U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

PI:	**Perry Cregan**
Institution:	**USDA-ARS**
Address:	**Soybean and Alfalfa Research Lab** **Bodg. 006, Room 100** **Beltsville, MD 20705**
Email:	**pcregan@asrr.arsusda.gov**
Phone:	**301-504-5070**
Fax:	**301-504-5728**
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Grant Number:	**N/A**
Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 167,436**

Project

Program Area	Project Title	Requested Amount
Biotech	Microsatellite Marker Development and Construction of a Microsatellite Allele Size Database of Elite and Scab Resistance Wheat Genotypes	$ 243,187
	Total Amount Requested	**$ 243,187**

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Principal Investigator Date

(Form – FPR01)

Project 1: Microsatellite Marker Development and Construction of a Microsatellite Allele Size Database of Elite and Scab Resistance Wheat Genotypes

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

Wheat breeders do not have unfettered access to DNA markers that can be effectively used in the discovery of and selection for genes that control Fusarium resistance in wheat. As a result, wheat breeding programs with the goal of producing agronomically superior cultivars with acceptable grain quality make relatively little use of existing RFLP markers. To solve this problem we are developing microsatellite (SSR) DNA markers that are more polymorphic and less laborious to use than RFLPs. New SSR markers will be placed on the wheat genome map in the ITMI mapping population and by physical mapping with aneuploid stocks. In order to pre-enable application of this technology, markers representing each of the 84 virtual ½ arm map bins (4 per chromosome) will be used to characterize both scab resistant lines (e.g. Sumai 3, Niing7840 and W14) as well as a panel of 36 or more breeder-identified breeding parents.

2. What were the most significant accomplishments?

A total of 410 markers were developed from random genomic libraries, 233 were polymorphic among Opata 85, M6 (parents of the ITMI RIL population) and Chinese Spring. One hundred and eight-one of these markers were polymorphic in the ITMI mapping population and 169 were positioned on the ITMI map. A total of 310 markers including169 markers which were mapped on the ITMI map were positioned using nulli-tetrasomic lines of Chinese Spring, 116, 146 and 104 loci from 310 primer sets were mapped on A, B, and D genomes respectively. New microsatellites were integrated into a framework map consisting of previously published RFLP and microsatellite markers. A total of 31 of the new markers were positioned in gaps larger than 10cM based upon the previous version of the map, nine were mapped to the ends of chromosomes, the length of the linkage map was extended by 77.8cM. Among the 169 markers which had been placed on both maps, the order of 153 markers was consistent on both maps. Most of the inconsistencies were confined to chromosome 5. A total of 33 out of 169 new markers were positioned in close proximity known. The proportion of markers linked to genes was significantly greater than would be anticipated by random chance.
Furthermore, a total of 250 primer sets were designed, they will be tested for polymorphism among Chinese Spring, Opata 85 and M6. In addition, a total of 200 new microsatellite-containing clones were sequenced and primers to these microsatellites are being selected.

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.

Song QJ, Fickus EW, PB Cregan. 2002. Characterization of trinucleotide microsatellites in wheat. Theoretical Applied Genetics 104: 286-293.

Song Q. J. , J. R. Shi, S. Singh, E. W. Fickus, R. Fernalld, B. S. Gill, P. B. Cregan, and R. Ward. Development and mapping of microsatellite markers in wheat. 2002. Plant and Animal Genome X, the International Conference on the Status of Plant, Animal and Microbe Genomes, p 371. (San Diego, CA, January 12-16, 2002).

Song Q. J. , J. R. Shi, S. Singh, E. W. Fickus, R. Fernalld, B. S. Gill, P. B. Cregan, and R. Ward. Development and mapping of microsatellite markers in wheat. 2001 National Fusarium Head Blight Forum Proceedings, p31-34. (Erlanger, KY, Dec 8-10, 2001).

S. Singh, Song Q. J. , J. R. Shi, G. L. Brown-Guedira, B. S. Gill, P. B. Cregan, and R. Ward. Physical mapping of microsatellite markers on wheat chromosome. 2001 National Fusarium Head Blight Forum Proceedings, p35-36. (Erlanger, KY, Dec 8-10, 2001).

Song Q. J. , J. R. Shi, S. Singh, E. W. Fickus, R. Fernalld, B. S. Gill, P. B. Cregan, and R. Ward. Development and mapping of wheat microsatellite markers. Annual Meeting of American Society of Agronomy (ASA), Crop Science of America(CSSA) and Soil Science Society of America (SSSA), (Charlotte, NC, Oct 21-25, 2001).