

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY15 Final Performance Report  
Due date: July 15, 2016**

**Cover Page**

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<b>Fiscal Year:</b>	2015
<b>USDA-ARS Agreement ID:</b>	59-0206-1-116
<b>USDA-ARS Agreement Title:</b>	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in WW in ND.
<b>FY15 USDA-ARS Award Amount:</b>	\$ 16,812
<b>Recipient Organization:</b>	North Dakota State University Office of Grant & Contract Accounting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
<b>DUNS Number:</b>	80-388-2299
<b>EIN:</b>	45-6002439
<b>Recipient Identifying Number or Account Number:</b>	FAR0018562
<b>Project/Grant Reporting Period:</b>	04/12/15-05/11/16
<b>Reporting Period End Date:</b>	05/11/16

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
DUR-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in North Dakota.	\$ 7,774
HWW-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.	\$ 9,038
	<b>FY15 Total ARS Award Amount</b>	<b>\$ 16,812</b>

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Principal Investigator

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Date

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\* MGMT – FHB Management  
FST – Food Safety & Toxicology  
GDER – Gene Discovery & Engineering Resistance  
PBG – Pathogen Biology & Genetics  
EC-HQ – Executive Committee-Headquarters  
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:** *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in North Dakota.*

**1. What are the major goals and objectives of the project?**

FHB has been a serious constraint to quality durum production recently in some of the major durum producing regions of North Dakota. When conditions are favorable for FHB development, controlling DON levels and FHB is more problematic in durum than in spring wheat due to the lack of genetic resistance to FHB in currently available durum cultivars. The objectives of this research were to quantify the effect of currently available durum cultivars when combined with the best fungicide practice on the control of FHB and DON. This research was done under misted and inoculate conditions to ensure high levels of FHB development.

**2. What was accomplished under these goals?**

- 1) Major activities: The variety by fungicide trials was planted in REC Carrington under misting conditions as planned. Good levels of FHB were obtained with DON levels in harvested grain averaging 20.6 ppm.
- 2) Specific objectives: To determine the relative importance of variety and fungicide on the control of FHB and level of DON in the grain at harvest.
- 3) Significant results: This season the genetic resistance and a fungicide application (Prosaro at flowering) provided similar levels of control. The best cultivar, Divide, had 5.7 ppm DON, while the most susceptible cultivar, Carpio, had 10.2 ppm DON. The fungicide application when averaged over varieties had 5.1 ppm DON compared to the non-sprayed level of 7.9 ppm. The combination of best variety and fungicide resulted in 3.0 ppm. These results confirm the superiority of Divide with regards to FHB resistance. This combination also produced the highest yield, more than 10 bu/acre higher than the next cultivar.
- 4) Key outcomes or other achievements: The information provided practical guidance to growers who have been seeing FHB damage more frequently in recent years, on the importance of combining genetic resistance with fungicides in order to obtain the best FHB control.

**3. What opportunities for training and professional development has the project provided?**

Two graduate students were trained in how to evaluate FHB damage and in how to apply fungicides and evaluate their effectiveness.

**4. How have the results been disseminated to communities of interest?**

The results of this experiment were posted on the variety trial results section of the NDSU Extension Service's website. They were used to update variety information on the published durum variety selection guide, and was included in presentations made at four major meetings attended by growers and crop consultants.

**Project 2:** *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.*

**1. What are the major goals and objectives of the project?**

The problem that we are confronting is how to most effectively combine genetic resistance with recommended fungicides in order to minimize yield and quality losses in winter wheat to FHB. There are few FHB resistant varieties within the winter wheat class and their level of resistance needs verification. The objective of this research was to quantify the effect of currently available winter wheat varieties when combined with the best fungicide practice on the control of FHB and DON.

**2. What was accomplished under these goals?**

1) Major activities: An experiment was conducted in south eastern North Dakota with 20 genotypes (19 released varieties and one experimental) and two fungicides levels in a factorial arrangement. The fungicide levels were no fungicide, and Prosaro™ applied at flowering. This experiment was conducted under natural levels of rainfall and FHB inoculum.

