


**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY10 Final Performance Report
July 15, 2011**

Cover Page

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Fiscal Year:	FY10
USDA-ARS Agreement ID:	59-0206-9-075
USDA-ARS Agreement Title:	Mapping and Sequencing of CHR. 2H Bin 10 FHB Resistance QTL for Gene Discovery.
FY10 USDA-ARS Award Amount:	\$ 62,037

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Genetic and Physical Mapping of the chr. 2H Bin 10 FHB Resistance QTL.	\$ 62,037
	Total ARS Award Amount	\$ 62,037



Principal Investigator

7-15-11

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: *Genetic and Physical Mapping of the chr. 2H Bin 10 FHB Resistance QTL.*

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

Breeding for resistance to a hemi-biotrophic disease organism, such as Fusarium Head Blight (FHB), is a slow incremental process. To develop new genetic modification approaches, we need to understand the resistance genes and mechanisms involved. There are no single strong resistance genes known for FHB. The Chromosome 2H bin 10 QTL identified in hoCI4196 is one of the strongest FHB resistance QTL known and therefore presents a target for cloning and characterization. Cloning QTL is difficult. In order to facilitate the process we sequenced 36 Bacterial Artificial Chromosome (BAC) clones from the target region in order to identify potential candidate genes and develop improved molecular markers. The candidate genes will be useful as molecular markers in Molecular Marker Assisted Selection (MMAS) and will facilitate identification and validation of resistance QTL from other sources. They should also facilitate understanding of the FHB resistance mechanism.

Line hoCI4196 carries good to excellent FHB resistance, but it is a poor breeding parent. To rapidly facilitate the breeding effort, we identified mutants that convert the (a) 2-rowed plant to 6-rowed (one line already available and widely distributed to breeders), (b) tall plant to semi-dwarf, and (c) late maturing plant to early or moderate maturity.

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:

We sequenced 36 BAC clones from the bin 10 region in three groups of 12. The sequence was analyzed and identified 132 predicted genes. Of these, only 32 were previously mapped. We are in process of characterizing the predicted genes, mapping them on BAC clones and the genetic map and identifying probes to be used for extending the BAC contigs.

Impact:

The 132 predicted genes identified from the chromosome 2H bin 10 region will provide many new molecular markers for use in MMAS.

Accomplishment:

Mutants of the hoCI4196 FHB resistant line were developed. These include 6-rowed head type, early maturity and reduced height. The mutants have retained the CIho4196 FHB resistance and low DON levels. A male sterile mutant was developed to facilitate crossing. These lines are available to barley scientists for use in breeding.

Impact:

The 6-rowed mutant has been widely distributed to barley breeders. The male sterile mutant also has been distributed and should facilitate crossing with the FHB resistant parent. It is expected that these mutants will positively impact the development of 6-rowed FHB resistant cultivars suitable for US barley growers. The other mutants are still being evaluated.

FY10 (approx. May 10 – May 11)

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PI: Kleinhofs, Andris

USDA-ARS Agreement #: 59-0206-9-075

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.

Boyd, C.N., Horsley, R., and Kleinhofs, A. Saturation genetic and physical mapping of the barley 2H bin 10 Fusarium Head Blight resistance QTL. In preparation.