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

Cover Page

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Year:	**FY1999**
Grant Number:	**59-0790-9-025**
Grant Title:	**Fusarium Head Blight Research**
Amount Granted:	**$95,610.00**[1]

Project

Program Area	Objective	Requested Amount
Biotechnology	Create saturated molecular marker maps near FHB resistance QTL and develop of breeder-friendly markers.	$28,000
Variety Development	To enhance variety development of scab resistant varieties.	$70,000
	Requested Total	$98,000

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Principle Investigator Date

Project 1: Create saturated molecular marker maps near FHB resistance QTL and develop of breeder-friendly markers.

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

(Form – PR1)

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

DNA markers for FHB resistance may be useful in speeding the process of breeding for resistance. We are using SSR markers to saturate genomic regions known to contain FHB resistance genes. The SSRs are being screened for polymorphism in 3 populations and those polymorphic will be mapped on recombinant inbred progeny. We are concentrating our efforts on chromosomes 3BS and 2AL. Previous research identified an AFLP fragment associated with FHB resistance on 3BS. We plan to clone and sequence this fragment and design PCR markers that could be implemented in breeding programs. Another objective of this project is to test the markers developed to date on germplasm that contains a scab resistance source in its pedigree.

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

Most primers in the 3BS and 2AL regions have been screened for polymorphism on the three populations. In total, more than 90 SSR primers have been screened. Polymorphism is 29%, 42%, and 56% in the three populations. Two of the markers that map to 3BS in a different population have been mapped on the progeny of one of the three populations. One did not map to the expected location, and the other mapped to chromosome 3BS and explains 30% of the phenotypic variation in FHB resistance in the population.

We have cloned the AFLP fragment on 3BS and are having it sequenced. Primer design and testing will follow.

We have not yet done testing of DNA markers on lines suspected to contain resistance gene from the original marker source. This testing will take place after we have completed the saturation mapping and primer design from the AFLP fragment so that we do our testing on the best possible marker(s).

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

We are in the earlier stages of this research – funding was available just over two months ago.

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

We identified an additional marker (an SSR) for scab resistance that explains more of the phenotypic variation in FHB resistance than the RFLP and AFLP markers mapped to date in our populations.

Project 2: To enhance variety development of scab resistant varieties.

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

Scab resistant varieties are necessary to reduce the impacts of this disease. We are developing scab resistance hard red spring wheat lines adapted to the Northern Great Plains, especially wheat-growing areas in Minnesota. Techniques include conventional breeding procedures of crossing, selection, and multilocation testing of germplasm. Scab resistance is assessed by greenhouse screenings and three field screenings each year.

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

142 lines in advanced yield trials and approximately 450 lines in preliminary yield trials were screened in inoculated, misted FHB screening nurseries and either three or two locations, respectively. Those lines advanced will be screened in a greenhouse inoculation in the Spring of 2000.

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

We are in the earlier stages of this research – funding was available just over two months ago. Breeding is long term research – one year of funding is not sufficient to develop or fully evaluate new germplasm.

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

An additional location, Crookston, was added for field screening of scab resistance. This is important because this location is in the heart of the wheat-growing region of Minnesota. The performance of some lines at this location, particularly those with the Chinese line Fu-Gian 5114 in their pedigree performed particularly well at this location. Therefore, this may be a valuable new source of resistance.

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.

None.