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Project Title: Improve Fusarium Head Blight Resistance of Hard Winter Wheat through Marker-assisted Selection.

PROJECT 2 ABSTRACT
(1 Page Limit)

Epidemics of Fusarium head blight (FHB) can significantly reduce wheat grain yield and quality. Breeding resistant cultivars is the most effective measure to control the disease. FHB epidemics have been severe in Central and Northern Great Plains, but hard winter wheat curtivrs currently grown in this area are highly susceptible to FHB. Because large environmental variation associates with disease evaluation and the disease screening procedure is laborious, progress in breeding for resistant hard winter wheat cultivars has been slow with conventional methods. Due to urgent need of FHB resistance in Great Plains areas, we propose to initiate a pilot project to speed up the processes of deploying Chinese FHB resistance QTLs into hard winter wheat in these regions by use of USDA high throughput genotyping facility. Resistance QTL on chromosomes 3BS and 5AS of Sumai 3 or its relatives will be transferred into adapted hard winter wheat cultivars from Great Plains areas by direct marker-assisted backcross and marker-assisted background screening. This will be a collaborative project between the USDA Genotyping Center in Manhattan and three public wheat-breeding programs in Nebraska, Kansas and South Dakota. Breeding programs provide initial backcross populations segregating for the target QTLs and be responsible for field selection for disease resistance and other important agronomic traits, while the Genotyping Center will be responsible for screening these breeding populations with flanking simple sequence repeats (SSRs) markers for the target QTL and a set of background markers from recurrent parents, and further backcross with selected plants. Our objective is to use the high throughput marker technology to shorten breeding selection process and combine these QTL with locally adapted minor FHB resistance QTL to develop marketable FHB resistant hard winter wheat cultivars and useful germplasm. The outputs of this research will facilitate marker-assisted breeding to minimize FHB damage and lead to quick release of hard winter wheat germplasm and cultivars with FHB resistance in Great Plains. These will lead to *developing as quickly as possible effective control measures that minimize the threat of FHB to the producers, processors, and consumers of wheat* as proposed by USWBSI.