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Project ID: FY14-HW-001

ARS Agreement #: NA

Research Category: HWW-CP

Duration of Award: 1 Year

Project Title: Doubled Haploidy to Rapidly Develop FHB Tolerant, Low DON Wheat Cultivars.

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) has been more frequent and severe in hard winter wheat (HWW) region of the Great Plains. However, most of HWW cultivars grown in the Great Plains are highly susceptible. Transferring major QTL into adopted hard winter wheat will minimize losses caused by FHB epidemics. Previously, marker-assisted backcross has been used to transfer *Fhb1*, a QTL with the largest effect on FHB resistance identified from China, into adapted US HWW cultivars. Because only *Fhb1* was selected using markers, other genes in the backgrounds are still segregating and it takes several years of selection before the selected plants become homozygous for most genes in the backgrounds. Double haploid can quickly fix the background genes and generate homozygous plants in a year, which significantly speeds up the breeding process and shortens the breeding cycle. Our objectives in this proposal are to 1) transfer Asian FHB-resistant QTL into 10 new elite hard winter wheat lines or cultivars from ND, SD, KS, OK and NE through marker-assisted backcross (MSB); 2) use chromosome doubling technique to quickly generate homozygous plants with target FHB resistance QTL from the backcross progenies carrying heterozygous target QTL; 3) use markers to remove haploid plants that have no target QTL; and 4) increase enough DH seeds in both greenhouse and winter nursery to be distributed to all breeding programs. DNA markers will be analyzed using ABI 3730 DNA sequencer. Selected double haploid lines (1000) with target QTL, but different agronomic traits, will be released to breeding programs for further selection and tested for FHB resistance in both greenhouse and Tri-state FHB Field Nurseries. This objective uses double haploid technique to speed up the breeding process as described in Goals #2 and #3 of VDHR Action Plan.