

PI: Lisa Vaillancourt**PI's E-mail: lisa.vaillancourt@uky.edu****Project ID: FY10-IN-007****FY09 ARS Agreement #: New****Research Category: PBG****Duration of Award: 1 Year****Project Title: Genetics of Quantitative Pathogenic Variation in *Fusarium graminearum*.****PROJECT 1 ABSTRACT**

(1 Page Limit)

The degree of pathogenically-significant phenotypic and genotypic variation that exists in the North American population of *F. graminearum* has important implications for the durability of FHB resistance breeding efforts. The fungus is homothallic, and a high degree of genetic polymorphism has been reported in the population. However, there appears to be only limited variation among regional subpopulations in relative allelic frequencies. Thus, it is generally believed that resistant wheat varieties bred using local isolates for screening will remain effective even if strains from other regions of North America are introduced, or if novel strains are produced by sexual recombination. However, we don't really know whether members of other regional 15-ADON subpopulations may be more fit, more toxigenic, or more aggressive in the field on wheat bred for resistance against indigenous pathogen subpopulations (e.g. in Kentucky). We do know that there is quantitative variation among 15-ADON isolates in many pathogenically significant traits. As yet we do not have associated markers for these traits and thus we cannot track them in the population. The ability to follow particularly relevant alleles in the population would be very helpful for management of resistance and for improved understanding and prediction of disease and mycotoxin epidemics. Markers would also be very useful to help identify the most representative strains for resistance breeding screening. This proposal is to analyze the results of a cross between two well-characterized and closely related lineage 7 isolates (strains PH-1 and Gz3639), both of which have sequenced genomes, to identify and eventually map genetic polymorphisms relevant to pathogenically significant traits, if they exist, and also to determine whether transgressive segregants will arise from a cross of these isolates.

Our hypothesis is that there are polymorphic loci in these two closely related members of the dominant lineage 7 that have large quantitative effects on mycotoxigenicity, aggressiveness, fertility, and fecundity. Identification of molecular markers linked to these QTLs could provide a useful new tool for analysis of the current and future population structure of the pathogen in North America and for selection and characterization of strains for breeding programs. We further hypothesize that genetic reassortment via sexual recombination will produce transgressive isolates that are more aggressive, more fertile, and/or more toxigenic than the parental strains. **Our objective for this one-year study** is to complete our on-going characterization of a set of 94 progeny from a cross of two sequenced lineage 7 strains, with the long-term goal of mapping QTLs with large pathogenicity-related effects and developing linked markers in order to track alleles in the population.