



ALFALFA DISEASE MANAGEMENT PROGRAM

Diseases may reduce alfalfa yields up to 30 percent or more each year in Illinois—depending on the diseases involved, the varieties grown, the management practices followed, and various environmental factors. Approximately 30 different diseases commonly reduce yields, forage quality, and longevity of alfalfa stands in Illinois.

Losses can be minimized by a comprehensive disease-management program that includes elements such as (1) growing winter-hardy, disease-resistant varieties; (2) planting top-quality, disease-free seed grown in an arid area; (3) providing a well-drained, well-prepared seedbed; (4) using a crop rotation of several years or longer with nonlegume crops; (5) timely cutting to maximize high-quality forage and minimize losses to leaf and stem diseases; (6) creating a balanced soil fertility and proper soil reaction (pH) based on a soil test; (7) avoiding cutting or overgrazing during the last five or six weeks of the growing season to allow food reserves to build up before frost; (8) controlling insects and weeds; (9) cutting only when the foliage is dry; (10) plowing down unproductive stands; and (11) following other suggested cultural practices.

An integrated disease-control program, based on knowledge of pathogen biology and which diseases are most likely to occur in an area, is the most effective and efficient means of controlling pests in the long run.

Table 1 lists the diseases that are known to cause yield losses in Illinois and the relative effectiveness of various control measures. More specific information can be found in Report on Plant Diseases, Numbers 300 through 307. These are available from your nearest Extension office or from N-533 Turner Hall, 1102 South Goodwin Avenue, Urbana, IL 61801 (217-333-8375).

No control measures are practical or necessary for several of the common alfalfa diseases, including bacterial blight or leaf spot, bacterial stem blight, downy mildew, and rust.

Disease-Resistant Varieties

Growing varieties that are winter hardy, high yielding, and disease resistant is the most economical, efficient, and easiest way to control many alfalfa diseases.

Resistance to bacterial wilt, Fusarium wilt, Verticillium wilt (where it is known to occur), common leaf spot, Lepto leaf spot, spring black stem, anthracnose, and Phytophthora root rot is of major importance in Illinois. No alfalfa variety is resistant to more than a few of the major diseases. Several of the newer varieties, however, are resistant to the important leaf and stem diseases. Alfalfa producers should thus select varieties according to local adaptability, high yield potential, and resistance to the most common

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and serious diseases in their area. For information on how a given variety is likely to perform in a particular area, check with your nearest Extension adviser and consult the current issue of the Agronomy Handbook and Illinois Agricultural Pest Management Handbook. Because planting disease-resistant alfalfa varieties will not control all diseases, the integrated use of other control measures is necessary.

Planting Site and Crop Rotation

The choice of a planting site often determines which diseases are likely to occur, because most pathogens survive between growing seasons on or in crop debris, volunteer alfalfa, and alternative host plants. These pathogens die out once alfalfa residue has thoroughly decayed.

In areas or fields where clean plowing, to promote the decay of crop residue, is not possible due to soil erosion, it is most important to use all other available disease management practices. Depending on a single practice will not ensure proper disease management and may result in substantial crop losses.

Some disease-causing organisms are found in every field, regardless of crop history or cultural practices. For example, rust spores may be carried by the wind for many miles before descending on alfalfa plants (often in a rainstorm), and alfalfa mosaic viruses are transmitted by aphids that may be blown considerable distances.

The diseases strongly associated with continuous alfalfa production include bacterial wilt, a variety of dry fungal root and crown rots, anthracnose, Phytophthora root rot, Fusarium wilt, Verticillium wilt, spring and summer black stem, common and Lepto leaf spots, bacterial leaf spot, and Stagonospora leaf and stem spot. Rotating crops and using tillage programs that permit residue decomposition before the next alfalfa crop is planted will help reduce the incidence of many of these diseases.

Of the fungi and bacteria that attack alfalfa plants, very few infect plants in the grass family, which includes corn, small grains, sorghum, and forage grasses. Rotations of three or four years with a grass crop deprive alfalfa pathogens of a host plant on which to feed, reproduce, and carry over between alfalfa crops.

Achieve Balanced Fertility

Adequate and balanced levels of lime, phosphorus (phosphate), potassium (potash), and other nutrients can be important in reducing disease losses. An adequate level of nitrogen (through *rhizobium* nitrogen fixation) must be available for top yields and must be balanced with the phosphate and potash levels. New plantings should receive an application of 25 to 50 pounds of nitrogen per acre unless the organic-matter content of the soil is greater than 25 percent or the preceding crop was a well-nodulated legume crop. Losses from a number of root and crown rots can increase where the phosphate and potash levels in the soil are inadequate. Leaf and stem diseases are often more severe where there is excess nitrogen or too little potash. Soil pH levels of 6.5 to 7 are necessary for the maximum availability of needed nutrients and for good nodulation. Healthy and vigorous plants can tolerate diseases better than stressed plants and are able to produce a near-normal yield despite disease.

Plant High-Quality Seed

Many important alfalfa pathogens can infect seeds. Pathogens may also be carried with or on seeds. Examples of seed-transmitted diseases include certain mosaics, downy mildew, seed rot, damping-off,

seedling blights, several different crown and root rots, spring black stem, yellow leaf blotch, *Stemphylium* leaf spot, *Verticillium* wilt, and bacterial blight or leaf spot. Dodder and stem nematode may also be transmitted by seeds. Mature, certified seed produced in arid regions is usually free of pathogens. Avoid planting seeds produced in the southern states or in foreign countries.

