

PI: Murphy, J. Paul**PI's E-mail: Paul_Murphy@ncsu.edu****Project ID: FY08-MU-071****FY08 ARS Agreement #: 59-0790-4-117****Research Category: VDHR-SWW****Duration of Award: 1 Year****Project Title: Enhancement of Fusarium Head Blight Resistance in the Southeastern US Germplasm Pool.****PROJECT 1 ABSTRACT**

(1 Page Limit)

The Southern Uniform Winter Wheat Scab Nursery provides breeders in the public and private sectors with an opportunity for multi-environment, independent evaluations of FHB resistance in advanced generation breeding lines compared with the current most resistant check varieties Ernie and Bess. The information provided by the nursery is critical to making informed variety release decisions and nursery protocol permits the utilization of any nursery entry as parents in the development of breeding populations by cooperators. During the 2008-10 seasons the North Carolina program will contain F_1 , BC_1 and BC_2 , three- and four-way breeding populations segregating for FHB resistance in the F_1 to F_{12} generations. The pedigrees of the populations will contain many different exotic and adapted parents exhibiting partial to high levels of FHB resistance, and numerous superior soft red winter wheat cultivars and breeding lines used as sources of disease, insect, yield and end-use quality alleles. 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. Our one-acre field mist irrigation system is capable of including 60 head row trays. Approximately 27 trays will be required for the Uniform Southern FHB Nursery, Preliminary, Advanced, and NC-Official Variety Trials. The remaining 33 trays will accommodate selected $F_{3;4}$, and $F_{4;5}$, populations. Sixty $BC_2F_{2;3}$ lines selected for the presence / absence of *Qfhs.ndsu-3AS* in an NC-Neuse background using the SSR marker *Xgwm2* will undergo field and greenhouse testing for components of FHB resistance starting fall, 2008. $BC_2F_{2;3}$ lines selected for the presence of Frontana marker alleles at loci on 3A will undergo field testing for Type 1 resistance beginning fall 2008. A geographically diverse array of 15 accessions that do not contain *Fhb1* served as donor parents in a pre-breeding program. None of these accessions have been included in published haplotyping studies but recent in-house haplotype evaluations found three accessions contain the 'Maringa' allele at 3BSc, one has the 'Wuhan' allele at 4B, and three have the Sumai 3 allele at 6B. The goal of this research is parental germplasm adapted to the southeastern U.S. with unique resistance to FHB. In addition we are using winter-type accessions of the Sando intergeneric hybrid germplasm collection. In fall 2008, the materials from these pre-breeding efforts will be in $BC_1F_{3;4}$, $BC_1F_{4;5}$, $BC_2F_{2;3}$, and $BC_2F_{4;5}$ generations. All materials at that stage will have undergone several inoculated greenhouse and field evaluations for FHB resistance in comparisons with the susceptible recurrent parent. They will undergo further evaluation in a misted nursery in 2008-09 and 2009-10. Selected F_1 hybrids produced from moderately resistant parents with native resistance such as NC-Neuse, Roane, Bess, and adapted lines containing exotic sources of resistance such as *Fhb1*, *Qhhs.ifa-5A*, and *Qfhs.ndsu-3AS* will be entered in a doubled haploid program.