Phytophthora Root Rot Of Alfalfa:
A Major Factor in Stand Decline

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Phytophthora root rot of alfalfa was described as a new disease in California in 1954. Presently, this disease is thought to be the most common and most serious disease of alfalfa in California. The disease is also known to occur in Australia, Canada, and in the state of Minnesota, Mississippi, Ohio, Illinois, Iowa, Nebraska, Wisconsin, and South Dakota.

SYMPTOMS. The first symptom of the disease consists of stunting, leaf yellowing and overall wilting of the plant. The most dramatic symptom is a rotting and collapse of the main tap root. Affected plants may die rapidly or recover temporarily if environmental factors are not favorable for disease development. In the low elevation areas of Arizona, the disease is most commonly seen during fall, winter, and spring. The disease may affect a few plants in the field or, in severe cases, cause complete stand failure. Normally, plant death occurs in an irregular pattern in the field. The fungus may invade and cause death of lateral roots which reduces plant vigor. In greenhouse studies in Tucson, growth of alfalfa seedlings in infested soil has been reduced by approximately 50 percent after one month when compared with growth of seedlings in non-infested soil.

The disease may be confused in the field with root rot of alfalfa caused by the soil fungus Phymatotrichum omnivorum (Texas Root Rot) which, although not as common as Phytophthora root rot, can be a serious disease in Arizona. The Texas Root Rot fungus causes a similar collapse of the main tap root. This disease, however, occurs only during the summer months and generally is restricted to

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somewhat circular patterns in the field as compared with the scattered, irregular pattern of kill with *Phytophthora*.

The Texas Root Rot fungus produces characteristic brown, thread-like structures, known as strands, on the surface of dead tap roots. These structures are large enough to be seen by the unaided eye and are unique to this pathogenic fungus.

**Phytophthora Root Rot**

**CONTROL. CULTURAL PRACTICES.** Practices such as fertilization and clipping frequency apparently have little effect on disease incidence or severity of *Phytophthora* root rot on alfalfa. Irrigation length and frequency are, however, a significant factor because *P. megasperma* produces a motile, swimming spore, which is the infective propagule, only in the presence of water. Thus, the disease is aggravated by frequent irrigations of excessive length, particularly in heavy, poorly-drained soils. The disease has been found in light, well-drained soils in Arizona. Apparently, excessive water increased disease incidence in these locations.

No specific studies have been made on the effect of crop rotation on disease incidence or on factors that may be involved in the persistence of the fungus in soil. However, studies with other closely related fungi indicate that *P. megasperma* probably survives indefinitely in field soils in the absence of the host. This fact precludes rotation as a practical method of control.

**RESISTANT VARIETIES.** Since the major varieties of alfalfa presently grown at lower elevations in Arizona and California are susceptible to root rot, the most practical method of control would be the development of resistant varieties. For this reason, a selection program is in progress in Arizona. Varieties with desirable agronomic characteristics are presently being screened in the greenhouse for resistant plants. A seedling assay technique has been developed that eliminates 95 to 98 percent of the population. The survivors in these studies will be propagated and used in the breeding and selection program.

The two roots, left and right, are infected by *Phytophthora*. Note the margin between healthy and diseased tissue.