2) Specific objectives: To determine the relative importance of variety and fungicide on the control of FHB and level of DON in the grain at harvest.

3) Significant results: FHB development was quite good during this season with the DON levels, when no fungicide was applied and averaged over varieties, of 4.7 ppm. This level of DON is similar to what farmers obtain in a moderate to heavy FHB season. Varieties differed significantly in susceptibility to FHB, with the most susceptible having 10.3 ppm and the most resistant 0.7 ppm DON when no fungicide was applied. Fungicide highly significantly reduced DON levels (4.7 to 1.1 ppm). Several of the most resistant varieties when treated with fungicide had no detectable DON levels. The results show the potential control that can be achieved with fungicides and confirmed the importance of integrating the most resistant varieties with fungicides in order to control FHB effectively.

4) Key outcomes or other achievements: This research confirms the relatively good level of resistance to FHB of Lyman and Overland and the excellent resistance of AC Emerson. AC Emerson's resistance is similar to that found in spring wheat and offers an excellent option for farmers who routinely deal with FHB in winter wheat.

**3. What opportunities for training and professional development has the project provided?**

Two graduate students were trained in how to evaluate FHB damage and in how to apply fungicides and evaluate their effectiveness.

**4. How have the results been disseminated to communities of interest?**

The results of this experiment were posted on the variety trial results section of the NDSU Extension Service's website. They were used to update variety information on the published winter wheat variety selection guide, and included in presentations made at four meetings attended by growers and crop consultants where winter wheat variety selection was discussed.

### **Training of Next Generation Scientists**

- 1. Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY15 award period? No.**
- 2. Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY15 award period? No.**
- 3. Have any post docs who worked for you during the FY15 award period and were supported by funding from your USWBSI grant taken faculty positions with universities? None.**
- 4. Have any post docs who worked for you during the FY15 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies? None.**

**Release of Germplasm/Cultivars**

**Instructions:** In the table below, list all germplasm and/or cultivars released with full or partial support through the USWBSI during the FY15 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations. *Leave blank if you have nothing to report or if your grant did NOT include any VDHR-related projects.*

Name of Germplasm/Cultivar	Grain Class	FHB Resistance (S, MS, MR, R, where R represents your most resistant check)	FHB Rating (0-9)	Year Released

Add rows if needed.

**NOTE:** List the associated release notice or publication under the appropriate sub-section in the ‘Publications’ section of the FPR.

**Abbreviations for Grain Classes**

- Barley - BAR
- Durum - DUR
- Hard Red Winter - HRW
- Hard White Winter - HWW
- Hard Red Spring - HRS
- Soft Red Winter - SRW
- Soft White Winter - SWW

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### **Publications, Conference Papers, and Presentations**

Refer to the FY15-FPR\_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

#### **Journal publications.**

Nothing to report.

#### **Books or other non-periodical, one-time publications.**

Nothing to report.

#### **Other publications, conference papers and presentations.**

Proceedings Abstract:

Salgado, J.D., K. Ames, G. Bergstrom, C. Bradley, E. Byamukama, J. Cummings, V. Chapara, M. Chilvers, R. Dill-Macky, A. Friskop, P. Gautam, N. Kleczewski, L.V. Madden, E. Milus, M. Nagelkirk, **J. Ransom**, K. Ruden, J. Stevens, S. Wegulo, K. Wise, D. Yabwalo and P.A. Paul. 2015. Robust management programs to minimize losses due to FHB and DON: A multi-state coordinated project. *In: S. Canty, A. Clark, S. Vukasovich and D. Van Sanford (Eds.), Proceedings of the 2015 National Fusarium Head Blight Forum.* (pp. 24). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.

Status: Published

Acknowledgement of Funding Support: Not applicable; publication did not pertain to project under this agreement.