PI: Bernd Friebe **PI's E-mail: friebe@k-state.edu**

Project ID: FY16-HW-005 **ARS Agreement #: 59-0206-4-022**

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

Project Title: New Sources of Resistance to FHB and DON in Wheat.

PROJECT 1 ABSTRACT

(1 Page Limit)

The overall goal of the proposed project is to identify novel sources of resistance to FHB and use directed chromosome engineering to produce compensating wheat–alien translocation and recombinant lines with new sources of resistance to FHB and DON accumulation, develop genetic markers for the targeted alien chromosome segment to facilitate prebreeding into elite hard winter wheat germplasm, and make it available for wheat improvement programs. Previously, we have identified genes *Fhb3* and *Fhb6* for providing type-2 resistance to FHB. *Fhb3* was transferred to wheat from the tetraploid species *Leymus racemosus* in the form of a compensating Robertsonian translocation T7AL·7Lr#1S. *Fhb6* was transferred to wheat land race "Chinese Spring" from the hexaploid species *Elymus tsukushiensis* in the form of a T1AL·1AS-1E^{ts}#1S recombinant chromosome and needs prebreeding into more adapted US wheats.

Objective 1: Transfer of *Fhb6* into adapted winter wheat cultivars Everest, Lyman, and Overland, with native resistance to FHB and use molecular marker and genomic in situ hybridization analyses and field evaluations to recover the recurrent wheat genotype with the *Fhb6* gene. Once homozygous *Fhb6* lines in Everest, Lyman, and Overland background are recovered, they will be evaluated in the greenhouse and under field conditions for their FHB resistance and DON accumulation. Adding *Fhb6* to wheat cultivars with native resistance to FHB may improve the level of FHB resistance and reduce DON accumulation.

Objective 2: New sources of FHB resistance are constantly needed and preliminary studies suggest that the germplasm release KS93WGRC28, besides having the powdery mildew resistance gene *Pm21* present on a compensating wheat–rye Robertsonian translocation T6BS·6RL, also has a gene/s conferring type-2 resistance to FHB. KS93WGRC28 will be further analyzed for its resistance to FHB and DON accumulation under greenhouse and field conditions and directed chromosome engineering aimed at shortening the rye segment in this translocation will be initiated if required.

The proposed research will produce winter wheat cultivars with superior levels of FHB resistance and DON accumulation and small seed samples will be distributed upon request.