

# DISEASES AND NEMATODES OF ALFALFA

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## ABSTRACT

Plant pathogens and nematodes that infect alfalfa reduce plant vigor, yield, quality and stand. Disease management relies on knowing what pathogens to expect in a given geographical area and on proper identification of what diseases and nematodes have been problems in past years. In alfalfa, diseases and nematodes are managed by variety selection, promotion of vigorous plant development, and good cultural practices.

## INTRODUCTION

Alfalfa plants can be infected by pathogens such as fungi, bacteria, viruses, and nematodes that can reduce plant vigor, yield, quality and stand. Depending on the pathogen, the impact can be dramatic resulting in obvious yield reduction and plant death, or can be relatively unnoticeable to the eye but yet still take a toll on yield and quality. Few chemical pesticides are registered on alfalfa, with the exception of seed treatments. Growers therefore depend on varietal resistance and cultural practices to minimize disease development and impacts.

## VARIETAL RESISTANCE

Alfalfa is a tetraploid crop, meaning it has four copies of its chromosomes instead of the usual two copies that most other crops, such as corn and cotton, contain. As a result, alfalfa varieties are made up of populations of plants that are not genetically identical. Within an alfalfa variety there is still a lot of variability among plants. Compare this to a corn or cotton variety in which every plant is essentially identical genetically to every other plant. Because of this variability, it is very difficult to get an alfalfa variety where all the plants are resistant to a particular pathogen; therefore, the terminology for susceptibility and resistance is different for alfalfa than for other crops.

The table below has the accepted terminology and definitions used for alfalfa varieties when describing their resistance levels for insects, disease pathogens, and nematodes.

Table 1. Pest Resistance Ratings in Alfalfa

<b>Resistance Class</b>	<b>Class Abbreviation</b>	<b>% Resistant Plants</b>
Susceptible	S	0 - 5 %
Low Resistance	LR	6 - 14 %
Moderate Resistance	MR	15 - 30 %
Resistance	R	31 - 50 %
High Resistance	HR	> 50 %

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The susceptibility/resistance information for certified alfalfa varieties can be accessed from the web site of the National Alfalfa and Forage Alliance: <http://www.alfalfa.org/> under the “Variety Leaflet” subtitle. The ratings are provided to the Alfalfa Council by the breeders and company producing a variety. Currently the leaflet lists resistance ratings, if available, for Verticillium Wilt, Fusarium Wilt, Anthracnose, Phytophthora Root Rot, Aphanomyces, Stem Nematode, Southern Root Rot Nematode, and Northern Root Rot Nematode. It also includes resistance levels for the spotted alfalfa, the pea, and the blue alfalfa aphids.

Varieties cannot be developed with resistance to every possible disease pathogen or nematode so information for any one variety is often limited to a few key pests. It is therefore important to know what diseases or nematodes are most likely to occur in a given area based on location, climate, and soil type. For example, Aphanomyces is not very important in California. Phytophthora root rot resistance will not be as important in sandy soils that drain well as it is in a field with poor drainage due to soil type or presence of a hardpan layer two feet below the surface. In areas with cool springs and sprinkler irrigation, stem nematode is more likely to be a problem than areas that are hot and surface irrigated.

## **CULTURAL PRACTICES**

Cultural practices that promote vigorous, healthy alfalfa growth will reduce the impact of many diseases. A planting date that favors rapid germination and stand establishment, fertilization that provides the crop the nutrients it needs, and irrigation that is uniform, timely, and in the proper amounts are critical to a healthy crop.

Specific pathogens or nematodes may require attention to more specific details. For example, if planting in sandy soils, check for root knot nematodes prior to selecting a variety. If numbers are high, planting other crops for one or more years to reduce root knot nematode populations before planting alfalfa is a good idea. After that, choose a variety highly resistance to root knot nematodes.

For stem nematode, the first step is to buy certified seed that is clean of these nematodes. Avoid introduction of stem nematodes into an uninfested field by using clean harvesting equipment (either it hasn't just harvested an infested field or it was thoroughly cleaned after harvesting an infested field). If growing in an area with a history of stem nematode, also choose a variety that has resistance.

Another example is the fungus that causes Phytophthora root rot. This fungus requires saturated soil for infection. Good drainage, proper leveling to prevent ponding along borders, in the middle of checks or during wet winters, and irrigation management that prevents water standing at the tail ends of fields are important to minimize infection even with varieties that are highly resistant.

For many diseases, including several foliar diseases, the resistance level in commercial varieties is insufficient or unknown at this time. Yet these diseases can cause premature defoliation

leading to reduced yield and quality. The fungi that cause common leafspot, *Stemphyllium* leafspot, downy mildew, anthracnose, and *Stagnospora* leafspot, survive in decomposing plant tissue. Rotating to different crops to allow alfalfa residue to fully decompose before planting a field back to alfalfa reduces sources of disease for the new planting.

### **SUMMARY**

Disease and nematode management in alfalfa requires a combination of cultural practices and, when available, resistant varieties. Knowledge of the biology of specific nematodes and plant disease pathogens helps to understand the management techniques and options for minimizing problems. Chapters 10 and 11 in the new publication, "Irrigated Alfalfa Production in Mediterranean and Desert Zones," provide more detailed information on the major nematodes and diseases affecting alfalfa in California.