0203-BA-022 Biological Control of Wheat Scab with the Endophytic Bacterium *Bacillus mojavensis.*

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PROJECT ABSTRACT
(1 Page Limit)

Scab or head blight of wheat affects grain yield and quality. This disease has caused billion dollar losses to U.S. growers and millers within past decades, and losses to this disease are expected for this decade. The disease is caused primarily by strains within the *Fusarium graminearum* complex (*F. graminearum* and 7 cryptic species or lineages). Traditional breeding for scab resistance and molecular technology using wheat transformation methods are in progress, but neither has yielded an effective means for controlling the disease. These techniques are slow in developing because they are based on a functional pathogen defense system, which is not applicable to *F. graminearum*. The interaction of this fungus with wheat is saprophytic, especially during the final expression of the disease and production of the mycotoxin and virulence factor deoxynivalenol (DON). We propose to use natural endophytic bacterial strains with novel properties for preventing the colonization of wheat, resulting in a reduction of mycotoxins in the grain.

The bacterium we propose to use is *Bacillus mojavensis,* a recently erected bacterial species within the *B. subtilis* group that we have characterized as endophytic and antagonistic to fungal pathogens of plants, especially corn and wheat. We have patented a strain of *B. mojavensis* as an endophyte for the control of diseases caused by fungi, and have established that it reduces the fumonisin mycotoxin content in corn that is produced by *F. moniliforme.* We have established that this strain can be used for the suppression of *F. graminearum* induced seedling blight in pot culture (Bacon and Hinton, 2001). This strain persists during the entire growing season. Thus, this is the first report of using an endophytic bacterium for control of scab, representing new technology for control of this and other diseases.

The major goal of this proposal is to determine if this bacterium can as an endophyte protect wheat from scab thereby reducing seedling blight, and the resulting fungal contamination in the later stages of plant growth and the level of DON and other mycotoxins. The specific objectives are: 1) To establish the specific applications of the bacterial strain for use on wheat for the control of *F. graminearum* for reducing seedling blight and floret infection, thereby reducing scab development; 2) Determine levels of DON and related mycotoxins in wheat infected by bacterial endophytes in instances when scab is produced. The long range goal of this research is to establish new technology based on a new group of endophytic bacteria that will control scab and reduce mycotoxin levels that pose a health threat to livestock, poultry and humans. Thus, these goals are relevant to the goals of the U.S. Wheat and Barley Scab Initiative.