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PROJECT 2 ABSTRACT
(1 Page Limit)

Fusarium head blight (FHB) significantly reduced yield and quality of wheat grain. Growing resistant cultivars is the most effective strategy to control the disease. Many Asian sources of resistance have been reported, but they are not present in any U.S. HWW cultivars grown in the Great Plains. Several moderately resistant lines have been reported from hard winter wheat, but markers are not available for marker-assisted pyramiding of these genes with others. Developing high-throughput next generation markers for these QTLs will improve breeding selection efficiency. Our objectives in this proposal are to 1) identify QTL and linked SNP markers in US native HWW cultivars Overland and Lyman; 2) use marker-assisted backcross (MAB) to pyramid *Fhb1* and *Fhb3* in US HWW backgrounds; 3) continue the *Fhb1* MAB project and screen markers in double haploid plants generated from backcross project; 4) develop a set of SNP markers for previously mapped QTLs using high- throughput SNP platform such as Sequenom MassArray or Ion Proton for MAS. Simple sequence repeat (SSR) and SNP markers will be used for MAS coupled with phenotypic selection in Tristate FHB Nurseries to transfer resistance QTLs into elite hard winter wheat backgrounds. DNA markers will be analyzed using genotyping-by-sequencing and ABI 3730 DNA sequencer. Repeated FHB evaluation of these mapping and breeding populations will be conducted in both greenhouse and Tri-state FHB Nurseries, which is a major component of the Coordinated Project. Breeders in the Coordinated Project will use the materials developed from MAB project freely in their breeding crosses or select for new cultivars as they need. This objective uses MAB to speed up the breeding process as described in Goals #2 and #3 of VDHR Action Plan. New QTL identified from this project using new technology will be directly used to enhance resistance levels of HWW and also be released to public for use in other breeding programs through publications. Identification of new QTL and markers for effective use of FHB resistance meets Goals #4 of VDHR Action Plan.