USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY11 Preliminary Final Performance Report
July 13, 2012

Cover Page

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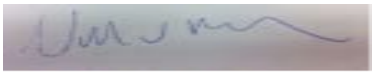
Fiscal Year:	FY11
USDA-ARS Agreement ID:	59-0206-9-089
USDA-ARS Agreement Title:	Uniform Fungicide and Biocontrol Agent Tests for Control of Fusarium Head Blight and Deoxynivalenol.
FY11 USDA-ARS Award Amount:	$ 6,878

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Uniform Fungicide and Biocontrol Agent Tests for Control of Fusarium Head Blight.	$ 6,878
	Total ARS Award Amount	**$ 6,878**



7/12/2012

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: *Uniform Fungicide and Biocontrol Agent Tests for Control of Fusarium Head Blight.*

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

The research involved testing of products (fungicides and biofungicides) that may be registered in the near future; provided supporting documentation for Section 18 registration (if necessary) or for the registration of new products; and provided an additional testing site for the uniform trials in Michigan. Test results provided information to producers locally and nationwide on what products resulted in the greatest disease control and improvement in yield and quality. The test results supplied necessary information for this purpose.

The effect of fungicides on Fusarium head blight (FHB) and deoxynivalenol (DON) levels were evaluated in Michigan on soft white wheat at Clarksville Horticultural Research Station in irrigated plots. The development of FHB was enhanced by planting plots into fields that were previously cropped to a FHB-susceptible crop (corn), and *Fusarium graminearum* spawn (*F. graminearum)* grown on sterile millet seed was spread throughout the plots. Irrigation during head development through soft dough (Feekes 11.2) was used to supplement natural rainfall to provide a favorable environment for *F. graminearum* infection and disease development.

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:

Disease data were collected from the experiment including head severity (% spikelets infected per diseased head) and incidence (% heads infected per plot) determined from 40 heads per plot around 3 weeks after anthesis. In addition, date were collected for other diweases that developed in the trial including, Stagonospora leaf and glume blotch; *Stagonospora nodorum*; Powdery mildew; *Blumeria graminis*; and Wheat stem rust; *Puccinia graminis* f. sp. *Tritici*. Plot severity, or index, was calculated from these data. Plots were harvested for determination of total yield, 1000 kernel weight, and incidence of Fusarium-damaged kernels. Samples from each plot were sent to appropriate laboratories for analysis of DON content.

Moderately dry conditions during flowering and grain development favored some Fusarium head blight development due to frequent irrigation, moderately cool temperatures and wet conditions during and 1-wk following anthesis. Fusarium head blight developed in the trial and all treatments significantly reduced the severity index in comparison with the untreated control except Evito and Headline applied at Feekes GS 10.5. Powdery mildew developed in the trial in 2011 and all treatments had significantly less disease on the in comparison to the untreated control (26.3%). Weather conditions were conducive for the development of

wheat stem rust in 2010. Stagonospora also developed but was overwhelmed in the untreated plots by other diseases and all treatments significantly controlled the disease in comparison to the untreated control. All treatments had significantly less wheat rust on the flag leaf in comparison to the untreated control (72.5%). Stem rust developed toward the end of the season and all treatments suppressed the development of the disease in comparison to the untreated control. Treatments with greater than 48.7 bu/A had significantly higher yield than the non-treated control (42.7 bu/A). Based on analysis of variance, no treatments were significantly different in terms of test weight or 1000-grain weight.

