

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

Cover Page

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Fiscal Year:	FY11
USDA-ARS Agreement ID:	59-0206-9-050
USDA-ARS Agreement Title:	Integrated FHB Management Research - South Dakota.
FY11 USDA-ARS Award Amount:	\$ 33,659

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management of FHB and DON in Wheat and Barley for SD.	\$ 20,000
MGMT	Uniform Fungicide Trials for Control of FHB and DON on wheat in South Dakota.	\$ 13,659
	Total ARS Award Amount	\$ 33,659

Bruce Bleakley

7-12-12

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
 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 Management of FHB and DON in Wheat and Barley for SD.*

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

To investigate when and how to incorporate different management strategies including fungicide, crop rotation and varietal selections for Fusarium head blight (FHB) and DON suppression under different environmental conditions. The hope is to identify a combination of these strategies that will help the producer gain an edge against FHB and DON when he/she is thinking about planting small grains, and to help assure that the producer is maximizing potential profit margins on the wheat acres grown.

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 South Dakota, success in using an integrated-management strategy has shown that by using at least a moderately resistant variety planted on a previous non-host crop field (i.e. soybeans), all paired with a timely fungicide application, the highest percent of control for FHB and DON is achieved. This study has shown producers that by making the right choices in their cropping systems, significant improvement of FHB suppression can be achieved. This integrated-management strategy is very important in South Dakota, as most of the producers are no-tilling, which leaves residue on the top of the fields, providing a ready source of FHB inoculum. The collection of this data from 40 trials from 12 states has also shown that use of a tebuconazole + prothioconazole application, coupled with cultivar resistance, is a more effective management strategy for reducing Fusarium head blight index and DON than either approach used by itself. However, differences in the percentage of control will vary among the different environments (K.T. Willyerd et al, 2012).

Impact:

Increasing the producer knowledge of the effects of cropping systems, and understanding the disease cycle and what tools can be used to develop an integrated management program to prevent/suppress FHB, are ultimately leading to an improved profit per acre grown.

Project 2: *Uniform Fungicide Trials for Control of FHB and DON on wheat in South Dakota.*

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

Fusarium head blight can only be managed by a combination of cultural and chemical means. In many cases, producers have had to compromise on cultural approaches for disease management and become reliant on chemical control. We have been investigating different fungicides and different application timings to ascertain which products available in the

industry are most effective, and how the different application timings affect Fusarium head blight and DON levels. We have also been testing various biological control agents used as stand-alone treatments, and also used in combination with chemical fungicides, to see how these combined programs perform against Fusarium head blight.

- 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:

As a result of conducting the uniform trials, there has been success in demonstrating to producers, crop consultants, etc. that there is a difference in fungicide efficacy, and more importantly that in general, fungicides can be very successful tools for FHB suppression. In some areas of the region it has been shown that if a fungicide is applied a little later in the flowering period, but within the pre-harvest interval that is listed on the chemical label, those fungicides can still be effective against FHB and DON.

Impact:

During the wet and rainy weather that we have had in the last few years, we have tested the different timings of spraying the fungicides, and have found that an application later than early flowering, but within the pre-harvest interval of that fungicide, still provides protection against FHB. Being armed with this knowledge has helped producers, so when they have wet conditions and are unable to get into their fields, they are able to spray at a later date and still have some protection against FHB.

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.

Bleakley, B.H., K.R. Ruden, N. Srinivasa-Murthy and S. Halley. 2011. "2011 Trial of the Performance of Selected Biological Control Agents for the Suppression of Fusarium Head Blight in South Dakota and North Dakota. In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (p.122). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

Bradley, C.A., E.A. Adee, S.A. Ebelhar, G.C. Bergstrom, R. Dill-Macky, J.J. Wiersma, A.P. Grybauskas, W.W. Kirk, M.P. McMullen, S. Halley, E.A. Milus, L.E. Osborne, K.R. Ruden and K.A. Wise. 2011. "Effects of Triazole, Strobilurin, and Triazole + Strobilurin Fungicides on Fusarium Head Blight and Associated Mycotoxins." In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 125-126). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

Halley, S., G. Yuen, C. Jochum, B.H. Bleakley, N.K.S. Murthy, K.R. Ruden, K.D. Waxman, G.C. Bergstrom and L.E. Sweets. 2011. “Uniform Biological Fungicide Evaluations for Control of Fusarium Head Blight and Deoxynivalenol in Wheat.” In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp.140-141). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

Ruden, K.R., G.S. Redenius, K.D. Glover, J.L. Kleinjan and L.E. Osborne. 2011. “2011 Uniform Fungicide Performance Trials for the Suppression of Fusarium Head Blight in South Dakota.” In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp.145-146). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

Ruden, K.R., G.S. Redenius and L. E. Osborne. 2012. 2011 Field Plot Summaries: Plant Disease and Fungicide Trials. SDSU Extension Service. 94 p.

Srinivasa Murthy, N. and B. H. Bleakley. 2011. “Lipase Activity of Bacillus Strains used for Biological Control of Fusarium Head Blight. In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp.151). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

Willyerd, K., G. Bergstrom, C. Bradley, R. Dill-Macky, P. Gross, A. Grybauskas, S. Halley, D. Hersman, L. Madden, M. McMullen, G. Milus, L. Osborne, K. Ruden, J.D. Salgado, L. Sweets, S. Wegulo, K. Waxman, K. Wise and P. Paul. 2011. “Uniform Fusarium Head Blight Integrated Management Trials: A 2011 Update.” . In: S. Canty, A. Clark, A. Anderson-Scully, D. Ellis and D. Van Sanford (EDS.). *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp.161-166). East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Initiative.

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-Macky, 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(7): 957-967.