

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY13 Final Performance Report  
July 15, 2014**

**Cover Page**

<b>PI:</b>	Shawn Conley
<b>Institution:</b>	University of Wisconsin
<b>Address:</b>	Department of Agronomy 493a Russell Laboratories 1575 Linden Dr. Madison, WI 53706
<b>E-mail:</b>	spconley@wisc.edu
<b>Phone:</b>	608-262 7975
<b>Fax:</b>	
<b>Fiscal Year:</b>	FY13
<b>USDA-ARS Agreement ID:</b>	59-0206-9-088
<b>USDA-ARS Agreement Title:</b>	Integrated Management Studies to Improve Overall Management of FHB and DON in Wisconsin.
<b>FY13 USDA-ARS Award Amount:</b>	\$ 12,171

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
MGMT	Uniform Fungicide Trials for Management of FHB and DON in Wisconsin.	\$ 4,868
MGMT	Integrated Management of Fusarium Head Blight and DON in Wisconsin.	\$ 7,303
	<b>FY13 Total ARS Award Amount</b>	<b>\$ 12,171</b>

Principal Investigator \_\_\_\_\_ Date 7/12/14

\* 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

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

Soft red winter wheat (SRWW) production continues to be an important aspect of integrated agricultural systems in Wisconsin. Winter wheat fits well with rotations of corn and soybean, which are the major field crops in the state. With the growing importance of using wheat in Wisconsin comes the concern for Fusarium head blight (FHB) and deoxynivalenol (DON) accumulation in harvested grain. Many growers in Wisconsin find the occurrence of FHB to be sporadic, which is frustrating. They also find that there is a lack in information about resistance to FHB in some SRWW varieties. Others desire to plant susceptible varieties that might yield better and manage FHB using fungicide applications. While the anthesis application of fungicide targeted at controlling FHB is considered the best timing of fungicide application; many growers find it difficult to get in the field during this critical time due to weather or other more pressing tasks. Therefore, some growers desire to spray later. Data is lacking in Wisconsin, to validate the utility of post-anthesis applications of fungicide. Integrating both resistance and fungicide application has proven to be complicated. However, our key stakeholders (including growers, consultants, and the Wisconsin Crop Improvement Association; our main entity that certifies seed in the state) want to know if and when a fungicide may be needed for control of scab.

As illustrated above one of the central tenets that we have recognized in Wisconsin is the need to integrate more fully in the projects affiliated with the USWBSI especially to improve stakeholder knowledge. Our approach has been proactive in the educational aspect for understanding management decisions related to scab. We developed a blog format to provide real-time observations and information about wheat production, wheat diseases and management (this blog does also discusses issues related to soybean production). In addition, Dr. Damon Smith (Extension Field Crops Pathologist, Department of Plant Pathology at The University of Wisconsin-Madison) also maintains a disease-specific blog for field crops including wheat. In addition he maintains a website that is updated regularly which has a section on wheat diseases including FHB.

**2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:****Accomplishment:**

- 1) Provide commentary for the Fusarium Head Blight Prediction Center.
- 2) Established scab-specific research trials.

**Impact:****1) Provide commentary for the Fusarium Head Blight Prediction Center.**

Wisconsin joined the list of state's providing commentary for the prediction website. In addition to commentary, we actively provided training on how to use the site. Based on

comments, we have been told many look at this as a method to monitor for scab in their areas of Wisconsin, especially to determine if fungicides are needed.

## **2) Established scab-specific research trials.**

By participating in scab-specific trials, we have been able to develop a framework to improve management recommendations based on variety selection and the need for a foliar fungicide spray. We will be able to more fully measure the impact of this work future years since we hope to more fully roll out an online database on variety response to scab, but wanted to highlight this for the current report.

### **Project 2: *Integrated Management of Fusarium Head Blight and DON in Wisconsin.***

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

Many of the growers recognize the wheat varieties that are favorable for other traits like yield or resistance to foliar diseases may be more susceptible to scab when conditions are favorable. Therefore, understanding what factors should be examined to better manage the disease is critical. Given that we do not have a defined wheat breeder in Wisconsin, one of our approaches has been to develop an approach to using the Wisconsin Winter Wheat Performance Testing program that “mimics” a screening approach from the breeding side. The Wisconsin Winter Wheat Performance Testing program has 4 testing sites across WI that are subject to diverse climates. These sites are screened and rated for FHB. One of the weaknesses we do have in this approach is the inability to obtain measurements of mycotoxin levels in wheat grain from these evaluations. We do not currently feel we could increase fees for varieties entered without the loss of participation in the program by the commercial wheat seed industry.

Another area that is a key component to our current USWBSI project is the question about the effect of crop rotation on the risk of scab. Our results indicated interactions among the different management tactics were not consistent for all three crops. However, crop rotation and variety selection were found to be most important for maximizing corn, soybean, and wheat yields. Highest yields for each crop were observed in the corn-soybean-wheat (CSW) rotation system. Variety rotation influenced the yield of each crop, but results suggested selecting varieties with the highest yield potential for each crop was best. Fungicide use increased soybean yield on average by 1.4%, and wheat yield response to fungicide use was not consistent each year. In conclusion, results from this study suggested growers should use high-yield potential varieties in a CSW crop rotation in order to reach maximum yield potential for these three crops.

