

**U.S. Wheat and Barley Scab Initiative
 FY00 Final Performance Report (approx. May 00 – April 01)
 July 30, 2001**

Cover Page

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Grant Number:	59-0790-9-041
Grant Title:	Fusarium Head Blight Research
2000 ARS Award Amount:	\$103,233

Project

Program Area	Project Title	Requested Amount
Chemical & Biological Control	Uniform fungicide trials to identify safe products that are effective against FHB.	\$5,814.00
Food Safety, Toxicology, Utilization	Multidisciplinary Approach to Fusarium Head Blight Research.	\$126,173.00
	Requested Total	\$131,987.00¹

Principal Investigator

Date

¹ Note: The Requested Total and the Award Amount are not equal.

Project 1: Uniform fungicide trials to identify safe products that are effective against FHB.

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

The severity of the epidemics in the US in 1993, 1996, and 1997, and again in 2000, suggests a potential use for fungicides with efficacy against FHB when applied at flowering and/or other heading growth stages. Tests across wheat classes and environments will evaluate products under different conditions. The proposed research allows testing of products that may be registered in the future, and further evaluation of application methods to improve application coverage. Test results will provide information to producers nationwide and locally on what products are providing the greatest disease control and improvement in yield and quality, plus this information is valuable in getting federal or special registrations of new materials. A set of core fungicide treatments will be established and compared to the untreated check. Treatments are applied at the time of flowering. Fungicides are applied with a nozzle arrangement allowing angled spraying of the heads and are applied with a backpack type sprayer at 40 psi, 18-20 gpa. Disease ratings are taken at the soft dough stage of kernel development (Feekes 11.2) and include FHB incidence, FHB head severity, flag leaf disease severity, and other head disease incidence and severity, if present. Plots are harvested for yield and quality, and DON concentrations determined either at Pat Hart's lab, Michigan State University, or at Howard Casper's lab, North Dakota State University. Data will be analyzed by ANOVA. Results will be presented at the 2001 FHB Initiative Forum.

2. What were the most significant accomplishments?

Wheat fungicide trials in Michigan were harvested on July 18th, and the data is still being analyzed. The onset of scab in these research plots was late in 2001, suggesting an infection period several weeks after the application of fungicides. During the most favorable infection period air temperatures were below 15 C. This temperature should have been too low for infection at this time according to disease models developed at Ohio State University. However, scab incidence and severity was high in these fungicide trials. In 2000, low levels of scab occurred in the fungicide nurseries.

Project 2: Multidisciplinary Approach to Fusarium Head Blight Research.

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

This proposal addresses issues related to the delivery of safe food products derived from small grains to the consumer. Two objectives are included: 1) Develop sampling protocols providing estimates of vomitoxin in pre-harvested grain; and 2) Continued operation of a regional diagnostic laboratory. Estimating DON levels in grain prior to harvest allows producers and processors to take appropriate action insuring a safe food product. Such actions might include increased testing for DON at buying points, and importing and purchasing of wheat from regions where FHB did not occur. In research, increasing plot size, and using commercial fields as research units (ie epidemiological studies) results in uncertainty of comparative studies due to heterogeneity of FHB, and therefore DON, within a field. The DON levels in Michigan in 2000 resulted in 50% of the wheat used by processors being imported, and a significant amount of the 2001 wheat crop was designated feed grade due to vomitoxin. In 2000, high levels of vomitoxin were not consistent with the record high wheat yields (72 bu/acre), and in 2001 a preliminary survey suggested wide variability in vomitoxin levels across the state. Therefore, sampling protocols for estimating DON in wheat/barley before harvest would be a valuable tool. Previous research identified sampling protocols that predicted limits of DON in trucks. Therefore, it should be possible to predict DON levels in individual fields prior to harvest. Although the principles and experiments involved are complex, the results should provide for a relatively simple sampling and testing protocol to provide reliable estimates of DON.

2. What were the most significant accomplishments?

- a. Diagnostic Laboratory: Samples of wheat for vomitoxin analysis were received and analyzed from 10 states, and fifteen different USDA and University research projects. Wide variability in vomitoxin levels occurred in the submitted samples, from highs of 40-50 ppm to lows of 0-1. The number of samples analyzed exceeded 4,500. Collaboration with a check program indicated that different laboratories involved in providing diagnostic services were obtaining very similar results. Samples for the 2001-2002 season are just beginning to come into the Michigan Diagnostic Laboratory.
- b. In field estimates of vomitoxin: Intensive sampling along predetermined transects indicated there was no relationship for vomitoxin levels between sampling points as close as two feet or as far as two hundred feet apart. A comparison of the mean vomitoxin levels from transect sampling with vomitoxin levels in the harvested grain collected by probe sampling of wagons indicated no significant difference in vomitoxin levels between the two methods. This suggests that relatively simple sampling patterns, and a limited number of samples collected within a field prior to harvest might accurately predict harvested levels of vomitoxin. Factors such as how much low

quality wheat is actually combined at harvest compared to hand harvesting needs to be considered. Future testing will involve more intensive sampling using a pattern that covers entire fields.

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.

Lewis, J. M., R. W. Ward, and L. P. Hart. 2000. Site of action of Type II resistance to FHB in wheat: Ning 7840 retards spread of *F. graminearum* within rachis. National Fusarium Head Blight Forum (2000). P 158.

Hart, Patrick. 2000. NCR-184 State Report: Management of head scab in small grains. National Fusarium Head Blight Forum (2000). P 316-318.