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

# Cover Page

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|---|---|
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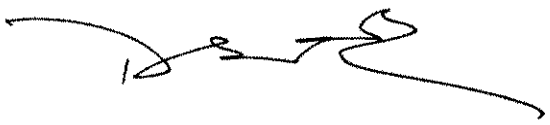
| **Fiscal Year:** | FY13 |
| **USDA-ARS Agreement ID:** | 59-0206-2-082 |
| **USDA-ARS Agreement Title:** | Diagnostic Testing Services for Deoxynivalenol in the Eastern U.S. |
| **FY13 USDA-ARS Award Amount:** | $ 64,056 |

**USWBSI Individual Project(s)**

| USWBSI Research Category* | Project Title | ARS Award Amount |
|---|---|---|
| FSTU-S | Diagnostic Testing Services for Deoxynivalenol in the Eastern United States. | $ 64,056 |
| | **FY13 Total ARS Award Amount** | **$ 64,056** |



July 14, 2014

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:** *Diagnostic Testing Services for Deoxynivalenol in the Eastern United States.*

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

   Demand continues for USWBSI diagnostic testing services for mycotoxins across the United States. DON testing services are vital to the development of new varieties of wheat and barley with reduced mycotoxin potential and are necessary to identify and/or exclude appropriate strategies for managing FHB. FY13 DON testing services at Virginia Tech provided analytical services necessary to develop new cultivars of wheat and barley with reduced potential for DON contamination and to improve chemical and cultural practices necessary to reduce DON contamination in wheat and barley.

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:**
   In FY13, DON data was delivered for 4,618 wheat and barley samples from four USWBSI investigators (Griffey, Grybauskas, Rideout, and Schmale). Samples were slated for Laskar and Glover, but were not submitted for testing during the funding cycle. The testing number does not include controls, checks, and re-runs. Most of the samples tested in FY13 were 100g kernel lots from FHB field trials, but some were smaller lots (~5g samples) from laboratory experiments. We also processed samples associated with DON during ethanol production, DON detoxification studies, and DON contamination of wheat straw. Extraction, clean-up, and quantification of DON were conducted following standard protocols using a GC/MS. DON testing services were coordinated, supported, and managed by a talented research associate (Niki McMaster). The Schmale Lab at Virginia Tech continues to be committed to the long-term management of a successful and productive mycotoxin testing lab for the USWBSI.

   **Impact:**
   The goals of this work were to provide analytical services necessary to develop new cultivars of wheat and barley with reduced potential for DON contamination and to facilitate DON testing that will improve chemical and cultural practices necessary to reduce DON contamination in wheat and barley. This work directly addresses Goal #1 of the Action Plan to ‘Provide analytical support for DON/trichothecene quantitation for Initiative’s stakeholders’. We are providing DON testing services for wheat and barley samples from USWBSI investigators. Schmale routinely interacts with stakeholders in the mid-Atlantic to discuss new diagnostic technologies for DON and related management strategies for FHB, an effort aligned with Goal #2 of the Action Plan to ‘Provide requisite information on DON/ trichothecene safety issues to producers, millers, researchers, risk assessors and regulators’.

**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.**

Khatibi, P.A., Wilson, J., Berger, G., Brooks, W.S., McMaster, N., Griffey, C.A., Hicks, K.B., Nghiem, N.P., and Schmale, D.G. 2014. A comparison of two milling strategies to reduce the mycotoxin deoxynivalenol in barley. Journal of Agricultural and Food Chemistry. DOI: 10.1021/jf501208x

Berger, G., Green, A., Khatibi, P.A., Brooks, W.S., Rosso, L., Liu, S., Chao, S., Griffey, C.A., and Schmale, D.G. 2014. Characterization of Fusarium head blight resistance and deoxynivalenol accumulation in hulled and hulless winter barley. Plant Disease 98 (5): 599-606.

Khatibi, P.A., McMaster, N., Musser, R., and Schmale, D.G. 2014. Survey of Mycotoxins in Corn Distillers Dried Grains with Solubles from Seventy-Eight Ethanol Plants in Twelve States in the U.S. in 2011. Toxins 6(4): 1155-1168.

Prussin, A.J., Szanyi, N.A., Welling, P.I., Ross, S.D., and Schmale, D.G. 2014. Estimating the Production and Release of Ascospores from a Field-scale Source of Fusarium graminearum Inoculum. Plant Disease 98 (4): 497-503.

Prussin, A.J., Ross, S.D., and Schmale, D.G. 2014. Monitoring the long distance transport of Fusarium graminearum from field-scale sources of inoculum. Plant Disease 98(4): 504-511.

