U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

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Year:	**FY2001 (approx. May 01 – April 02)**
Grant Number:	**59-0790-9-041**
Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 148,457**

Project

Program Area	Project Title	Requested Amount
Chem/Bio	Chemical Management of FHB in wheat	$ 6,173
Food Safety	Multidisciplinary Approach to Fusarium Head Blight Research	$ 156,303
	Total Amount Requested	**$ 162,476**

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Principal Investigator Date

(Form – FPR01)

Project 1: Chemical Management of FHB in wheat

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

The severity of the FHB epidemics in Michigan in 1996 and 1998, and again in 2000 and 2001, suggested a role for fungicide management. 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.

2. What were the most significant accomplishments?
FHB developed late in 2001, toward the end of flowering, which occurred between May 25th and June 15th. Frankenmuth headed and flowered 7-10 days later than Harus or Freedom. Heading and flowering occurred later compared to previous years, and the flowering was longer, probably due to the cool temperature during flowering. FHB incidence was one hundred percent in all the plots, and severity was moderate. Several treatments significantly reduced the severity of FHB, but did not significantly affect yield or DON. The rain and temperature data suggested that favorable infection periods probably occurred only toward the end of flowering, and may account for the limited affect of fungicide treatments on yield and DON.

Comparison of fungicide efficacy on FHB incidence, severity, yield, and DON in Uniform Fungicide Trials at Michigan State University.

Treatment #	Incidence	Mean Severity	Mean Yield	DON (ppm)
Untreated	100	31.1a	70.3a	1.2a
Folicur	100	22.5ab	74.8a	1.2a
AMS	100	19.7b	72.4a	0.8a
BAS 505	100	21.3b	72.7a	1.1a
BAS 505 + Folicur	100	20.6b	72.3a	1.2a
Cornel Biol-cont	100	29.0ab	65.0a	1.3a
Peoria Biol-Control	100	26.7ab	70.0a	1.2a

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?
   - **1)** DON levels were similar between pre-harvest samples and probe samples in the 2000 study, but the truck probe samples tested about 1 ppm higher than the field samples in 2001 (Table 1). The results may be attributed the use of different research scale grain threshers between the two years. Small particles were more likely to be removed by threshing of the field samples using the new thresher in 2001, and may have contributed to the difference. Since small kernels are often associated with high deoxynivalenol concentration, this raises the important question as to "what constitutes a sampling unit?" Regardless, our studies in 2000 and 2001 suggested that infield sampling prior to harvest can be used to obtain an estimate of DON corresponding to DON levels in the harvested grain. Because DON was unevenly distributed within a field sampling protocols will have to be developed to account for the non-random distribution.
   - **2)** Approximately 4,000 samples were submitted for DON analysis by seventeen researchers in eleven states. Michigan participated in a quality assurance program comparing analytical results on common samples conducted by four separate laboratories. The QA program allows laboratories to identify potential problems with analytical procedures when significant differences between analytical laboratories occur.

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.

Hart, L. P., G. VanEE, and R. Lederbuhr. 2001. Uniform fungicide trial collaborative study 2001- Michigan State University. 2001 National Fusarium Head Blight Proceedings. 54-58. Cincinnati, OH.

Hart, L. P. and O. Schabenberger. 2001. Early detection of deoxynivalenol in wheat grain. 2001 National Fusarium Head Blight Proceedings. 164-167. Cincinnati, OH.

Xie, W., P. Hart, P. Schwarz, and B. Tacke. 2001. Update on DON diagnostic services in 2000/2001. 2001 National Fusarium Head Blight Proceedings. P 171-174. Cincinnati, OH.

Hart, Patrick. 2001-2002. Fusarium head blight in Michigan in 2001. Michigan State University Extension Presentation to commercial growers groups and agriculture business dealers at six different locations in the state.