

Assessing Commercial Biological Control Agents for Activity Against Alfalfa Root Rotting Pathogens

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Alfalfa is the fourth most valuable crop in the United States and is widely grown as feed for livestock due to its high protein content. According to the USDA 2021 Crop Production Summary, the United States planted 1,646,000 acres of newly seeded alfalfa, and alfalfa seedlings are highly susceptible to disease. Pathogens such as *Aphanomyces euteiches* and *Pythium* sp. have devastating effects on newly seeded alfalfa stands causing seed rot, reduced root development, and diminished stand establishment. Current management strategies for these diseases are fungicidal seed treatments and planting of disease resistant alfalfa varieties. To expand upon these management strategies, we investigated commercial biological control (biocontrol) treatments. Isolates of both *A. euteiches* and *Pythium* sp. were tested against commercial biocontrol agents with active ingredients such as: *Streptomyces actinobacterium* K61 (Mycostop), *Bacillus amyloliquefaciens* D747 (Southern Ag), *Streptomyces lydicus* WYEC 108 (Actinovate), *Bacillus subtilis* QST 713 (Minuet/Serenade), *Trichoderma asperellum* ICC012 and *Trichoderma gamsii* ICC080 (Tenet), and *Trichoderma harzianum* Rifai KRL-AG2 (RootShield). Biocontrol activity against *A. euteiches* and *Pythium* sp. was evaluated in growth chamber assays using a susceptible alfalfa variety, Saranac. Treatment effectiveness against *A. euteiches* was assessed by rating seedling roots using the NAAIC Standard Test rating scale of 1-5, with a score >2 indicating susceptibility. Seedlings in pots inoculated with *Pythium* sp. were counted after 5 days to calculate percent germination. Biological controls with the active ingredient, *B. amyloliquefaciens* D747 have antagonistic effects against *Pythium* sp. increasing percent germination of alfalfa by 21-70% depending on the pathogen isolate. *S. actinobacterium* K61 (Mycostop) had high activity against *A. euteiches*. Several biological control agents demonstrated activity against both *A. euteiches* and *Pythium* sp., providing an additional management strategy against these root rotting pathogens.

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