

**U.S. Wheat and Barley Scab Initiative
 FY02 Preliminary Final Performance Report (approx. May 02 – April 03)
 July 15, 2003**

Cover Page

PI:	Brett Carver
Institution:	Oklahoma State University
Address:	Department of Plant and Soil Sciences 368 Ag. Hall Stillwater, OK 74078-6028
E-mail:	bfc@mail.pss.okstate.edu
Phone:	405-744-6414
Fax:	405-744-5269
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Grant Title:	Fusarium Head Blight Research
FY02 ARS Award Amount:	\$ 39,024

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

 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 are mapping 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?

- a. Several RGA markers have been identified for scab resistance and one of them has been successfully converted into a STS marker. This STS marker showed a R^2 value about 10% in Ning7840/Clark mapping population, and did not correlate with markers on 3BS. This marker seems to associate with minor QTL in Ning 7840.
- b. Mapping population derived from Wangshuibai/Alondra's was tested for two greenhouse cycles. Disease and DON levels of these RILs were evaluated.
- c. About 400 SSR markers were screened between bulk and parents and about 80 primers showed polymorphism between two parents and 15 of them were polymorphic between bulks. Further population screening indicated that the major QTL was also in 3BS, but the QTL effect was smaller than that in Ning 7840 population. Also, the SSR banding pattern in Wangshuibai was different from that in Ning 7840.
- d. About 140 F6 RILs from Wangshuibai/Wheaton were evaluated in Greenhouse this spring and 500 AFLP primers are being screened for this population with bulk segregant analysis.

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. **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
2. **Bai G-H**, Chen L-F and Shaner G. 2003. Breeding for resistance to head blight of wheat in China. Page 296-317 in: *Wheat Fusarium Head Blight*. Kurt Leonard (ed). APS Press.
3. 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
4. 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
5. W-C. Zhou, F. L. Kolb, **G-H. Bai**, L. L. Domier, J-B Yao. 2002. Effect of individual Sumai3 chromosomes on resistance to scab spread within spikes and deoxynivalenol accumulation within kernels in wheat. *Hereditas.* 137:81-89.
6. Zhou W-C, Kolb FL., **Bai G.-H.**, Shaner GE., Domier L. L. 2002. Genetic analysis of scab resistance QTL in wheat with microsatellite and AFLP markers. *Genome:* 45:1-9,

Meeting Abstract

1. 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
2. **Bai G-H**, Guo P-G, Xiao K., Zhou W-C, Kolb F.L., Xu X-Y, Gaddam S.R., Bernardo A.N. 2002. Development of high-throughput markers for improvement of scab resistance in wheat. 2002 Annual Meetings of ASA, CSSA, SSSA. Nov 10-14, Indianapolis, IN
3. Zhou W-C, Kolb F.L., Bai G-H, Yao J-B, Domier L.L. 2002. Effect of Sumai3 chromosomes on scab resistance and Deoxynivalenol accumulation within wheat spikes. 2002 Annual Meetings of ASA, CSSA, SSSA. Nov 10-14, Indianapolis, IN
4. Zhou W-C, Kolb FL, **Bai G-H**, Shaner GE, and Domier LL. 2002. Molecular mapping of *Fusarium* head blight resistance QTL in wheat with microsatellite and AFLP markers. *Genome X*. Jan 12-17, San Diego. CA
5. Bai, G-H, Amy Bernardo, P-G Guo, K Xiao, M Das X-Y Xu and S R. Gaddam. 2002. Molecular characterization of scab resistance QTL in wheat National *Fusarium* Head Blight Proceeding. P14-15 December 7- 9 2002 Cincinnati Erlanger KY
6. Zhou W-C, FL. Kolb L. K. Boze N.J Smith G-H Bai , LL Domier and J-B Yao. 2002. Effect of Sumai 3 chromosome on Type II and Type V scab resistance in wheat 2002 National *Fusarium* Head Blight Proceeding. P274 P14-15 December 7- 9 2002 Cincinnati Erlanger KY