Treatment and rate of application/A	FHS Severity Index[z]	Powdery mildew[y] (%) 16 Jun	Stagono-spora[x] (%) 16 Jun	Stem rust[w] (%) 30 Jun	Yield (bu/A) 22 Jul	TW[v]	1000 kernal weight (oz)	DON (ppm)
Cogito 46.6 SC 6.5 fl oz + NIS 0.25% (C[u])…….	10.6cd[t]	1.8c	7.5de	8.8cd	95.0ab	55.8ab	1.6a	0.8bc
Caramba 0.75SL 14 fl oz + NIS 0.25% (C)…….	1.6e	3.3bc	7.5de	4.0ef	101.3ab	55.5ab	1.7a	0.3c
Prosaro 421 SC 6.5 fl oz + NIS 0.25% (C)……..	3.1de	1.5c	11.3cd	3.0ef	93.5ab	55.6ab	1.6a	1.1abc
Headline 2.09SC 6 fl oz + NIS 0.25% (A)……..	15.1bc	5.8b	8.8de	13.8b	104.7a	55.9a	1.4a	0.7bc
Headline 2.09SC 6 fl oz + NIS 0.25% (A); Caramba 0.75SL 14 fl oz + NIS 0.25% (C)…….	2.6de	1.5c	4.0e	2.0f	92.0ab	54.7ab	1.7a	0.7bc
Headline 2.09SC 6 fl oz + NIS 0.25% (B)……..	19.6ab	1.5c	9.0de	6.3de	95.9ab	54.5ab	1.4a	0.8bc
Quadris 2.08F 6.2 fl oz + NIS 0.25% (B)……	17bc	2.3c	10.0de	12.0bc	86.2b	55.5ab	1.7a	1.4ab
Evito 2.09EC 4 fl oz + NIS 0.25% (B)……	19.6ab	3.3bc	17.5bc	9.0cd	89.2ab	53.1b	1.4a	1.7a
Twinline 1.75EC 9 fl oz + NIS 0.25% (B)……..	10.2cd	5.5b	13.8bcd	4.5ef	95.0ab	54.3ab	1.6a	1.1abc
Stratego YLD 43.1SC 4 fl oz + NIS 0.25% (B)...	6.3de	2.3c	18.8b	3.5ef	93.2ab	54.3ab	1.6a	0.8bc
Quilt 1.67EC 10.5 fl oz + NIS 0.25% (B)……	0.7e	4.3bc	18.8b	3.5ef	92.3ab	54.1ab	1.6a	0.4c
Untreated……	27.1a	26.3a	32.5a	22.5a	67.5c	55.8ab	1.6a	1.0abc
Tukey's HSD (P=0.05)	2.98	3.13	6.44	3.34	17.72	2.79	0.35	0.76

[z] Mean Fusarium head blight index = (FHB incidence * FHB severity)/100 on four sub-samples of 20 heads of wheat per plot on 14 Jul (266 days after planting at Feekes 11.4)
[y] Powdery mildew caused by *Blumeria graminis* percent severity over whole plant on 16 Jun (238 DAP at Feekes 11)
[x] Stagonospora leaf and glume blotch caused by *Stagonospora nodorum* percent severity over whole plant on 16 Jun (238 DAP at Feekes 11)
[w] Stem rust caused by *Puccinia graminis* f. sp. *tritici* percent severity over the stem on 30 Jun (252 DAP at Feekes 11.1)
[v] Test weight lb/bu at 13% moisture
[u] Fungicides were applied on A= 27 May (GS 9), B= 3 Jun (GS 10.5), C= 4 Jun (GS 10.5.1)
[t] Values followed by the same letter are not significantly different at P = 0.05 (Tukey Multiple Comparison)

Impact:

Research results were shared in a timely fashion with our state's producers and extension educators at meetings, conferences, in newsletters and on websites. A data summary was prepared for publication in *Plant Disease Management Reports,* and the Proceedings of the National Fusarium Head Blight Forum. The most recent extension bulletin containing FHB information for Michigan was updated to include more current information about best management practices for wheat scab. This information enabled growers to select an appropriate fungicide should the need arise when conditions favorable for head scab were predicted.

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.

Kirk, W.W., R.L. Schafer. 2012. Evaluation of foliar fungicides treatments for control of head scab and winter wheat foliar diseases, Clarksville, MI, 2010/11. 6:FC030

Nagelkirk, M, Kirk, W. 2012 Managing Fusarium Head Blight. MSU Extension News. http://msue.anr.msu.edu/uploads/files/5-14FHBFactsheet.pdf. May 2012.

Bradley, C. A., Adee, E. A., Ebelhar, S. A., Dill-Macky, R., Bergstrom, G.C. Wiersma, J. J., Grybauskas, A. P., Kirk, W. W., McMullen, M. P., Halley, S., Milus, E. A., Osborne, L. E., Ruden, K. R., Wise, K.A. Conley, S.P. and Esker P.D. 2011. Effects of triazole, strobilurin, and triazole + strobilurin fungicides on Fusarium head blight and associated mycotoxins. Proceedings of the National Fusarium Head Blight Forum, St. Louis, MS, p. 76.