

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

Cover Page

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Year:	FY1999
Grant Number:	59-0790-9-056
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$43,902.00

Project

Program Area	Objective	Requested Amount
Germplasm	Maintain a germplasm center.	\$20,000
Variety Development	To enhance variety development of scab resistant varieties.	\$15,000
Variety Development	To screen varieties for scab resistance in a uniform nursery.	\$10,000
	Requested Total	\$45,000¹

Principle Investigator

Date

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

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Progress Report

Project 1: Maintain a germplasm center

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

This grant is to enhance the Fusarium Head Blight (FHB) resistance in the Southeastern U.S. soft red winter wheats. Southeastern breeders, growers, processors, and millers are anxious that proactive measures be taken to try to avoid a repeat of the midwestern experience with FHB. The current popular adapted cultivars and advanced generation breeding lines that have been evaluated with Southeastern isolates of the fungus are generally fully susceptible.

Accessions of cultivated and synthetic hexaploids, ancestral tetraploid, and diploid *Triticum* and *Aegilops* species, together with the more genetically distant *Thinopyrum* and *Lophopyrum* species are being evaluated in greenhouse and field experiments as potentially novel sources of resistance to the FHB fungus.

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

Results from greenhouse screening of almost 400 accessions for Type 2 resistance in 1998-99 found the highest levels of resistance in 13 hexaploids of Chinese, Japanese, Italian, and Serbian origin, plus six synthetics of CIMMYT origin. No resistance was observed in accessions of *T. monococcum*, *T. urartu*, *T. araraticum*, *T. cylindricum*, *T. triunciale*, *T. neglecta*, *Ae. speltoides*, and *Ae. sharonensis*.

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

Not applicable.

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

The identification of cultivated germplasm of diverse origin with Type 2 resistance to Southeastern isolates of the FHB. The dissemination of selfed seed from resistant accessions to five public and private breeding programs in the Southeast. The identification of resistance in synthetic wheats of Durum x *Ae. tauschii* origin may reveal a novel source of FHB resistance transferred from D-genome ancestor. The initiation of a coordinated cultivated hexaploid screening program with Dr. A. McKendry, Univ. of Missouri. Beginning fall 1999 all screenings at N. C. State will be replicated at the Univ. of Missouri. Simultaneous gathering of data at both institutions will result in resistant germplasm being passed on to breeding programs in a more timely fashion. The hiring of Mr. Goran Smic, Master of Science (Nov. 1, 1999) will expand the scope and size of this endeavor.

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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?

This grant is to enhance the development of Fusarium Head Blight- (FHB) resistant cultivars with overall superior agronomic and end-use quality. Southeastern breeders, growers, processors, and millers are anxious that proactive measures be taken to try to avoid a repeat of the midwestern experience with FHB. Current cultivars and advanced generation breeding lines are generally susceptible to the fungus. Identified sources of resistance are of exotic origin--e.g., China, Japan, Eastern Europe, and are inferior for agronomic and end-use quality.

Approximately 100 new cultivar development populations containing 75% or more adapted Southeastern soft red winter wheat germplasm and 25% or less exotic FHB-resistant germplasm will be developed annually. Cultivated, synthetic, and related species accessions identified as resistant to FHB in the germplasm program will be incorporated into the cultivar development program. Typically, these cultivar development populations will be advanced to the F₄ generation in bulk, whereupon derived lines will be developed for evaluation in field nurseries inoculated with the FHB fungus.

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

Over 1200 F_{2:3} lines were selected from nine populations segregating for resistance to FHB in field evaluations in 1998-99. In addition, 59 three-parent populations containing 75% adapted and 25% exotic were developed in greenhouse crossings.

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

Not applicable.

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

The initiation of a cultivar development effort in FHB resistance. We did not receive funding for this program until September 1999; thus, the scope of the effort was limited. The hiring of Mr. Goran Srnic, Master of Science (Nov. 1, 1999) will expand the scope and size of this effort.

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Project 3: To screen varieties for scab resistance in a uniform nursery.

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

This grant is to support the Uniform Southern Soft Red Winter Wheat Fusarium Head Blight (FHB) Nursery. This nursery will enhance breeding activities in the southeastern region designed to produce FHB-resistant cultivars with overall superior agronomic and end-use quality. The nursery will provide southeastern breeders with extensive evaluations of the FHB resistance levels in their advanced generation lines, and facilitate the free exchange of adapted FHB-resistant germplasm between cultivar development programs.

The nursery will be coordinated by Paul Murphy, N. C. State University. Entries (maximum 40) will be solicited annually from all public and private breeding programs in the Southeastern U.S. Coordination of seed distribution, entry designation, data compilation, and dissemination of results will be the responsibility of Paul Murphy.

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

The first Uniform Nursery seed was distributed to nine cooperating public and private programs for planting in fall 1999. The nursery has 20 entries from five different southeastern programs plus two checks.

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

Not applicable.

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

Getting the nursery up and running before grant money had been received and new technician hired.

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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.