

# Characterizing the interaction between a fungal seed pathogen and a deleterious rhizobacterium for biological control of cheatgrass

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## abstract

Two soil microorganisms have been shown to negatively affect the invasive species cheatgrass (*Bromus tectorum*) and have the potential to serve as biological control agents. The fungal pathogen *Pyrenophora semeniperda* kills mostly slow-germinating cheatgrass seeds and reduces the cheatgrass seedbank. It is naturally occurring within the western United States. The deleterious rhizobacterium *Pseudomonas fluorescens* D7 inhibits cheatgrass root elongation and seedling vigor. This paper characterized the interaction between the two microorganisms in order to determine if dual inoculations would provide more effective cheatgrass control. First, to determine the effect of *P. fluorescens* D7 on *P. semeniperda* activity, dormant cheatgrass seeds were exposed to the microorganisms in combination and alone. We found a slight increase in fungal infection with dual inoculations but a decrease in fungal-caused seed mortality. Second, to study the effect of *P. semeniperda* on *P. fluorescens* D7, non-dormant cheatgrass seeds were exposed to one or both microorganisms. We observed no increase in the inhibitory effect of *P. fluorescens* D7 with dual inoculations and in some cases saw less growth inhibition in the presence of both microorganisms. Overall, our findings suggest that there is no beneficial interaction between *P. semeniperda* and *P. fluorescens* D7 that provides improved cheatgrass control. Possible explanations include the production of antifungal metabolites by *P. fluorescens* D7, the production of antibiotics by *P. semeniperda*, or competition within the seed zone (i.e. spermosphere) for space or limited resources.