PI: Andrew Green
PI's E-mail: andrew.j.green@ndsu.edu
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PROJECT 1 ABSTRACT
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The primary objective of this project is to develop higher levels of FHB resistance in the Northern Plains spring wheat. Breeding for FHB resistance is a "Gatekeeper" trait in our program, meaning that released varieties must be at least moderately resistant to this important pathogen, regardless of other attributes. All derived lines in our program are screened for FHB in inoculated, misted nurseries over at least two locations each year. Additionally, grain data such as test weight, *Fusarium* Damaged Kernels (FDK) and DON are collected on these entries. Beginning in 2020, we also tested bulk samples of F_5 populations for FHB. $F_{5:6}$ lines will be tested in nurseries and genotyped for major QTL. Our objectives for FY21-22 include:

- Continue to develop varieties adapted to the Northern Plains spring wheat region which are at least moderately resistant to Fusarium head blight using traditional methods, marker assisted selection, and genomic prediction.
- Introgress novel germplasm from pre-breeding into adapted spring wheat backgrounds with suitable end-use quality for breeding and cultivar development.
- Characterize non-Fhb1 resistance (i.e. 'Glenn', 'SY Rowyn') present in breeding program through marker-assisted selection and phenotyping.

All lines must possess good agronomic traits, including yield, as well as high end-use quality. All experimental lines in our program will continue to be screened in misted, inoculated nurseries in North Dakota, and valuated visually, by scoring grain, and testing DON. This data will be coupled with Marker-Assisted Selection in the breeding program in cooperation with the USDA-ARS genotyping facility in Fargo, ND. Approximately 3,000 entries will continue to be tested for DON with an objective to increase the level of resistance to DON accumulation in the breeding program. An additional focus is to enhance resistance genes in the population by identifying and enriching non-*Fhb1* sources of resistance. We will continue to introgress novel sources of germplasm resistance that have been developed through pre-breeding work in previous projects. These populations are screened in FHB nurseries based on selected based on agronomic suitability, FHB resistance, and end-use quality.