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**Project ID: FY07-MC-103**

**FY06 ARS Agreement #: 59-0790-4-114**

**Research Area: EEDF**

**Duration of Award: 1 Year**

**Project Title: Greenhouse Studies of DON Development in Spring Grains as Influenced by Infection Timing, Moisture, and Temperature.**

### PROJECT 3 ABSTRACT

(1 Page Limit)

Deoxynivalenol (DON) accumulation in wheat has been shown to be positively correlated with visible scab (McMullen, et al. 1993; Stack, et al. 1995). However, correlations between disease severity and DON levels are not always high (McMullen, et al, 1994; Paul, et al., 2005), and DON accumulation has been reported in asymptomatic winter wheat (Cowger and Sutton, 2005), raising questions about how time of infection, environmental conditions, or genetics influence DON production. Field studies with soft white winter wheat cultivars currently are examining the effects of cultivar, moisture levels, and timing of infection on DON accumulation (Cowger, 2005; Nita, et al., 2005). Greenhouse studies with spring wheat indicated that single post-anthesis (Feekes 10.54) inoculations with *Fusarium graminearum* did not result in appreciable visible symptoms of FHB, but DON levels were not measured (Jordahl, et al., 2003; McMullen, et al. 2004).

Further studies on factors affecting DON production are ongoing in winter wheat, and similar studies are needed in spring wheat where cultivars with Sumai-3 germplasm are commercially grown. Data from this research has several implications. For example, if late infections and prolonged moisture increase risk of DON in certain grain classes or cultivars, this information may be used: 1) to incorporate weather prediction into current FHB forecasting models for spring and winter wheat; 2) to prompt further evaluation of post-flowering fungicide efficacy and provide justification to EPA for shortened pre-harvest intervals (PHI) for available fungicides (current fungicides have a 30-40 day PHI); and 3) to assist breeders in incorporating DON resistance into their germplasm.

A controlled greenhouse environment is available at NDSU to study factors affecting DON production. Within this greenhouse, approximately 40,000 wheat plants can be grown to maturity per winter season. Under a greenhouse setting, large numbers of plants are necessary to assure a representative grain sample per replicate for DON determination. The proposed experiment will consist of evaluating 2 greenhouse temperatures (23°C and 28°C), 2 wheat classes (hard red spring and durum), two cultivars per class, 5 inoculation treatments (not inoculated, Feekes 10.51, 10.54, 11.1 and 11.2) and 3 misting durations, giving 30 treatments per temperature regime and grain class. The 2 temperature regimes will be done at separate times in the greenhouse. FHB will be assessed at soft dough stage and then plants will be allowed to grow to maturity for hand harvesting and DON determination.

The proposed project addresses the following priority area of this Research Area; Pathogen Biology and Ecology: *Determination of the environmental conditions that favor pathogen survival, inoculum production, dispersal, infection, colonization, and mycotoxin production.*