

ALFALFA DISEASE MANAGEMENT

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Alfalfa can be a vigorous and productive forage crop for Kentucky farmers. Like all farm crops, however, alfalfa is subject to infectious diseases that can limit forage production. Managing these diseases is an important part of economical alfalfa production.

Alfalfa diseases can cause reduced forage yield, reduced forage quality, and decreased stand persistence. Sometimes, the effects of infectious diseases can be dramatic, such as sudden stand loss in a fall-seeded crop caused by *Sclerotinia* crown and stem rot. Often, the effects of diseases on alfalfa are more subtle but no less important. For example, alfalfa plants with *Phytophthora* root rot sometimes regrow slowly following cutting, resulting in a stunted stand showing no other obvious symptoms of disease. Other diseases like bacterial wilt can kill a few scattered plants between each cutting. Over a period of a few seasons, this can result in a gradual yet substantial loss in plant stand. Also, several diseases predispose alfalfa to winter injury, such as crown rot diseases and *Phytophthora* root rot. In some cases, stand loss during the winter may be blamed on winterkill when an infectious disease ultimately may be involved.

TYPES OF ALFALFA DISEASES

1. **Seedling diseases.** Infection of roots and stems of very young seedlings by fungi can cause sudden wilting and collapse (**damping-off**) of seedlings. Seedlings that are several weeks old at the time of root infection may become stunted or even killed, but still remain erect (**seedling blight**). Significant stand loss can result from a severe epidemic of a seedling disease. A variety of infectious fungi can cause seedling diseases of alfalfa in Kentucky.
2. **Leaf spots and shoot blights.** Invasion of leaves by disease-causing microorganisms (**pathogens**) can produce discrete dead spots on leaves. Leaves with a great number of spots are less effective at photosynthesis, which can result in reduced plant growth. Also, leaves with spot symptoms often drop to the ground, resulting in reduced forage yield and quality. Many of the fungi and bacteria that infect leaves also infect stems of alfalfa. Often, stem infections prevent water flow to the rest of the shoot, causing sudden wilting and dessication (**blight**). Lepto leaf spot, Spring black stem, and *Stemphylium* leaf spot are common alfalfa diseases that cause spotting of leaves. Anthracnose, *Rhizoctonia* stem blight, *Sclerotinia* crown and stem rot, and Spring Black Stem cause blighting of shoots.
3. **Root rots.** Root rot diseases may be caused by a variety of fungi. Following infection, roots become rotted and no longer function in removing water and nutrients

from the soil. Aboveground, affected plants may exhibit stunting, yellowing or reddening, and wilting. Also, some root rot diseases can make alfalfa more susceptible to winter injury. Phytophthora root rot is a common root rot disease of alfalfa grown in Kentucky.

4. **Wilts.** Certain fungi and bacteria infect the water-conducting tissues of alfalfa plants without causing any noticeable root rot. While roots may superficially appear fine, infection of the water-conducting tissues of roots and stems prevents water flow to leaves. This results in wilting of shoots and eventual death of infected plants. Bacterial wilt and Fusarium wilt are two common wilt diseases of alfalfa.
5. **Crown rots.** A great variety of fungi can infect the crown of the alfalfa plant, which is the portion of the taproot just below the soil line. The alfalfa plant stores food reserves for winter in the crown. Crown rot diseases interfere with this, making plants more susceptible to winter injury.

DISEASE MANAGEMENT

Most disease control decisions for alfalfa are made before diseases are visibly apparent. For several alfalfa diseases, once the symptoms appear, little can be done to control the disease. Therefore, careful planning is necessary to keep alfalfa diseases from building up to damaging levels. Like most crop diseases, alfalfa diseases are most effectively managed by integrating as many control practices as is practical. With the exception of seed treatment, alfalfa diseases cannot be controlled economically using commercial fungicides.

1. **Crop rotation.** Most alfalfa pathogens do not survive well in the absence of a host plant. As infested alfalfa residues decompose, cells of the pathogen become exposed to the soil environment, where they die out. Therefore, rotating to another crop for several years can help reduce populations of pathogens in the field, particularly if rotating to a crop other than red clover.
2. **Site selection and preparation.** Alfalfa is most vigorous when growing on deep, well-drained soils. Increased plant vigor can result in increased resistance to some diseases. Also, several root rot fungi are more active in poorly drained soils, so choosing a well-drained site helps to reduce root rot diseases. Preparing a fine but firm seedbed can provide an environment favorable for plant growth and unfavorable for pathogens.
3. **High-quality seed.** Several pathogens of alfalfa can be transmitted in infected seed. Therefore, it is advisable to use only high-quality, certified seed. Plump, high-quality seed will produce vigorous stands with less loss from seedling diseases. Remember, alfalfa stand density will always decline with time, so it is important to start out with a good stand of seedlings. See the UK extension publication AGR-76, "Alfalfa, Queen of the Forage Crops," for information on seeding rates. Seed treatment with

the fungicide Apron^R may improve stand establishment, particularly where alfalfa is being grown with little or no rotation to other crops.

