

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY09 Final Performance Report
July 15, 2010**

Cover Page

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Fiscal Year:	2009
USDA-ARS Agreement ID:	59-0206-9-050
USDA-ARS Agreement Title:	Integrated FHB Management Research - South Dakota.
FY09- USDA-ARS Award Amount:	\$ 24,390

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
MGMT	Uniform Fungicide and Biocontrol Agent Test for Control of FHB and DON on winter wheat in South Dakota.	\$ 7,805
MGMT	Integrated Management of FHB and DON in Spring Wheat, Winter Wheat and Barley in South Dakota.	\$ 16,585
	Total Award Amount	\$ 24,390

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 Winter Wheat Region
 SWW – Southern Sinter Wheat Region

Project 1: *Uniform Fungicide and Biocontrol Agent Test for Control of FHB and DON on winter 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?

The major issue addressed involves developing and testing a component (fungicides) of optimal FHB management plans that are practical to implement and raise the profitability of growers through improved management or decreased input costs. Furthermore, the dissemination of this information is crucial to the success of FHB management state- and region-wide.

This research directly or indirectly addresses Action Plan Goals #1, 2, and 4. AP Goals #1 and #2 address the **integrated management of FHB and the development of the next generation of management tools.**

The fungicides, biological agents and application methods tested in these trials will provide the basis for the applied, in-season management of FHB in South Dakota and around the region through integrated management plans. In all regions affected by FHB, chemical management remain a mainstay for FHB management along with host resistance and disease forecasting. As new products are emerging onto the marketplace or as older, effective chemistries become less available, it is critical that pathologists have adequately evaluated those chemicals or biological agents that will be in the hands of producers and crop disease managers. At SDSU we are gathering and analyzing data (and contributing to the wider collaborative effort) that allows us to say with certainty which management approaches are producing acceptable results for growers.

AP Goal #4 relates to the **dissemination of effective management information to the proper audiences.** The efficacy information gathered through this research is directly utilized to inform growers about FHB management and is used in a way that makes them more aware of the biology and epidemiology of this disease. We are implementing a comprehensive outreach and extension program in cereal diseases with special emphasis on scab.

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:

We successfully tested several commercially available and widely used fungicide products for the management of FHB and disseminated that information through extension outlets.

Impact:

Growers in SD did not have widespread high levels of scab in 2009 however those that were threatened with high risk conditions have been made aware of the optimal management strategies including the use of Caramba and Prosaro fungicides for the optimal management of the disease in conjunction with resistant varieties. We have a highly connected and active extension plant disease management education program in the state. We deliver scab management information to thousands of growers, agronomists, applicators and other crop managers each year. In 2009-10, we contacted approximately 1,500 individuals through approximately 40 winter clinics and summer field tours. Publications and data summaries were distributed widely. Over 900 website hits were received in May – July, 2009 on our Wheat and Barley Scab Advisory, and we also maintained a commentary on the USWBSI-sponsored forecasting site through Penn State.

Project 2: *Integrated Management of FHB and DON in Spring Wheat, Winter Wheat and Barley in South Dakota.*

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

The major issue addressed involves integrating component management options into optimal FHB management plans that are practical to implement and raise the profitability of growers through improved management or decreased input costs. Furthermore, the dissemination of this information is crucial to the success of FHB management state- and region-wide.

This research directly or indirectly addresses Action Plan Goals #1, 2, and 4. AP Goals #1 and #2 address the **integrated management of FHB and the development of the next generation of management tools.**

We are testing the integrated management of FHB using disease forecasting, resistant varieties and chemical management to optimally manage the disease. In all regions affected by FHB, chemical management remain a mainstay for FHB management however we have shown that integration of host resistance and disease forecasting will provide superior control with little added input costs. At SDSU we are gathering and analyzing data (and contributing to the wider collaborative effort) that allows us to say with certainty which management approaches are producing acceptable results for growers.

AP Goal #4 relates to the **dissemination of effective management information to the proper audiences.** The efficacy information gathered through this research is directly utilized to inform growers about FHB management and is used in a way that makes them more aware of the biology and epidemiology of this disease. We are implementing a comprehensive outreach and extension program in cereal diseases with special emphasis on scab.

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:

We successfully tested integrated management strategies against component and untreated wheat plots for efficacy and economic impact. Through funding from local resources, we conducted testing on all three classes of grain in 2009 (HRWW, HRSW, Barley) though we were funded only for winter wheat.

Impact:

Growers in SD did not have widespread high levels of scab in 2009 however those that were threatened with high risk conditions have been made aware of the optimal management strategies including the planting of resistant or moderately resistant varieties, the consultation with disease forecasting information, and the use of Caramba and Prosaro fungicides on for the optimal management of the disease. We have a highly connected and active extension plant disease management education program in the state. We deliver scab management information to thousands of growers, agronomists, applicators and other crop managers each year. In 2009-10, we contacted approximately 1,500 individuals through approximately 40 winter clinics and summer field tours. Publications and data summaries were distributed widely. Over 900 website hits were received in May – July, 2009 on our Wheat and Barley Scab Advisory, and we also maintained a commentary on the USWBSI-sponsored forecasting site through Penn State.

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.

