

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY11 Final Performance Report
July 13, 2012**

Cover Page

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| PI: | Shawn Conley |
| Institution: | University of Wisconsin |
| Address: | Department of Agronomy 1575 Linden Dr. Madison, WI 53706 |
| E-mail: | spconley@wisc.edu |
| Phone: | 608-262-7975 |
| Fax: | |
| Fiscal Year: | FY11 |
| USDA-ARS Agreement ID: | 59-0206-9-088 |
| USDA-ARS Agreement Title: | Integrated Management Studies to Improve Overall Management of FHB and DON in Wisconsin. |
| FY11 USDA-ARS Award Amount: | \$ 20,390 |

USWBSI Individual Project(s)

| USWBSI Research Category* | Project Title | ARS Award Amount |
|----------------------------------|---|-------------------------|
| MGMT | Integrated Disease Management of Fusarium Head Blight in Wisconsin. | \$ 14,634 |
| | Total ARS Award Amount | \$ 20,390 |

Principal Investigator _____ Date 7/3/12

* 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: *Integrated Disease Management of Fusarium Head Blight in Wisconsin.*

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

Currently, the major issue facing growers in Wisconsin about the risk of Fusarium head blight (FHB) has been the effect of crop rotation in combination with environmental conditions favorable for disease development. We have seen FHB incidence be variable across WI the past several years. Another major issue we have been working on is making sure that our prediction information is available for an extended period of time for the state. For example, it is not uncommon for flowering to occur over a three to almost four week period in Wisconsin though in 2012 the flowering window was condensed. Specifically, in areas closest to Lake Michigan, an area that represents a larger wheat production area in the state, flowering is often later than in other major production areas. As such, we have made sure to provide updates regarding risk through the “Fusarium Head Blight Prediction Center” and our “Soy Report” blog over a longer period.

In terms of our research, we continue to conduct trials under the integrated management coordinated project. In 2010-2011, we continued our trials at the Lancaster Agricultural Research Station, where we are examining varieties and fungicides under non-inoculated conditions. What we have seen, however, is that wheat variety has an effect of the development of FHB and that foliar fungicide response has been variable, especially for mycotoxin levels. We also harvested one year of the integrated management trial at the Arlington Agricultural Research Station that, while similar to the trial at Lancaster, has an additional block where we inoculated with *Fusarium graminearum*. Due to budget cuts this project was not performed in 2012. Lastly, we continue our research to examine the effect of crop rotation and foliar fungicide on development of FHB. This trial has great interest for us since it matches with current rotations the producers in Wisconsin use. In particular, we are most interested in examining response in situations where the previous crop was corn harvested for silage. Preliminary results from 2009-2012 trial indicated that there were effects of rotation and a variety by fungicide effect on DON levels. In years with FHB infection the highest levels of DON were found when wheat followed corn for grain. Also, there was evidence of reductions in DON with the application of Prosaro for several varieties, especially those considered susceptible. A similar result was found for grain yield although response to the fungicide on yield was did not completely match with DON levels. We are also taking soil samples to quantify the role of genetics and management on soil populations of *F. graminearum*. The qPCR protocol to quantify *F. graminearum* has been optimized. DNA from the 2011 soil samples is being extracted and analyzed. The development of a standard curve to relate the Ct value to *F. graminearum* spore density is currently in the beginning stages of development. The 2012 soil samples will begin to be processed later this summer.

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: *Verbatim to our 2011 accomplishments

- 1) Improved communication for delivering FHB risk information via the Fusarium Head Blight Prediction Center and The Soy Report blog.
- 2) Improved information regarding the risk of FHB over a longer period of the growing season to account for the variation in flowering dates around the state.
- 3) New data available regarding the risk and response of different management tactics for FHB.

Impact:

- 1) Growers and consultants continue to increase their willingness to sign up to the real-time reporting on FHB risk information via the USWBSI website and we continue to increase the number of members of our email listserv for The Soy Report blog.
- 2) Phone calls, emails, and personal communication from consultants and growers about the risk of FHB have indicated that they are using the Fusarium Head Blight Prediction to monitor the risk of FHB and doing follow-up scouting to match with the predictions made during flowering.
- 3) There is an improved working knowledge of the risk factors associated with FHB, in particular crop rotation. More growers are integrating this component into their overall management program for wheat diseases.
- 4) FHB is focal point of our 2011 Winter Wheat meetings. Research results from this grant impacted >74,000 acres (based on survey information) from these meetings alone and countless acres from our other outreach vehicles (USWBSI website and The Soy Report blog).
- 5) Educational highlights from the 2011 Winter Wheat meetings:
 - a. Clientele can easily identify head scab when it presents itself alone; however the inclusion of other head related diseases such as glume blotch decreases their ability to correctly identify FHB.
 - b. 98% of the clients that participated in the wheat meetings indicated that they improved their wheat management knowledge found the meeting valuable.
 - c. 80% indicated they will change some aspect of their wheat management system.

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.

Journal Articles (2011-2012):

Willyerd, K.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.

Lackermann, K. V., and P. D. Esker. 2011. Application of a rank-based method for improved cultivar selection in soft red winter wheat. *Plant Disease* 95:1407-1413.

Lackermann, K. V., Conley, S. P., Gaska, J. M., Martinka, M. J., and Esker, P. D. 2011. Effect of location, cultivar and disease severity on grain yield of soft red winter wheat in Wisconsin. *Plant Disease* 95:1401-1406.

Talks and Presentations (June 2011 – June 2012):

June 2011: Evening Walk – Winter Wheat Variety Trial, Chilton, WI. Total Attendance = 45.

November 2011: Pest Management Update Program – Portion of talk focused on wheat disease management. Eight locations, total attendance = 501.

January 2012: Agronomy Update Meetings – Portion of talk focused on wheat disease management. Eight locations, total attendance = 416.

June 2012: Evening Walk – Winter Wheat Variety Trial, Chilton, WI. Total Attendance = 50.

Articles (June 2011-June 2012):

Conley, S. 2012. Fusarium head blight risk remains low for WI. *Wisconsin Crop Manager* 19(8): 29.

Conley, S. 2012. Looking ahead – early scab forecast and fungicide labels. *Wisconsin Crop Manager* 19(8): 27.

Postings on FHB on The Soy Report Blog related to FHB (June 2011 – June 2011): 4