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:	59-0206-2-085
USDA-ARS Agreement Title:	Integrated Management and Prediction of Fusarium Head Blight and DON in Winter Wheat.
FY12 USDA-ARS Award Amount:	$ 9,357*

USWBSI Individual Project(s)

USWBSI Research Category**	Project Title	ARS Award Amount
MGMT	Effects of Local Corn Debris Management on FHB and DON Levels (Year Two).	$ 2,047
MGMT	Integrating Strategies to Mitigate Fusarium Head Blight and DON in Winter Wheat.	$ 7,310
	Total ARS Award Amount	**$ 9,357**

July 16, 2013
Principal Investigator Date

* Partial funding for this research is under ARS agreement # 59-0206-9-055

** 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: *Effects of Local Corn Debris Management on FHB and DON Levels (Year Two).*

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

Reduction or elimination of within-field sources of inoculum of *Fusarium graminearum* is the basis for cultural control measures such as crop rotation sequences in which cereals follow non-cereal crops. The goal of this USWBSI research project is to provide realistic estimates of 'DON reduction' that can be expected from cultural controls that reduce within-field inoculum sources. We utilized moldboard plowing of corn debris as a proxy for planting after a non-cereal crop to compare directly with wheat planted no-till into corn debris in commercial-scale wheat fields planted following grain corn harvest in Nebraska. Following corn harvest in 2011, replicated wide (60 ft) strips were moldboard plowed or left non-plowed prior to sowing wheat over the entire field with a no-till drill. Wheat in each strip was monitored for FHB and sampled for laboratory quantification of head infection by *F. graminearum* and contamination of grain by DON in 2012. There were hardly any FHB symptoms at the soft dough stage due to dry conditions caused by a severe drought. At crop maturity, no wheat heads were found to be infected by *F. graminearum* and there was no measurable DON in grain from either moldboard-plowed or no-till strips.

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:

Even though FHB did not develop in the 2012 growing season (year 2 of the project), data from year 1 suggest that inoculum from area atmospheric sources exerts a far greater effect than inoculum from in-field corn residue on the level of DON contamination in agricultural-scale strip plots.

Impact:

Based on year 1 data, it appears that localized corn debris management prior to wheat planting results, on average, in fairly small reductions in FHB and in DON contamination in wheat. Regional atmospheric inoculum appears to play a far greater role in corn-dominated landscapes, thus prioritizing the need for resistant wheat varieties and effective fungicides as the main pillars of integrated management in corn production regions. FHB developed in the third year of experimentation in 2013 and the data will enable us to derive a realistic quantitative answer to the question being addressed.

Project 2: *Integrating Strategies to Mitigate Fusarium Head Blight and DON in Winter Wheat.*

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

   The major problem being resolved is to more effectively manage Fusarium head blight (FHB, scab) and deoxynivalenol (DON) in winter wheat through integration of management strategies. Four cultivars, Jagalene, 2137, Harry, and Overland were planted in the fall of 2011 following corn. The following activities were planned, but did not take place due to a drastic cut in the budget that led the PI to opt not to proceed with the project. Plots were to be sprayed or not sprayed with the fungicide Prosaro at early flowering and then spray-inoculated with spores of *F. graminearum* (1×10^5 spores/ml) using a hand-pumped backpack sprayer 24 hours after fungicide application. Data on FHB index, yield, *Fusarium*-damaged kernels (FDK) and DON were to be obtained from the plots.

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:

   Plots were planted in the fall of 2011, but the project was not completed due to a drastic cut in the budget.

   Impact:

   The project was not completed and therefore there is no impact to report.

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.

Bergstrom, G.C., J.A. Cummings, K.D. Waxman, C.A. Bradley, A.L. Hazelrigg, D.E. Hershman, M. Nagelkirk, L.E. Sweets, and S.N. Wegulo. 2012. Effects of local corn debris management on FHB and DON levels in fourteen U.S. wheat environments in 2011 and 2012. Pages 5-6 in S. Canty, A. Clark, A. Anderson-Scully, and D. Van Sanford (Eds.) Proc. 2012 National Fusarium Head Blight Forum, East Lansing MI/Lexington, KY: U.S. Wheat and Barley Scab Research Initiative.