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Research Area: **HGR** **Duration of Award: 1 Year**

Project Title: FHB Resistance in Hard Red Spring Wheat Near-Isogenic Lines.

PROJECT 3 ABSTRACT

(1 Page Limit)

In many instances presumptive novel Fusarium head blight (FHB) resistance quantitative trait loci (QTLs) have been mapped in a diverse range of common wheat (*Triticum aestivum*) genotypes and related species, but have not yet been introgressed into U.S. hard red spring wheat (HRSW). In 2001, we initiated a project with two overall goals. The first overall goal was to validate the effect of novel FHB resistance genes from diverse germplasm sources in HRSW backgrounds, and simultaneously develop adapted HRSW containing these genes (pre-breeding). This was done by marker-assisted backcrossing of several reported scab resistance QTLs into different FHB-susceptible HRSW backgrounds. The initial QTLs selected included two reference QTLs from Sumai 3 (on chromosome arms 3BS and 5AS), and three novel QTLs - one from the soft red winter wheat Freedom (chromosome arm 2AS), one from the Brazilian wheat Frontana (chromosome arm 3AL), and one from wild emmer, *T. dicoccoides* (chromosome arm 3AS). By developing near-isogenic lines (NILs) series that contain each of these QTLs, we could validate individual QTL effects. This has been completed for the first three QTLs introgressed, and the last two QTLs are being evaluated this funding cycle. The second overall goal is to evaluate the effect of gene pyramids with the FHB resistance QTLs that were introgressed and that we find are functional in reducing FHB symptoms.

The objectives of this project proposal are 1) to evaluate the effect of gene pyramids among the first three introgressed QTLs (*Qfhs.ndsu-3BS, Qfhs.ifa-5A*, Freedom 2A) that we found reduce FHB symptoms in HRSW; and 2) to develop new gene pyramids involving the last two FHB resistance QTLs (*Qfhs.ndsu-3A*, Frontana 3A) that we have introgressed. To accomplish these goals, populations developed during the current funding cycle (FY 06) will be used to develop lines with gene pyramids for evaluating FHB resistance effects as specified in Objective 1. Objective 2 will be accomplished by including in gene pyramiding crosses lines with the two new QTLs that we are evaluating/validating this FY (06). These crosses will start near the beginning of the FY 07 funding cycle.

The specific objectives outlined for this proposal as well as the entire overall project, are directly relevant to the goals of the FY 07 USWBSI HGR Research Priority "generation of unique and adapted parental germplasm (pre-breeding)". This includes the introgression of unique and effective FHB resistance genes, pyramiding of unique and/or known genes into adapted lines suitable for direct use as parents in cultivar development programs, introgression of validated unique FHB resistance genes not previously deployed in adapted parental lines using molecular breeding (where markers are available) methods, and pyramiding of complementary FHB resistance genes into adapted parental lines via marker assisted selection (MAS).