- 2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:**

**Accomplishment:**

1. *Fusarium* spp, research and manuscripts in review.

**Impact:**

One manuscript is accepted and one is currently in review.

1. Marburger, D., M. Venkateshwaran, **S.P. Conley**, P.D. Esker, J.G. Lauer, and J.M. Ané. 2014. Crop Rotation and Management Effect on *Fusarium spp.* Populations. *Crop Sci.* In press.
2. Marburger, D., **S.P. Conley**, P.D. Esker, J.G. Lauer, and J.M. Ané. 2014. Corn, Soybean, and Wheat Yield Response to Crop Rotation, Variety Rotation, and Fungicide Use. *Crop Sci.* In review.

**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 FY13 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.**

Web Resources (Extension):

1. The Soy Report Blog, <http://thesoyreport.blogspot.com> (used to provide real-time observations on FHB risk, etc.)
2. Wisconsin Field Crops Pathology Blog and Website - <http://fyi.uwex.edu/fieldcroppathology/> (Used to provide real-time disease updates, including FHB and is used as a repository for disease information and management advice)

**Extension Presentations:**

1. Wheat Disease Management. 2013 Wisconsin Pest Management Update Meetings. November 11-14 & 18-21, 2013. Marshfield, Chippewa Falls, Belmont, Arlington, Fond du Lac, Green Bay, Sparta, and Janesville, WI. (*Total of 8 presentations; 503 clients*).
2. Understanding fungicides to improve their use and efficacy. 2013 Wisconsin Crop Management Conference. January 15-17, 2013. Madison, WI. (100 clients).

**Extension Articles or Publications:**

1. Smith, D.L. and Proost, R. 2013. Fact Sheet: A3878 – Fungicide resistance management in corn, soybean, and wheat in Wisconsin. UW Extension - Cooperative Extension Service. University of Wisconsin.
2. Cullen, E., Davis, V., Jensen, B., Nice, G., Renz, M., and Smith, D.L. 2013. A3646 – Pest Management in Wisconsin Field Crops. UW Extension - Cooperative Extension Service. University of Wisconsin.
3. Groves, C., Fritz, C., and Smith, D.L. 2013. Fact Sheet: XGT1016 – Leaf blotch diseases of wheat. UW Extension - Cooperative Extension Service. University of Wisconsin.
4. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – June 19, 2013. Wisconsin Crop Manager – June 20.
5. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – June 12, 2013. Wisconsin Crop Manager – June 13.
6. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – June 5, 2013. Wisconsin Crop Manager – June 6.
7. Smith, D.L. 2013. Fusarium Head Blight Update – June 4, 2013. Wisconsin Crop Manager – June 6.
8. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – May 29, 2013. Wisconsin Crop Manager – May 30.
9. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – May 15, 2013. Wisconsin Crop Manager – May 16.
10. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – May 8, 2013. Wisconsin Crop Manager – May 9.
11. Smith, D.L. 2013. Wisconsin Winter Wheat Disease Update – April 24, 2013. Wisconsin Crop Manager – April 25.
12. Smith, D.L. 2013. Wheat Scouting and a Little More about Rusts. Wisconsin Crop Manager – April 3.
13. Groves, C. and Smith, D.L. 2013. Disease Profile – Leaf Blotch Diseases of Wheat. Wisconsin Crop Manager – March 21.
14. Smith, D.L. 2013. Using Fungicides on Wheat. Wisconsin Crop Manager – March 21.
15. Smith, D.L. 2013. Webpage: Fusarium head blight (scab) of wheat. <http://fyi.uwex.edu/fieldcroppathology/fusarium-head-blight-scab-of-wheat/>
16. Groves, C. and Smith, D.L. 2013. Leaf blotch diseases of wheat. <http://fyi.uwex.edu/fieldcroppathology/files/2013/03/Leaf-Blotch.pdf>

**Conference Proceedings/abstract:**

1. David A Marburger, Jean-Michel Ané, Muthusubramanian Venkateshwaran, Paul David Esker, Joseph G. Lauer and Shawn P Conley. 2013. Characterizing *Fusarium* Diversity In Long Term Rotational Systems. In Agronomy Abstracts. ASA, Madison, WI.

**Research publications:**

1. Marburger, D., M. Venkateshwaran, **S.P. Conley**, P.D. Esker, J.G. Lauer, and J.M. Ané. 2014. Crop Rotation and Management Effect on *Fusarium spp.* Populations. *Crop Sci.* In press.
2. Marburger, D., **S.P. Conley**, P.D. Esker, J.G. Lauer, and J.M. Ané. 2014. Corn, Soybean, and Wheat Yield Response to Crop Rotation, Variety Rotation, and Fungicide Use. *Crop Sci.* In review.