PI: Xiwen Cai **PI's E-mail: xiwen.cai@ndsu.edu**

Project ID: FY12-DU-002 **ARS Agreement #: 59-0790-8-068**

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

Project Title: Transferring FHB Resistance from Hexaploid Wheat to Durum.

PROJECT 1 ABSTRACT

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The biggest challenge of managing FHB in durum wheat (*Triticum turgidum* L. ssp. durum) remains the lack of an effective resistance source. Partial resistance has been identified in the tetraploid relatives of durum, including wild emmer wheat (*T. turgidum* L. ssp. *dicoccoides*), Persian wheat (*T. turgidum* L. ssp. *carthlicum*), and cultivated emmer wheat (*T. turgidum* L. ssp. *dicoccum*). However, these sources of resistance have not provided enough defenses for durum against FHB. Therefore, it is an urgent need to explore and incorporate other sources of resistance into durum. More and better sources of resistance to FHB have been identified in common wheat (*T. aestivum* L.) than in durum and its tetraploid relatives. Also, we have observed that FHB resistance QTL exhibit less effectiveness of resistance in durum than hexaploid wheat. Preliminary results suggest that D genome of hexaploid wheat might contain the gene with the capacity to boost FHB resistance. Here we propose to continue introgression of FHB resistance from common wheat to durum for germplasm development and to determine the effect of D-genome chromosomes on FHB resistance in durum. The specific objectives of this proposed project are to: 1) Introgress FHB resistance QTL from common wheat into adapted durum wheat backgrounds; 2) Develop durum germplasm with improved resistance to FHB; 3) Validate the molecular markers tagging the resistance QTL in durum germplasm; and 4) Determine the effect of D-genome chromosomes on FHB resistance in durum.

Both common and durum wheat share A and B genomes and common wheat contains an additional D genome. The A- and B-genome chromosomes from common and durum wheat can normally recombine during meiosis in the hybrids of these two wheat species. Subsequent backcrosses of the hybrids to the durum parents and self-pollination of the hybrids lead to the formation of the progeny without a D-genome chromosome (genome AABB) as well as the progeny with different D-genome chromosomes on the A- and B-genome background. Molecular marker analysis and disease screening will be performed to select resistant individuals. Chromosome constitutions of resistant individuals will be determined by cytogenetic analysis. We anticipate developing durum germplasm with FHB resistance derived from common wheat in this project. The breeder-friendly durum germplasm with enhanced FHB resistance and reduced DON accumulation will be utilized immediately in the development of superior durum cultivars.