

Project Abstract

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| Project Title: | Developing Improved Cultivars of North Dakota Hard Spring Wheat | |
| Principal Investigator: | Andrew Green | North Dakota State University |
| Co-Investigator: | Jason Fiedler | USDA-ARS |

The overall goal of this project is to develop higher levels of FHB resistance in North Dakota spring wheat. Varieties released by our program must be at least moderately resistant to FHB, relative to our long-term checks with superior resistance. All experimental lines are screened annually in at least two misted, inoculated FHB nurseries. Significant weight is placed upon damage to kernels by measuring *Fusarium* damaged kernels (FDK) and Deoxynivalenol content (DON) in these controlled environments.

Our specific project objectives are:

- 1) Continue to develop varieties adapted to North Dakota which are moderately resistant to FHB

To accomplish this objective, we plan to continue screening all fixed lines in 2-3 misted inoculated nurseries each year. Visual ratings of plant symptoms will be collected in addition to FDK and DON on harvested grain samples. We will continue to improve selections by working with the ARS genotyping lab for Marker Assisted Selection (MAS) of major QTL. Lastly, we will continue to advance populations derived through Single Seed Descent (SSD) which contain the 5A QTL from PI277012 in adapted backgrounds, developed by Steven Xu.

- 2) Increase efficiency of data collection and line advancement for FHB resistance

Plans to accomplish this objective include a project to compare visual symptoms, FDK collected visually, FDK collected by seed imaging software, and DON. Our hypothesis is that data collection may be streamlined by focusing on the trait(s) which best predicts DON in the grain. We will also continue to advance our preliminary genomic prediction models to earlier generations of the breeding program, which are currently being evaluated on Year 3 yield trial lines. Good genomic predictions are critical for the rare years when FHB incidence is variable in the nurseries, and for cases where the disease severity varies across the field.

Our FHB breeding efforts benefit many stakeholders. Primarily, value added to cultivars with FHB resistance can minimize risk to producers. Additionally, lower DON and *Fusarium* damage benefits millers and bakers from a higher valued crop as well as a food safety perspective. Lastly, other breeding programs benefit from enhanced FHB resistance shared to the community through released varieties and experimental lines in the Uniform Regional Scab Nursery (URSN).