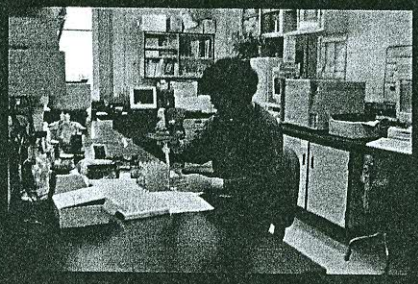
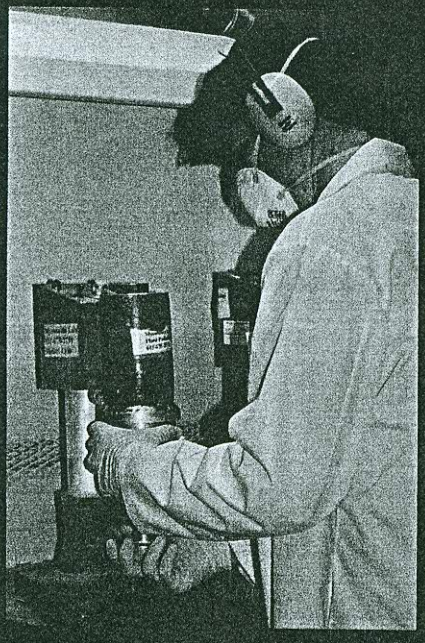
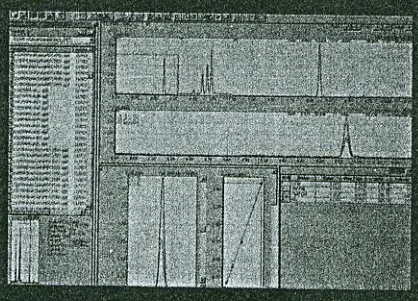
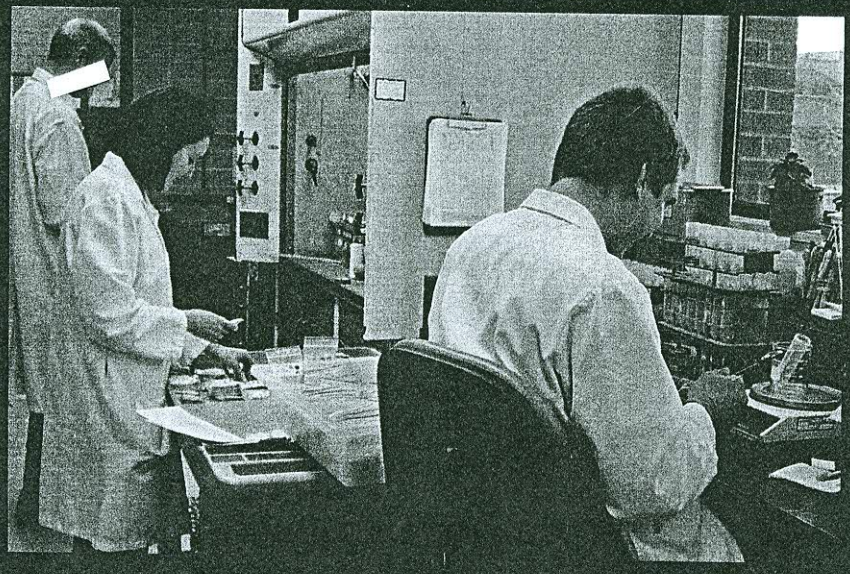
Proceedings of the 2009 National Fusarium Head Blight Forum









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Photos on the cover starting at the top left and moving clockwise:

- Screen capture of home page of UWWBSI's Website for the Don Testing Labs - http://www.uky.edu/Ag/Wheat/wheat_breeding/USWBSI/DON_submission.html
- Jun Yingyang, Lab Assistant in NDSU's DON Testing Lab - Barley, preparing samples for derivatization; photo submitted by Paul Schwarz, North Dakota State University (NDSU)
- Diane Reaver (left) and Patty Gundrum (right), VA Tech DON Testing Lab, analyzing DON samples using a GC/MS; photo submitted by David Schmale, Virginia Polytechnic Institute and State University (VA Tech)
- University of Minnesota DON Testing Lab computer showing DON quantification using GCMS solution software (version 2.5 Su1); photo submitted by Yanhong Don. University of Minnesota
- Photo demonstrating initial grain sample processing and weighing: Center - Kelly Benson, Chemist in NDSU-Veterinary Diagnostic Lab (VDL), sorting through samples coming into the lab; Right - Todd Singer, NDSU-VDL technician, weighing out samples; and Left - Quincey Faul, NDSU-VDL work study student, placing analyzed samples into a hazardous waste container in the chemical fume hood. Photo submitted by Michelle Mostrom, NDSU-Veterinary Diagnostic Laboratory.
- Tyler Potts, Student Lab Technician in University of Minnesota's DON Testing lab, grinding grain samples using a Stein Mills (mode M-2) grinder under an exhaust hood; photo submitted by Yanghong Dong, DON Testing Laboratory, University of Minnesota

