**USDA-ARS/**
**U.S. Wheat and Barley Scab Initiative**
**FY09 Final Performance Report**
**July 15, 2010**

# Cover Page

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| **Fiscal Year:** | 2009 |
| **USDA-ARS Agreement ID:** | 59-0790-7-075 |
| **USDA-ARS Agreement Title:** | Alien Chromosome Engineering and the Deployment of a Novel Source of Fusarium Head Blight Resistance in Wheat. |
| **FY09- USDA-ARS Award Amount:** | $ 29,991 |

**USWBSI Individual Project(s)**

| USWBSI Research Category* | Project Title | ARS Adjusted Award Amount |
|---|---|---|
| HWW-CP | Alien Chromosome Engineering and the Deployment of a Novel Source of Fusarium Head Blight Resistance in Wheat. | $ 29,991 |
| | **Total Award Amount** | **$ 29,991** |

15 July 2010

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 Winter Wheat Region
SWW – Southern Sinter Wheat Region

**Project 1:** *Alien Chromosome Engineering and the Deployment of a Novel Source of Fusarium Head Blight Resistance in Wheat.*

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

We are working on transferring new sources of resistance to FHB and DON from perennial grasses, *Leymus racemosus* and *Elymus tsukushiense*, using chromosome engineering, molecular markers an conventional breeding. The specific objectives were:

1. Further evaluate *Fhb3* (T7AL·7Lr#1S) resistance in a Jagger/Overley background in the greenhouse and field plots for FHB incidence and DON.
2. Evaluate *Fhb3* recombinant chromosome lines for FHB resistance in the greenhouse and field tests.
3. Evaluate and transfer a new source of resistance from DA1E$^{st}$#1, 2n = 44, derived from *Elymus tsukushiense*.

**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:**

Field and greenhouse evaluations of the new genetic materials were accomplished.

1. Three homozygous lines, 08-193 and 08-189 in Jagger and 08-184 in Overley carrying *Fhb3* (T7AL·7Lr#1S) from *L. recemosus* were evaluated in greenhouse and field tests for resistance to FHB. Line 08-193 was moderately resistant in both greenhouse and field tests; disease severity rating of 30% for 08-193 vs. 44% for Jagger in greenhouse test and 28.7% for 08-193 vs. 36.8% for Jagger in the field test. DON data is not available as of this date.
2. Of the three *Fhb3* (T7AL·7Lr#1S) recombinant lines, one proximal rec124 and two distal rec679 and rec989 in Overley background; rec124 was moderately resistant in both greenhouse and field tests. Disease severity rating was 38.7% for rec124 vs. 67.3% for Overley in the greenhouse test and 27.6% for rec124 vs. 50.2% for Overley in the field test.
3. DATW1E$^{st}$#1S, 2n = 44, derived from *Elymus. Tsukushiense* in Chinese Spring background was highly resistant to FHB in greenhouse test; disease severity rating of 10.0% for DATW1E$^{st}$#1S vs. 32.0% for Chinese Spring.

**Impact:**

Both *Fhb3* (line 08-193) and DATW1E$^{st}$#1S appear to be promising new sources of resistance for wheat improvement programs.

1. FHB resistance of 08-193 has been documented in the scab nursery in Manhattan over a two-year period and limited amount of seed will be made available for crossing purposes to the breeders participating in the USBWI.
2. We have only one-year data on the evaluation of *Fhb3*-derived line rec124, additional one year data on its evaluation will be obtained before release.
3. Chromosome engineering and transfer to winter wheat has been initiated for the DATW1E$^{st}$#1S source of resistance.

**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.**

None.

**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.**

1. Bockus WW, Friebe B, and Gill BS. 2010. Reaction of winter wheat accessions containing *Fhb3* and selected cultivars to Fusarium head blight, 2009. Plant Dis Manage Rep 4(CF012):1-2.
2. Friebe B, Qi LL, Cainong J, Pumphrey MO, Bockus WW, and Gill BS. 2009. Chromosome engineering of T7A·7LR#1S for the isolation of new recombinants and field evaluation of T7A·7LR#1S chromosome introgression hard winter wheat lines for resistance to FHB and DON. National Fusarium Head Blight Forum, December 2009, p117.