

## Important Diseases of Alfalfa In California

R. Michael Davis  
Dept. of Plant Pathology  
Univ. of California, Davis

### Bacterial Diseases

Bacterial wilt (Clavibacter michiganese pv. insidiosum)

Infected plants are stunted and yellow-green. Stems often proliferate. The disease is first evident following cutting-plants are slow to recover and regrow. Internally, the xylem is discolored yellowish brown. When the bark is peeled off the taproots of infected plants, pockets of infection appear on the inner surface of the bark. Bacteria enter plants through wounds in stems, crowns, or leaves. Once infected, a plant does not usually recover and may die in 5 to 8 months. The bacteria are spread by mowers, irrigation water, seed, etc. Bacteria can survive in dry plant tissue or seed for at least 10 years. Most varieties of alfalfa have partly resistant populations but susceptible plants are nearly always present. Besides resistant varieties, other control measures include sanitation and mowing when plants are not wet.

### Fungal Diseases

Damping-off (Pythium, Rhizoctonia, and Fusarium spp)

Symptoms include poor germination and sudden collapse of seedlings with constriction of hypocotyls. The organisms that cause damping-off are ubiquitous and infect many different crop plants. The disease usually occurs in cool weather when the soil is excessively wet. Controls include planting when the soil is at an optimum temperature for seed germination, planting more seeds than necessary to establish a stand, and chemical seed treatment.

Phytophthora root rot (Phytophthora megasperma)

Symptoms first noticeable after cutting because plants are slow to recover; severely infected plants may die suddenly. Lesions develop on tap roots, anywhere from soil surface to 10 inches deep. Lesions appear as dark, wet lesions. A yellowish brown color, which doesn't extend far beyond the lesion, develops internally. The tap and lateral roots are often pruned off. Infection sometimes occurs in the crowns. The fungus requires free water in the soil to produce infectious units called zoospores. Because of this, the disease is usually associated with fine-textured soils or soils with poor internal water percolation. Root rot also develops where a hard pan exists. The fungus is more active in the warm months. Resistant cultivars are available. Other control measures include breaking of compacted layers by deep tillage, land leveling, and reducing the length of flood irrigation runs.

Rhizoctonia root and stem canker (Rhizoctonia solani)

This disease often occurs in circular areas in the field. Young or old fields can be affected. Black, circular lesions develop on roots and/or stems near the soil line. Infected plants are sometimes found in wheel tracks. The fungus is a common soil inhabitant. The disease is most often found in warm areas of the state, especially the Imperial Desert and the southern San Joaquin Valley. Some alfalfa cultivars are more tolerant than others, possibly because they are more vigorous in rooting.

Fusarium wilt (Fusarium oxysporum f. sp. medicaginis)

Fusarium wilt is characterized by rapid wilting of stems, followed by bleaching of leaves and stems. The affected stems may develop a light pink discoloration. Internally, the xylem of both the root system and the stem is streaked reddish brown. Affected plants usually die. Although resistant cultivars are available, a small percentage of plants are susceptible in any population. The disease is most prevalent during first- and second-year growth, with fewer plants affected later. The fungus infests soil indefinitely. Little economic damage occurs in California.

Common leaf spot (Pseudopeziza medicaginis)

Symptoms include circular, dark brown lesions on leaf blades one millimeter or smaller in diameter. Infected leaves turn chlorotic and drop off. The disease is favored by cool, moist weather. It is most common in the spring although it is occasionally found in late fall. The spores are windborne from infected debris on the soil surface. Some cultivars are moderately resistant. Early cutting may minimize leaf loss, which can lower hay quality from the first cutting.

Sclerotinia rot (Sclerotinia spp.)

This disease is found in cool, humid environments. In California it is found in winter and early spring. The fungus invades stems at the soil line and causes rapid wilt of tops. Infected seedlings may die. A white fluffy mass of mycelium grows over the dead plant parts or the soil surface. When the food supply is exhausted, the fungus produces hard black sclerotia on infected tissue. Plant at optimal times to avoid cool, wet weather and maintain three to four year intervals between forage legumes in rotations.

Stagonospora crown and root rot (Stagonospora meliloti)

Perhaps the most serious disease of alfalfa in California, resulting in premature stand decline. Symptoms include a gradual decline in vigor of plants, which have necrotic areas in the crowns. Bark tissue on roots and crowns often cracked. Internally, the affected areas are tan in color with red flecks, which is a diagnostic symptom. Red streaks are also apparent in tap roots below rotted crown. The fungus usually enters the crown through the stems. Inoculum comes from infected plant residue. Spores may be carried in water and in soil on contaminated equipment. Only known control is rotating out of alfalfa for two to three years. Alfalfa and sweet clover are only known hosts.

Southern anthracnose (Colletotrichum trifolii)

Although leaves can be infected, the crown rot phase of this disease can cause noticeable plant decline. The crown rot is bluish-black, often appearing in "V" shaped lesions extending into the root. The fungus spores are spread in irrigation water or during rain. Inoculum comes from infected plant debris in the field or in soil on contaminated equipment. Controls include sanitation and resistant cultivars.

Stemphylium leaf spot (Stemphylium botryosum)

Spots on leaves appear as irregularly shaped tan lesions with sharply defined dark margins. The disease is common in interior valleys and occurs throughout the year in cooler coastal areas. Higher summer temperatures and drier conditions inhibit growth. Defoliation rarely results from anything but a very severe infection. The fungus overwinters in debris from many kinds of plants, not just alfalfa. Some cultivars have a degree of resistance.

Verticillium wilt (Verticillium dahliae)

Symptoms include flagging of individual stems on a plant. Closer inspection reveals V-shaped yellow to brown segments of the tips of leaflets. Young leaflets curl and twist along their midribs, forming a spiral. Stems do not wilt, but may remain green until all leaves are dead. When the stems eventually do become chlorotic, they still do not wilt, in contrast to other fungal diseases of alfalfa. Severely affected plants are stunted. The disease has been found in Humboldt, Monterey, San Luis Obispo, Riverside, Los Angeles, and San Bernardino Counties.

Spring black stem (Phoma medicaginis)

First signs of the disease are small black or brown spots on leaves and stems in the early spring. The disease is favored by cool, moist weather. Spots may coalesce into large, irregularly shaped blackened areas. Leaves later yellow, wither, and fall off the plant. Lesions may form large blackened areas near base of plant and girdle leaf petioles. The fungus overwinters as mycelia in infected crowns and roots or in fruiting bodies on dead leaves and stems. In the spring spores are splashed by rain and irrigation water to new shoots. The fungus may be seedborne. Use certified seed and avoid very susceptible cultivars.

Viral Diseases

Alfalfa mosaic (Alfalfa mosaic virus)

Symptoms include mottling, striping, or triangular yellow streaks in the leaflets. The classic symptom is an interveinal light green or yellow mottle. The virus is seedborne. Greenhouse experiments showed seed yield reductions in infected plants. Experimental field data indicates that alfalfa mosaic reduces forage yield in commercial fields. The virus is spread by various species of aphids. No control measures are practiced.