**PI:** Schmale, David
**Project:** Diagnostic Testing Services for Deoxynivalenol in the Eastern United States.

# FY13 FPR – USWBSI ADDENDUM
# DON Service Labs – Quality Control Data

**Insert below Quality Control Data/Results from the FY13 Award Period (approx. May 2013-May 2014):**

Quality control data was collected at Virginia Tech through (a) the blind testing of samples with unknown DON levels (coordinated by the USWBSI through Trilogy Analytical Laboratories), and (b) the testing of subsamples of grain lots in each GC/MS run (to test for consistency among GC/MS runs). Known standards are run throughout the the GC/MS run to establish our standard curves.

a. QC data for blind testing of samples from Trilogy Labs (coordinated by Trilogy Labs, and communicated through Sue Canty; scabusa@scabusa.org). Lab ID 'Lab3' is the Virginia Tech lab (highlighted in grey). Lab IDs 1-4 are other USWBSI labs. Data are in ppm.

| | Trilogy Sample | Trilogy Quant | Lab1 | Lab2 | Lab3 | Lab4-1 | Lab4-2 |
|---|---|---|---|---|---|---|---|
| Mar 2013 | Low | 0.50 | 0.62 | 0.60 | 0.56 | 0.37 | 0.39 |
| | High | 6.40 | 6.44 | 5.80 | 5.20 | 4.04 | 4.44 |
| | Med | 3.50 | 3.79 | 3.10 | 3.02 | 2.12 | 2.25 |
| Apr 2013 | Low | 1.00 | 1.11 | 0.90 | 0.91 | 0.76 | 0.78 |
| | High | 6.20 | 6.93 | 5.30 | 6.26 | 4.43 | 4.53 |
| | Med | 4.90 | 6.17 | 3.90 | 5.32 | 3.72 | 3.79 |
| Aug 2013 | Low | 0.90 | 0.96 | 0.80 | 0.88 | 0.84 | 0.76 |
| | High | 6.20 | 5.67 | 5.20 | 4.84 | 5.89 | 5.93 |
| | Med | 2.60 | 2.49 | 2.20 | 1.94 | 2.31 | 2.36 |
| Sept 2013 | Low | 0.40 | 0.33 | 0.30 | 0.29 | 0.29 | 0.32 |
| | High | 6.40 | 5.93 | 4.60 | 5.95 | 5.47 | 5.39 |
| | Med | 2.10 | 1.85 | 0.80 | 1.49 | 1.93 | 1.91 |
| Oct 2013 | Low | 0.50 | 0.45 | 0.50 | 0.45 | 0.40 | 0.45 |
| | High | 6.40 | 5.08 | 4.60 | 5.36 | 4.13 | 4.46 |
| | Med | 3.90 | 2.77 | 2.90 | 2.33 | 2.63 | 2.75 |
| Nov 2013 | Low | 0.70 | 0.66 | 0.60 | 0.62 | 0.46 | 0.04 |
| | High | 6.20 | 6.46 | 5.10 | 6.33 | 5.01 | 5.11 |
| | Med | 2.60 | 2.50 | 2.10 | 2.04 | 1.88 | 2.05 |
| Dec 2013 | Low | 1.00 | 0.89 | 0.90 | 0.78 | 0.93 | 0.96 |
| | High | 6.40 | 5.34 | 5.20 | 5.06 | 4.96 | 5.55 |
| | Med | 2.10 | 1.72 | 1.90 | 1.42 | 1.80 | 1.70 |
| Jan 2014 | Low | 0.50 | 0.26 | 0.40 | 1.13 | 0.42 | 0.40 |
| | High | 6.40 | 3.20 | 4.60 | 6.32 | 4.66 | 4.42 |
| | Med | 3.90 | 1.81 | 2.60 | 3.97 | 2.78 | 3.04 |
| | Low | 0.70 | 0.48 | 0.60 | 0.56 | 0.63 | 0.61 |

**PI:** Schmale, David
**Project:** Diagnostic Testing Services for Deoxynivalenol in the Eastern United States.

| | Trilogy Sample | Trilogy Quant | Lab1 | Lab2 | Lab3 | Lab4-1 | Lab4-2 |
|---|---|---|---|---|---|---|---|
| Feb 2014 | High | 7.90 | 6.00 | 6.30 | 6.98 | 6.87 | 6.45 |
| | Med | 4.50 | 2.67 | 3.40 | 4.27 | 3.70 | 3.42 |
| Mar 2014 | Low | 1.60 | 1.38 | 1.60 | 1.06 | 1.57 | 1.58 |
| | High | 6.40 | 5.79 | 6.30 | 5.33 | 5.78 | 6.04 |
| | Med | 2.60 | 2.38 | 2.40 | 1.93 | 2.94 | 3.06 |
| Apr 2014 | Low | 1.00 | 1.08 | 0.80 | 0.87 | 0.92 | 0.95 |
| | High | 6.20 | 8.05 | 7.20 | 7.40 | 6.66 | 7.18 |
| | Med | 3.90 | 3.47 | 2.80 | 2.98 | 3.00 | 3.33 |

b. QC data from internal checks of subsamples of grain lots from Trilogy (12-Nov-02 and 13-Nov-02) in each GC/MS run (to test for consistency among GC/MS runs).