

Project 1: *Regional Diagnostic Laboratory Providing DON Analytical Services for Regional FHB Research Projects.*

1. What major problem or issue is being resolved and how are you resolving it?

To provide consistent and unbiased testing of DON levels on wheat, a centralized diagnostic laboratory at Michigan State University was established in 1999. Having a centralized laboratory and a uniform technique for DON levels reduced redundancy as researchers did not have to spend time and funds on testing and improving data comparisons. With this grant, MSU-DON diagnostic laboratory provided DON testing free of cost to the research community. In 2006, a total of 10 States submitted samples to MSU-DON diagnostic laboratory and these were: Arkansas, Illinois, Kentucky, Louisiana, Maryland, Michigan, North Carolina, Ohio, Pennsylvania, and Virginia. Also in 2006, two private companies provided samples to be tested by this diagnostic laboratory by information shared through MSU extension personnel. A total of 9,537 (2006) samples analyzed using standardized ELISA plates and the DON level for each sample was determined using a programmable ELISA reader.

We were also able to assist a research program directed toward the understanding of the relationship between *Fusarium graminearum* infection and DON levels in wheat. We conducted DNA assays to determine the concentration of the fungus in three types of wheat tissue (kernel, rachis, and glume). A total of 1,242 samples were analyzed using real-time PCR technology. The final analysis (correlation between *F.graminearum* DNA concentration and DON levels) and conclusions drawn from our results were conducted and reported by Dr. Christina Cowger (North Carolina-USA). DNA was extracted from the kernel, rachis, and glumes of various varieties of wheat, and DNA concentration of each sample was determined using a standard curve specific for *F. graminearum*.

**2. List the most important accomplishment and its impact (how is it being used?).
Complete all three sections (repeat sections for each major accomplishment):**

Accomplishment:

A total of 9, 537wheat or barley samples were tested in our DON diagnostic laboratory, which represented a total of 17 organizations including universities, USDA-research facilities and private companies. Obtaining samples from private companies was a gratifying indication that our diagnostic laboratory was being considered, by not only the research community, as one worth their trust on our DON analysis. We processed the wheat samples based upon the order of arrival to our laboratory, which resulted in prompt reports of the data sent to the researchers.

A total of 1,242 wheat samples were analyzed for *Fusarium graminearum* DNA in our DON/RT-PCR diagnostic laboratory. These samples were provided by Dr. Cowger, which represented a multi-year, multi-disciplinary experiment to explore the influences of post-flowering moisture duration, infection timing, and cultivar resistance differences on FHB and DON in winter wheat.

Impact:

Prompt reports of DON levels sent by electronic mailing system helped researchers and extension agents make appropriate decisions in a timely manner. Researchers could re-direct

their efforts in testing breeding lines more resistant to FHB (Scab). And, extension agents could assist growers about the necessary steps to prevent Scab from their future barley/wheat crop.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

Make prompt decisions about barley/wheat breeding lines and its potential DON levels, which will result in a more secure food supply for consumers. Also, increase our understanding on how the environment and the host influences in the final concentration of DON in winter wheat grains and tissues.

FY06 (May 06 – May 08)

FY06 Final Performance Report

PI: Fulbright, Dennis

USDA-ARS Agreement #: 59-0790-4-105

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Presentation and Abstract Submission

Cowger C, Medina-Mora C. 2007. Duration of Post-Flowering Moisture and Infection Timing Affect FHB and DON in Wheat.