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Research Category: VDHR-SWW

Duration of Award: 1 Year

Project Title: Enhancement of Fusarium Head Blight Resistance in the Southeastern U.S. Germplasm.

PROJECT 1 ABSTRACT

(1 Page Limit)

The objectives of this project are 1) increased acreage planted to varieties with improved FHB resistance and low DON, 2) Increased efficiency of Coordinated Project breeding programs to develop and release FHB resistant varieties, and 3) Develop new breeding technologies and germplasm and introgress effective resistance genes. The Southern Uniform Winter Wheat Scab Nursery provides breeders in the public and private sectors with an opportunity for multienvironment, independent evaluations of FHB resistance in advanced generation breeding lines compared with the current resistant check varieties Ernie, Bess and Jamestown. 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. Over 95 percent of our variety development breeding populations result from crosses between one or more parents exhibiting partial to high levels of resistance to FHB. Typical FHB sources include in-house advanced generation lines containing Fhb1, Qfhs.ndsu-3AS, Qhhs.ifa-5A, and 'Frontana' 3A and 5A alleles. More emphasis is being placed on parents with 'native' resistance, particularly lines from the MO, IL, VA and NC programs. Approximately 550 F2 and F3 bulks (combined) will be advanced in both seasons utilizing mass selection. Approximately 35,000 headrows in the F4, F5 and F6 generations (combined) will be advanced each season using the pedigree method. Our current misted/inoculated nursery contains 3200 headrows. Our approach is enrichment of targeted populations of three-way F1's, and F2 bulks using marker assisted selection combined with extensive phenotypic evaluation in later generations when heritabilities are greater and more seed is available. In addition to the Uniform Southern FHB Nursery, we will evaluate the seven state Gulf-Atlantic Nursery in our misted/inoculated nursery. We will evaluate important released varieties (50 plus) entered in the annual NC Official Variety Testing (OVT) program. Results from the OVT will be posted on the NC Small Grains Production website: We will share all cultivar development doubled haploid lines with whomever wishes to evaluate them, without delay or prior to any selection in North Carolina. In fall 2010, the 135 doubled haploid lines in each of the two populations NC-Neuse / Bess and MD01W233-06-1 / SS8641 will be available for distribution. Additional DH lines with the following pedigrees will be available for distribution in fall 2010: NC05-21937(Fhb1) / GA991209-6E32; NC05-21937(Fhb1) / NC-Yadkin, and NC03-11458 (Fhb1) / Bess // SS8641. We will enter five to eight populations into the DH process per year. One hundred sixty plus F5:6 lines from the cross NC-Neuse / AGS2000 will be evaluated for components of FHB resistance in 2010-11 and 2011-12 in field tests in North Carolina utilizing an inoculated/misted nursery. The population will undergo DArT analysis. During 2010-11 we will cooperate with the Virginia Tech program in evaluating a population designed to map native resistance in the cultivar Tribute, and with the Maryland program to map native resistance in MD01W233-06-1.