

**PI: Griffey, Carl A.****Project ID: 0304-GR-045****Research Area: BIO****Project Title: Development & Evaluation of FHB Resistant Near-isogenic Lines using Marker Assisted Selection.****PI's E-mail: cgriffey@vt.edu****ARS Agreement #: 59-0790-9-038****Duration of Award: 1 Year****PROJECT 1 ABSTRACT**

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The overall goal of the proposed research is to evaluate the effectiveness of using DNA markers linked with genes governing Fusarium Head Blight (FHB) resistance in a marker-assisted selection (MAS) program to accelerate development of resistant wheat varieties and germplasm. In the proposed study, MAS will be used in the development and evaluation of FHB resistant near-isogenic lines (NILs). Two donor parents (DP) W14 and Futai8944 were crossed with two recurrent parents (RP) Roane and Ernie, respectively and the F<sub>1</sub> plants were then backcrossed to their respective RP. In three subsequent crossing cycles, FHB resistant BC<sub>n</sub>F<sub>1</sub> plants, selected on the basis of Type II reaction via single floret inoculation in greenhouse tests, were backcrossed to their respective RP from which four BC<sub>4</sub>F<sub>1</sub> populations were ultimately obtained. From these four populations, 40 BC<sub>4</sub>F<sub>1</sub> plants were genotyped with 8 SSRs associated with FHB resistance at three target QTL regions on chromosomes 2BS, 3BS and 5AL in a preliminary study during summer 2002. Nineteen BC<sub>4</sub>F<sub>1</sub> plants were identified as having target marker loci, while 21 plants lacked target marker loci. These BC<sub>4</sub>F<sub>1</sub> plants will be evaluated for Type II resistance and self pollinated to produce BC<sub>4</sub>F<sub>2</sub> progeny during winter 2002. Beginning spring 2003, up to 800 BC<sub>4</sub>F<sub>2</sub> plants (20 from each of the 40 BC<sub>4</sub>F<sub>1</sub>) will be genotyped to identify plants that are homozygous for DP alleles at the target markers as well as possible recombinants within each target region. These plants also will be genotyped for markers that are polymorphic between DP and RP to estimate the proportion of DP genome remaining in the non-target regions of each BC<sub>4</sub>F<sub>2</sub>. Selected BC<sub>4</sub>F<sub>2</sub> plants, that are similar to the RP except for the introgressed target QTL regions, will be advanced to BC<sub>4</sub>F<sub>3</sub> generation. Selected BC<sub>4</sub>F<sub>3</sub> NILs will be genotyped for markers at target QTLs and characterized for Type II resistance in winter 2003 greenhouse tests. These BC<sub>4</sub>F<sub>3</sub> lines simultaneously will be evaluated in an inoculated field nursery for FHB resistance and agronomic similarity to their respective recurrent parent in spring 2004. Near-isogenic FHB resistant wheat genotypes derived from these populations will provide breeding programs with adapted Type II resistant parents that can be used in incorporating and pyramiding scab resistance genes to develop superior scab resistant varieties, and will also provide genetic materials for applying fine structure mapping and map-based cloning.