U.S. Wheat and Barley Scab Initiative
FY02 Final Performance Report (approx. May 02 – April 03)
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Cover Page

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Year:	**FY2002 (approx. May 02– April 03)**
Grant Number:	**NA**
Grant Title:	**Fusarium Head Blight Research**
FY02 ARS Award Amount:	**$ 59,057**

Project

Program Area	Project Title	USWBSI Recommended Amount
VDUN	Scab resistant gene deployment into wheat lines via marker assisted selection.	$60,533
	Total Amount Recommended	**$60,533**

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Principal Investigator Date

Project 1: Scab resistant gene deployment into wheat lines via marker assisted selection.

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

The primary objective of this project is to utilize molecular markers in conjunction with phenotypic evaluation to facilitate development of wheat lines resistant to Fusarium head blight. This is being accomplished through a collaboration of four soft red winter wheat breeding programs and the ARS wheat germplasm development program at Manhattan, KS. Populations at different stages of development are analyzed with molecular markers at Manhattan while being evaluated in the field for reaction to FHB by the respective breeding programs. Breeders can then use the combination of marker and phenotypic data to make selection decisions that should result in more rapid deployment of FHB resistance into wheat cultivars. In order to educate personnel in traditional wheat breeding programs in use of molecular markers and interpretation of data for marker assisted selection, post-docs and graduate students from the collaborating breeding programs visit the ARS unit at KSU for training in the use of molecular markers.

2. What were the most significant accomplishments?

Marker analysis was done on 780 lines from eight populations of F4, F5 or F6 lines from two-, three- and four-way crosses that were provided by three collaborating breeding programs (Dr. Paul Murphy, NCSU; Dr. Dave Van Sanford, UK; and Dr. Jose Costa, UM). In each case, Ning 7840 was the source of resistance and the lines had not been previously selected for scab resistance in the field or with molecular markers. Genomic DNA of the lines was isolated and amplified with three microsatellite markers *(Xgwm533, Xgwm493*, and *Xbarc133*) linked to the *Qfhs.ndsu-3BS* resistance locus. From the NCSU material, 22 of 92 lines that were either heterozygous of homozygous for the Ning 7840 alleles at the markers flanking the resistance QTL were determined to have acceptable levels of scab resistance and acceptable plant type. These lines are being carried forward for additional evaluation. Entries in the 2003 Scab Screening Nursery were also analyzed with these microsatellite markers and data provided to Dr. Paul Murphy at NCSU. The marker analysis indicated that none of the nursery entries has the Sumai 3 alleles at all of the loci analyzed. A hard red winter wheat population segregating for FHB resistance was developed at Manhattan, KS. The line Wuhan #3, which is reported to have the same resistance QTL on chromosome 3BS as Sumai 3 and Ning 7840 was backcrossed to Jagger and BC1F2:4 lines were evaluated for reaction to FHB in a replicated nursery in 2003. Seed was harvested from individual plants of the lines having low levels of disease. Genomic DNA will be isolated from five to ten seed from each BC1F4 individual to identify F5 lines having the 3BS resistance QTL. The remaining seed will be planted for scab resistance testing in the 2003-04 growing season. Two graduate students from the University of Kentucky visited the lab at Manahattan, KS to learn molecular marker protocols and data analysis. Dr. Jianli Chen from VPI visited for ten days during which she analyzed a set of advanced lines and 189 individuals from an F2 population with 13 SSRs to verify previous FHB resistance mapping work. Dr. Chen was able to collect over 2500 marker data points during her visit. A graudate student from UM will visit Manhattan in August, 2003.

3. 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 to report.