

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

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 entries in the Eastern Malting Barley Trial and the Winter Barley Nursery.

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

What were the major activities?

During the reporting period, we harvested the 2024-25 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 2024-25 nursery included 59 NABSEN entries, 58 Eastern Malting Barley Trial entries, and 29 Uniform Winter Barley Nursery entries. We planted in 4-foot plots with two rows to a plot, and used three replicate blocks of which two had the 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 was 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 2025, the 2025-26 NABSEN nursery was planted at the Raleigh FHB screening nursery location. As in the previous year, the NABSEN nursery (62 entries) was planted along with the Eastern Malting Barley Nursery (EMBT, 44 entries) and the Uniform Winter Barley Nursery (UBN, 27 entries). As usual, the nursery consisted of 3 replicate blocks; two-row plots were planted in randomized order within the blocks. Standard herbicide and insecticide practices were followed. *Fusarium*-infected corn spawn was applied in March-April 2026 using the same system as that described above to ensure equal exposure to inoculum of all maturities of barley. Misting was applied on the same schedule as that described above.

Harvest occurred in late May 2026, and samples underwent threshing, debearding, cleaning, sub-sampling, and milling for DON analysis. We are currently awaiting DON data.

What were the significant results?

Data were obtained on all 2024-25 NABSEN, EMBT, and UBN 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.

Data on heading date and FHB index were also obtained on all entries in the 2025-26 nursery. DON data will be obtained later in summer 2026, and the final results will be sent to breeders with entries in the NABSEN, EMBT and UBN nurseries.

List key outcomes or other achievements.

The nursery is designed to help breeders identify experimental lines with FHB susceptibility or resistance. Key outcomes have been 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. Having three replicates of each line in the field significantly expands the total effort, but it also ensures that data on a given line are almost never based on less than two field plots.

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

Technicians and both graduate and undergraduate students have been 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 September 2025, data on index and DON in the 2024-25 Winter 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 2025-26 Raleigh Barley Scab Nursery was planted as usual in fall 2025 and harvested in spring 2026. As usual, the NABSEN nursery (62 entries) was planted along with the Eastern Malting Barley Nursery (EMBT, 44 entries) and the Uniform Winter Barley Nursery (UBN, 27 entries). As usual, the nursery consisted of 3 replicate blocks, within which two-row plots were planted in randomized order within the blocks.

In late May, the plots were hand-harvested. In July and August, we cleaned and debearded 399 samples and milled 100-g sub-samples for DON testing. We sent the samples 8/10/26 to UMinn lab for DON testing. When the data are available, we will analyze them and report them to the NABSEN coordinator and all breeders of barley entries.

In Sept. 2026, we will prepare to plant the 2026-27 barley nurseries in our scab nursery in Raleigh. We will plant in October and the normal annual cycle will continue.