

# ALFALFA DISEASES AND CURRENT MANAGEMENT OPTIONS

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## ABSTRACT

Limiting the potential economic damage of alfalfa diseases to a production field are generally accomplished by a combination of three factors; **genetics, cultural practices and to a lesser extent chemical control**. Selecting an **adapted** variety that has genetic resistance to the major diseases, combined with proper cultural practices that limit disease infection are the growers best defense to the major alfalfa diseases. Chemical control is generally limited to seed treatments that reduce seedling damping off problems at planting or foliar applications in established fields that prevent or minimize the effect of foliar leaf diseases. Chemical control of established root diseases in alfalfa is generally considered less effective and/or uneconomical.

**Keywords: Alfalfa, plant pathology, disease control, cultural practices, management, alfalfa diseases, alfalfa fungicides**

## INTRODUCTION

Much progress has been made by alfalfa breeders in the last 30 years in improving the genetic resistance of alfalfa varieties to diseases. Utilization of these genetic advances in the selection of adapted resistant varieties is still the best and most economical means of insuring maximum yield, quality, and stand life. Variety selection should be based on knowledge of which alfalfa diseases are most prevalent in a grower's field and are historically known to reduce yield and stand life. Knowledge of any potential new diseases reported in the area should be also considered in the selection of a variety with disease resistant traits.

Selecting an **adapted** variety that has genetic resistance to the major diseases, combined with proper cultural practices, is the grower's best defense in minimizing disease incurred production losses. Selecting a good disease resistant variety, adapted to his or her farm, is the **cheapest** and best line of defense against disease incurred production losses. It is hard not to over emphasis this point. The variety choice the grower makes in the beginning, will often determine the extent and severity of any future disease outbreaks, and more importantly the length of time that field will remain profitable. Growers often become fixated on the initial cost of the alfalfa seed, but often fail to realize that the choice they make in the beginning, will determine the profitability of that field for many years. A poor choice can actually cost money in the form of lost yield and/or quality due to stand losses and the resulting weed encroachment. These factors often result in the grower having to prematurely take fields out of production and unexpected replanting costs. **These costs are significantly more than what he would have paid in seed costs for a better**

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**disease resistant variety.** Picking a low cost inferior disease susceptible variety often results in the grower having to fight an uphill battle to optimize forage production and profit. For the most part, once a variety is planted, there are only a limited amount of options available to the grower to prevent or eliminate pathogens from damaging an established field.

## **IDENTIFYING HEALTHY AND DISEASED ALFALFA PLANTS**

One of the simplest tools a grower has at his disposal for gauging the health of his alfalfa field is his shovel. Once or twice a year, growers should dig up 20-30 plants and slice open the crown and taproot with a knife to look for disease symptoms. The inside of a healthy alfalfa root should be relatively white, any brown or red discoloration is an indication that the root system is suffering from a disease infection. The severity of the damage tends to get worse with age, and often these plants don't survive the winter. If you are not sure if there is a disease problem, take plant samples into your nearest extension agent and they can help you with the identification.

## **ALFALFA DISEASE MANAGEMENT**

As mentioned earlier, the first line of defense in preventing disease outbreaks is planting an **Adapted Variety** with a disease rating of **High Resistance (HR)** or a **Resistant (R)** for those diseases known to occur in the region. After selecting the proper variety, growers should then implement cultural practices that **prevent a new disease introduction** and also **limit the disease build-up and severity** of those pathogens currently in the field.

The following are a few of the common recommended cultural practices that minimize alfalfa diseases: (1) Plant certified disease free seed; (2) Avoid spreading disease spores from old fields into newly planted fields, cut new fields before older fields to reduce spread of diseases; (3) Disinfect equipment by washing or spraying with a 10% Clorox solution before moving between fields to prevent diseased soil and/or plant residue transfer from older infected fields. (4) Use tiling to reduce excess water in fields. (5) In irrigated regions, use land preparation and irrigation practices that limit excess water conditions, i.e. land leveling or sprinkler vs. flood irrigation. If using furrow or flood irrigation, shorten irrigation time and/or distances to avoid water logged conditions. Avoid reuse of excess irrigation water from diseased fields. (6) Minimize traffic and /or excessive cultivation in established fields. This often results in damaged or wounded plants and increased disease infection. All of these should be considered in a proper management plan to reduce the economic effect of alfalfa diseases.

## **CHEMICAL CONTROL**

There are several fungicides that offer cool season disease prevention in alfalfa. Headline (*pyraclostrobin*) is active against common diseases such as downy mildew, common leaf spot, spring black stem (Phoma), Stemphyllium leaf spot, Cerospora and Stagnospora leaf spot. Pristine (*pyraclostrobin* and *boscalid*) also controls these diseases as well as Sclerotinia stem and crown rot ('white mold') and can prevent stand losses in seedling fields infected by this fungal pathogen when applied in a timely manner. Quadris (*azoxystrobin*) is labeled against common diseases such as downy mildew and Cercospora leaf spot in alfalfa.

When using currently registered fungicides in alfalfa, it is important to know that they will not get rid of the existing pathogen, but they will protect the treated foliage from further disease infection. However, new foliage that grows after a fungicide application will not be protected, as the fungicides available for use in alfalfa are more contact than systemic. Lower leaves tend to be most affected by diseases due to the higher humidity and prolonged moisture time low in the canopy, so good spray coverage of lower leaves is essential.

BASF is currently seeking registration of Priaxor (*pyraclostrobin+fluxapyroxad*) for disease control in alfalfa. This product will help control most all of the above listed diseases and has the added benefit of being systemic so will protect new foliage. However, it is still several years away from registration in California because BASF is currently seeking a federal label for alfalfa.

