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

Project Title: Effects of Post-Anthesis Moisture, Cultivar, and Infection Timing on FHB and DON in Wheat.

PROJECT 1 ABSTRACT

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Deoxynivalenol (DON) levels are important both for their deleterious effects on mammal health and because DON is a pathogenicity factor in cereals. Our understanding of how environmental and host genetic influences interact to determine DON concentrations in small-grain spikes is incomplete. High levels of DON have sometimes been observed in the absence of abundant disease symptoms. **We propose to conduct a third one-year trial of an ongoing experiment on how FHB symptoms, *Fusarium* growth, and DON development are influenced by the duration of post-flowering moisture, the timing of infection, and cultivar resistance phenotype.** Understanding these relationships is critical to the process of forecasting epidemic severity and DON risk.

The field experiment will be planted in a misted nursery in Kinston, NC. The experiment will have a split-plot design, with four durations of post-anthesis misting as the main plots (0, 10, 20, and 30 days post-anthesis). Subplots will consist of two treatments of each of eight soft red winter wheat cultivars: artificially inoculated at anthesis, or uninoculated. The cultivars vary for level and putative type of FHB resistance. All treatments will be replicated three times. To simulate late infections, 40 main spikes will be randomly chosen and labeled at anthesis in each uninoculated plot for each of the following treatments: artificial inoculation 0, 10, or 20 days post-anthesis, or never. Inoculum will be applied to the appropriate spikes at each indicated time. Disease incidence and severity will be assessed in all plots. At grain maturity, labeled spikes and random spike samples will be collected. Samples will be assessed for DON content using ELISA, and for *Fusarium* colonization levels using real-time PCR. Separate assays will be conducted on the rachis, kernels, and glumes of each cultivar under each irrigation regime and each inoculation treatment (artificially inoculated at anthesis, at 10 or 20 days post-anthesis, or never). To study DON development over time, random spike samples will be gathered from inoculated plots at intervals throughout grain maturation and assayed for DON. Type I and Type II resistance will be assayed in the greenhouse.

Disease levels were low in 2005, but in a higher and useful range in 2006. **These data indicate that the number of moist days following flowering can significantly increase FHB severity.** The current proposal covers a third year of work. The project addresses several priority areas in the Etiology, Epidemiology and Disease Forecasting (EEDF) research area of the USWBSI for FY07: determination of the environmental conditions that favor infection, colonization, and mycotoxin production; investigation and quantification of factors that increase the risk of severe epidemics; and research addressing factors associated with high levels of mycotoxin in asymptomatic grain.