FY16 USWBSI PROJECT ABSTRACT

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Project ID: FY16-HW-001 **ARS Agreement #: 59-0200-3-006**

Research Category: **HWW-CP** **Duration of Award: 1 Year**

Project Title: Development of Winter-hardy HRWW Lines with Pyramided QTL for FHB Resistance.

PROJECT 1 ABSTRACT

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In wheat, economic losses from FHB infection are due to blighted kernels, reduced test weight and the accumulation of deoxynivalenol (DON). Host resistance can help to reduce these disease symptoms, particularly when integrated with cultural and chemical control strategies. However, breeding for resistance to FHB is complex as resistance genes provide only partial protection while phenotypic selection can be challenging, especially in the early generations.

At NDSU, available and suitably cold-hardy HRWW germplasm has a narrow genetic base and is seriously lacking in disease resistance, particularly with respect to FHB, the cereal rusts and leaf spot diseases. This project is part of a concerted attempt to introduce and widely disperse promising FHB resistance QTL into the NDSU HRWW breeding population. In previous funding cycles, individual resistance genes (*Fhb1*, *Qfhs.ifa-5A*, *QTL5AS* & *5AL* (PI277012), *QTL3A* (Frontana) and *Fhb6*) were acquired from spring wheat and incorporated into winter wheat genotypes. Literature shows that the individual QTL reduce disease progression and DON accumulation yet their abilities to complement one another are generally less well understood. The primary aims of this project are: (a) to widely establish *Fhb1* throughout the NDSU breeding population; (b) to produce new 2- and 3-gene combinations of *Fhb1* with the above-mentioned resistance QTL within winter-hardy genetic backgrounds. Such combinations will then be evaluated for FHB resistance in greenhouse trials. This will help to determine whether specific combinations can provide stronger resistance than the individual genes. While attempting to pyramid the subsets of genes, both intermediate and finalized genotypes with promising resistance will be phenotypically evaluated for possible commercial use and use as future breeding parents. The project is expected to hasten the introduction and dispersal of a broad spectrum of resistance QTL into the breeding population.