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Project Title: Development of Hard Spring Wheat Cultivars Resistant to Fusarium Head Blight

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 we will not release a variety which is not at least moderately resistant to this important pathogen, regardless of its other attributes. Historically, the majority of our breeding emphasis has been on visual ratings in misted, inoculated nurseries combined with DON testing from field plots. Our vision for FHB breeding moving forward is to accompany visual ratings with kernel soundness testing and DON analysis from the misted inoculated nurseries. The rationale is to try and minimize experimental error by building a complete dataset from a controlled environment. We also intend to identify and characterize non-Fhb1 sources of resistance in our program. Our goals are as follows:

- Continue to develop varieties adapted to the Northern Plains spring wheat region which are at least moderately resistant to Fusarium head blight.
- Screen breeding lines, varieties, and uniform nurseries in misted, inoculated nurseries, and test those entries for DON accumulation.
- Characterize non-Fhb1 resistance present in breeding program through marker-assisted selection and phenotyping.
- Identify germplasm which is low in DON accumulation in addition to having a low visual rating score for disease presence.
- Introgress novel germplasm from pre-breeding into adapted spring wheat backgrounds with suitable end-use quality for breeding and cultivar development.
- Utilize marker assisted selection for FHB resistance in cooperation with the USDA-ARS genotyping facility

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 evaluated 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 3000 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 which have been developed through pre-breeding work in previous projects. These populations are screened in FHB nurseries, and selected on the basis of agronomic suitability, FHB resistance, and end-use quality.