FY22 USDA-ARS/USWBSI

Project Abstract

Project Title:	Coordinated Fungal Biomass Measurements of FHB in Barley	
Principal Investigator:	Thomas Baldwin	North Dakota State University

To determine the relationship between *Fusarium* biomass and DON for the purposes of breeding spring malting and hulless barley. We will collect barley samples from the North American Barley Scab Evaluation Nursery (NABSEN), hulless barley trails, and training population trails from NDSU and UMN breeding programs. Approximately 4,000 samples will be tested for *Fusarium* biomass from NABSEN and material from other barley nurseries including those from PIs: Baldwin, NABSEN PIs, Smith, and Horsley with the following objectives:

Establish a *Fusarium* biomass measurements pipeline for harvested seeds. Seeds will be sent to our program from collaborators for grinding, DNA extraction, and *Fusarium* biomass measurements before being sent to the DON testing laboratories. New primer/probe set will be tested in a 384 well capacity to increase throughput of samples.

Fusarium biomass measurements can be accomplished with a primer/probe set to test multiple targets at once to increase accuracy on seed measurements. *Fusarium* biomass measurements will be reported to the breeders, NABSEN cooperators, and reported in a publication on the efficacy of Fusarium biomass measurements in FHB nurseries.

Measure *Fusarium* biomass and DON from the UMN and NDSU training populations grown in FHB mist nurseries 3 weeks post heading. The *Fusarium* biomass and DON measurements will be compared to the harvested grain *Fusarium* biomass measurements in objective 1.

Fusarium biomass and/or DON taken at 3 weeks post heading is a predictor of *Fusarium* biomass and DON at harvest in those training populations. **Determination** – If the measurement of *Fusarium* biomass and DON at 3 weeks post heading has no predictive capacity for *Fusarium* biomass and DON at harvest then the hypothesis is nullified.

This is a unique study in USWBSI that targets the usefulness of *Fusarium* biomass measurements for enhancing breeding selection and for gaining insight into the relationship between head blight and DON. The relationship of *Fusarium* biomass to infection and DON in the field is not well understood. This study will determine if *Fusarium* biomass measurements positively influence genotypic analysis and selection decisions by providing a more complete picture of the Fusarium head blight resistance in barley.