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

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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 50% of the North Carolina wheat crop unsuitable for human consumption. Between 33 and 80% of the growers in the top ten wheat producing counties were affected, yields were reduced by 30 to 100% and DON levels as high as 10 ppm were recorded. 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: 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 2005-06 Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery. During the 2005-06 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 80 different exotic and adapted parents exhibiting partial to high levels of FHB resistance. Approximately 400 bulk populations in the F_2 and F_3 generation will undergo generation advance. Approximately 24,000 $F_{3:4}$ and $F_{4:5}$ headrows will undergo selection for plant height, maturity, powdery mildew, leaf rust, Stagonospora, BYDV and perhaps Hessian fly resistance. A field mist irrigation system will be sufficient for 80 head row trays. Approximately 25 trays will be required for the Uniform Southern FHB Nursery, Observation, Preliminary and Advanced generation trials. The remaining 55 trays will accommodate selected $F_{3:4,}$ $F_{4:5,}$ $F_{5:6}$ populations. We will conduct marker assisted selection on three-way F_1 plants, $F_{3:4}$, $F_{4:5}$ and $F_{5:6}$ lines based on pedigrees for which published markers are available. For example, we will screen *Qfhs.ndsu-3BS* and perhaps *Qfhs.ifa-5A.* With the rapidly changing information on markers / FHB it is difficult to describe exactly what loci will be tracked even one year from now, but we are planning to obtain 3-4,000 SSR data points in our own laboratory. A Uniform Soft Red Winter Wheat FHB Screening Nursery for the 2005-06 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.