4. **Resistant varieties.** For several diseases, selection of resistant varieties is *the most important means of disease control*. Bacterial wilt, anthracnose, Phytophthora root rot, and Fusarium wilt are important diseases that can be controlled using resistant varieties. *Plant only varieties with a "moderate resistance" (MR) rating or higher to each of these diseases*. An even higher level of resistance is recommended on farms where these diseases have been diagnosed, or in fields where alfalfa is being grown with little or no crop rotation. See the UK extension publication PPA-28, "Alfalfa Varieties: Relative Disease Resistance and Winter Hardiness," for a listing of variety reactions to diseases.
5. **Balanced soil fertility.** Maintaining an appropriate soil pH and adequate levels of nutrients is important for promoting vigorous growth, which helps the plant resist diseases and winter injury. Have a soil sample tested to determine lime and fertilizer requirements. See the UK extension publication AGR-76 for more information on soil fertility for alfalfa.

6. **Harvest management.**

Cut alfalfa at the late-bud to early-flower stage. Cutting alfalfa before the late-bud stage prevents plants from storing adequate food reserves for regrowth, thus weakening plants. Postponing cutting much past the late-bud/early-flower stage gives foliar diseases time to build up and cause defoliation. Timely cutting, before significant defoliation occurs, helps to avoid losses in yield and quality caused by foliar diseases. It also helps protect future cuttings by reducing the accumulation of pathogen-infested leaves on the soil surface.

Cut only when foliage is dry. Cells and spores of several infectious fungi and bacteria can be spread in droplets of water on cutting equipment. One can reduce the spread of pathogens by waiting until the foliage is dry before cutting.

Harvest young stands before old. Older stands of alfalfa have had more time for diseases to build up than younger stands. Cut younger stands before older ones to reduce the chance of spreading pathogens to young stands, and then clean equipment between harvests.

Remove hay promptly. During warm, wet weather, some pathogens can spread from hay curing in the field to the newly developing alfalfa shoots underneath the swath. In circumstances where hay has not cured completely but warm, wet weather is expected, it may be best to treat with a hay preservative and bale earlier. See the UK extension publication ID-46, "Hay Preservatives," for more information.

Allow adequate growth before freezedown. Alfalfa needs four to six weeks of regrowth between the final harvest and freezedown. This is necessary in order to have sufficient root reserves to withstand winter weather and to resist crown rot

infections during the dormant season. Following freezedown, the forage can be harvested or grazed as desired.

7. **Control insects and weeds.** Several insects create wounds that allow invasion of alfalfa plants by crown rot fungi and wilt pathogens. Weeds can also aggravate some diseases, if growth is dense and rank. Dense weed growth reduces air circulation and slows drying of foliage, making conditions more favorable for diseases of leaves and stems.
8. **Minimize crown injury.** Injuries to the crown provide infection sites for crown rot fungi. Avoid practices that injure crowns such as grazing or using heavy equipment when the soil is wet.

**ALFALFA DISEASES IMPORTANT IN KENTUCKY AND THE RELATIVE EFFECTIVENESS
OF VARIOUS CONTROL MEASURES**

Disease	Crop rotation	Site selection & preparation	Quality seed	Resistant varieties	Balanced fertility	Timely cutting	Cutting when dry	Balanced fertility	Timely cutting	Cutting when dry	Harvest young stands first	Remove hay promptly	Allowing adequate fall growth	Controlling insects and weeds	Minimizing crown injury
Anthracnose	++	+		+++			+			+	++	+	+	+	+
Bacterial wilt	++	+	++	+++			+			+	++	+		+	+
Crown rots	+	++			++	+		++	+				++	+	++
Fusarium wilt	+	+		+++			+			+					
Lepto leaf spot	++	+		+	+	++	+	+	++	+		+		+	
Phytophthora root rot	+	++	++	+++									+		
Rhizoctonia stem blight		+			+	++		+	++		+	++		+	+
Sclerotinia crown & stem rot	+	++											++		
Seedling diseases	+	++	+++		+			+							
Spring black stem	++	+	++	++		++	+		++	+	+	++	+	+	+
Stemphylium leaf spot	+	+	+			++			++			+		+	

^a "+++" represents a highly effective control measure; "++", a moderately effective control measure; and "+", a slightly effective control measure.

^b The format of this table was adapted from the University of Illinois extension publication RPD No. 308, "Alfalfa Disease Management Program," by M. C. Shurtleff, H. W. Kirby, D. M. Eastburn, and D. W. Graffis, 1989.