

Project FY22-BA-024: Coordination of the NABSEN and Screening US Barley Germplasm

1. What are the major goals and objectives of the research project?

Overall Project Objective:

- Develop adapted barley varieties with improved resistance to FHB and lower DON accumulation

Specific Objectives:

1. Establish and Maintain FHB Nurseries:

- Make available FHB nurseries across a range of environments with sufficient levels of disease to adequately screen barley for FHB resistance.
- Maintain consistent levels of infection across various locations, including:
 - Crookston and St. Paul, MN
 - Osnabrock, Fargo, and Langdon, ND
 - Brandon, MB, Canada
- Evaluate advanced breeding lines with putative FHB resistance from four barley-breeding programs in the upper Midwest US and two breeding programs in Canada.

2. Coordinate NABSEN and Establish Irrigated Nurseries:

- Coordinate the North American Barley Scab Evaluation Nurseries (NABSEN).
- Establish misted irrigated nurseries at the Fargo and Langdon, ND locations.
- Coordinate the evaluation of western breeding materials.
- Determine Fusarium head blight severity and deoxynivalenol (DON) accumulation for each entry replicated at least twice per location for robust and timely evaluation of material from multiple breeding programs.

Expected Outcomes:

• Evaluation and Comparison of Elite Materials:

- Enable Midwestern breeding programs to evaluate their elite materials and make head-to-head comparisons of lines from different programs containing distinct genetic resistances.
- Share results with collaborating breeding programs and the US Wheat & Barley Scab Initiative (USWBSI) through the annual NABSEN report.

Broader Goals:

• Promote Collaboration:

- Enhance collaboration between barley breeders and pathologists in North America to advance and distribute elite barley germplasm with resistance to FHB.
- Continue progress towards acceptable levels of genetic resistance to FHB by expanding improved screening techniques for FHB.

By achieving these objectives, the project aims to make significant strides in developing barley varieties with better resistance to FHB and lower levels of DON, thereby supporting barley production in the United States.

2. What was accomplished under these goals or objectives? *(For each major goal/objective, address these three items below.)*

What were the major activities?

FHB nurseries were established in diverse environments, including Fargo and Langdon, ND, and St. Paul, MN, ensuring robust screening of advanced breeding lines for FHB resistance. Coordinated efforts through NABSEN led to the creation of misted irrigated nurseries in Fargo and Langdon, ND, which facilitated the evaluation of breeding materials from various western programs.

What were the significant results?

Consistent and sufficient infection levels were maintained across all sites, enabling the nurseries to successfully identify breeding lines with improved FHB resistance. Accurate measurements of Fusarium head blight severity and DON accumulation were conducted across multiple locations. The collected data from these evaluations were shared among the participating breeding programs, enhancing collaborative efforts and supporting the development of resistant barley varieties.

List key outcomes or other achievements.

There was an enhanced ability to compare and evaluate elite barley lines across different breeding programs, leading to the identification of several promising lines for further development. Improved screening methodologies and consistent data collection across various sites contributed to the reliability of results. The annual NABSEN report provided critical insights and shared results with the USWBSI and collaborating programs, fostering improved collaboration and informed decision-making in breeding efforts.

3. What opportunities for training and professional development has the project provided?

NA

4. How have the results been disseminated to communities of interest?

The 2023 NABSEN report is located here https://scabusa.org/pdfs_dbupload/nabsen-report_23.pdf

5. What do you plan to do during the next reporting period to accomplish the goals and objectives?

The next reporting period we will accomplish the 2024 NABSEN screening, DON analysis, and generation of the 2024 NABSEN report.