

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

Cover Page

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Year:	FY1999
Grant Number:	59-0790-9-045
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$82,927.00

Project

Program Area	Objective	Requested Amount
Epidemiology	Investigate alternate hosts and moisture effects on inoculum.	\$35,000
Germplasm	Maintain a germplasm Center.	\$50,000
	Requested Total	\$85,000¹

Principle Investigator

Date

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

Project 1: Investigate alternate hosts and moisture effects on inoculum.

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

Several cohesive research areas are planned to address some basic epidemiological questions in scab. These include 1) the role of alternative hosts (i.e. weedy grasses) in inoculum production, 2) effects of soil moisture/wetness on perithecial formation, and 3) ascospore survival and accumulation on plant surface. Research on these areas will provide information toward inoculum management and disease forecasting.

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

Experiments have been initiated in the summer of 1999 and will continue through the fall and winter in the greenhouse, and next growing season in the field. Several field and greenhouse seasons will be required to accomplish the objectives. Experiments on the effects of soil moisture on inoculum production have not been initiated because we encountered difficulties in measuring the levels of moisture/wetness on the top soil layer (within 2 cm), which may have the most impact on perithecial development on plant residues. We are experimenting various types of devices that can be used to collect reliable data on this important variable.

3. What were the reasons established objectives were not met? If applicable.
4. What were the most significant accomplishments this past year?

Preliminary data from greenhouse experiments indicated that the viability of ascospores on plant surface declined following a negative exponential function. Viability maintained stable for a period of approximately 7 days prior to the rapid decline phase.

Project 2: Maintain a germplasm Center.

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

Known sources of resistance to scab (*Fusarium* head blight) in wheat are very limited at the present time. The widespread use of a few resistant sources will create a genetic uniformity of large magnitude that may lead to potential genetic vulnerability to diseases and other biotic or abiotic stresses. Further more, resistance to scab in wheat is partial. Identification of additional sources of resistance and incorporation of these new resistances are critical for enhancing the level of resistance and for diversifying the current resistance gene pool. This project confronts the issue of finding additional or new sources of resistance in spring wheat, maintaining and characterizing the resistance, and facilitating the utilization. Spring wheat germplasm from targeted regions of the world are evaluated under high scab pressure in field nurseries. Selections from the initial field evaluation are re-evaluated through two greenhouse screening cycles to confirm the level and type of resistance. Elite selections will be used as test entries for an elite germplasm nursery evaluated at multiple locations. Introgression of new resistance into adapted germplasm will be achieved by backcrossing into an adapted spring wheat cultivar. Elite selections as well as backcross-derived lines will be made available to other researchers through the National Scab Forum to facilitate prompt incorporation of resistance in various breeding and germplasm improvement efforts.

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

The project is planned as a multi-year project. All phases of the project, i.e. germplasm evaluation, establishment of elite germplasm nursery, and introgression, have been initiated.

3. What were the reasons established objectives were not met? If applicable.
4. What were the most significant accomplishments this past year?

In the 1999 crop season, a total of 1,200 spring wheat accessions, mostly originated from South America, southeastern Europe and eastern Asia, were tested in the field screening nursery. Ninety-four accessions (7.8%) were selected for further evaluation based on visual disease assessment and/or seed score. Selected lines are being grown in the greenhouse for screening cycles in the fall and winter and for crossing with adapted germplasm. Elite selections after greenhouse evaluations will be entered as test entries for the germplasm nursery in 2000 field season. An elite germplasm nursery was established using the elite selections from the 1998 season. This nursery was planted at Brookings, SD. Elite selections were also distributed to other spring wheat breeding programs. Twenty crosses were made to initiate the introgression of resistance using elite selections from the 1998 screening. Progeny evaluation, selection, and backcrossing will be conducted in 2000.

Year: 1999

Progress Report

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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.

None.