

**U.S. Wheat and Barley Scab Initiative
 FY01 Final Performance Report (approx. May 01 – April 02)
 July 15, 2002**

Cover Page

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| Year: | FY2001 (approx. May 01 – April 02) |
| Grant Number: | 59-0790-9-056 |
| Grant Title: | Fusarium Head Blight Research |
| FY01 ARS Award Amount: | \$ 27,531 |

Project

| Program Area | Project Title | Requested Amount |
|---------------------|---|-------------------------|
| Variety/Uniform | Development of Fusarium head blight-resistant wheat varieties in North Carolina | \$ 10,743 |
| Variety/Uniform | The 2001-02 Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery | \$ 17,538 |
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| | Total Amount Requested | \$ 28,281 |

Principal Investigator

Date

Project 1: Development of Fusarium head blight-resistant wheat varieties in North Carolina

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. The problem that is being resolved is to infuse North Carolina wheat breeding populations with resistance genes from a diverse array of adapted and exotic sources to increase the overall levels of FHB resistance in Southeastern varieties. The populations are advanced to the F₃ generation when they undergo selection in field nurseries inoculated with scabby corn and spore suspensions under a mist irrigation system. During the 2000-01 period we made a total of 413 two- and three-way crosses, of which 208 (50%) contained FHB-resistant parents of exotic or adapted origins. Fifty F₂ and 16 F₃ populations with similar parentage underwent generation advance. A severe freeze at head emergence in 2001 precluded our obtaining FHB data on field nurseries of F₃-, F₄-, and F₅-derived lines. Materials were saved for evaluation in 2002.

2. What were the most significant accomplishments?

The most significant accomplishment is that we are now operating at the 'critical mass' necessary for a reasonable probability of success in developing FHB-resistant varieties. FHB resistance from Chinese, CIMMYT, Italian, Serbian and U.S. materials has been incorporated into breeding populations adapted to the southeastern U.S. Field and greenhouse evaluations of NC96-13156 (NC-Neuse) undergoing release were identified as partially resistant to FHB. All entries in our advanced test were evaluated in an inoculated field nursery for the first time. Three accessions of *Triticum monococcum* expressed excellent Type 2 resistance in second year of greenhouse testing, suggesting that they may serve as a new source of FHB resistance.

Project 2: The 2001-02 Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery

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

Southeastern U.S. wheat breeders, producers and millers 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 of the current varieties adapted to the Southeast are very susceptible. There is little or no information available to breeders with respect to levels of FHB resistance in their elite, advanced generation breeding lines which would assist them in releasing varieties to growers with improved levels of FHB resistance. To resolve this situation, the Second Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery was coordinated out of North Carolina State University during the 2001-02 growing season. Twenty-seven elite breeding lines and varieties submitted by seven public and private breeding programs were distributed to 11 cooperators in nine states. Six cooperators returned greenhouse and/or field nursery data. These data were summarized in a nursery report which was distributed to wheat breeders and pathologists in Dec. 2001. The third Uniform Nursery was distributed in fall 2001 to 11 public and private cooperators. The number of entries increased to 28 breeding lines and varieties. Data will be summarized and distributed in fall 2002.

2. What were the most significant accomplishments?

The number of cooperators providing data increased from six to seven this year reflecting the growing familiarity of the researchers working with the fungus in greenhouse and field nurseries. Significant variation was observed in both greenhouse and field nursery estimates of resistance to FHB among the nursery entries. For example, 12 entries were equal to the resistant check 'Ernie' for Type 2 resistance in greenhouse evaluations. Fifteen entries were equal to Ernie for FHB index and percent scabby seed measurements taken in field environments. The nursery report provided southeastern breeders with a comprehensive set of solid data on the performance of their elite breeding materials in the presence of FHB epidemics. For the third nursery distributed in fall 2001, we had an increase in number of entries, most notably the number of entries containing resistant Chinese lines in their pedigrees.

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.

McKendry, A. L., J. P. Murphy, K. Bestgen, R. Navarro, and M. O'Day. 2001. Resistance to Fusarium Head Blight in accessions from The Balkans: A progress report, pp. 194-197. *In* S. M. Canty, J. Lewis, L. Siler, and R. W. Ward (eds.) 2001 National Fusarium Head Blight Forum Proceedings. U.S. Wheat and Barley Scab Initiative, Michigan State University, East Lansing.

Murphy, J. P., and R. A. Navarro. 2001. Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Screening Nursery. Dept. of Crop Science, N. C. State Univ., Raleigh.

Navarro, R. A., and J. P. Murphy. 2001. Fusarium Head Blight Resistance in fall-sown triticale, pp. 199-202. *In* S. M. Canty, J. Lewis, L. Siler, and R. W. Ward (eds.) 2001 National Fusarium Head Blight Forum Proceedings. U.S. Wheat and Barley Scab Initiative, Michigan State University, East Lansing.