Project Abstract

Project Title:	**Breeding for scab resistance in Neb HWW by optimizing introgression and selection**	
Principal Investigator:	**Katherine Frels**	**Board of Regents, Univ of Nebraska, Univ of Nebraska-Lincoln**
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Our goal for this project is to develop wheat cultivars that are resistant to Fusarium head blight and accumulate less DON for the hard winter wheat growing regions specifically targeting Nebraska. Our three objectives include:

1. ***I****ncrease the proportion of University of Nebraska wheat breeding crosses targeted towards increasing FHB resistance and reducing DON accumulation.* To increase the frequency of UNL hard winter wheat cultivars that are resistant to FHB, we must increase the frequency of both major QTL (specifically *Fhb1* and *Fhb7*) and native resistance in our germplasm. We will develop new collaborations with regional breeding programs that have successfully developed extensive FHB resistance and utilize a designed crossing block plus marker-assisted selection (MAS) to combine Nebraska wheat genotypes with native resistance and major QTL donor genotypes.
2. *Improve evaluation and selection of germplasm with increased FHB resistance and reduced DON accumulation*. We will validate genomic prediction models for scab previously generated by the UNL breeding program and design optimized training populations for our F_3:F_6 preliminary yield trial. We will work with breeders in the region to develop regional FHB prediction models. By optimizing and improving our genomic prediction methods, we will be able to increase replication of the genotypes in the training population in our inoculated misted FHB nursery and gain improved phenotypic data on FHB infection and DON accumulation.
3. *Evaluate the effect of genotype x fungicide treatments for FHB in our conventional vs intensive management breeding trials.* Our elite F_3:F_8 yield trial is planted in both conventional and intensive management (fungicide applied) trials. Using these trials, we will identify genotypes with superior responses to fungicide treatment and develop best management strategies for UNL wheat varieties.

The results of these objectives will benefit wheat breeders, producers, and end-users by developing and selecting new combinations of native and major QTL FHB resistance with the agronomic and quality traits necessary for cultivar release in Nebraska. The methodologies we develop will be shared with the wheat community as will our FHB resistant germplasm. By advancing more resistant germplasm through the program, we will be able to identify elite, high-yielding, excellent quality cultivars with MR and R phenotypes for FHB. Our work with conventional vs intensive management breeding trials will improve management recommendations for all producers who grow UNL varieties.