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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 health effects and because DON is a pathogenicity factor in cereals. Our knowledge of the epidemiological and host genetic influences governing DON concentrations is incomplete. While anthesis is thought to be the primary period for FHB infection in wheat, late infections can also lead to DON production. High levels of DON have sometimes been observed in the absence of abundant disease symptoms. The influences of the timing of moisture and the timing of infection on FHB symptoms, *Fusarium* growth, and DON development are not well understood, particularly in relation to cultivar differences. We will investigate these relationships, which are important to the process of forecasting epidemic severity and economic risk. The goal is to improve our understanding of how the duration of moisture and the timing of infection affect disease development, fungal growth, and DON production.

The field experiment will be planted in a misted nursery in Kinston, North Carolina. 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 heads 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 heads only at each indicated time. Disease incidence and severity will be assessed in all plots. At grain maturity, labeled heads and random head 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 0, 10, or 20 days post-anthesis, or never). To study DON development over time, grain samples will be gathered at intervals throughout grain maturation and assayed for DON. Type II resistance will be assayed in the greenhouse.

The proposed project addresses the Epidemiology research priority areas in the Etiology, Epidemiology and Disease Forecasting (EEDF) research area of the USWBSI for FY06: determination of the environmental conditions favoring development of inoculum, toxin production, and promotion of infection; the factors leading to epidemics; and the development and implementation of disease forecasting/risk assessment systems.