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PROJECT 1 ABSTRACT
(1 Page Limit)

Effective and economic means of controlling Fusarium head blight 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 *Fusarium graminearum* have shown promise. 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. However, the biocontrol performance of this BCA has been variable under the diverse environments of regional field trials. This non-uniformity in performance is likely due in large part to variability in product quality, so we have undertaken studies in the past year to chemically fingerprint fermentation broths of *B. subtilis* TrigoCor as part of our FY04 USWBSI grant. Our preliminary results indicate that the efficacy of *B. subtilis* is positively correlated to the timing of production and quantity of a number of compounds known to have antifungal activity *in vitro*. Therefore, the presence and quantity of these compounds under defined fermentation conditions can provide the means to improve product quality and consistency and to optimize the use of this BCA against wheat scab. The proposed research will define the conditions essential to produce a biological control product of consistently high quality. Through the use of chemical analysis, *in vitro* bioassay, and plant disease testing, we will define the range of chemical parameters and growing conditions that produce a microbial product with maximal biological control efficacy. This optimization process will bring quality controls to the formulation process and should therefore maximize BCA performance under field conditions. We will use chemical profiling to evaluate the production of antifungal compounds produced by *B. subtilis* TrigoCor and deoxynivalenol (DON) produced by *F. graminearum* in grain and will analyze these data in association with the efficacy of biological control of FHB. Our goal is to provide an economic and efficacious BCA product that can achieve disease control and reduce DON levels in the field. Our goal is in accordance with the biological control efforts of the U.S. Wheat and Barley Scab Initiative to develop, evaluate, and formulate test BCAs that have been shown to be effective against FHB