

**U.S. Wheat and Barley Scab Initiative  
 FY02 Final Performance Report (approx. May 02 – April 03)  
 July 15, 2003**

**Cover Page**

<b>PI:</b>	<b>J. Paul Murphy</b>
<b>Institution:</b>	<b>North Carolina State University</b>
<b>Address:</b>	<b>Department of Crop Science      Box 7629      Raleigh, NC 27695</b>
<b>E-mail:</b>	<b>njpm@unity.ncsu.edu</b>
<b>Phone:</b>	<b>919-513-0000</b>
<b>Fax:</b>	<b>919-515-5657</b>
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<b>Grant Number:</b>	<b>59-0790-9-056</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>FY02 ARS Award Amount:</b>	<b>\$ 17,058</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>USWBSI Recommended Amount</b>
VDUN	Breeding Fusarium Head Blight Resistant Wheat for the Southeastern United States.	\$17,484
	<b>Total Amount Recommended</b>	<b>\$17,484</b>

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 Principal Investigator

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 Date

## **Project 1: Breeding Fusarium Head Blight Resistant Wheat for the Southeastern United States.**

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

Southeastern U.S. wheat breeders, producers and end-users are anxious that pro-active measures be taken to avoid a repeat of the Northern Soft Winter and Hard Spring Wheat experiences with Fusarium Head Blight (FHB) during the 1990s. Almost all varieties currently grown in the Southeast are very susceptible to FHB. This was vividly demonstrated during spring 2003 when environmental conditions were conducive to FHB development in the Carolinas and Virginia. Fusarium Head Blight is a relatively difficult pathogen with which to conduct applied research and data are subject to relatively large experimental errors. Thus it is imperative that variety developers have a mechanism in place to provide large scale independent evaluation of their advanced generation breeding lines to speed the release of varieties with improved FHB resistance. We are resolving these problems by infusing North Carolina wheat breeding populations with resistance genes from a diverse array of adapted and exotic sources of resistance. We conduct detailed greenhouse and field screening procedures on advanced generation lines and are cooperating with the USDA to use molecular markers to identify early generation lines carrying specific resistance alleles. In order to provide breeding programs with solid, independent data on resistance in advanced generation lines the third Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery was coordinated out of North Carolina State University during the 2002-03 growing season.

### 2. What were the most significant accomplishments?

NC-Neuse, which will be available for commercial production in fall 2003, exhibited good levels of resistance to naturally occurring FHB in nurseries and certified production fields in an unusually heavy FHB epidemic in spring 2003. Controlled environment evaluations had indicated the variety had moderate levels of resistance, but this was the first confirmation of resistance under more widespread production. Successful evaluations of resistance were conducted on 150 lines in the greenhouse and on 590 lines in misted field nurseries inoculated with spore suspensions. Over 21,000 pollinations were made to obtain nine BC<sub>1</sub>F<sub>1</sub> seeds in an interspecific crossing program during summer 2002 to transfer resistance from three accessions of *Triticum monococcum*. Over 50 BC<sub>2</sub>F<sub>1</sub> seed were obtained during winter 2002-03. During the 2002-03 period we made a total of 361 two- and three-way crosses, of which 162 contained FHB-resistant parents of exotic or adapted origins. One hundred ninety F<sub>2</sub> and 67 F<sub>3</sub> populations with similar parentage underwent generation advance. In a cooperative project with the USDA Genotyping Center at Kansas State University, 440 F<sub>3,4</sub> lines underwent simultaneous evaluations in an inoculated field nursery and for the presence of Sumai 3 QTLs governing resistance to FHB. Twenty-eight elite breeding lines submitted by seven public and private breeding programs were distributed to 12 cooperators in ten states. Eleven cooperators returned greenhouse and/or field nursery data, and one cooperator returned SSR genotyping data. These data were summarized in a nursery report distributed to wheat breeders and pathologists in Dec. 2002. The fourth Uniform Nursery was distributed in fall 2002 to 12 public and private cooperators in the United States and three cooperators in Europe.

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.

\*Murphy, J.P., R.A. Navarro and D.A. Van Sanford. 2002. Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Screening Nursery, p. 253. In S.M. Canty et al. (eds.) 2002 National Fusarium Head Blight Forum Proceedings. Michigan State Univ., East Lansing.

\*Murphy, J.P., R.A. Navarro and D.A. Van Sanford. 2002. Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Screening Nursery. Dept. of Crop Science, N.C. State Univ.

Invited presentations:

\*Murphy, J.P. Sources of Fusarium head blight resistance in related species of common wheat. Workshop on Fusarium Head Blight Resistance in Common Wheat, 12-13 Sept. 2002, Univ. of Minnesota, St. Paul.