PI: Christina Cowger
PI's E-mail: christina_cowger@ncsu.edu

Project ID: 0506-CO-073
FY04 ARS Agreement #: NA

Research Area: EDM
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
(1 Page Limit)

While anthesis is thought to be the primary period for FHB infection in wheat, it has been shown that DON production depends on hours of head wetness, rather than on the stage of kernel development, and that late infections in field-grown wheat 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 incidence and severity, *Fusarium* growth, and DON development are not well understood, particularly in relation to cultivar differences. These relationships, which are important to the process of forecasting epidemic severity and economic risk, will be investigated in this experiment. The goal is to improve our understanding of how the timing of moisture and infection affects disease development, fungal growth, and DON production.

The experiment will be planted in a misted FHB 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 seven soft red winter wheat cultivars: artificially inoculated at anthesis, or subjected only to natural inoculum. The cultivars vary for level and putative type of FHB resistance. All treatments will be replicated three times. To simulate late infections, 15 main heads will be randomly chosen and labeled at anthesis in each uninoculated plot for each of the following treatments: artificial inoculation 0, 10, 20, or 30 days post-anthesis. At each time, inoculum will be applied to the appropriate heads only.

Disease incidence and severity will be assessed in all plots, omitting the late-inoculated heads. At grain maturity, labeled heads and random head samples will be collected, and yields will be measured in all plots. Samples will be assessed for DON content using ELISA, and for *Fusarium* colonization levels using real-time PCR. Separate assays will be conducted on samples of the rachis, kernels, and glumes of each cultivar under each irrigation regime and each inoculation treatment (artificially inoculated at anthesis or at 0, 10, 20, or 30 days post-anthesis).

The proposed project addresses the Epidemiology research priority areas in the Epidemiology and Disease Management Program of the USWBSI for FY05: 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.