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Project Title: Developing Technologies to Enhance the Utility of *B. subtilis* Against Wheat Scab.

PROJECT 1 ABSTRACT
(1 Page Limit)

Effective and economic means of controlling Fusarium head blight (FHB) are needed, and new chemical or biological control strategies have yet to meet the immediate and long-term needs of growers. Within the arena of integrated pest management, microbial biocontrol agents to control FHB have had modest success. That includes TrigoCor 1448, a proprietary isolate of *Bacillus subtilis*, which in some cooperative field tests has reduced FHB and mycotoxin contamination comparable to synthetic fungicides. This success, however, is tempered by the fact that the biology of the microbial antagonist and its interaction with *Fusarium* within the plant environment is poorly understood, and biocontrol efficacy is not consistent across environments.

This proposal focuses on developing technologies to supplement and expand the biological control potential of TrigoCor 1448 through the use of particle film technology. A preliminary experiment under greenhouse conditions indicated that particle films, such as Surround (kaolin), may be useful in providing a matrix for TrigoCor 1448 on the grain surface. Particle films have been very effective against insect pests, and there is some evidence that these surface barriers may also be useful to protect crops from plant pathogenic fungi and bacteria.

We expect that the biology of the organisms and environmental conditions play an important role in biocontrol agent/pathogen interactions. Therfore, we propose to evaluate the timing and number of applications needed to effect control using TrigoCor 1448 alone and in combination with Surround. These studies will be conducted within a mist chamber/greenhouse in order to more clearly understand the dynamics of the system. We also propose to follow the changes in population structure and metabolite production during grain development and at harvest in order to understand how TrigoCor 1448 populations and its metabolic state may act to inhibit the population status and growth of the fungus, *Fusarium graminearum*, and reduce the formation of deoxynivalenol (DON). This work would be conducted by plating plant tissues on agar media coupled with chemical analysis through the use of LC/MS/MS analysis to identify and quantify antifungal metabolites produced by TrigoCor 1448. Both of these approaches should yield data that detail the population and chemical profiles needed for successful biocontrol. This information will be essential to understand how to enhance the effectiveness of microbial biocontrol in field applications.