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PROJECT 1 ABSTRACT

(1 Page Limit)

The identification of effective chemical and biological controls for managing Fusarium head blight (FHB) remains a challenge. This project has three objectives: 1) to determine the potentials for combining the bacterial biological control agent *Lysobacter enzymogenes* C3 with other biocontrol fungi and bacteria having different modes of action to control FHB; 2) to evaluate the effectiveness of the combining *Lysobacter enzymogenes* C3 and other inducers of host resistance with tebuconazole in controlling FHB; and 3) to isolate microorganisms that can biodegrade deoxynivalenol (DON). The first two objectives build on results from previous projects in which C3 was found to have unique mechanisms of action compared to other FHB biocontrol agents and combinations of C3 with the fungicide tebuconzole were found to be more effective than either strategy alone. Their successful completion may provide keys to the most efficient use of new and existing biological control agents. To achieve objective 1, C3 will be tested in combination with known FHB biocontrol agents: *Bacillus* strains 1BA and TrigoCor 1448 and the yeast *Cryptococcus nodaensis* OH182.9. In addition, C3 will be combined with elicitors of induced systemic resistance (ISR): *Pseudomonas fluorescns* WCS417 and autoclaved fungal biomass (AFB) preparations. In objective 2, the ISR elicitors and *L. enzymogenes* C3 will be tested in combination with tebuconzole. Given that high levels of control are difficult to achieve using biological agents alone and that fungicides alone do not often provide complete control, use of biological control agent combinations or biocontrol-fungicide combinations with complementary action may provide higher level and more consistent control. Objective 3 is novel, not having been tried previously in relations to DON. Precedence for this strategy comes from the science of bioremediation of toxic organic compounds in soil. The efforts in this third objective will focus on finding microorganisms that can degrade DON through a two stage enrichment and isolation procedure using media containing DON. If successful, the organism can potentially be used as inoculants applied to wheat and barley in the field or to harvested grain to directly reduce DON levels. In this context, commercial development of these organisms could be on a faster, more economical track than conventional biological control agent. DON-degradation genes from the microorganisms also could be used to create transgenic wheat and barley with the ability to suppress DON levels. This project addresses the Biocontrol Development and Evaluation research priority in the Chemical, Biological and Cultural Control (CBCC) research area. The potential significance of this project is the identification of effective and practical tools for managing FHB that can be easily integrated with other existing and new practices.