USDA-ARS / USWBSI
FY03 Final Performance Report (approx. May 03 – April 04)
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Cover Page

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Year:	**FY2003 (approx. May 03 – April 04)**
FY03 ARS Agreement ID:	**59-0790-1-078**
FY03 ARS Agreement Title:	**Study of scab-related genes and molecular markers.**
FY03 ARS Award Amount:	**$ 15,176**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
GIE	Molecular Analysis of Gene Novelty of the Newly Identified FHB Resistance Sources in the USDA Spring Wheat Germplasm.	$ 15,176
	Total Amount Recommended	**$ 15,176**

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Principal Investigator Date

* BIO – Biotechnology
CBC – Chemical & Biological Control
EDM – Epidemiology & Disease Management
FSTU – Food Safety, Toxicology, & Utilization
GIE – Germplasm Introduction & Enhancement
VDUN – Variety Development & Uniform Nurseries

Project 1: ***Molecular Analysis of Gene Novelty of the Newly Identified FHB Resistance Sources in the USDA Spring Wheat Germplasm.***

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

Through the efforts of USWBSI, hundreds of cultivars, breeding lines, land-races and wild species have been systematically screened for new FHB resistant sources. Identifying the novelty of these newly selected FHB resistance sources is necessary to avoid unnecessary efforts of incorporating the duplicated resistance genes into varieties. Besides the FHB-resistance and other agronomic traits, molecular fingerprinting to each germplasm selection will add important information of these accessions for breeders who will employ marker-assisted. This proposed research is designed to do such novelty test with molecular assay. The objective is to screen the Spring wheat germplasm selections with the available molecular markers to the currently used FHB resistant genes. Other landmark SSR markers to each wheat chromosome arm will also be screen to provide the breeders a molecular fingerprint for each selection. This proposed project will help realizing the following USWBSI's goal set for the Germplasm Introduction and Enhancement: "Genetic analyses of newly identified and/or acquired sources of resistance".

2. What were the most significant accomplishments?

Ninety-six bread wheat accessions were fingerprinted with 32 simple-sequence-repeat (SSR) markers, which cover all wheat chromosome arms and includes the three 3BS markers *Xgwm389*, *Xgwm493* and *Xgwm533*. Of the 96 accessions 93 came from Europe, Asia and South America and were selected from the entries of the USWBSI's Spring Wheat Germplasm Survey for their excellent performance for FHB resistance in the multi-year examination. "Sumai 3" and "Wheaton" were included in this assay as checks. A total of 254 SSR alleles at 105 loci were uncovered. Most of these SSR alleles were not evenly distributed worldwide. A total of 49 alleles were not observed in any Asian accessions assayed, while 34 and 32 alleles were respectively absent from the European and the South American accessions. Forty-four alleles were found to be continent-specific. The accessions were clustered based on their alleles of all the 32 SSR markers and on the three 3BS markers, respectively. Genome-wide cluster analysis clearly divided the 96 accessions into two groups with 48 accessions per group. Accessions in the group where 'Sumai 3" is not in should be a good source for novel FHB resistance QTLs if they are also different from 'Sumai 3' for the 3BS chromosomal region defined by SSR markers *Xgwm389*, *Xgwm493* and *Xgwm533*. Examples of such FHB resistance sources we found include 'Tokai 66' and 'Nobeoka Bozu' from Japan, 'Laureano Alvarez Laah' and 'Tezanos Pintos Precoz' from Argentina, 'Chudoskaja' and 'Ostka Wierzbienska' from Poland, and 'Abura' from Brazil.

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 you grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Liu, D.C., Y. Yen and A.M. Ibrahim. 2003. Screening elite South Dakota winter wheat for SSR markers linked to Fusarium head blight resistance. Proc. SD Acad. Sci. 82:19-25.

Xing, D.-H. and Y. Yen. 2003. Alternative Transcription of a Putative Long-Chain Acyl CoA Binding Protein Gene Possibly Regulates the Pathogenic Strength of Fusarium graminearum in Response to Changing Pathogenetic Environment. In: 2003 National Fusarium Head Blight Forum Proceedings, pp50.

Weng, Y.-J., Y. Yen and Y. Jin. 2003. Results of SSR fingerprinting of 94 Newly Identified Fusarium Head Blight Resistance Sources. In: 2003 National Fusarium Head Blight Forum Proceedings, pp236

Liu, D.C., Yang Yen and A. M. Ibrahim. 2003. Screening Elite South Dakota Winter Wheat for SSR Markers Linked to Fusarium Head Blight Resistance. In: 2003 National Fusarium Head Blight Forum Proceedings, pp264

Xing, D.-H. and Y. Yen 2003. A putative acyl-CoA-binding-protein of *Fusarium graminearium* possibly plays an important role in the FHB pathogenesis in wheat. ASA CSSA-SSSA 2003 annual meeting.