USDA-ARS / USWBSI
FY02 Final Performance Report (approx. May 02 – April 04 [NCE])
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Cover Page

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Year:	**FY2002 (approx. May 02– April 03)**
FY02 Agreement Number:	**59-0790-0-060**
FY02 Agreement Title:	**Fusarium Head Blight Research**
FY02 ARS Award Amount:	**$ 39,024**

USWBSI Individual Project

Program Area	Project Title	USWBSI Recommended Amount
BIO	Molecular Characterization of QTL for Scab Resistance in Wheat Cultivar Wangshuibai.	$ 40,000
	Total Amount Recommended	**$ 40,000**

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Principal Investigator Date

Project 1: Molecular Characterization of QTL for Scab Resistance in Wheat Cultivar Wangshuibai.

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

Effective utilization of scab resistance resources relies on understanding inheritance of wheat resistance to scab and to DON accumulation in wheat grain. Major scab resistance QTL from Sumai 3 has been mapped and widely used in breeding programs. Identification of resistance genes from different sources may enrich scab resistance gene diversity and provide new genes to enhance scab resistance level through gene pyramiding. We mapped scab resistance QTL from Wangshuibai, a Chinese landrace different from Sumai 3, with AFLP and microsatellite markers, and to elucidate genetic effects of these QTL by testing the mapping population for scab resistance and DON accumulation under greenhouse conditions. The results are also expected to provide breeders with selectable markers for breeding wheat cultivars with low DON and high levels of scab resistance to speed up breeding process.

2. What were the most significant accomplishments?

1. 140 F6 RILs from Wangshuibai/Wheaton were evaluated for Type II resistance and DON content in two greenhouse cycles and about 600 AFLP primers and 800 SSR primers were screened between parents.
2. About 1000 polymorphic AFLP fragments and 150 SSR markers were analyzed in the RIL population using Li-Cor DNA Analyzer.
3. About 100 markers were identified to be associated with Type II resistance and/or low DON level with $r^2>0.05$.
4. The largest R^2 value was 0.35 for type II resistance and 0.15 for low DON content. Preliminary data analysis indicated two QTL on 3BS although SSR alleles are different from that in Sumai 3 and the other possible QTLs for Type II resistance on chromosomes 3A, 3D, 7A, 7B, 5B, 5A, 2B, 2A, and 6A. Among them, four also have a significant effect on low DON content.

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.

Peer-reviewed articles

1. Zhou W-C, Kolb F. L., Yu J-B, **Bai G-H**, Boze, L K, Domier, L.L. 2004. Molecular characterization of Fusarium head blight resistance in Wangshuibai with SSR and AFLP markers. (Accepted).
2. Zhang X, Zhou, M, Ren, L, **Bai G-H**, Ma, H, Scholten O.E., Guo P.G, Lu W-Z. 2004. Molecular characterization of *Fusarium* head blight resistance from wheat variety Wangshuibai. Euphytica (Accepted with minor revision)
3. **Bai G-H,** Shaner GE. 2004. Management and resistance in wheat and barley to Fusarium head blight. Phytopathol. Ann Rev. (In Press)
4. **Bai G-H**, Chen L-F and Shaner G. 2003. Breeding for resistance to head blight of wheat in China. In: Wheat *Fusarium* Head Blight. Kurt Leonard (ed). APS Press. Pp. 296-317
5. W-C. Zhou, F. L. Kolb, **G-H. Bai**, L. L. Domier, L. K. Boze and N. J. Smith. 2003 Validation and marker-assisted selection of a major QTL for scab resistance with SSR markers in wheat. Plant Breeding 122:40-46
6. Guo P-G, **Bai G-H** and Shaner G.E. 2003. AFLP and STS tagging of a major QTL for scab resistance in wheat. Theor. & Appl. Genet. 106:1011-1017
7. W-C. Zhou, F. L. Kolb, **G-H. Bai**, L. L. Domier, J-B Yao. 2003. Effect of individual Sumai3 chromosomes on resistance to scab spread within spikes and deoxynivalenol accumulation within kernels in wheat. Hereditas. 137:81-89.
8. **Bai G-H**, Guo P-G and Kolb FL. 2003. Genetic relationships among scab-resistant cultivars of wheat based on molecular markers. Crop Science 43: 498-507

Abstracts

1. Bernardo A.N., **Bai G-H , Ayoubi P.,** and Guenzi A. 2003. Using cDNA microarray to monitor the transcriptional response of wheat cultivars to infection by Fusarium graminearum. Dec. 13-15, 2003 National Fusarium Head Blight Forum, Bloomington, MN.
2. Bernardo A.N., **Bai G-H** and Guenzi A. 2003. Microarray analysis of gene expression in wheat infected with Fusarium graminearum. Genome XI. Jan 10-16, San Diego. CA
3. Guihua Bai. 2003. Role of USDA Regional Genotyping Centers. Dec. 13-15, 2003 National Fusarium Head Blight Forum, Bloomington, MN.

4. J-B Yu, **G-H Bai**, S-B Cai and T Ban. 2003. AFLP Analysis of Asian Wheat Cultivars Resistant to Fusarium Head Blight. November 2-6, 2003, ASA-CSSA-SSSA Annual Meetings, Denver, Colorado
5. J-B Yu, **G-H Bai**, S-B Cai and T Ban. 2003. Genetic relationship among Asian Wheat germplasm resistant to Fusarium head blight. Dec. 13-15, 2003 National Fusarium Head Blight Forum, Bloomington, MN.
6. W. C. Zhou, F. L. Kolb, **G. H. Bai**, 2003. Marker-assisted backcrossing selection of near isogenic lines for 3BS Fusarium head blight resistance QTL in hexaploid wheat. November 2-6, 2003, ASA-CSSA-SSSA Annual Meetings, Denver, Colorado
7. W. C. Zhou, F. L. Kolb, **G. H. Bai**, L. K. Boze, L. L. Domier, 2003. Molecular mapping of scab resistance QTL in Wangshuibai. November 2-6, 2003, ASA-CSSA-SSSA Annual Meetings, Denver, Colorado
8. Yang J, Bai, G-H, Yu, J-B Sood S., Bernardo A. 2003. High-throughput genotyping facility for marker-assisted breeding and molecular marker development. Dec. 13-15, 2003 National Fusarium Head Blight Forum, Bloomington, MN.