PI: J. Paul Murphy **PI's E-mail: Paul_Murphy@ncsu.edu**

Project ID: 0405-MU-032 **FY03 ARS Agreement #: 59-0790-9-056**

Research Area: **GIE** **Duration of Award: 1 Year**

Project Title: Evaluation of Diploid Wheat Relatives and Intergeneric Hybrids for Fusarium Head Blight Resistance.

PROJECT 1 ABSTRACT
(1 Page Limit)

Because the best known sources of resistance to Fusarium head blight are characterized as partial rather than complete, it is logical to try to pyramid resistance alleles from an array of cultivated wheats and their relatives to develop higher levels of resistance. The goal of this research is to find potentially novel sources of Fusarium head blight resistance in selected A and D genome diploid wheat relatives and in winter-type accessions of the Sando intergeneric hybrid germplasm collection. Two hundred seventy accessions of *Triticum monococcum* sp. *monococcum* (A^MA^M), *T. monococcum* sp. *aegilopoides* (A^MA^M), *Aegilops tauschii* (DD) and intergeneric hybrids between *Triticum aestivum* and *Lophopyrum elongatum* are undergoing evaluation for Type II resistance in greenhouse evaluations at North Carolina State University. The diploid accessions were selected primarily from regions in Turkey and Iran where Fusarium head blight is recorded as being a constraint to wheat production. Approximately one-half of these accessions will undergo a second cycle of evaluations in 2004-05 to confirm the results of the current evaluations. Data will be shared with other researchers by posting results on the USWBSI web page. This proposed objective is related to the USWBSI goal of developing, as quickly as possible, control measures that minimize the threat of Fusarium head blight (scab) to the producers, processors and consumers of wheat.

PI: J. Paul Murphy **PI's E-mail: Paul_Murphy@ncsu.edu**

Project ID: 0405-MU-003 **FY03 ARS Agreement #: 59-0790-9-056**

Research Area: **VDUN** **Duration of Award: 1 Year**

Project Title: Development of Fusarium Head Blight-Resistant Wheat for the Southeastern United States.

PROJECT 2 ABSTRACT
(1 Page Limit)

The Fusarium Head Blight (FHB) epidemic of 2002-03 left one-half of the North Carolina wheat crop unsuitable for human consumption. The goal of this research is to develop varieties of soft red winter wheat with enhanced FHB resistance for the Southeastern United States. The focus of the research at N. C. State will be twofold: a) to develop cultivars adapted to North Carolina, the largest wheat-growing state in the region, and b) to facilitate development of cultivars adapted throughout the region by coordinating the 2004-05 Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery. During the 2004-05 season the North Carolina program will contain breeding populations segregating for FHB resistance in the F_1 to F_8 generations. The pedigrees of the populations will contain over 50 different exotic and adapted parents exhibiting partial to high levels of FHB resistance. Approximately 282 bulk populations in the F_2 and F_3 generation will undergo generation advance and we will utilize an inoculation protocol combined with travelling overhead irrigation on the F_3 nursery. Individual heads exhibiting Type 1 and Type 2 resistance will be tagged prior to senescence. Approximately 14,000 $F_{3:4}$ and $F_{4:5}$ headrows will undergo selection for plant height, maturity, powdery mildew, leaf rust, Septoria, BYDV and perhaps Hessian fly resistance. $F_{5:6}$ headrows will be evaluated in a mist-irrigated nursery and inoculated with a spore suspension at heading. Selection will be imposed for maturity, plant height, leaf and head fungal diseases. Eight heads will be harvested per F_4 and F_5 headrow and all plants will be harvested in selected F_6 headrows. Kernel quality will be evaluated on all selected plants. The USDA-ARS Genotyping Center should be functional at Raleigh by the 2004-05 season. Seed of $F_{5:6}$ lines containing Sumai 3 or one of its derivatives in their pedigrees will be evaluated for SSR markers linked to major resistance QTLs. Marker analysis data will be available prior to field selection in spring 2005. A Uniform Soft Red Winter Wheat FHB Screening Nursery for the 2004-05 season will be coordinated from N.C. State University. All FHB researchers will be entitled to enter materials and/or evaluate the nursery. Data will be returned to N.C. State, summarized and distributed to interested parties in a timely fashion. This project will provide breeders with critical information in a comprehensive, rapid and efficient manner to aid release of FHB-resistant varieties for southeastern producers. An added benefit will be the free exchange of breeding lines between variety development programs. These proposed objectives are related to the USWBSI goal of developing, as quickly as possible, control measures that minimize the threat of Fusarium Head Blight (scab) to the producers, processors, and consumers of wheat.