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PROJECT 2 ABSTRACT

(1 Page Limit)

Despite efforts to reduce the impact of FHB on grain production in the U.S., DON levels in grain often remain high. In order to address this problem, we continue to investigate the genetic diversity, especially with regard to traits of biological relevance in populations of *Fusarium graminearum* (*Fg*) currently found in the U.S. **We are focusing on genetically distinct populations of *Fg* in the Upper Midwest (emergent populations) and on nivalenol-producing populations of *Fg* found nearly exclusively in the Southern U.S.** The populations in the Upper Midwest are correlated to distinct DON chemotypes and result in different levels of DON accumulation in greenhouse-grown plants. Nivalenol-producing isolates have previously been described from Louisiana, where they are prevalent. Additionally, a significant proportion of isolates from a historical collection from Arkansas was determined to be of a nivalenol-type. Molecular data from these historical isolates from Arkansas lead to the working hypothesis that Arkansas may constitute a hybrid zone between southern and Midwestern populations of *Fg*.

The project objectives are to determine 1) Are strains of specific populations more aggressive and/or cause more toxin accumulation on wheat (including lines containing the major 3BS QTL for FHB resistance) grown in the field? 2) What is the extant population composition of *Fg* in Arkansas that is hypothesized to be a hybrid zone of Fg populations? What is the toxigenic potential of extant hybrid strains? 3) Are there differences in fungicide sensitivities in the various U. S. populations of *Fg*?

The goals of our project directly relate to **PBG FY09 Research Priority #1** Characterize genetic variation in the pathogen population with regard to aggressiveness toward plants and mycotoxin potential. By way of collaboration (**Integrated/Interdisciplinary Research**) we are partnering with two breeders (wheat breeder, Dr. James Anderson, University of Minnesota this proposal, and one barley breeder, Dr. Kevin Smith (separate proposal submitted to Barley CP), one field pathologist, Dr. Ruth Dill-Macky, University of Minnesota, and one plant pathologist Dr. Gene Milus, University of Arkansas. Of particular interest will be whether experiments with field-grown plants will support our working hypothesis (formulated from population level observations) that the increase of the emergent populations in ND, MN and SD is explained by an increased fitness of this population due to a higher toxigenic potential. Characterization of hybrid individuals from Arkansas will determine and clarify their toxigenic potential compared to parental populations. Assessment of fungicide sensitivities within and between populations of *Fg* will be helpful for disease management decisions and recommendations.