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SUSCEPTIBILITY OF ARROWLEAF CLOVER TO PHYTOPHTHORA ROOT ROT IN FLOODED SOIL

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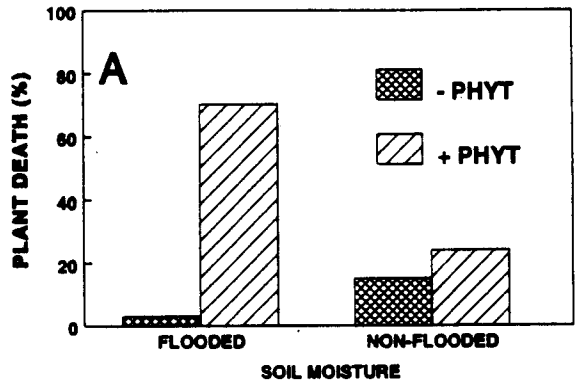
Background. Forage legumes are widely grown throughout the southeastern United States but production is limited in part by virus diseases and fungal root rots. Viruses and fungi are components of a poorly understood "disease complex" which may be causing stand failure with increasing frequency. Long periods of standing water in poorly drained pastures are conducive to certain root rot diseases, such as those caused by *Phytophthora* species. Some annual and perennial clovers are susceptible to *Phytophthora* root rot. The objective of this study was to evaluate the susceptibility, survival, and growth of arrowleaf clover inoculated with *Phytophthora* under flooded conditions in the greenhouse.

Research Findings. Germinated seed of arrowleaf clover varieties Yuchi and Meechee, and an experimental line were sown in 15-cm plastic pots containing a mixture of 1 peat:1 sand:1 vermiculite. Eight seedlings were planted per pot. After 4 weeks, half of the 72 pots received 40 mL inoculum composed of *Phytophthora trifolii* (PT) grown in a sand/cornmeal mixture. Control pots were not inoculated. Flooding was imposed on half of the pots in each treatment by placing in a 2.5-cm tall plastic saucer kept full of water, in addition to daily overhead watering to the point of saturation. Non-flooded pots were adequately watered and allowed free drainage. Dry matter yield was recorded three times during this study; only the final harvest is reported. Root systems were washed and examined for root rot symptoms at the conclusion of the study.

After 4 weeks, some plants inoculated with PT expressed chlorosis and reddening of older leaves, and by 5 weeks root rot killed 18 and 7 percent of the flooded and non-flooded plants, respectively. Root systems were completely rotted off of these plants. By the end of the study (approximately 120 days post-inoculation) PT had killed 70 percent of the flooded plants, while only 3 percent of flooded controls died (Fig. 1A). Taproots were nearly rotted off of flooded PT plants and taproots of non-flooded PT plants were partially gone. None of the inoculated plants escaped infection, and disease incidence was 100 percent. There were no differences in survival or disease severity between varieties. Control plants had healthy root systems, however, towards the end of the study some control plants developed symptoms of black root rot caused by the fungus *Thielaviopsis basicola*, which resulted in some plant deaths. Dry matter yield (Fig. 1B) of surviving plants reflected the severity of PT root rot under flooded conditions. Yields of non-flooded plants, whether or not inoculated with PT, were similar.

Application. There appears to be no immunity to PT root rot in arrowleaf clover, however, differences in susceptibility were evident as some plants died within 5 weeks of inoculation while others survived up to 4 months. Flooded soil conditions increased disease severity, resulting in a higher death rate. All inoculated plants had root rot disease and some showed evidence of secondary fungal invaders as well. Although some of these plants survived until the end of the study, it is doubtful that they could under stressful field conditions. The need for PT root rot resistant arrowleaf clover germplasm is vital, and even small differences in susceptibility could be exploited to achieve this goal.



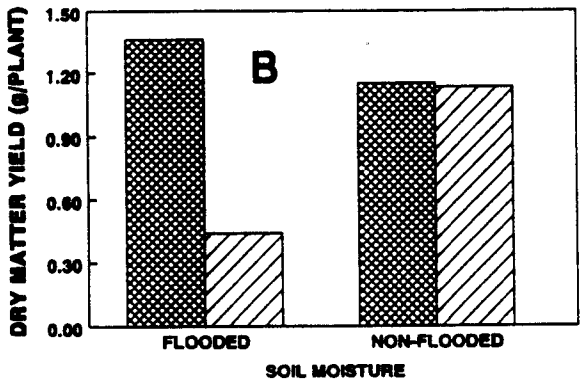


Figure 1A. Death of arrowleaf clover inoculated with *Phytophthora* root rot fungus.

Figure 1B. Dry matter yield of arrowleaf clover inoculated with *Phytophthora* root rot fungus.