PI: Kistler, H. Corby **PI's E-mail: hckist@umn.edu**

Project ID: FY06-KI-067 **FY05 ARS Agreement #: NA**

Research Area: **PGG** **Duration of Award: 1 Year**

Project Title: Heterogeneity and Selection in the F. graminearum Species Complex in the U.S.

PROJECT 1 ABSTRACT

(1 Page Limit)

A new and potentially more aggressive and toxigenic population of *Fusarium graminearum* has been discovered in Minnesota and North Dakota that is in the process to displace the former population that is otherwise dominant in the Midwestern U.S. The new population was first discovered in collections from 1999-2000 when approximately 7% of *F. graminearum* strains in Minnesota and North Dakota were characterized by a chemotype (3ADON) different from the majority of isolates from the Midwest (15ADON). Using molecular markers (RFLPs and VNTRs) we can reliably distinguish among the old and emergent populations due to the presence of private alleles. We have tracked the persistence and spread of this population that most likely was only recently introduced into the Upper Midwest. We know now that this emergent population also consists of strains producing 15ADON but that otherwise are indistinguishable from the 3ADON population. While surveys in 2003 indicated a frequency of 20% 3ADON strains in North Dakota and Minnesota (30% if 15ADON strains of the emergent population are included), a further increase has been determined for the 2004 surveys (35% 3ADON; 45% including 15ADON strains). Only immense fitness advantages of the emergent population can explain this dramatic increase in frequency. Preliminary greenhouse tests indicate that strains of the emergent population may be more toxigenic on susceptible wheat varieties, allowing on average 1.5X the level of DON to accumulate in inoculated wheat heads than 15ADON strains of the older population.

Our surveys have also unearthed the dominance of the nivalenol chemotype in Louisiana (83%), consisting of predominantly *F. graminearum* and *F. asiaticum* isolates. Additional collections, analysis and greenhouse investigations are planned to further describe this population.

The specific goals of this project are to 1) Determine the current frequency and distribution of the emergent population in ND and MN and ascertain whether this population is being assimilated by recombination into the resident North American 15ADON population; 2) Further test and potentially confirm whether strains of the emergent population are more aggressive and cause more toxin accumulation on different varieties of wheat (including lines containing the major 3BS QTL for FHB resistance); and 3) Determine the potential of the nivalenol chemotype of *F. graminearum* and *F. asiaticum* spreading to major wheat growing areas of the U.S.