



Extension FactSheet

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Damping-off and Root Rot of Beans

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Root rots, damping-off before and after seedling emergence, and seed rots are destructive diseases of green, snap, lima, and dry beans. These diseases are caused primarily by soilborne fungi. Significant losses may occur to susceptible varieties, especially if cool, wet weather conditions prevail for the first few weeks after seeding and then are followed by hot, dry weather. Disease incidence and severity often vary greatly, even in areas with a history of root rot. In the same growing season, it is not uncommon to lose a crop completely and then re-seed and experience no problems. This situation results from changes in biological, environmental, and soil conditions. Since there are no commercially acceptable resistant varieties, growers should learn how to recognize these diseases and use a combination of management practices to minimize potential losses.

Symptoms

Damping-off before emergence results from fungal attack of germinating seeds and/or young seedlings while they are still in the ground. Infected seeds may fail to germinate, become soft and mushy, and finally disintegrate. Slightly darkened water-soaked lesions may be visible on stems of young seedlings. Infected areas enlarge quite rapidly, and seedlings may die shortly after infection, prior to emergence from soil. Roots or stems of seedlings that have already emerged also can be attacked at or below the soil line resulting in damping-off. Infected roots are usually discolored or rotted and sometimes reddish-brown lesions develop on the tap root. Infected stem tissues are soft and colorless to dark-brown. Basal portions of invaded stems may be much thinner than the areas above the lesion, a condition called “wire stem.” As a result, the seedling may fall over and die. Damping-off is a major cause of poor stand establishment in bean plantings. Older plants can also be attacked by these fungi. Later infections are usually confined to roots, which may result in stunting, wilting, or plant death. To diagnose bean root rots, suspected plants should be carefully dug and washed, because

pulling plants may leave tissues with characteristic symptoms in the soil. If plants are brought to a diagnostic clinic, they should be dug and left intact in soil.

Causal Organisms

Root rots, damping-off, and seed rots are caused primarily by soilborne fungi. Fusarium root rot is caused by *Fusarium solani* f. sp. *phaseoli*. This fungus is capable of surviving long periods in soil, even in the absence of beans, by the production of thick-walled resting spores. Its host is mainly green beans, but lima beans and garden peas are also susceptible. Coarse-textured, acidic and poorly fertilized soils favor development of *Fusarium* root rot. A number of fungi in the genus *Pythium* are capable of inciting seed rot and seedling damping-off. This may vary with environmental conditions and developmental stage of the host. These fungi can survive in soil for many years, either by producing thick-walled resting spores, or in a vegetative condition within crop residues left from previous years. They may also survive by attacking several other garden vegetable crops such as



Figure 1. Fungal attack of bean seedling at the soil surface resulting in damping off. Note constricted stem lesion.

beets, cabbage, peas, melons, squash, and cucumbers. Development of diseases caused by *Pythium* is more prominent under 1) high or low temperatures that are unfavorable to crop growth, 2) excess water and/or nitrogen, or 3) continued cropping of susceptible plants. *Rhizoctonia solani* is another soil-inhabiting fungus causing root rots and damping-off. This fungus overwinters free in the soil or within decayed plant tissues. Aside from bean, its host range includes beets, cabbage, lettuce, peas, pepper, tomatoes, and many others. Warm, relatively dry soil conditions favor disease development.

Management

1. Do not grow beans or other susceptible crops continually in the same location. Continuous cropping of susceptible plants will eventually lead to a buildup of these fungi in the soil. Since they are capable of long-term survival, a rotation of 4–5 years is desirable. Avoid planting beans in fields known to be heavily infested with bean root-rot fungi.
2. Plant beans only on well-drained soils or try to improve drainage. This could be done by improving soil structure and/or installing drain tiles. Subsoiling to a depth below the plowed layer will reduce soil compaction, and improve drainage. Deep plowing of the previous years' crop residues will reduce bean root rot.
3. Delay planting until the soil is warm (above 65°F) and seed shallow to insure rapid emergence. Avoid planting seeds too close together—follow instructions on the seed container. Do not overfertilize, especially with nitrogen.
4. Use of fungicide-treated seeds will minimize problems with damping off and root rots. For current recommendations consult the Ohio Vegetable Production Guide (OSU Extension Bulletin 672).

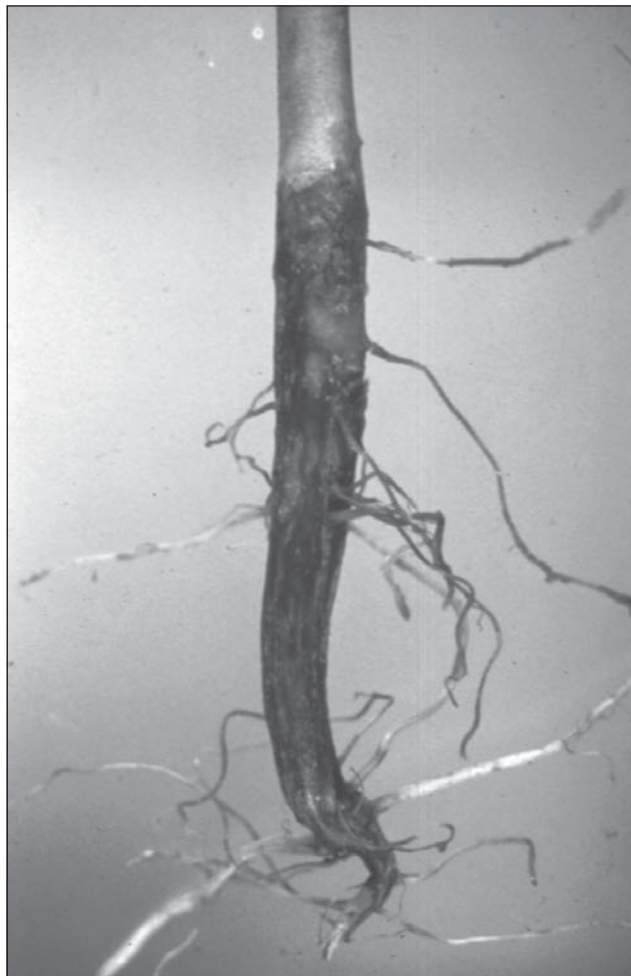


Figure 2. Fusarium root rot of bean with characteristic reddish-brown lesions on both tap and side roots.

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