

**U.S. Wheat and Barley Scab Initiative
Annual Progress Report
September 15, 1999**

Cover Page

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Year:	FY1999
Grant Number:	59-0790-9-052
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$117,073.00

Project

Program Area	Objective	Requested Amount
Germplasm	Maintain a germplasm center.	\$50,000
Variety Development	To enhance variety development of scab resistant varieties.	\$70,000
	Requested Total	\$120,000¹

Principle Investigator

Date

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

Project 1: Maintain a germplasm center.

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

This project is aimed at finding, through a world-wide search, additional or new sources of resistance to Fusarium head blight (scab) in winter wheat. After discovery, this project is charged with verifying resistance and disseminating information to wheat breeders nationally. A third objective is to continue to facilitate the introduction of elite scab resistant germplasm from international breeding programs. A systematic search of winter wheat cultivars, breeding lines and land-races currently maintained in the National Small Grains Collection is underway. Accessions (4200) from targeted geographical regions where scab is a problem have been identified to be screened first. Approximately 1000 accessions per year are being screened. In FY1998, 937 accessions from Asia, Brazil and Italy were screened in the greenhouse and field. Resistance in these lines will be verified during the fall of 1999. In FY1999, 1006 accessions from Yugoslavia will be screened for Type I and Type II resistance in the field and greenhouse respectively. Finally, a visit to China during October 1999 is planned to facilitate the introduction of additional sources of resistance from programs working on scab resistance.

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

Because this project involves winter wheat, the timing of the grant (May 1999) precluded new germplasm work during the summer of 1999, and as such, work for this grant will commence during the fall greenhouse after accessions have been vernalized and will continue with field screening in May 2000. In FY98, 937 accessions were screened and 240 plants representing 87 accessions were identified as having good to excellent levels of Type II resistance and kernel quality compared to Sumai 3 and Ernie soft red winter wheat (the resistant checks). During FY1999, Type II resistance in these plants will be verified through progeny tests conducted in the greenhouse. Data will be presented at the Scab Forum in December, 1999. Also in FY1999, 1006 accessions from Yugoslavia, currently being vernalized, will be screened for Type II resistance and kernel quality in the greenhouse during the fall of 1999 and winter of 2000. These lines will be planted in the field in October 1999 and evaluated for Type I resistance in May of 2000.

3. What were the reasons established objectives were not met? If applicable.

Distribution of funds in the spring of 1999, precluded work during the summer of 1999 because this center works on winter wheat which must be vernalized for fall greenhouse planting or planted in the fall for field screening in the spring. As such work will commence in the fall of 1999 as outlined above.

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

The most significant accomplishments FY 1999 will be the verification of resistance identified in some 87 accessions identified during FY1998 greenhouse screening. Once verified, these sources of resistance will be introgressed into adapted winter wheat cultivars, shared with other wheat germplasm centers and shared with breeders on request as seed quantities permit.

Project 2: To enhance variety development of scab resistant varieties.

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

Wheat scab has caused serious losses in both yield and quality in Missouri soft red winter wheat. In 1990, state-wide losses were in excess of \$80 million while in 1991, losses exceeded \$120 million. Limited resistance to scab is present in currently released soft red winter wheat cultivars, and few lines have been screened for genetic resistance to this pathogen. The goals of this project are to: (1) increase the size of the Missouri field and greenhouse screening programs in order to evaluate scab resistance in all breeding lines in advanced testing, (2) incorporate genes for resistance into elite breeding lines, (3) grow and evaluate the 1999 Winter Wheat Scab Nursery, and (4) enhance the efficiency and effectiveness of greenhouse screening protocols through completion of research on the effects of isolate and genotype on resistance response.

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

This project involves winter wheat which is planted in October in Missouri. The distribution of scab funds during the spring of 1999 precluded the establishment of an expanded scab screening nursery during the summer of 1999. This will be initiated in the fall of 1999 and has been expanded to include: 55 F2 populations segregating for scab resistance, approximately 3,000 F5 head rows selected from populations developed from parents with good to excellent levels of scab resistance, and approximately 150 plots of lines in advanced stages of testing. The 1999 scab nursery which was planted in the fall of 1998 was screened for Type I resistance in the field and for Type II resistance and kernel quality in the greenhouse during the spring of 1999. Finally four replications of a study involving 28 lines entered into the 1999 scab nursery and five isolates from breeders/pathologists in MO, MI, IN, OH and VA were completed. Two additional replications of the study will be completed in the fall of 1999.

3. What were the reasons established objectives were not met? If applicable.

Distribution of funds in the spring of 1999 precluded work during the summer of 1999 because the Missouri wheat breeding program focuses on soft red winter wheat which, in Missouri, is planted in October. Consequently, the expanded nursery will be planted in the first week in October and evaluated in May of 2000.

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

Of 120 breeding lines screened for Type II resistance and kernel quality during the spring of 1999, 34 advanced lines were identified as having good levels of resistance or were segregating for resistance compared to the resistant check varieties Sumai 3 and Ernie. Four of these lines have been entered into the 2000 Winter Wheat Scab Nursery. Verification of resistance will be done through progeny tests in 1999/2000. Resistant lines will be entered into the crossing program, and in addition, crossed with MO 94-317 (susceptible) to develop mapping populations and populations for conventional genetic studies.

Year: 1999

Progress Report

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Grant: 59-0790-9-052

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.

None during this period

Non peer-reviewed articles written about scab research at MU.

Hillyer, G. 1999. Wheat: 'Stop Scab' in: Progressive Farmer, July, Page 41. (Midwest Edition)

Dailey, D. 1999. 'Seeds for Scab Resistance.' Missouri Ruralist, April. Pages 8-9.

Beahler, J. 1999. 'Saving the Wheat Industry – MU Joins The Research Attack On Devastating Wheat Scab.' Mizzou Weekly. February 4th p. 8.

Dailey, D. 1999. 'Federal Funding Aids Research to Cut Loss from Wheat Scab.' MidAmerica Farmer Grower, Perryville, MO, January 29, 1999.

Presentations:

McKendry, A. L. 1999. 'The National Wheat and Barley Scab Initiative' Presentation given to the Missouri Seed Improvement Annual Meeting, Feb 4, 1999.

Television Report:

'Scab germplasm research within the National Scab Initiative' AG Day (Midwestern television)