

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

**Cover Page**

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**Project**

<b>Program Area</b>	<b>Objective</b>	<b>Requested Amount</b>
Biotechnology	Develop wheat microsatellite markers and associated information databases.	\$45,000
	<b>Requested Total</b>	<b>\$45,000<sup>1</sup></b>

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Principal Investigator

Date

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<sup>1</sup> Note: The Requested Total and the Amount Granted are not equal.

**Project 1: Develop wheat microsatellite markers and associated information databases.**

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

Wheat breeders and geneticists do not have access to DNA markers that can be effectively used in the improvement of cultivated wheat. This is because, in cultivated wheat, genetic diversity at the molecular level is extremely low. Thus, while many restriction fragment length polymorphism (RFLP) markers have been developed for use in wheat, they function best in highly diverse or exotic genetic materials and are much less useful in populations derived from crosses of cultivated wheats within a market class. As a result, wheat breeding programs with the goal of producing agronomically superior cultivars with acceptable grain quality standards make relatively little use of RFLP markers. The laborious procedure required to assay RFLP markers is also a detriment to the easy integration into breeding programs. In contrast, microsatellite DNA markers have been demonstrated to be more polymorphic and far less laborious to use than RFLP markers. It is the objective of this work to develop an initial set of 100 wheat microsatellite markers based upon microsatellites with three or four basepair repeat motifs.

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

As of September 1, 1999 we had developed a total of 42 new polymorphic tri- or tetranucleotide wheat microsatellite loci. The assessment of polymorphism is based upon a comparison of the wheat genotypes Chinese Spring, M6 and Opata. Over 10,000 clones have been isolated and preserved from the (TAA)<sub>n</sub>-enriched library and 2600 from the (TAGA)<sub>n</sub>-enriched library. We have noted a high number of duplicate clones in these libraries but are eliminating these via a simple hybridization procedure. We anticipate that by the end of calendar year 1999 we will be close to the original goal of developing 100 new polymorphic wheat microsatellite loci. The primer sequences to all wheat microsatellite loci published to date were compiled and transmitted to Dr. Jerry Lazo of the USDA GrainGenes Database.

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

As indicated above, we will be close to meeting the first year goals of the project. The major reason for not having already met the goal of 100 new microsatellite loci was the need to first determine the most appropriate trinucleotide repeat motif(s) to serve as the basis of microsatellite marker development in wheat and secondly to develop a plasmid library enriched for these particular repeat motifs.

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

In addition to the development of 42 new functional wheat microsatellite markers, we determined that (TAA)<sub>n</sub>, (CAA)<sub>n</sub>, and (GAA)<sub>n</sub> were the trinucleotide microsatellite motifs most likely to result in useful microsatellite markers. Also, the development and screening of plasmid libraries enriched for (TAA)<sub>n</sub> and (TAGA)<sub>n</sub> microsatellite containing clones was an important accomplishment. These libraries are now ready to be exploited as a source of new markers.

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, Q.J., and P. B. Cregan. 1999. Characterization of trinucleotide motifs and newly developed microsatellite markers in wheat. Abstracts Am. Soc. Agron. (In press).