USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY08 Final Performance Report (approx. May 08 – April 09)
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Cover Page

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Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-4-118
USDA-ARS Agreement Title:	Breeding Soft Winter Wheat with Multiple FHB Resistance.
FY08 USDA-ARS Award Amount:	$ 99,167

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
VDHR-NWW	Improvement of Soft Winter Wheat that is Resistant to FHB and Adapted to Indiana.	$96,878
VDHR-NWW	Mapping Fusarium Head Blight Resistance in Truman Wheat.	$ 2,289
	Total Award Amount	**$ 99,167**

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
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: *Improvement of Soft Winter Wheat that is Resistant to FHB and Adapted to Indiana.*

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

   Many of the currently grown soft winter wheat cultivars are susceptible or moderately susceptible to fusarium head blight (FHB), which causes significant grain production losses and which produces a vomitoxin. Host resistance is an important factor in reducing losses to this disease. We are developing soft winter wheat cultivars with effective FHB resistance, and with resistance to other important diseases, milling and baking qualities and agronomic characteristics, so that the cultivar is commercialized.

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: Released wheat cv. INW0801 that has moderate FHB resistance and is very early maturing for doublecropping with soybean, has short strong straw, and is well-adapted to southern Indiana and the surrounding important wheat-growing region.

   In 2009 we will release two cv.: Purdue line 02444A1-23-9 with FHB1 and is very high yielding, and a second line: Purdue 99751RA1-4-3-94 that has type 1 and type 2 (from native parent lines) FHB resistance, and has short and stiff straw, and responds well to high fertility for high grain production.

   We have developed a number of lines that performed at the top of Indiana multi-location tests in 2009 that have two or more genes/QTL for type 2 FHB resistance and also type 1 resistance. Incidence of FHB in these lines was 15 - 20% compared to susceptible lines at 50 – 85% incidence and disease spread at maturity was 1 – 2 diseased spikelets in these lines compared to 3 – 5 spikelets in lines that have *Fhb1*. We made plant selections in these F_3 – F_5 lines to grow in 1-m plots, and some of the lines will be in performance trials, in 2010, and then will enter these lines in regional nurseries, seeded in fall 2010. We believe that it is important to submit lines that are fairly homogeneous in regional tests, so that the resistance evaluations are more meaningful.

   Impact:

   INW0801 performed very well in yield tests and seed producers' fields in 2009. Disease index (incidence x severity) in southern Indiana in 2009, of INW0801 was 0.1 – 0.2, significantly lower than susceptible cvs., 0.3 – 0.6.

Project 2: *Mapping Fusarium Head Blight Resistance in Truman Wheat.*

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

   Genetics and mapping of type 1 resistance of cv. Truman. We characterized a RI population from the cross: Truman x MO940317 for type 1 (spray inoculation) and type 2 (point inoculation and natural infection).

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:

   Identified RI lines that have type 1 and some type 2 resistance.

   Impact:

   Promising results for type 1 resistance, and Truman has some type 2 resistance. No economic impact yet.

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.

Wheat Field Days (at Evansville, May 27, 2009 and at West Lafayette, June 9).

Journal manuscripts to be submitted in fall 2009:

1. Combining in wheat *Qfhs.pur-7EL* and *Bdv3* on chromosome 7D.
2. Augmentation of type 2 FHB resistance with combination of *Qfhs.pur-7EL* and *Fhb1*.

If your FY08 USDA-ARS Grant contained a VDHR-related project, include below a list all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance. If this is not applicable (i.e. no VDHR-related project) to your FY08 grant, please insert 'Not Applicable' below.

INW0411 – has moderately high type 2 FHB resistance (disease index = 0.2 compared to 0.6 on susceptible cvs. at Evansville in 2009, with severe natural infection; and SR36.

INW0412 – has type 1 and type 2 FHB resistance (disease index = 0.1compared to 0.6 for susceptible cvs. at Evansville in 2009; and is highly resistant to stripe rust.

INW0731 – has moderate type 2 FHB resistance (disease index = 0.3 compared to 0.6 on susceptible cvs. at Evansville in 2009; and is drought tolerant and has excellent milling and baking qualities.

INW0801 – has moderately high type 2 FHB resistance (disease index = 0.2 compared to 0.6 on susceptible cvs. at Evansville in 2009; and is early maturing for doublecropping with soybean.

INW0412 and INW0731are being marketed by a number of seed producers in Indiana and throughout the mid-eastern US. INW0801 performed well for seed producers in 2009 and its acreage will greatly increase in the next years.