



## BACTERIAL WILT OF ALFALFA

Bacterial wilt, caused by *Clavibacter* (*Corynebacterium*) *michiganense* subsp. *insidiosum*, subsp. is a very destructive disease of susceptible alfalfa varieties three years old or more. The disease occurs wherever the crop is grown in the United States, except in arid areas without irrigation. Bacterial wilt was first recognized as a distinct disease in Illinois and Wisconsin in 1924. Bacterial wilt has been reported in Canada, Mexico, Chile, Europe, the USSR, the Near East, Japan, Australia, and New Zealand. Damage seldom occurs during the first two years following seeding.



Figure 1. Bacterial wilt caused by *Clavibacter michiganense* subsp. *insidiosum*. Healthy (left) and diseased (right) alfalfa plants.

The bacterium that causes the disease has contaminated soils in many parts of Illinois. Bacterial wilt is favored by cool temperatures and abundant moisture, usually becoming most severe in low, poorly drained areas. Plants weakened by bacterial wilt are more susceptible to winterkill than are healthy plants. Crown injuries may also increase disease levels.

### SYMPTOMS

Bacterial wilt causes a stunting and yellowing of the entire plant. Growth is slow. Diseased plants are dwarfed, with a bunched growth resulting from numerous, spindly, shortened stems and small, light green to yellow leaflets (Figure 1). Leaflets are commonly rounded at the tip and tend to curve upward (a condition called "mouse-leaved"). Affected plants may wilt during the heat of the day and recover temporarily during the cool of the night. Plants may wilt and die rapidly during warm, dry weather. At first, only the tips of the stems droop. This is followed by a more or less complete wilting and finally by the death of the infected plant. Stunting is most evident during regrowth following cutting. Progressively less growth is produced after each cutting. Infected plants usually die beginning in midsummer and into the next hay year. Severely diseased plants rarely survive the winter. Once infection has occurred, susceptible plants generally do not recover.

A sure sign of bacterial wilt is a yellow to dark golden brown discoloration in the outer vascular tissue of the taproot when the bark is peeled. This discoloration is in sharp contrast to the creamy white color of healthy roots. If an infected taproot is cut across just below the crown, scattered yellowish to brownish dots or a ring of discolored tissue are usually evident (Figure 2). As the disease progresses, the entire stele becomes discolored.

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The disease symptoms and death of alfalfa are probably due to the water-conducting vessels being plugged by the bacteria and to the production of a bacterial toxin (a glycopeptide).

## DISEASE CYCLE

The causal bacteria survive in living or dead alfalfa plant tissue in the soil. The bacteria have survived in dry plant tissue or seed for 10 years or more in the laboratory. The bacterial wilt organism is spread in the field by surface water, tillage equipment, mower sickles, infected hay, and animals. A long-distance spread most likely occurs by means of seed and hay.

The infection of plants commonly occurs during cool, wet weather in spring and early summer. The bacteria enter plants through wounds in the roots and crowns produced by winter injury and animals in the soil, or through the cut ends of stems as a result of mowing or grazing. In advanced stages of the disease, bacteria multiply rapidly in crown and stem tissues and are released into the surrounding soil water.

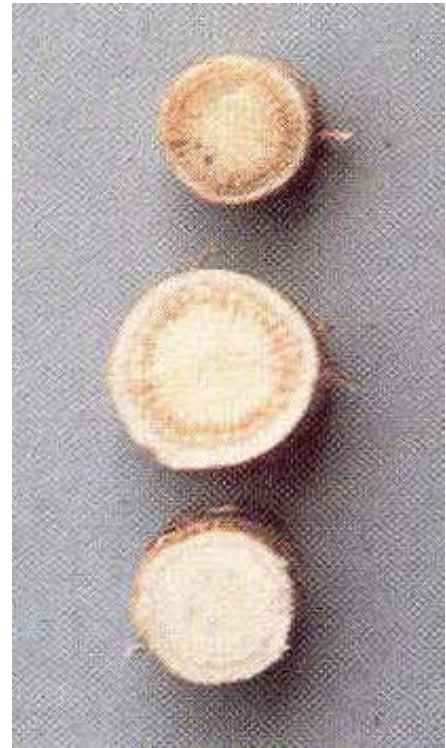


Figure 2. Cross sections of healthy root (bottom) and diseased roots (center and top). Similar symptoms may be caused by *Pseudomonas marginalis* var. *alfalfae* and *Serratia marcescens* (Courtesy F.I. Frosheiser)

## CONTROL

1. The only practical control is to grow adapted, wilt-resistant varieties. This is especially true for an alfalfa stand that is to be maintained for three years or more. Varieties range from completely susceptible to highly resistant. No alfalfa variety is immune to bacterial wilt. Disease resistance may be conveniently divided into four groups: moderately susceptible, moderately resistant, resistant, and very resistant. Moderately susceptible varieties may survive for three years after seeding. Moderately resistant ones are productive up to five years. Varieties vary somewhat in their resistance, but usually remain productive for five to ten or more years. Stands are usually reduced by factors other than bacterial wilt.

For a listing of currently recommended alfalfa varieties which are resistant to bacterial wilt, read Illinois Agricultural Pest Management Handbook (revised annually).

2. Do not plant alfalfa in poorly drained soils.
3. For best yield, harvest at the late-bud to first-flower stage and every 30 to 40 days for succeeding harvests. This results in a rather rapid loss of plants in wilt-susceptible varieties. Less intensive harvesting schedules reduce the loss rate of susceptible plants.
4. Harvest young stands before old stands when using the same equipment. Harvest fields showing wilt symptoms last. Clean equipment with steam before moving from field to field, especially where wilt is present.
5. Mow only when the foliage is dry.

6. Use a program of high, balanced fertility based on a soil test to help maintain plant vigor.
7. Grow other crops for two or three years before reseeding a field to alfalfa.
8. Reduce injury to crowns (livestock movement, equipment, etc) which provide entry wounds and may weaken plants.