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PROJECT 1 ABSTRACT
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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 novel 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 *Leymous racemosous* in the form of a compensating Robertsonian translocation T7AL·7Lr#1S. *Fhb6* was transferred to the wheat landrace '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- cultivars.

The specific objectives of this project are:
Objective 1: Transfer of *Fhb6* into the adapted winter wheat cultivars Everest, Lyman, and Overland, with native resistance to FHB and use molecular markers, genomic in situ hybridization analysis, and field evaluations to recover the recurrent wheat genotype with the *Fhb6* gene. Once *Fhb6* lines in Everest, Lyman, and Overland background have been 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 will improve the level of FHB resistance and reduce DON accumulation.
Objective 2: New sources of FHB resistance are constantly being sought. Our preliminary studies suggested that the germplasm release KS93WGRC28, besides having the powdery mildew resistance gene *Pm21* present on the compensating wheat-rye Robertsonian translocation T6BS·6RL, also might have a gene conferring resistance to FHB. We will further verify this FHB resistance and DON accumulation of KS93WGRC28 together with the parent germplasm TAM104 under field conditions.

Both objectives can be achieved during the field evaluations in the 2017/18 and 2018/19 growing seasons.

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