

2019 USAFRI Research Project Objectives

Improving Our Understanding of *Aphanomyces* Root Rot of Alfalfa University of Kentucky - Wise

Project Award: \$24,928

Justification:

- *Aphanomyces* root rot, caused by the oomycete pathogen *Aphanomyces euteiches*, can seriously impact alfalfa establishment, and is an important disease of alfalfa in poorly-drained soils in Kentucky. *Aphanomyces* root rot can kill or stunt alfalfa seedlings and disease-stressed plants are unable to out-compete weeds, leading to thin, weedy stands. *Aphanomyces euteiches* survives in soil for many years, even when alfalfa is not planted, meaning that once the disease is present, alfalfa will always need to be managed for *Aphanomyces* root rot. In addition to the longevity of the pathogen, *A. euteiches* can evolve and adapt to become more aggressive and damaging, and the development of these more aggressive “races” has impacted alfalfa production in Kentucky.

Currently, *A. euteiches* race 1 and race 2 are present in Kentucky. However, the distribution and frequency of these races is not well-known since the last comprehensive survey for *A. euteiches* was conducted from 1990-1992 (Vincelli et al., 1994). One *A. euteiches* sample from Lexington, KY, was race-typed in 2001 and determined to be race 2 (Malvick and Grau, 2001), and it is assumed that race 2 is widely prevalent in Kentucky, although there is little research to confirm this.

Aphanomyces root rot management is primarily achieved by planting cultivars that have race-specific resistance. However, in spring of 2019, *Aphanomyces* root rot was reported in fields planted to cultivars with race 2 resistance. This has led to concerns that a new race is developing (race 3) or potentially a more aggressive form of race 2. This information is critical to understand, since if there is a race 3, or adapted race 2, there will be very limited management options available for farmers.

Fungicide seed treatments have been available for alfalfa for several years, but recently new products have been labeled, some of which are specifically designed to manage *Aphanomyces* root rot. New chemical seed treatment active ingredients such as pyraclostrobin and tolclofos-methyl are now labeled for *A. euteiches*, however, their activity against *A. euteiches* has not been tested in public trials in Kentucky. These treatments have been shown to have some efficacy in other states (Smith, et al. 2015), but climate and population differences may impact efficacy in Kentucky.

Improving management of *Aphanomyces* root rot in Kentucky starts with understanding the population and race structure of the pathogen, and its ability to cause disease on resistant cultivars. Seed treatment management should also be investigated to determine if multiple management strategies can help alleviate the effects of disease until race structure and improved cultivars are available. Distributing this information to alfalfa farmers in diverse formats, such as publications, webinars, videos, etc. will be important to make sure Kentucky farmers understand the most current information about *Aphanomyces* root rot management.

Objectives:

- The objectives of this project are to 1) Soil sample alfalfa fields in Kentucky and determine race structure of *A. euteiches* using a race bio-assay; 2) Determine if new chemical active ingredients have efficacy against *A. euteiches* in field research trials in Kentucky; and 3) Distribute management information on *Aphanomyces* root rot in diverse formats to Kentucky alfalfa farmers.