USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY12 Final Performance Report
July 16, 2013

Cover Page

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Fiscal Year:	FY12
USDA-ARS Agreement ID:	59-0206-1-116
USDA-ARS Agreement Title:	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in WW in ND.
FY12 USDA-ARS Award Amount:	$ 14,619[*]

USWBSI Individual Project(s)

USWBSI Research Category[**]	**Project Title**	**ARS Award Amount**
HWW-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat.	$ 14,619
	Total ARS Award Amount	**$ 14,619**

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Principal Investigator Date

[*] Partial funding for this research is under ARS agreement # 59-0206-9-062

[**] 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
HWW-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

Project 1: *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat.*

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

   Winter wheat varieties adapted to North Dakota lack high levels of genetic resistance to Fusarium head blight (FHB). Several varieties have been identified with moderate levels of resistance that could, when combined with fungicides offer a fairly robust FHB control package. Furthermore, new backcrosses that contain the gene that has been the backbone of resistance in spring wheat varieties is now available in some winter wheat lines. The value of this resistance needs to be confirmed in plots of sufficient size to enable the measurement of yield. The research we are conducting as part of this project involves verifying the value of genetic resistance, fungicide applications and their combination using a misting system that helps ensure that we will be able obtain relevant data, even when the weather might not otherwise be conducive to FHB development. Our results will provide valuable information to breeding program as to the effectiveness of the resistance they have bred into their materials and will provide information to growers in North Dakota as to their potential adaptation for use in North Dakota, should they ever be released.

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:
   The misting system that has been in operation for two years now, enabled us to develop very high levels of FHB, even though the environment in ND was not conducive to the development of the disease. The results confirmed the value of genetic resistance and also confirmed the value of the FHB resistance gene from Sumai 3 in an adapted background (Wesley). The disease pressure that was developed under our misting system was perhaps too severe to allow us to get good separation between our treatments. We plan to adapt our technique somewhat to enable a more realistic level of disease this season.

   Impact:
   The data obtained in 2012 demonstrates the value of genetic resistance and its use in combination with effective fungicides in reducing losses due to FHB in winter wheat. Information about the level of resistance of commercially available varieties will help winter wheat farmers that regularly confront FHB select varieties that are adapted and that will perform well under FHB pressure. The combination of resistance and fungicides reduced the level of DON by about 50%.

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.

Willyerd, K., K. Ames, G. Bergstrom, C. Bradley, J. Cummings, P. Gross, L. Madden, J. Ransom, K. Ruden, J.D. Salgado, L. Sweets, K. Wise and P. Paul. 2012. Uniform FHB integrated management trials: A summary from 2012. In: S. Canty, A. Clark, A. Anderson-Scully and D. Van Sanford (Eds.), Proceedings of the 2012 National Fusarium Head Blight Forum (pp. 29-33). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative**.**

Willyerd, T., C. Li, L.V. Madden, C.A. Bradley, G.C. Bergstrom, L.E. Sweets, M. McMullen, J.K. Ransom, A. Grybauskas, L. Osborne, S.N. Wegulo, D.E. Hershman, K. Wise, W.W. Bockus, D. Groth, R. Dill-Mackey, E. Milus, P.D. Esker, K.D. Waxman, E.A. Adee, S.E. Ebelhar, B.G. Young, and P.A. Paul. 2012. Efficacy and stability of integrating fungicide and cultivar resistance to manage Fusarium Head Blight and deoxynivalenol in wheat. Plant Disease 96:957-967.