Project FY22-BA-008: Screening Winter NABSEN at a High-performance North Carolina Barley FHB Nursery

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1. **What are the major goals and objectives of the research project?**
   The project seeks to screen winter NABSEN for FHB resistance, along with the Eastern Malting Barley Trial entries and the Winter Barley Nursery entries.

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

What were the major activities?

Since May 2024, we have harvested the 2023-2024 winter barley FHB screening nursery at our field location near Raleigh, NC. This is a misted, corn-spawn-inoculated nursery in which we screen winter barley experimentals and commercial varieties for FHB resistance. The 2023-24 nursery included 55 NABSEN entries, 40 Eastern Malting Barley Trial entries, and 26 Winter Barley Nursery entries. We planted in 4-foot plots with two rows to a plot, and used three replicate blocks within which two had entries in random order.

Plots were protected from BYDV with insecticide to avoid stunting that could delay maturity. Entries were binned into 3 maturity classes, and each class was inoculated starting at the same growth stage in March or April 2024 with *Fusarium*-infected corn spawn, in three batches at one-week intervals to ensure that all maturities were equally inoculated, without escapes by early or late genotypes. Mist irrigation was applied 2 minutes in each 20-min interval, for 3 hours in the morning and 3 hours in the afternoon.

Notes were taken on heading date and disease to calculate index. At physiological maturity, entire plots were hand-harvested. The harvested heads were hand-threshed, retaining all light-weight grain. Samples were debearded and cleaned; test weight measured; and a 100-g subsample was taken, avoiding skewing toward light or heavy kernels. This subsample was milled with a flour mill and samples were submitted to U. Minnesota for DON analysis.

In October 2024, the 2024-25 NABSEN nursery was planted at the Raleigh FHB screening nursery location. As in the previous year, the NABSEN nursery (59 entries) was planted along with the Eastern Malting Barley Nursery (EMBT, 58 entries) and the Uniform Winter Barley Nursery (UBN, 29 entries). As usual, the nursery consists of 3 replicate blocks, within which two-row plots are planted in randomized order within the blocks. Standard herbicide and insecticide practices have been followed. *Fusarium*-infected corn spawn is being applied in March-April 2025 using the same system as that described above to ensure equal exposure to inoculum of all maturities of barley. Misting is being applied on the same schedule as that described above.

What were the significant results?

Data were obtained on the 2023-24 NABSEN entries, as well as the EMBT and UWBT entries. The data included heading date, FHB index, and DON. Data analysis included a mixed model that used maturity as a factor to address the correlation between lateness and higher DON. Entries were grouped into susceptible, moderately susceptible and moderately resistant categories.

List key outcomes or other achievements.

Key outcomes were high-quality data on the resistance/susceptibility of barley experimental lines, enabling breeders to make choices about which lines to advance and which to discard due to FHB susceptibility.

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

Technicians were trained in production and application of corn spawn inoculum, as well as the processing of harvested samples for DON analysis.

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

In November 2024, data on index and DON in the 2023-24 NABSEN screening nursery were shared with the NABSEN Coordinator and breeders of NABSEN entries as well as entries in the other two nurseries.

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

The 2024-25 Raleigh Barley Scab Nursery was planted as usual in fall 2024 and harvested in spring 2025. Again, in October 2024, the NABSEN nursery (59 entries) was planted along with the Eastern Malting Barley Nursery (EMBT, 58 entries) and the Uniform Winter Barley Nursery (UBN, 29 entries). As usual, the nursery consists of 3 replicate blocks, within which two-row plots are planted in randomized order within the blocks.

At this point, these activities lie ahead:

July-Aug. 2025: Clean and debeard samples; record weights and test weights; grind sub-samples for DON testing. Send samples to Yanhong Dong's lab for DON testing.

Sept-Oct. 2025: Report nursery data to NABSEN coordinator and breeders of barley entries.