

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY10 Final Performance Report
July 15, 2011**

Cover Page

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Fiscal Year:	FY10
USDA-ARS Agreement ID:	59-0790-6-065
USDA-ARS Agreement Title:	Integrated Management of FHB in Spring and Winter Wheat in North Dakota.
FY10 USDA-ARS Award Amount:	\$ 54,254

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
HW-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.	\$ 36,561
MGMT	Developing and Disseminating Integrated Management Practices for Control of FHB in Wheat and Barley.	\$ 17,693
	Total ARS Award Amount	\$ 54,254

Principal Investigator

Date

* MGMT – FHB Management
 FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
 GDER – Gene Discovery & Engineering Resistance
 PBG – Pathogen Biology & Genetics
 BAR-CP – Barley Coordinated Project
 DUR-CP – Durum Coordinated Project
 HW-CP – Hard Winter Wheat Coordinated Project
 VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
 SPR – Spring Wheat Region
 NWW – Northern Soft Winter Wheat Region
 SWW – Southern Soft Red Winter Wheat Region

PI: Ransom, Joel

USDA-ARS Agreement #: 59-0790-6-065

Project 1: *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.***1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?**

Since no one practice is completely effective, integrating available Fusarium head blight (FHB) control practices is needed in order to effectively reduce losses due to this disease in winter wheat. Using cultivars with genetic resistance to FHB has been shown to be effective in reducing FHB damage, particularly if disease pressure is not excessive and more dramatically in spring wheat where more resistance is available. Most winter wheat cultivars currently lack strong resistance genes. Fungicides can also be effective in reducing FHB severity and DON levels if applied in a timely manner. Combining these two practices, along with avoiding the planting of winter wheat after small grains or corn, forms the key components of an integrated FHB control program. The objectives of this research were to identify the most resistant winter wheat cultivars adapted to North Dakota and to verify the effectiveness of recommended fungicides on the control of FHB in cultivars with differing levels of genetic resistance. These data will help farmers select the most resistant cultivars and help them understand the value of combining genetic resistance and fungicide. Potentially, information from this project will promote the use of best FHB management practices and therefore reduces losses associated with this disease.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):**Accomplishment:**

In 2010, two variety by fungicide trials were conducted that included 20 cultivars with differing levels of FHB resistance. These trials were effective in identifying the most adapted cultivars (survived the winter and had good yield potential) and in quantifying the value of fungicides on each of them. Varieties ranged in yield from 35 bu per acre to 70 bu per acre in Forman, and 45 to 75 bu/acre in Prosper, ND. Fungicides on average increased yields by nine bu/acre at both locations. FHB levels were high at Forman and varieties differed significantly in their response to FHB disease development and DON production. The combination of fungicide with the most resistant varieties resulted in DON levels below one ppm demonstrating the value of combining these control strategies.

Impact:

Information on the level of FHB resistance in winter wheat varieties adapted to ND was updated and published in the winter wheat variety selection guide. Additionally, resistance levels of adapted varieties were updated in Scabsmart. This information was also presented at several winter meetings in North Dakota.

Project 2: *Developing and Disseminating Integrated Management Practices for Control of FHB in Wheat and Barley.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

The best currently available Fusarium head blight (FHB) control practices are not always effective when disease pressure is high. Furthermore, the level of FHB resistance in barley cultivars is limited. The objectives of this project were to determine if planting configurations could alter the environment sufficiently to reduce FHB development and to determine the level of adoption of FHB control practices and factors impacting their adoption.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

Accomplishment:

Experiments were conducted in Prosper, Langdon, and Minot to determine the effect of row spacing, plant population, variety and fungicide on barley, durum and spring wheat. FHB or DON was reduced in durum by the more resistant variety and by fungicide, in spring wheat by resistant variety and by fungicide and in barley with the higher seeding rate and with fungicide. These data indicate that plant spatial arrangement and seeding date are not effective in altering disease development significantly, but that the established practices of resistant variety and fungicide are effective.

Impact:

These results confirm the important role of fungicides and varieties in controlling FHB in all of the small grain species tested. Since plant arrangement and seeding rate did not impact FHB, no additional research is planned with regards to integrating these practices for the control of FHB.

Accomplishment:

A survey was administered to nearly 5,000 growers in ND and MN, to determine the level of adoption of various FHB control practices. From this survey we found a high level of adoption of the most effective recommended FHB control practices. Most growers, in fact were using two or more control practices. We also found that the vast majority of those adopting FHB management practices primarily use university extension resources to help them make informed decisions. Crop consultants, extension meetings and extension publications are valued as sources of information on how to control FHB. Although 80% of the growers surveyed have access to the internet, most still rely on traditional educational approaches to learn about scab control.

Impact:

The survey documents the very high level of adoption of techniques and varieties developed with funding from the USWBSI, suggesting that the Scab Initiative has been very effective in developing and extending management practices that have reduced FHB damage. Furthermore, we found that a range of extension approaches are needed to educate farmers on FHB management practices. These data also suggest that the Scab Initiative has been very successful in developing and extending management practices that have reduced FHB damage in spring wheat in ND and MN.

Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance.

None

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.

McKee, G., J. Ransom, and M. McMullen. 2010. Determinants of adoption of scab management techniques. In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2010 Dec 7-9; Milwaukee, WI. Lexington, KY; University of Kentucky. P. 86-89.

Ransom, J.K., J. Pederson, and S. Halley. 2010. Influence of row spacing, seeding rate, fungicide and variety on yield and FHB development in spring wheat, durum and barley. In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2010 Dec 7-9; Milwaukee, WI. Lexington, KY; University of Kentucky. P. 93.