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REFERENCING ITEMS IN THE FORUM PROCEEDINGS

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Last Name and Initial(s) of Author, [followed by last names and initials of other authors, if any]. Year of Publication. Title of paper. In: Description of proceedings and Title of Conference; Year Month and Days of Conference; Location of Conference. Place of Publication: Publisher. Page Numbers.

Sample Reference:

Dalitso Yabawalo, Mohamed Mergoum and William Berzonsky. 2009. "Chromosome Location of Fusarium Head Blight Resistance in 'Frontana' Spring Wheat." In: S. Canty, A. Clark, J. Mundell, E. Walton, D. Ellis and D. Van Sanford (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2009 Dec 7-9; Orlando, FL. Lexington, KY: University of Kentucky. pp. 161-164.

HEAD BLIGHTERS AND BLASTERS OF WHEAT: ARE WE READY?

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ABSTRACT

Wheat disease-causing agents can colonize different plant organs including the heads. These are of great importance because of the direct impact on the economic product of wheat – the kernels. In Brazil, there is a great concern about the increasing threat that two fungal diseases, known as wheat blast and head blight, now pose to wheat production. Wheat blast is incited by *Magnaporthe grisea* (*anamorph = Pyricularia grisea*). This disease was first described in wheat, in 1985, in northern Paraná, Brazil. Since then it has been reported in all wheat growing areas of the country. Up to this far, wheat blast occurrence is restricted to lower latitude wheat growing areas as those in Brazil, Paraguay and Bolivia. The disease may cause severe damage under conditions of high temperature (28°C) and high humidity (>93%). Fusarium head blight caused by *Gibberella zeae* is currently one of the most important diseases of wheat worldwide. Epidemics have been observed with a higher frequency in recent years in several regions, with damage on both yield and grain quality. In Brazil, the pathosystem has been studied for more than three decades, and recent reports indicate that a previous disease, previously sporadically outbreaking, achieved the status of major disease in wheat growing regions of southern Brazil causing significant economic impacts. Fusarium head blight is described as a disease of warm and humid climate, so that the rainfall and temperature are the main factors that influence the occurrence and severity of epidemics of this disease. Both fungi have other hosts besides wheat and can survive on crop residues. Depending on the region and time of the year, low temperatures or long dry periods may prevent growth and development of these fungi. Mechanistic simulations models have been developed for both diseases. The disease models take into account host development including details of the heading process (i.e., proportion of heads emerged, anther extrusion, grain filling and physiological maturity). Inoculum is considered not limiting. Hourly observed and 5-day forecast data for precipitation, relative humidity and temperature are used in mathematical equations to estimate infection risks. The models are implemented in a web platform which is intended to provide risk information to assist decision-making on crop management. An important wheat producing area in Brazil characterized by warm temperatures and moderately dry, is comprised by the North of Paraná, São Paulo and South of Mato Grosso do Sul states. This area, despite the likely occurrence of water stress during pre-flowering in some years, is considered a favorable environment for wheat production in terms of yield potential and quality. During the growing season of 2009, an abnormally high frequency of rainy days in July and August was observed. In the state of São Paulo, for example, July rainfall had record precipitation, four times the normal, since meteorological observations started in 1943. The resulting humid and warm climate observed in July coincided with the heading stage of wheat. Consequently, there were outbreaks of both Fusarium head blight and wheat blast. Crop yield declined 23% from pre-season estimates. The harvested product has been rejected by the milling industry due to low quality for bread and pasta making. Farmers suffered heavily from this climatic condition that resulted in crop failure due to head blighters of wheat. Continued global warming is likely to exacerbate Fusarium head blight problem. Moreover, it may contribute to the expansion of the geographical limits of new diseases like wheat blast. This hypothesis is supported by empirical evidence of the occurrence of wheat blast in

more southern regions of Brazil, which may relate to the warmer winters that have occurred in recent years. Therefore, efforts need to be made for better understanding of damaging head diseases of wheat in order to reduce impact on grain yield and quality, especially the mycotoxin issue related to Fusarium head blight. Genomic-based approaches promise to make a large and immediate impact through the identification of genes for disease resistance. However, the goal of lasting head blight disease control will depend on having an equally comprehensive understanding of the disease process from an epidemiological perspective.