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Project Title: Development of Spring Wheat Varieties with FHB Resistance using DNA Markers and Retrospective Breeding.

PROJECT 1 ABSTRACT

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Wheat varieties with greater resistance to *Fusarium* head blight (FHB) would make a substantial contribution to reducing the losses from this devastating disease. Given i) the ongoing need for FHB resistant wheat varieties; ii) the current knowledge regarding the inheritance of FHB resistance and the number of quantitative trait loci (QTLs) that have been tagged with markers; and iii) the establishment of the USDA-ARS Small Grains Genotyping Centers, now is the time to employ our expertise and resources to address this issue. The objectives of this proposal are to:

- 1) Develop *Fusarium* head blight resistant wheat varieties adapted for commercial production in Minnesota and the surrounding region using DNA markers to enrich selected populations for their frequency of major FHB QTLs.
- 2) Characterize the relative FHB resistance of different combinations of FHB QTLs.

This proposal will utilize retrospective breeding to identify populations likely to produce variety candidates and contain multiple FHB QTLs. These populations will be enriched for FHB QTLs by selecting for linked DNA markers in the F₂ and F₃ generations. Enriched populations will be larger than normal breeding populations and undergo phenotypic selection for FHB resistance, and other yield, disease resistance, and end-quality use testing necessary to produce variety candidates. Twenty new F₂ populations per year will be entered into this marker-enrichment program. Three FHB nurseries per year will be utilized in order to speed the identification of the most FHB resistant lines that are suitable variety release candidates.