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

# Cover Page

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| **PI:** | Brian Steffenson |
| **Institution:** | University of Minnesota |
| **Address:** | Department of Plant Pathology<br>495 Borlaug Hall<br>1991 Upper Buford Circle<br>St. Paul, MN 55108 |
| **E-mail:** | bsteffen@umn.edu |
| **Phone:** | 612-325-4735 |
| **Fax:** | 612-625-9728 |
| **Fiscal Year:** | FY11 |
| **USDA-ARS Agreement ID:** | 59-0206-1-119 |
| **USDA-ARS Agreement Title:** | Mapping Loci Conferring Resistance to FHB and DON Accumulation in Barley. |
| **FY11 USDA-ARS Award Amount:** | $ 38,234 |

**USWBSI Individual Project(s)**

| USWBSI Research Category* | Project Title | ARS Award Amount |
|---|---|---|
| BAR-CP | Mapping Loci Conferring Resistance to FHB and DON Accumulation in Barley. | $ 38,234 |
| | **Total ARS Award Amount** | **$ 38,234** |

Principal Investigator — July 13, 2012 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:** *Mapping Loci Conferring Resistance to FHB and DON Accumulation in Barley.*

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

Our primary and long-term goal is to reduce the losses caused by FHB, including quality discounts due to DON contamination. This can be best achieved by developing barley cultivars with the highest level of resistance possible. We have identified promising sources of resistance through multiple years and locations of field screening. Several diverse sources of resistance have been crossed with advanced breeding lines to map and characterize loci conferring FHB resistance. The specific objective for this proposal is to determine the number, effect, and chromosomal position of FHB resistance loci in two barley accessions (Kutahya, a two-rowed cultivar from the Netherlands and W-365, a wild barley accession from Iraq) using the advanced backcross quantitative trait locus (QTL) method. This research will lead to the development of advanced breeding lines with loci conferring resistance to FHB and the accumulation of DON. This information and germplasm will allow breeders to more rapidly develop FHB resistant barley cultivars for growers.

**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):**

**<u>Accomplishment:</u>**

We have produced ~70 $BC_2F_1$'s from the Kutahya/Quest population and ~86 $BC_2F_1$'s from the W-365/Quest population. The $BC_2F_1$ crossed seed was advanced three additional generations ($BC_2F_1$, $BC_2F_2$, and $BC_2F_3$) by long day (22 hour) incubation in the growth chamber in order to have sufficient seed for disease phenotyping in the field in 2012. The populations were sown at Crookston, Minnesota and Brandon, Manitoba in May. FHB assessments will commence in late July and DON assays will be completed by February 2013. Plants from the $BC_2F_4$ generation will be genotyped with SNP markers in early 2013.

**<u>Impact:</u>**

We have discovered new and diverse sources of FHB resistance in barley that are different from those already reported. This is based on genotyping assays conducted with Diversity Arrays Technology (DArT) and other molecular markers such as SNPs. The identification of resistant germplasm is the first step in developing barley cultivars with enhanced resistance to FHB and the accumulation of toxins. Our project previously developed an advanced backcross QTL population involving the Israeli wild barley accession PI466423 with the Minnesota cultivar 'Rasmusson' as the recurrent parent. Progeny with enhanced resistance and acceptable agronomic characteristics were identified and are being used in the breeding program. We hope to identify and characterize additional new loci for FHB resistance in the Kutahya/Quest and W-365/Quest populations.

**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.**

Burlakoti, R. R., Neate, S. M., Adhikari, T. B., Gyawali, S., Salas, B., Steffenson, B. J., and Schwarz, P. B. 2011. Trichothecene profiling and population genetic analysis of *Gibberella zeae* from barley in North Dakota and Minnesota. Phytopathology 101:687-695.