U.S. Wheat and Barley Scab Initiative
FY00 Final Performance Report (approx. May 00 – April 01)
July 30, 2001

Cover Page

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Year:	**FY2000 (approx. May 00 – April 01)**
Grant Number:	**59-0790-9-049**
Grant Title:	**Fusarium Head Blight Research**
2000 ARS Award Amount:	**$53,659**

Project

Program Area	Project Title	Requested Amount
Biotechnology	Disease resistance-like markers for Fusarium QTL	$65,727.00
	Requested Total	$65,727.00[1]

7/24/2001

Principal Investigator Date

[1] Note: The Requested Total and the Award Amount are not equal.

Project 1: Disease resistance-like markers for Fusarium QTL.

1. What major problem or issue is being resolved and how are you resolving it?

The major issue being resolved is to provide molecular markers, that are closely associated with Fusarium Head Blight (FHB) resistance, to breeders for use in marker assisted selection in their work towards development of FHB resistant cultivars. More and more efforts are going into moving resistance QTYL to adapted cultivars and availability of multiple molecular markers is essential for this work. We are resolving this issue by isolating, mapping on genetic and physical maps, and sequencing Resistance Gene Analog (RGA) markers. The mapping data is available on my web site http://barleygenomics.wsu.edu and will be provided to breeders for use in marker assisted selection on request. Sequencing will facilitate development of user friendly PCR methods for use of these markers. We have advanced the Foster x CI4196 mapping population to the F7 generation and are now using this population for mapping RGAs that are polymorphic. The CI4196 line is one of the most Fusarium Head Blight resistant lines available.

2. What were the most significant accomplishments?

To date 82 new RGA loci (NBS-LRR-type) have been placed on the barley map. Several additional receptor-like kinases have also been mapped, but we have not placed emphasis on these to date. All of the above RGAs were confirmed by sequencing and the sequence is available for PCR primer development. A total of 826 BAC clones have been identified with these probes from a 6.3X Morex BAC library. This represents approximately 131 loci (826 divided by 6.3), a number larger than the loci that have been mapped to date. This discrepancy is due to the hybridization of many of the RGAs to several loci and the failure to map all loci due to limited polymorphism. Also, many of the RGAs exist as tightly linked complex gene families that can not be resolved without high resolution genetic mapping.

We have focused on developing techniques to facilitate large scale RGA isolation. RGA isolation is a slow and tedious procedure and faster, more efficient techniques are required to approach saturation of the 1,000 (or so) RGA genes that are estimated to reside in plant genomes. We developed a technique for RGA isolation based on searching a Bacterial Artificial Chromosome (BAC) genomic library. This technique was satisfactory, but still tedious. We have applied a similar technique to the many cDNA libraries that we have developed under an EST (expressed sequence tag) sequencing grant from USDA-NRI. This is working much better and many of the new RGAs are the result of the application of this approach. Many more new RGAs are also comming from the rice genome sequencing effort. These RGAs are being provided to us by Dr. Scot Hulbert and will be mapped to the barley genetic and physical map.

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.

Brueggeman, R., A. Druka, D. Kudrna, and A. Kleinhofs (1999) Isolation and characterization of resistance gene analogs from barley. 16th American Barley Researchers Workshop, p54, Idaho Falls, Idaho, July 11-15, 1999.

Kanazin, V., T. Blake, A. Kleinhofs, and G. Muehlbauer (1999) Cloning and characterization of disease resistance gene analog clusters in barley. 16th American Barley Researchers Workshop, p63, July 11-15, 1999, Idaho Falls, Idaho.

Brueggeman, R., A. Druka, D. Kudrna, and A. Kleinhofs (2000) Novel resistance gene analogs from barley. Plant and Animal Genome VIII p108, Jan. 9-12, 2000, San Diego, CA.

Kanazin, V., T. Blake, A. Kleinhofs, and G. Muehlbauer (2000) Cloning and characterization of the disease resistance genes analogs in barley. Plant and Animal Genome VIII p83, Jan. 9-12, 2000, San Diego, CA.

Rostoks, N., R. Brueggeman, A. Druka, D. Kudrna, and A. Kleinhofs (2001) Characterization of a barley gene family homologous to the maize Rp1 gene. Plant and Animal Genome IX p169, Jan. 13-17, 2001, San Diego, CA.

Brueggeman, R., A. Druka, D. Kudrna, and A. Kleinhofs (2001) Efficient cloning of resistance gene analogs. Plant and Animal Genome IX p170, Jan. 13-17, 2001, San Diego, CA.