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Project Title: Molecular Mapping and Pyramiding of New Scab Resistance Genes.

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB or scab) is one of the most destructive diseases of wheat causing significant reductions in grain yield and quality. Deployment of resistant varieties is an effective, economical and environmentally safe way to control FHB in wheat. To date most FHB resistant spring wheat lines trace back to the Chinese line 'Sumai-3 or its derivatives', most of which share the same QTL's. One of the main goals in breeding for resistance to FHB is to explore resistance genes from other sources, which will enhance genetic diversity of the resistance genes and facilitate pyramiding of resistance genes from different sources with the ultimate objective of developing effective and durable FHB resistant varieties. Marker assisted selection for FHB resistance is an efficient tool that can accelerate selection, germplasm development and release of wheat varieties with durable resistance to FHB. Recently, released HRSW variety "Steele-ND" shows high resistance to FHB. A RIL population comprising 212 F2:7 lines involving the newly developed Hard Red Spring Wheat (HRSW) cultivar Steele-ND and ND 735 were developed by breeding program for the purpose to map the genes involved in the resistance of Steele-ND. The pedigree and preliminary molecular studies indicate that the FHB resistance of Steele-ND is different to 'Sumai3 or its derivative'. The objectives of this proposal are to:

- i) **characterize quantitative trait loci (QTL) for FHB resistance from Steele-ND, a newly released variety possessing FHB resistance unrelated to 'Sumai3 or its derivatives' and**
- ii) **pyramiding genes for FHB resistance by combining the resistance of Steele-ND and other sources of resistance.**

Besides looking for new markers we will use existing markers in addition to the information on wheat EST's being generated by the NSF funded wheat genomic project to identify and develop 'breeder friendly' markers to map the resistance of Steele-ND. Crosses between Steele-ND and other sources of resistance to FHB have been initiated and advanced generations of these crosses will be evaluated for FHB resistance in greenhouse and field FHB nurseries. Selected FHB lines will be screened with various molecular markers that map to different FHB resistance genes to confirm that multiple resistance genes occur in selected lines. The information from this project will be used to develop markers linked to resistance QTL's from Steele-ND to fasten the process of selection for FHB resistance. Markers may represent the only mean by which pyramiding resistance genes from different sources can be achieved in order to develop durable FHB resistant wheat varieties.