

Proposal No. _____

The Andersons Research Grant Program

Project Title: Multiplex, Quantitative, Real-Time PCR for Rapid Detection, Identification and Quantification of Mycotoxigenic *Fusarium* spp. in Durum Wheat

Principal Investigator(s)

Name	Institution/Agency/Other
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(Attach an additional sheet if more space is needed.)

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Period of Proposed Project Dates:

Beginning: January 2008 Ending: December 2010

Amount Requested (maximum \$25,000 per year for two years):

Year 1: \$25,000 Year 2: \$25,000

ANDERSONS RESEARCH FUND - RESEARCH PROPOSAL BUDGET

Wolf-Hall and Tobias

Multiplex, Quantitative, Real-Time PCR for Rapid Detection, Identification and Quantification of Mycotoxigenic *Fusarium* spp. in Durum Wheat



Problem Identification and Related Research

North Dakota has been the country's top producer of small grains. In 2005, ND growers planted a total of 1.98 million acres to durum wheat alone, representing 72% of the nation's total (USDA-NASS 2005). However, durum wheat is host to a number of pathogens including *Fusarium graminearum*, which is the predominant cause of Fusarium Head Blight (FHB). Thus, the potential for serious economic losses is very high. Widespread FHB epidemics in the 1990's reduced the marketability and price of grains with losses estimated in the billions of dollars (McMullen et al. 1997, Nganje et al. 2004).

The persistence of trichothecenes in infected stored grains and in processed food poses a great risk to human health and animals (Marasas et al. 1984, Tanaka et al. 1988, Schwarz et al. 1995). Concern over mycotoxin presence in durum wheat grains for pasta and semolina has been focused on DON. *F. graminearum* produces the mycotoxin deoxynivalenol (DON), a strong protein synthesis inhibitor (Charmley et al. 1994) known to cause vomiting and feed refusal in nonruminant animals. However, other *Fusarium* spp. are also known producers of important mycotoxins aside from other trichothecenes. Marketability and prices of grains are presently affected by DON concentration but not by the presence of other trichothecenes (i.e., nivalenol, T-2 toxins, 15-acetyldeoxynivalenol) or zearalenone. This somehow disregards the fact that other mycotoxigenic *Fusarium* species can and do co-exist in infected grains. Salas et al. (1999) identified *F. graminearum* (62-64%) as the predominant species in Red River Valley barley (1994-96), which were DON (type B) producers. Other species included *F. poae* (13-20%) which is a T-2 and HT-2 producer (type A), and *F. sporotrichioides* (10-17%) as well as *F. avenaceum* (6-10%) which are type B producers.