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

Cover Page

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Fiscal Year:	FY13
USDA-ARS Agreement ID:	59-0206-9-086
USDA-ARS Agreement Title:	Discovering, Understanding, and Utilizing Wheat Genes for FHB Resistance in Ohio.
FY13 USDA-ARS Award Amount:	$ 79,193

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-NWW	Male Sterile Facilitated Recurrent Selection for FHB Resistance (MPI-5).	$ 633
VDHR-NWW	Discovering, Understanding, and Utilizing Wheat Genes for FHB Resistance in Ohio.	$ 60,546
VDHR-NWW	Coordinated Evaluation of FHB Resistance of Advanced Soft Winter Wheat Lines and Cultivars.	$ 18,014
	FY13 Total ARS Award Amount	**$ 79,193**

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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: *Male Sterile Facilitated Recurrent Selection for FHB Resistance (MPI-5).*

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

   We are trying to facilitate recombination among the genes conferring resistance to FHB in soft red winter wheat (SRWW). This would help to pyramid the genes for resistance and thus improve resistance over our current levels.

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:

   We have gone through three cycles of allowing intermating

   Impact:

   We do not know the results of the recombination at this time so it is difficult to determine the impact.

Project 2: *Discovering, Understanding, and Utilizing Wheat Genes for FHB Resistance in Ohio.*

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

   Host resistance to FHB must be combined with high yield for growers to accept FHB resistant cultivars. This can be done by screening the breeding lines that are in development, building parents with good resistance and yield levels, and by designing crosses amongst such parents.

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:

   Prior to any selection, 72% of the OSU lines had FHB resistance that was better than that of the moderate resistance check (Freedom), while 6% were better than the resistance check (Truman). After cycles of testing and selecting for FHB resistance and yield, 79% of the OSU lines had FHB resistance that was better than that of the moderate resistance check, while 35% were better than the resistance check.

   Impact:

   The high percentage of advanced lines with at least moderate resistance provides an excellent probability of finding the desired combination of yield and FHB resistance. In 2014 we released two new varieties for branding (OH07-263-3, OH08-180-48). Both had high yield in multi-state trials and had good FHB resistance.

Project 3: *Coordinated Evaluation of FHB Resistance of Advanced Soft Winter Wheat Lines and Cultivars.*

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

   Accurately predicting the FHB resistance of a breeding line or cultivar requires extensive phenotyping in field trials. The OSU program has coordinated a uniform trial of ~120 SRWW lines that are tested in 8-15 locations per year. The lines come from ~13 public and private breeding programs. This provides robust data on FHB resistance so the breeders can make informed decisions on what lines to release and which to use as parents.

   In addition to breeding lines, we also screen the OSU Official Variety Trial (OVT) for FHB resistance.

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 2013-14 season we evaluated 120 SRWW lines. The data is just now being delivered to the coordinator for analysis. Using just OSU data, 68% of the lines had FHB resistance that was better than that of the moderate resistance check, while 45% were better than the resistance check.

   In the OSU OVT, 80% of the commercially available lines had FHB resistance that was better than that of the moderate resistance check, while 16% were better than the resistance check.

   Impact:

   The screening of the breeding material continues to shows the progress that SRWW breeders have made in improving FHB resistance. This is manifested in the results of the OVT where 80% of the commercially available cultivars appear to be at least moderately resistant to FHB.

Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY13 award period. List the release notice or publication. Briefly describe the level of FHB resistance.

Summary of the Fusarium Head Blight (FHB) data for OH08-180-48 and OH07-263-3 checks from the 2012 and 2013 USWBSI cooperative FHB tests and 2010-2013 OSU trials. Traits are incidence (INC, % of spikes showing infection), severity (SEV, % of spiklets showing symptoms on infected heads), index (IND=(INC*SEV)/100), fusarium damaged kernels (FDK, % of kernels showing symptoms), ISK (=(INC*.3)+(Sev*.4)+(FDK*.4)), deoxynivalenol (DON, concentration of toxin in grain in ppm), greenhouse severity (GH, severity assessed in greenhouse).

	OSU	Cooperative Trials						
	IND	INC	SEV	IND	FDK	ISK	DON	GHSEV
	%	%	%	%	%	%	ppm	%
TRUMAN	8.8	35.8	13.3	5.5	16.8	21.5	6.5	7.3
ERNIE		46.1	18.2	12.7	28.0	33.7	5.3	17.9
FREEDOM	27.9	55.2	25.2	18.4	40.7	43.0	6.2	16.1
PIONEER2545	39.2	73.6	41.4	36.3	50.2	57.3	12.8	27.1
OH08-180-48	25.9	55.0	26.8	19.0	39.0	45.8	11.2	35.1
MALABAR	20.6							
Pioneer 25R47	38.2							
# LOCATIONS	4	11	11	13	5	5	2	3

	OSU		Cooperative Trials						
	IND	IND	INC	SEV	IND	FDK	ISK	DON	GHSEV
	%	%	%	%	%	%	%	ppm	%
TRUMAN [R]	8.2	6.7	35.7	12.7	7.5	13.6	20.6	7.7	6.0
ERNIE [MR]			45.3	21.1	15.0	19.1	28.8	7.9	19.5
FREEDOM [MR]	25.8	25.3	55.6	26.6	19.4	23.9	34.8	8.5	13.5
PIONEER2545 [S]	44.1	43.0	64.5	42.2	34.5	35.5	47.0	18.0	56.6
OH07-263-3	16.8	18.9	53.2	26.3	18.2	16.8	31.9	6.8	44.7
MALABAR		25.8							
BROMFIELD		26.7							
PIONEER 25R47		49.5							
# LOCATIONS	4	3	23	23	27	15	14	6	5

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.

None to report