

# ALFALFA STAND DECLINE

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All of the alfalfa varieties commercially grown in Arizona are subject to ultimate failure or decline.

## What Causes Decline?

Several factors contribute to decline or thinning of Arizona alfalfa stands. These include factors not due to disease as well as those which are definitely disease-induced. Decline usually begins about the end of the second year of growth with an intensification during the third and succeeding years. Disease-induced decline in Arizona is caused by one or more fungi, certain bacteria and some of the viruses.

## The Nature of Decline in Arizona

Probably the most significant disease complex responsible for stand decline in Arizona is so-called "crown rot." Crown rot has been observed in all portions of the State where alfalfa is grown. This condition is not easily differentiated from other alfalfa diseases such as the bacterium-induced wilt and the virus-induced dwarf. The wilt-dwarf complex appears to be of secondary importance to crown rot in the central and southern portions of the State.

Crown rotting has been frequently associated with fungi such as species of *Fusarium* and *Rhizoctonia*, both groups of soil-inhabiting fungi. These fungi gain entrance to a plant through such injuries as split crowns. Split crowns may result from several causes including heavy machinery in fields and pasturing livestock too soon after irrigation.

## What to Look For

Sometimes the white cotton-like fungus growth is evident on the surface of a rotted crown. More often crown rot assumes the character of a dry, punky, rapidly deteriorating section of root, appear-



Chilean 21-5 alfalfa. Plant at left is a stunted, crown-rotted specimen. Healthy plant at right.

ing as a dark-colored area about ground level or slightly above. Buds on rotted crowns become functionless as far as producing suitable shoots for hay or seed are concerned. In early phases of crown rot the crown buds become discolored, generally yellow. Shoots from crown-rotted alfalfa plants, if they grow at all, are short, spindly, and of lighter than normal color.

## Exact Diagnosis in Field Difficult

Alfalfa plants infected by crown-rotting fungi are scarcely distinguishable in the field from plants attacked by other disease-inducing agents such as bacteria and viruses other than in the total collapse of the crown.

In the bacterial wilt vs. virus-induced dwarf complex, little crown rotting occurs except where plants have subsequently become infected by fungi. Under Arizona conditions the shoots of crown-rotted plants may turn yellow just as they do in plants infected by the bacterial wilt organism.

Dwarf-infected alfalfa plants also may have shoots that have turned yellow. In this respect crown-rotted plants are hardly different from plants attacked by other disease causing agents (pathogens). In addition, in crown-rotted plants as is the case also in plants attacked by the wilt bacterium or the dwarf virus, the main tap root becomes yellow-brown with dark-brown to black streaks noticeable in areas just beneath the bark.

In cross-sections of roots of crown-rotted alfalfa plants, dark-brown to black dot-like areas occur near the bark or deeper. Dot-like areas similarly colored and situated also occur in both alfalfa wilt



Crown-rotted Hairy Peruvian plants.



A stand of Hairy Peruvian alfalfa considerably thinned out, in fourth year of growth.

and alfalfa dwarf diseased roots. The dot-like discolored areas represent diseased, gum-plugged, water-conducting tissues of the root.

## How Can Decline of Stands be Eliminated?

No direct control measures have been devised for crown rots in Arizona alfalfas. Certain chemicals used primarily as soil fumigants are reported to be effective in other sections of the country. The most promising of these are now under study in Arizona.

For the present the principal recommendation that can be offered is crop rotation for three or more years with non-susceptible crops. Such rotation will at least discourage intense build-up of crown-rotting fungi in the soil in any particular field.

Fall reseeded of thin areas in alfalfa fields has been successful in southern Arizona. Diseased areas seeded and disked at the usual planting time have developed a good stand the following year.