USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY10 Final Performance Report  
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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)

<table>
<thead>
<tr>
<th>USWBSI Research Category*</th>
<th>Project Title</th>
<th>ARS Award Amount</th>
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<tbody>
<tr>
<td>BAR-CP</td>
<td>Genetic and Physical Mapping of the chr. 2H Bin 10 FHB Resistance QTL.</td>
<td>$ 62,037</td>
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<td>Total ARS Award Amount</td>
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* 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.
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.