

## FY16 USWBSI PROJECT ABSTRACT

**PI: Xiwen Cai**

**PI's E-mail: [xiwen.cai@ndsu.edu](mailto:xiwen.cai@ndsu.edu)**

**Project ID: FY16-SP-001**

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**Duration of Award: 1 Year**

**Project Title: Enhancing Resistance of Spring Wheat to FHB using Alien Species.**

### PROJECT 2 ABSTRACT

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Strengthening and diversifying FHB resistance is one of the primary research goals in spring wheat. One of the strategies to achieve this research goal is to search for novel resistance genes from wheat-related alien species and incorporate them into the wheat genome. Here we propose to continue FHB resistance gene introgression from wheat-alien species derivatives into spring wheat and to develop spring wheat germplasm with diverse FHB resistance genes. The specific objectives of this proposed project are to: 1) Incorporate FHB resistance genes from wheat-alien species derivatives into adapted spring wheat genotypes; 2) Position the alien chromatin containing FHB resistance genes incorporated into the wheat genome and minimizing linkage drag associated with resistance genes; 3) Pyramid alien and wheat FHB resistance genes; and 4) Develop FHB-resistant germplasm directly usable in spring wheat breeding. One of the major challenges for alien introgression is low meiotic recombination frequency between wheat and alien chromosomes and linkage drag associated with alien chromatin. We will enhance meiotic recombination between wheat and alien chromosomes and minimize unwanted alien chromatin using *ph1b* mutant, ultimately reducing linkage drag in this project. Another challenge for alien introgression is the evaluation and selection of introgression materials for FHB resistance. We will screen the materials at early generations under greenhouse environments and verify resistance of the introgression lines under field conditions in ND and China. Also, we will submit the resistant lines for DON testing. In addition, we will constantly search for new FHB resistance genes from relatives of wheat. Meanwhile, we will continuously make crosses and perform chromosome manipulation to build a pipeline of alien introgression materials for germplasm development. Recently, we have identified additional wheat-alien species derivatives with non-*fhb1* FHB resistance genes. We will add those resistance sources into the pipeline and incorporate their resistance genes into spring wheat. To date, we have provided a total of 65 breeder-friendly spring wheat germplasm lines with FHB resistance from different sources and various agronomic traits to the spring wheat breeding programs for variety development. This has made wild species-derived FHB resistance genes available for spring wheat breeding, and will potentially strengthen and diversify resistance of spring wheats to FHB. Additional breeder-friendly alien introgression lines with diverse FHB resistance genes and potentially reduced DON will be developed and immediately made available for the development of spring wheat varieties.