PI: Garvin, David F. **PI's E-mail: david.garvin@ars.usda.gov**

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Project Title: Tagging a New FHB Resistance QTL for Spring Wheat and Evaluating New FHB-Resistant Germplasm.

PROJECT 1 ABSTRACT

(1 Page Limit)

The hard red spring wheat region has suffered the greatest economic losses to Fusarium head blight (FHB) in the U.S., and improved FHB resistance is desperately needed to reduce these losses. 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 to validate the effect of novel FHB resistance genes from diverse germplasm sources in HRSW backgrounds, while simultaneously developing prebreeding resources for the spring whet breeding community. This was completed by marker-assisted backcross introgression of several reported scab resistance QTLs into different FHB-susceptible HRSW backgrounds. One source of FHB resistance was the soft red winter wheat Freedom. We have obtained advanced backcross HRSW lines in the genetic background of the cultivar Norm that exhibit significantly improved FHB resistance that derives from genes contributed by Freedom. However, the presumed single QTL conferring this resistance is not associated with a region on chromosome 2A previously reported to possess a major QTL. Thus, there is no efficient way to deploy it into breeding germplasm. The first goal of this project is to develop molecular markers for this Freedom-derived FHB resistance QTL, using as primary mapping populations one derived from a cross between Norm and a Norm near-isogenic line that exhibits FHB resistance from Freedom, and a comparable population in the wheat cv Apogee.

Extensive efforts have been directed at identifying wheat germplasm with resistance to scab that can be used as parents for the development of new commercially acceptable cultivars with enhanced scab resistance. For over a decade, a Uniform Regional Nursery to screen spring wheat parents for scab resistance has sought to address this issue by evaluating scab resistance in advanced spring wheat germplasm at several locations throughout the midwestern United States and Southern Canada. A second goal of this project will be to coordinate a multisite evaluation of wheat germplasm for the spring wheat region in 2009. This will be the fourteenth year that this nursery has been grown. Project objectives of the coordinator of this nursery are to oversee the logistics of organizing the nursery, in the early spring; to obtain, collate and analyze data associated with scab resistance that is gathered at each nursery location; and to produce an annual nursery report that is freely distributed to participants and other interested parties. By providing scientists an opportunity to evaluate the nursery entries at their own locations and to compare these results to those obtained at other locations, this nursery has proven to be valuable for identifying new scab resistant germplasm and its subsequent exchange among participants for use in breeding programs.