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

Project ID: FY07-MU-041 **FY06 ARS Agreement #: 59-0790-4-117**

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 objectives of this research are : 1) to meet the demands of North Carolina producers and end-users for wheat varieties of superior agronomic and end-use quality that exhibit enhanced FHB resistance, 2) to meet the demands of North Carolina producers and end-users for scientifically based information concerning the FHB resistance of the wheat varieties being sold in the state, and 3) to provide southeastern soft red winter wheat breeders in both the public and private sectors with a comprehensive evaluation of FHB resistance levels in their elite, advanced generation breeding lines in a rapid and efficient manner. The research is directed to the overall USWBSI goal of developing, as quickly as possible, effective control measures that minimize the threat of FHB in the wheat community. The research is directed to three specific VDUN Research Priorities for FY07: 1) breeding and release of FHB-resistant wheat varieties and germplasm that are adapted to FHB-threatened states; 2) multi-location validation of FHB resistance through participation in the southern uniform FHB screening nursery; and 3) providing growers with accurate FHB ratings of current varieties. Our approach is enrichment of targeted populations of three-way F_1's, and F_2 bulks using marker assisted selection combined with extensive phenotypic evaluation in later generations when heritabilities are greater and more seed is available. Twenty F_2 and 15 three-way F_1 populations will undergo marker assisted selection. Selection will concentrate on *Fhb1* and *Qfhs.ifa-5A* but additional loci will be targeted if appropriate. Obviously not all populations segregating for FHB resistance can undergo enrichment. In total, approximately 500 bulk populations in the F_2 and F_3 generations will undergo generation advance. Approximately 28,000 $F_{3:4}$ and $F_{4:5}$ lines will undergo selection for plant height, maturity, powdery mildew, leaf rust, Stagonospora, BYDV and perhaps Hessian fly resistance. A mist-irrigated nursery inoculated with a spore suspension at heading will evaluate entries in our Preliminary, Advanced and NC Official Variety Tests in addition to the Uniform Southern FHB nursery. The remaining space will accommodate selected $F_{3:4,}$ and $F_{4:5,}$ populations. Increased emphasis will be placed on DON evaluations in Preliminary, as well as Advanced generation tests. A Uniform Soft Red Winter Wheat FHB Screening Nursery for the 2007-08 season will be coordinated from N.C. State University. Data will be returned to N.C. State, summarized and distributed to interested parties in a timely fashion. An added benefit will be the free exchange of breeding lines between variety development programs. During the 2007-08 season BC_2F_2 plants segregating for the LDN(Dic-3A) resistance in a soft red winter background will undergo MAS and generation advance in the greenhouse. In a similar program to introgress the Frontana Type I resistance on 3A, BC_2F_2 plants will undergo MAS and generation advance in the greenhouse The N.C. State program will continue to deliver agronomically desirable advanced generation lines with enhanced FHB resistance. Some of these lines will be cultivar release quality.