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

Cover Page

PI:	**Frederic Kolb**
Institution:	**University of Illinois**
Address:	**Dept. of Crop Sciences** **1102 S. Goodwin Ave.** **Urbana, IL 61801**
Email:	f-kolb@uiuc.edu
Phone:	**217-333-9485**
Fax:	**217-333-9817**
Year:	**FY2000**
Grant Number:	**59-0790-9-050**
Grant Title:	**Fusarium Head Blight Research**
Amount Granted:	**$75,000.00**

Project

Program Area	Objective	Requested Amount
Variety Development & Uniform Nurseries	Accelerate development of resistant varieties.	$92,270.00
	Requested Total	$92,270.00[1]

_____

Principal Investigator Date

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

Project 1: Accelerate development of resistant varieties.

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

Many of the 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.

2. Please provide a comparison of the actual accomplishments with the objectives established.

1) About 300 single and three-way crosses were made involving one or more scab resistant parents in each cross. In addition, about 100 crosses were made with the objective of combining scab resistance from several sources. Many of the crosses in the second set involve parents with excellent scab resistance, but many of these parents are unadapted.

2) The misted, inoculated scab evaluation nursery was used to evaluate about 680 entries in replicated rows, about 1500 entries from single plots nurseries, and about 3500 headrows.

3) Plants from six populations were screened in the greenhouse (a total of 2220 plants were evaluated, and 844 plants (38%) were selected (most with Type II resistance better than Ernie). Heads were selected from 35 F_3 bulk populations grown in the field scab nursery, and about 3000 headrows resulting from these selections will be planted this fall.

4) Scab resistant lines were evaluated for many traits. Many of the lines with good scab resistance are poor for other traits such as grain yield, milling and baking quality, standability, or resistance to other diseases.

5) Four lines from the Illinois program were entered into the 2000 Cooperative Winter Wheat Scab Screening Nursery. By entering the breeding lines into this nursery these lines were made available to other breeders for use as parents. Although the data over locations has not yet been summarized, the lines from the Illinois program seem to be among the most scab resistant lines in the 2000 nursery.

6) The greenhouse screening procedure is working well on segregating populations. The experimental designs in our field nursery worked well to remove variation, so our nursery layout and uniformity improved this year. Our CVs are still larger than ideal.

7) Production of doubled-haploid plants using the wheat x maize technique was attempted. This technique is very labor intensive and to date has yielded disappointing results. About 1700 embryos were rescued, about 400 haploid seedlings were transplanted to the greenhouse, and 315 plants survived the colchicine treatment and are growing in the greenhouse. As we get more crosses with scab resistant parents advanced to higher generations I am questioning the benefit of continuing this technique.

3. What were the reasons established objectives were not met? If applicable. For #7, colchicine treatment to double chromosome number does not seem to have been effective.

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

- Good scab resistance of four lines in the Uniform Winter Wheat Scab Screening Nursery. These lines are available as parents to other breeding programs.
- Selection of 844 putatively resistant lines with the greenhouse screening technique.
- Identification in the field nursery of at least 70 new lines with scab resistance.

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 Articles in Journals

Bai, G-H., F. L. Kolb, G. Shaner, & L. L. Domier. 1999. AFLP markers linked to a major QTL controlling scab resistance in wheat. Phytopathology 89:343-348.

Kolb, F. L., G-H. Bai, G. J. Muehlbauer, J. A. Anderson, K. P. Smith, & G. Fedak. 2000. Host plant resistance genes for Fusarium head blight: Mapping and manipulation with molecular markers. Crop Sci. 40: (Accepted).

Abstracts

Kolb, F. L., G-H. Bai, G. J. Muehlbauer, J. A. Anderson, K. P. Smith, & G. Fedak. 1999. Host plant resistance genes for FHB: mapping and manipulation with molecular markers. Agron. Abstr. p. 83.

Bai, G-H., F. L. Kolb, G. E. Shaner, & L. L. Domier. 1999. Using an AFLP map to identify scab resistance QTL in wheat. Agron. Abstr. p. 159.

Presentations

"Host Plant Resistance Genes for Fusarium Head Blight: Mapping and Manipulation with Molecular Markers", American Society of Agronomy, National Meetings, Salt Lake City, UT, Nov. 1999.

"Keep the Best and Throw away the Rest", Illinois Wheat Association Forum, Highland, Illinois, August 17, 2000.

Unreviewed Articles and Newsletter Articles

Kolb, F. L., L. K. Boze, & N. J. Smith. 1999. University of Illinois research on wheat scab resistance. 1998 Illinois Agronomy Report. Crop Sciences Special Report No. 1999-02. p. 31-32.

Bai, G-H., F. L. Kolb, G. E. Shaner, & L. L. Domier. 1999. Using an AFLP map to identify scab resistance QTL in wheat. *In* J. A. Wagester, R. Ward, L. P. Hart, S. P. Hazen, J.

Lewis & H. Borden (eds.). Proc. 1999 National Fusarium Head Blight Forum. Sioux Falls, SD. p. 22-24.

Kolb, F. L., L. K. Boze, & N. J. Smith. 1999. NCR-184 management of head scab in small grains - Illinois report. *In* J. A. Wagester, R. Ward, L. P. Hart, S. P. Hazen, J. Lewis, and H. Borden (eds.). Proc. 1999 National Fusarium Head Blight Forum. Sioux Falls, SD. p. 194-195.

Kolb, F. L. & C. Beazer. 1999. What do we mean by different types of scab resistance? Illinois Wheat Association Newsletter 5:6.