Seeds infected by pathogens often have low rates of germination, low vigor, and produce poor, uneven stands—especially if the seedbed is cold and not well prepared and the soil pH is below 6.5. To minimize losses, plant only certified, high-quality seed with a germination rate greater than 80 percent. Fungicide seed treatments are not normally justified in Illinois, although such treatments may produce improved stands when adverse seedbed conditions exist. Suggested seed treatment fungicides are given in Illinois Agricultural Pest Management Handbook. A thiram seed treatment is suggested to prevent seed transmission of *Verticillium* wilt. Fortunately, this disease is only an economic problem in stands more than 3 years old.

Plump, high-quality seed that is free from pathogens will produce vigorous stands with fewer losses from seed rot, damping-off, and seedling blight fungi. In general, seed-rotting and seedling-blight fungi cause severe problems only where diseased or low-vigor seed is used. Planting high-quality seed in a moist, well-drained, well-prepared seedbed at the proper depth and spacing will ensure good stands of vigorous seedlings, which are important for producing high yields and minimizing weed problems.

Cut Alfalfa in the Mid- to Late-Bud Stage

Cutting heavily diseased stands before bloom and before the leaves fall will maintain the quality of the hay and remove the leaves and stems that are the source of infection (primary inoculum) for later disease. This will help ensure that succeeding cuttings have a better chance of remaining healthy. For the best yield, succeeding harvests should be spaced 30 to 40 days apart. Cut early enough to avoid rank foliar growth that is unusually tall. Cut the alfalfa short, leaving a stubble of 1 1/2 to 2 inches. Cutting in the mid- to late-bud stage, harvesting at 30- to 40-day intervals, and cutting the alfalfa short help to control most leaf and stem diseases of alfalfa.

Cut Only When the Foliage is Dry

This practice minimizes the spread of fungi and bacteria that cause leaf and stem diseases, wilts, and crown and root rots.

Control Insects

Insects commonly provide wounds by which wilt, crown- and root-rotting fungi, and bacteria enter plants. Insects also reduce plant vigor, increasing the risk of stand loss from wilts and root and crown rots.

In general, controlling the aphids that spread mosaic viruses is impractical. Alfalfa producers should follow the current suggestions given by Extension entomologists from the University of Illinois and your nearest Extension adviser.

Control Weeds

Do not allow a thick growth of weeds to mat around alfalfa plants. Like rank, tall growth, weeds reduce air movement, slow the drying of the foliage, and lead to serious crop losses from leaf and stem diseases.

Seedling stands under a thick companion crop, such as oats, are commonly attacked by leaf and stem diseases. Weeds also may harbor viruses that can be transmitted to alfalfa by the feeding of aphids. Keep down broadleaf weeds in fence rows, drainage ditches, along roadsides, and in other waste areas. Such places serve as a source of mosaic viruses. Whenever possible, do not grow alfalfa close to other legumes—especially clovers, garden peas, and beans. Many of the same viruses that infect alfalfa also attack these and other legumes.

Do not cut or graze during the last five or six weeks before a killing frost is anticipated (about September 1 in northern Illinois to September 25 in southern Illinois). This is a most important practice for avoiding losses from crown and root rots.

A top growth of 6 to 8 inches is needed for building food reserves before winter. Fields on well-drained soils may be cut or pastured after the growing season has ended. This helps prevent stand loss from a variety of root and crown rots.

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Use an Integrated Control Plant

The goal of control measures is to disrupt the combination of factors necessary for disease development: a favorable environment, susceptible plants, sufficient quantities of a virulent pathogen capable of rapidly reproducing and spreading, and adequate time for the disease to develop. Disease-control programs are based on an understanding of pathogens, disease cycles, which plant parts are attacked and when, and the factors involved in spreading the pathogens. Control may sometimes be achieved by a single practice, but the long-term reduction of disease losses generally requires the application of several control measures (Table 1).

Adopting a comprehensive management program for diseases will sharply reduce losses in yields and hay quality. Disease-related losses often make the difference between realizing a profit or sustaining a loss. Alfalfa producers who identify potential disease problems promptly and take action to prevent losses are more likely to produce high yields of top-quality forage than those who do not. Table 1 lists the relative effectiveness of various methods for controlling major alfalfa diseases.

Table 1. Alfalfa Diseases that Reduce Yields in Illinois and the Relative Effectiveness of Various Control Measures^a

Disease	Planting winter-hardy, resistant varieties	Using high-quality seed	having a well-drained soil; pH, 6.5 to 7	Employing correct crop rotation	Achieving adequate, balanced fertility	Cutting in the mid- to late-bud stage	Avoiding late cutting and planting	Avoiding rank growth and high stubble	Maintaining insect and weed control
Bacterial wilt	1		2	3	3	3			3
Dry root and crown rots, decline	3	3	2	2	2		2	3	2
Phytophthora root rot	1		2	2	3		2		
Fusarium wilt	1		3	2	3		2	3	3
Verticillium wilt	1	2			3		3		
Anthracnose	1		3	1	2			2	3
Spring black stem	1	2	3	1	3	2		2	3
Summer black stem		2	3	2	3	2		2	3
Common or Pseudopeziza leaf spot	1		3	2	2	2		2	3
Stemphylium or zonate leaf spot	3	2		2	3	2		2	3
Lepto or pepper leaf spot	2		3	2	3	2		2	3
Yellow leaf blotch		2	3	2	2	2		2	3
Stagonospora leaf and			3	2	3	2		2	3
Rhizoctonia stem blight		2	2		2	2		2	3
Seed rot, seedling blights, damping-off		1	2	3	2				3
Sclerotinia crown and root rot	2	3	2	2	2	3	2	2	2
Mosaics		3							2

^a1, represents a highly effective control measure; 2, a moderately effective measure; and 3, a slightly effective measure.