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Project Title: Isolate and Characterize Mutants Defective in DON Accumulation in Wheat Tissues.

PROJECT 1 ABSTRACT

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Fusarium head blight (FHB) caused by *Fusarium graminearum* is an important disease of wheat and barley. Losses are due to reduction in yield and contamination of infected grain with mycotoxins. Although most genes encoding enzymes for metabolic steps in deoxynivalol (DON) biosynthesis have been characterized, fungal regulatory genes and plant factors controlling trichothecene accumulation in infested wheat kernels are not well understood. In this study, we will use genetic approaches to identify and characterize genes that play critical roles in regulating DON synthesis in *F. graminearum*. The first objective is to screen the REMI transformants generated in our lab for mutants defective in producing mycotoxins. Fungal genes disrupted in REMI mutants that produce significant higher or lower (five folds) levels of DON than the wildtype PH-1 will be identified and characterized. Similar studies in mycotoxigenic fungi have identified novel genes involved in mycotoxin synthesis. For the second objective, we will generate and characterize gene replacement mutants of the C-type cyclin gene *FgFCCI* in *F. graminearum*. Homologs of *FCCI* have been implicated in regulating mycotoxin synthesis in corn kernels in other mycotoxigenic fungi. Results from this experiment will determine whether *FgFCCI* plays similar regulatory roles in DON synthesis in infested wheat kernels. Therefore, the objectives of this proposal are directly relevant to the FY06 research priorities of the Pathogen Genetics and Genomics (PGG) research area on 'Identify and characterize genes that control important pathogen traits' and 'Characterize the genomes of FHB pathogens'. Genes identified in this study will be useful to understand the complex fungal-plant interactions that influence DON synthesis and accumulation wheat kernels and may ultimately lead to the development of more effective disease and DON control strategies.