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Project ID: FY11-ZH-047

FY10 ARS Agreement #: 59-0790-8-067

Research Category: VDHR-SPR

Duration of Award: 1 Year

Project Title: Fine Mapping of QTLs for FHB Resistance in PI 277012 - An excellent Novel Resistance Source for Wheat Breeding.

PROJECT 3 ABSTRACT

(1 Page Limit)

To diversify the resistance sources and further improve wheat for resistance to the FHB disease, novel and effective sources of resistance to FHB are desperately needed for wheat breeding programs. In a large-scale evaluation of tetraploid wheat (*Triticum turgidum*) germplasm for reactions to FHB, Dr. Steven Xu at the USDA-ARS, Fargo, identified an accession (PI 277012) that consistently showed a high level of resistance across all environments in both greenhouse and field experiments. To characterize the FHB resistance in this accession, a doubled haploid (DH) mapping population consisting of 130 lines was developed from the cross between PI 277012 and the hard red spring wheat cultivar 'Grandin' (susceptible to FHB). The DH population was then evaluated for reaction to FHB under three greenhouse seasons and two field environments. At the same time, a whole genome linkage map was developed, which consisted of 350 SSR markers spanning 2,703 cM of genetic distance. QTL analysis based on FHB disease severity data identified two novel major FHB resistance QTLs located on chromosome arms 5AS and 5AL. However, Fusarium-damaged kernels (FDK) and DON tests and the relationships among QTL for resistance to the three traits (FHB severity, FDK and DON accumulation) remain to be investigated. Therefore, our overall goals in this proposal are to provide further more information about this novel FHB resistance resource and to saturate the two QTL regions with additional markers for easy identification of the FHB resistance QTL loci in wheat breeding programs. The specific objectives of this project are to:

- 1) Evaluate FDK and DON of each DH line in the mapping population from the PI 277012/Grandin cross harvested from two disease nurseries located in Fargo and Langdon, respectively;
- 2) Map QTL associated with resistance to FDK and DON accumulation and establish the relationship between QTLs for the three FHB traits (FHB severity, FDK and DON accumulation);
- 3) Develop additional markers to saturate the regions around the QTLs associated with the resistance.

The resistant DH lines will be used as resistant sources for the spring wheat breeding programs in the region. Identification of new resistance alleles and DNA markers associated with them are essential for accelerating the development of FHB resistant wheat varieties by marker assisted selection and gene pyramiding.