Refereed Publications:

Stein, J.M., L.E. Osborne, K.D. Bondalapati, K.D. Glover, and C.A. Nelson. 2009. Fusarium Head Blight Severity and Deoxynivalenol Concentration in Wheat in Response to *Gibberella zeae* Inoculum Concentration. *Phytopathology*. 99:759-764

Glover, K.D., J.C. Rudd, R.N. Devkota, R.G. Hall, Y. Jin, L.E. Osborne, J.A. Ingemansen, J.R. Rickertsen, D.D. Baltensperger, and G.A. Hareland. 2010. Registration of 'Brick' Wheat. *J. Plant Registrations* 4:22-27.

Bondalapati, K.D., J.M. Stein, L.E. Osborne, S.M. Neate, and C.R. Hollingsworth. 20XX. Development of Weather-Based Predictive Models for Deoxynivalenol Accumulation in Malting Barley. *Phytopathology*. Accepted for Publication.

Bondalapati, K.D., J.M. Stein, L.E. Osborne, S.M. Neate, and C.R. Hollingsworth. 2009. Progress on Modeling Deoxynivalenol in Barley. pp. 26-29 in: Proc. 2009 National Fusarium Head Blight Forum. Dec. 7-9, 2009. Orlando, FL.

Proceedings Article:

Bradley, C.A., E.A. Adey, S.A. Ebelhar, A.P. Grybauskas, C.R. Hollingsworth, W.W. Kirk, M.P. McMullen, E.A. Milus, L.E. Osborne, K.R. Ruden and B.G. Young. 2009. Application Timings of Caramba and Prosaro Foliar Fungicides for Management of FHB and DON. Proc. 2009 National Fusarium Head Blight Forum. Dec. 7-9, 2009. Orlando, FL.

Abstracts/Poster Presentations:

Bradley, C.A., E.A. Adey, S.A. Ebelhar, A.P. Grybauskas, C.R. Hollingsworth, W.W. Kirk, M.P. McMullen, E.A. Milus, L.E. Osborne, K.R. Ruden and B.G. Young. 2009. Effect of Pyraclostrobin Applications to Wheat at Different Growth Stages on DON Concentrations in Grain. Proc. 2009 National Fusarium Head Blight Forum. Dec. 7-9, 2009. Orlando, FL.

Ruden, K.R., L.E. Osborne, and B.H. Bleakley. 2009. 2009 Trial for the Performance of Biological Control Agents for the Suppression of Fusarium Head Blight in South Dakota. Proc. 2009 National Fusarium Head Blight Forum. Dec. 7-9, 2009. Orlando, FL.

Osborne, L.E., T.E. Chase, C.A. Tande, R.K. Berg, B.R. Ruden, and D.P. Todey, 2009. A Case of Clinic Collaboration Concerning Climate and Corn. 2009 NPDN National Meeting, Miami, FL. (Abstract)

Bleakley, B.H., S. Halley, L. Osborne, K. Ruden, and J. Morgan. 2009. Field plot trials in North Dakota and South Dakota using Bacillus strain 1BA for biological control of Fusarium Head Blight on wheat and barley. Abstracts of the 2009 Annual Meeting of the American Phytopathological Society. Aug. 1-5, 2009. Portland, OR.

Extension Publications:

FS952: South Dakota Wheat Fungicide Recommendations. 2009. L. Osborne and J. Stein. Produced by SDCES. <http://agbiopubs.sdstate.edu/articles/FS952.pdf>

FS949: Managing Crop Disease with Seed Treatments. 2009. L. Osborne and K. Ruden. Produced by SDCES. <http://agbiopubs.sdstate.edu/articles/FS949.pdf>

FS917: Managing Crop Disease with Fungicides. 2009. L. Osborne and K. Ruden. Produced by SDCES. <http://agbiopubs.sdstate.edu/articles/FS917.pdf>

ABC20714.09: Managing Change: Plant Disease Management Tools: Decision Support. 2009. L. Osborne. <http://agbiopubs.sdstate.edu/articles/ABC20714.09.pdf>

ABC20714.18: Managing Change: SDSU Plant Diagnostic Clinic. 2009. L. Osborne. Online at: <http://agbiopubs.sdstate.edu/articles/ABC20714.18.pdf>

2009 Field Plot Summaries: Plant Disease and Fungicide Trials. 2009 by L. Osborne and K. Ruden. <http://plantsci.sdstate.edu/planthealth/Pubs/2008DataBook.pdf>

Blight and Insights: A Newsletter of the SDSU Plant Diagnostic Clinic. 2009 (7 Issues). L. Osborne, et al. Produced through Extension Plant Pathology and supported by stakeholders.

Local Training and Presentations:

Conducted training for 100 participants at a 2-day SD Agronomy Professional Field School at SE Research Farm in Beresford, SD. (Received CES Team Award)

Conducted 5 field scouting/disease identification in-field trainings and outreach events for around 150 participants

Conducted 5 demonstrations at University or private industry field days, extending sound information on varietal resistance and plant disease management.

Conducted 8 Certified Pesticide Applicator Training sessions to approximately 500 individuals. Topics included fungicides and seed treatments.

FY09 (approx. May 09 – May 10)

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Delivered an invited presentation to the SD Agribusiness Association including FHB management (150 participants).

Produced 3 Print/Radio News Releases in cooperation with SDSU AgBio Communications relating to FHB.

Conducted 11 Radio Interviews on FHB management topics with local and national news outlets