

**U.S. Wheat and Barley Scab Initiative
 FY00 Final Performance Report (approx. May 00 – April 01)
 July 30, 2001**

Cover Page

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Year:	FY2000 (approx. May 00 – April 01)
Grant Number:	59-0790-9-050
Grant Title:	Fusarium Head Blight Research
2000 ARS Award Amount:	\$73,171

Project

Program Area	Project Title	Requested Amount
Variety Development & Uniform Nurseries	Development of Scab Resistant Soft Red Winter Wheat Varieties.	\$92,270.00
	Requested Total	\$92,270.00¹

Principal Investigator

Date

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

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Project 1: Development of Scab Resistant Soft Red Winter Wheat Varieties.

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

Many lines with excellent scab resistance are poor for other traits such as grain yield, milling and baking quality, standability, or resistance to other diseases. This problem is not resolved, but we are using backcrosses, and three-way crosses to attempt to develop well-adapted lines. We are also continuing to select and evaluate as many lines as possible. In addition, as more lines with good scab resistance are identified we are using these parents in crosses, so that in many crosses both parents, or two parents out of three in a three-way cross, are scab resistant.

2. What were the most significant accomplishments?

C Four lines from the Illinois program were entered into the 2000 Cooperative Eastern Winter Wheat Fusarium Head Blight Screening Nursery. The lines from the University of Illinois program were among the most scab resistant lines in the 2000 nursery. By entering these four breeding lines into the cooperative screening nursery these lines were made available to other breeders for use as parents. Five breeding lines from the University of Illinois program were entered into the 2001 Cooperative Eastern Winter Wheat Fusarium Head Blight Screening Nursery.

C About 680 breeding lines were evaluated in replicated rows in the 2000 misted, inoculated scab evaluation field nursery. In addition, about 1500 entries from single plots and 3500 headrows were also evaluated in the field. Heads were selected from 35 F₃ bulk populations grown in the field scab evaluation nursery, and headrows resulting from these selections were planted in the fall (2000-01 season).

C Plants from four segregating populations were screened in the greenhouse in 2000-2001. A total of 1700 plants were evaluated using the needle inoculation method, and 567 plants (33%) were selected (most with Type II resistance equal to or better than Ernie).

C Three microsatellite markers on the short arm of chromosome 3B were integrated into an amplified fragment length polymorphism (AFLP) linkage group containing a major QTL for scab resistance. The order of the three markers from telomere to centromere was Xgwm389-Xgwm533-Xgwm493. The microsatellite markers were used in conjunction with eight deletion lines for 3BS to show that the QTL for scab resistance is physically located distal to breakage point 3BS-8.

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.

Refereed Publication:

Kolb, F. L., G-H. Bai, G. J. Muehlbauer, J. A. Anderson, K. P. Smith, & G. Fedak. 2001. Host plant resistance genes for Fusarium head blight: Mapping and manipulation with molecular markers. *Crop Sci.* 41: 611-619.

Proceedings articles:

Bai, G-H., R. Plattner, G. Shaner, F. Kolb. 2000. Molecular mapping of a QTL for deoxynivalenol tolerance in wheat. *In* Ward, R. W., S.M. Canty, J. Lewis, and L. Siler (eds.). Proc. of the 2000 National Fusarium Head Blight Forum, Erlanger, Kentucky, 10 - 12 Dec. 2000. Michigan State University, East Lansing, Michigan.

Kolb, F. L., L. K. Boze, N. J. Smith, A. J. Stewart, W. C. Zhou, and I. Vroh Bi. 2000. Breeding for Fusarium head blight resistance in soft red winter wheat. *In* Ward, R. W., S.M. Canty, J. Lewis, and L. Siler (eds.). Proc. of the 2000 National Fusarium Head Blight Forum, Erlanger, Kentucky, 10 - 12 Dec. 2000. Michigan State University, East Lansing, Michigan.

Kolb, F. L., L. K. Boze, N. J. Smith, I. Vroh Bi and W. C. Zhou. 2000. NCR-184 - Management of head scab in small grains - Illinois Report. 2000. *In* Ward, R. W., S.M. Canty, J. Lewis, and L. Siler (eds.). Proc. of the 2000 National Fusarium Head Blight Forum, Erlanger, Kentucky, 10 - 12 Dec. 2000. Michigan State University, East Lansing, Michigan.

Vroh Bi, I., F. L. Kolb, G-H. Bai, G. Shaner, and L. L. Domier. 2000. Development of STSs and SNPs linked to Fusarium head blight resistance of wheat using AFLPs and antifungal gene analogs. *In* Ward, R. W., S.M. Canty, J. Lewis, and L. Siler (eds.). Proc. of the 2000 National Fusarium Head Blight Forum, Erlanger, Kentucky, 10 - 12 Dec. 2000. Michigan State University, East Lansing, Michigan.

Zhou, W. C., F. L. Kolb, G-H. Bai, G. Shaner, and L. L. Domier. 2000. SSR mapping and sub-arm physical location of a major scab resistance QTL in wheat. p. 69-73. *In* Ward, R. W., S.M. Canty, J. Lewis, and L. Siler (eds.). Proc. of the 2000 National Fusarium Head Blight Forum, Erlanger, Kentucky, 10 - 12 Dec. 2000. Michigan State University, East Lansing, Michigan.

Presentation and Article in Newsletter:

Kolb, F. L. 2000. Molecular markers: Part numbers for genes. Illinois Wheat Association Forum, August 2000, and Illinois Wheat Association Newsletter Vol. 6, No 4, Fall 2000.