**U.S. Wheat and Barley Scab Initiative**
**Annual Progress Report**
**September 15, 1999**

## Cover Page

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| **Year:** | **FY1999** |
| **Grant Number:** | **59-0790-9-049** |
| **Grant Title:** | **Fusarium Head Blight Research** |
| **Amount Granted:** | **$29,268.00** |

## Project

| Program Area | Objective | Requested Amount |
|---|---|---|
| Biotechnology | Develop disease resistance-like markers for Fusarium QTL. | $30,000 |
| | **Requested Total** | $30,000[1] |

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Principle Investigator Date

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

**Project 1: Develop disease resistance-like markers for Fusarium QTL.**

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

The major goal of this project is to isolate and map Resistance Gene Candidate (RGC) probes for use in locating and manipulating by marker assisted selection, fusarium resistance QTLs. We are resolving this goal by screening a barley BAC library for RGC sequences using a variety of primers and probes. The isolated clones are sequenced and if they are RGC-like, they are genetically mapped in barley using several different crosses. The map locations and probes will be made available to breeders for use in QTL mapping and molecular marker facilitated breeding for fusarium resistance.

2. Please provide a comparison of the actual accomplishments with the objectives established.

The proposed output is to isolate, sequence and add 100 new molecular markers to the barley map with the expectation that many of these will be disease resistance-like markers. In the initial experiment, screening the 6.3X barley Bacterial Artificial Chromosome (BAC) library with a P-loop primer identified 459 positive clones. A putative RGC fragment was isolated from 59 clones and sequenced. Two fragments contained clearly identifiable RGC sequences. These were mapped to 7 loci on 3 chromosomes. These results, although encouraging, were deemed to be too inefficient for large scale RGC isolation. Consequently other primers were designed and tested on a 1.5X portion of the BAC library yielding 64 clones for the kinase 2 primer and 12 clones for the kinase 3 primer. Further analysis of these BACs is in progress. In addition to these probes, we have obtained RGC probes from maize (Tony Pryor) and barley (Gary Muehlbauer). These probes are being mapped. Interestingly, many of the DNA fragments isolated as putative RGC probes in the P-loop experiment were genes that are related to disease resistance, but not RGC sequences, for example jasmonate inducible genes. In summary, we have isolated, sequenced, and mapped nearly 100 new molecular markers in barley. However, the majority have not turned out to be RGC probes. We are experimenting with procedures and materials to improve the efficiency of isolating RGC sequences.

3. What were the reasons established objectives were not met? If applicable.

Funding was not obtained until late in the fiscal year.

4. What were the most significant accomplishments this past year?

Gaining experience and development of techniques for the efficient isolation of RGC probes. We also developed bulked DNA samples from our BAC library. These will facilitate RGC cloning.

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.

Robert Brueggeman, Arnis Druka, David Kudrna, and Andris Kleinhofs (1999) Isolation and Characterization of Resistance Gene Analogs from Barley. Poster presented at the 16th American Barley Researchers Workshop held at Idaho Falls, Idaho July 11-15, 1999.