in increasing damage to subsequent crops. In Kentucky, rust is much more common in late summer and early fall than other times during the season.

## Disease Management

- Choose rust-resistant bean varieties.
- Rotate out of beans for 3 to 4 years.
- Preventative fungicide sprays can be especially valuable in fall plantings. Refer to Extension publications ID-36 (commercial growers) or ID-128 (home gardeners) for current recommendations.

## VIRUSES

Viruses can cause serious damage to Kentucky bean plantings. Common virus diseases include bean yellow mosaic virus (BYMV) and bean common mosaic virus. While beans can become infected by multiple viruses, BYMV seems to be the one most frequently observed.

## Symptoms

Although symptoms of BYMV may vary depending on time of infection, bean variety, and virus strain, symptoms generally include one or more of the following: crinkling, downward cupping (FIGURE 8), yellow mottling (FIGURE 9), and dead areas along the veins of infected leaves. Death of vine tips and new leaves may occur on pole and half-runner bean types (FIGURE 10). Vines may die back several feet, thereby destroying bean plants. Plants affected by other diseases or nutritional problems may show some symptoms similar to those of a virus, so laboratory diagnosis is often advisable.

**FIGURE 8.** CRINKLING AND CUPPING OF LEAVES DUE TO BEAN YELLOW MOSAIC VIURS. **FIGURE 9.** MOSAIC SYMPTOMS MAY OCCUR ON SOME VIRUS-INFECTED PLANTS. **FIGURE 10.** DEATH OF VINE TIPS MAY OCCUR ON POLE AND HALF-RUNNER BEANS INFECTED WITH BEAN YELLOW MOSAIC VIRUS.

### Disease Development

BYMV is carried to beans by aphids. These insects pick up the virus from other infected plants, mainly red clover, white clover, or other legume weed hosts growing near the planting. Earlier plantings of beans infected with BYMV also serve as a source of the virus.

### Disease Management

- Use certified disease-free seed.
- Use varieties resistant to bean common mosaic and bean yellow mosaic
- Plant bush beans, whenever possible. In general, half-runner and pole beans are highly sensitive to these viruses.
- Avoid planting near weedy borders, clover, and other legumes, as well as older bean plantings.
- Increase the seedling rate to help sustain yields when a high incidence of viruses occurs early.
- Use reflective mulches to disturb aphid flights and reduce virus transmission.
- Control weeds in the planting, fencerows, and other areas.
- Plant a barrier of sweet corn or other tall-growing crop upwind of beans.
- Stagger planting dates to increase the chances that some plantings will escape high aphid activity; however, be aware that sequential plantings can also harbor the virus.

## Additional Resources

The following University of Kentucky publications are available at county Extension offices, as well as on the Internet.

- Home Vegetable Gardening in Kentucky, ID-128
http://www.ca.uky.edu/agc/pubs/id/id128/id128.pdf
- Vegetable Production Guide for Commercial Growers, ID-36
http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm

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*Photos: Howard F. Schwartz, Colorado State University, Bugwood.org (figures 1, 2, 3, 4, 6, & 7); Cheryl A. Kaiser, University of Kentucky (figure 5A); John R. Hartman, University of Kentucky (figures 5B, 8 & 10); Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org (figure 9)*

Revised from the original fact sheet, *Bean Diseases* (PPA-13), written by W.C. Nesmith, J.R. Hartman, and C.A. Kaiser

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