Fungicides can be costly (about \$65/acre for Pristine and about half that for Headline and Quadris, depending on the rate). As a result, it's important to use the fungicides before a disease problem affects alfalfa yields, quality and stands for maximum efficacy with minimal costs. Disease occurrence and development is very dependent on humidity/moisture and temperature. The cost/benefit ratio of application will depend on geographic location and local weather. As these fungicides are more effective when applied prior to or at first signs of infection, the challenge will be deciding if and when to make a spray application. Varietal differences in levels of resistance to specific diseases may also be a factor.

## **MAJOR ALFALFA DISEASES AND CONTROL MEASURES**

### **Crown Rot Complex**

*(Complex of various pathogens: Fusarium, Pythium, Rhizoctonia, Phoma, and Stagonospora)*

*Optimal disease conditions* - Can occur in most soil types but damage can be more severe in the presence of nematodes or root feeding insects that create sites for entry into root system. Recent studies have shown that crown rots may be more severe as they result of crown damage due to livestock grazing and/or wheel traffic. Crown rot diseases are more common in warm climates, but are known to occur in almost all production areas. .

*Symptoms* - Stunting of plants; Red to reddish brown discoloration inside the root that becomes more severe with age of stand.

*Control* - Resistant varieties; Root knot nematode resistance may also be desirable, to complement Fusarium wilt resistance. This reduces exposure of the plant to the pathogen by stem nematode feeding on the crowns. Variety selection for grazing and/or wheel traffic tolerance may also reduce severity of crown rots that are the result of mechanical crown damage.

### **Phytophthora root rot (*Phytophthora megasperma f. sp. medicaginis*)**

*Optimal disease conditions* - Occurs most often in soils with poor drainage, or where water stands for an extended amount of time (> 24 hours).

*Symptoms* - Stunting and/or plant death in low areas of field where water stands. Damaged plants may have taproot girdled at same depth as water table in soil. Damaged roots may be brown in

color. Top growth may be wilted due to poor water uptake from damaged roots.

*Control* - Resistant varieties, Cultural practices that promote better drainage i.e. deep plowing, tiling, laser leveling, and planting on beds .

**Bacterial wilt** (*Clavibacter michiganense subsp insidiosum*)

*Optimal disease conditions* – Damage can occur in most soil types but damage is most severe in conditions where crowns and/or roots are damaged due to insects, grazing, wheel traffic or excessive cultivation. Bacterial wilt is more common in cold climates.

*Symptoms* - Stunting of plants; Yellowish to brown discoloration inside the root that becomes more severe with age of stand.

*Control* - Resistant varieties. Cultural practices that limit crown/root damage resulting from excessive cultivation, grazing, or repeated wheel traffic damage.

**Fusarium wilt** (*Fusarium oxysporum f.sp. medicaginis*)

*Optimal disease conditions* - Can occur in most soil types but damage can be more severe in the presence of nematodes or root feeding insects that create sites for entry into root system. Fusarium wilt is more common in warm climates.

*Symptoms* - Stunting of plants; Red to reddish brown discoloration inside the root that becomes more severe with age of stand.

*Control* - Resistant varieties, Cultural practices that limit crown/root damage resulting from cultivation, grazing, or repeated wheel traffic damage.

**Anthracnose** (*Colletotrichum trifolii*)

*Optimal disease conditions* - Occurs most often in spring or fall and spreads rapidly under warm wet conditions from spores produced on lower stems of infected plants.

*Symptoms* - Early stages may appear as individual straw colored stems on plants that display a curved top "Shepherds Crook". Diamond shaped lesions will occur on lower part of the stem. Advanced stages will be seen in the crown tissue as a dark black or coal color. Plant death usually occurs at this stage.

*Control* - Resistant varieties, Growers should avoid spreading spores from plant debris on harvest equipment to uninfected fields. 10% Clorox wash sprayed on harvest equipment or cutter bars may be advisable when moving from severely infected fields into new fields.

**Verticillium wilt** (*Verticillium albo-atrum*)

*Optimal disease conditions* - Thought to occur only in cooler northern climates until it was identified in the late 1980's in parts of Southern California. The pathogen can be spread by dry or fresh plant material on harvest equipment. Cutter bar blades of mowing equipment are extremely effective in spreading the pathogen spores. Manure from infected hay can also have viable disease spores unless composted.

*Symptoms* - Stunting of plants; Yellow 'V' shape at the tip of leaves. Leaves may curl along midrib and turn a pinkish color. Stems will remain green after leaves die.

*Control* - Resistant varieties; Clean farm equipment between fields, and mow younger fields before older to prevent spore transfer on mower blades. Cutter bar sanitation with 10% bleach has been shown to be effective in limiting plant infection.

## SUMMARY

A grower's first line of defense against alfalfa diseases should always be the variety he plants. A superior variety's built in genetic protection is the best insurance policy a grower can get against yield losses due to diseases. Whenever conditions occur that are favorable for disease buildup the genetic protection is always there and doesn't have to be applied by the farmer. Purchasing a variety that **lacks adequate resistance** may result in a uphill battle in preventing disease buildup and the resulting yield and stand loss. Alfalfa is a perennial crop, so a poor variety choice at planting time is one that the farmer will have to live with for many years.

Following the selection of a good adapted disease resistant variety, the grower should use good common sense agronomic practices to prevent the introduction of pathogens on his farm, or implement those practices that limit their buildup.

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