

**U.S. Wheat and Barley Scab Initiative
Annual Progress Report
September 18, 2000**

Cover Page

PI:	Gulhua Bai
Institution:	Oklahoma State University
Address:	Department of Plant Sciences 469 Agriculture Hall Stillwater, OK 74078-6028
Email:	bai@mail.pss.okstate.edu
Phone:	405-744-9608
Fax:	405-744-5269
Year:	FY2000
Grant Number:	59-0790-0-060
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$35,000.00

Project

Program Area	Objective	Requested Amount
Biotechnology	Create molecular maps of wheat genes imparting resistance to scab infection and deoxynivalenol (DON) accumulation.	\$45,700.00
	Requested Total	\$45,700.00¹

Principal Investigator

Date

¹ Note: The Requested Total and the Amount Granted are not equal.

Project 1: Create molecular maps of wheat genes imparting resistance to scab infection and deoxynivalenol (DON) accumulation.

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. Because of complexity of wheat resistance to scab infection and DON, conclusions from classical research are controversial. Molecular mapping of QTL provides an efficient tool for solving the complicated problem. We are constructing a highly saturated molecular linkage map with AFLP and microsatellite markers to map QTL for scab resistance and low DON, and to elucidate genetic effects of these QTL by testing the mapping population for scab resistance and DON accumulation under field and 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. Please provide a comparison of the actual accomplishments with the objectives established.
 - a. One major QTL for low DON under greenhouse conditions has been mapped on cv. Ning 7840.
 - b. Infected seeds of 133 F11 RILs from two field experiments are being analyzed.
 - c. The AFLP map derived from Ning 7840/Clark population is saturated with PstI-AFLP markers and SSR markers.
 - d. The major QTL for scab resistance located on chromosome 3BS by SSR markers.
 - e. One STS marker has been converted from AFLP, and further validation of the marker is underway.
3. What were the reasons established objectives were not met? If applicable.

Time required to complete the proposed project was predicted to be at least two years. Funding provided for this project was less than needed. Nevertheless, we made significant progress toward the proposed objectives.

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

Three additional minor QTL for Type II resistance have been mapped. A major QTL for low DON as evaluated by spray inoculation under greenhouse conditions has been identified. Infected F11 RIL seeds from two field experiments are being analyzed for further mapping of low DON under field infection conditions. One STS marker was developed and has potential to be used as a selectable marker for MAS after further validation. Work to saturate the map with PstI-AFLP markers is in progress. SSR mapping has been initiated by using LI-COR DNA Analyzer.

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Progress Report

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.

1. **Bai G-H**, Desjardins A.E and Plattner R.D. 2000. Deoxynivalenol-nonproducing *Fusarium graminearum* causes initial infection, but does not cause disease spread in wheat spikes. In: Proceeding of International Symposium on Wheat Improvement for Scab Resistance. May 5-10, 2000 Suzhou and Nanjing, China.
2. **Bai G-H**, Kolb, F. , Shaner, G., and Domier, L.. 2001. Creation of an AFLP map to identify scab resistance QTL in wheat. TAG (submitted).
3. **Bai G-H**, Plattner, R., Desjardins, A. and Kolb, F. 2000. Resistance to Fusarium head blight and Deoxynivalenol accumulation in wheat. Plant Breeding (Accepted)
4. **Bai, G-H**, Plattner, R., Shaner, G. and Kolb, F.. 2000. A QTL for deoxynivalenol tolerance in wheat. Phytopathology. 90(6):S4.
5. **Bai, G-H.**, Shaner, G., and Ohm, H. 2000. Inheritance of resistance to *Fusarium graminearum* in wheat. Theor. and Appl. Genet. 100: 1-8.
6. Chen, L-F, **Bai, G-H.**, and Desjardins, A. E. 2000. Recent advances in wheat head scab research in China. National Agricultural Library Internet publication, USDA <http://www.nal.usda.gov/pgdic/WHS/whsindex.html>
7. Desjardins A. E., **Bai G-H**, Plattner R. D., and Proctor R.H. 2000. Analysis of aberrant virulence of *Gibberella zeae* following transformation-mediated complementation of a trichothecene-deficient (*Tri5*) mutant. Microbiology (In press).
8. F. L. Kolb, **Bai, G-H.**, Muehlbauer, G. J., Anderson, J. A., Smith, K. P. and Fedak, G. **2000.** Molecular mapping of resistance genes for Fusarium head blight in wheat and barley. Crop Science (Accepted).
9. Zhou W-C, Kolb, F. L., **Bai, G.-H.**, Shaner, G.E. and Domier, L. L. 2001. Microsatellite mapping and sub-arm physical mapping of a major scab resistance QTL in wheat. TAG (Peer reviewing).