

Project FY22-BA-015: Developing FHB Resistant Barley Cultivars for California

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

Evaluate and enhance Fusarium Head Blight (FHB) resistance in the University of California Davis (UCD) barley breeding population and develop new barley varieties with moderate resistance to FHB

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

What were the major activities?

- 1) **Screening:** conducted the fourth round of screening UCD barley materials for FHB resistance in Crookston, MN.
- 2) **Resistance Introduction:** Introduced FHB resistance traits from non-UCD materials into UCD barley breeding population
- 3) **Breeding Advancement:** Advanced the breeding population to enhance FHB resistance using bulked pedigree selection methods.

What were the significant results?

- 1) **UC-Tamalpias Performance:** The only UC Davis naked barley cultivar, UC-Tamalpias, showed the highest FHB severity and DON accumulation.
- 2) **Six-row naked Barley Performance:** Of 33 six-row naked barley lines tested for the first time in 2023, two lines showed low FHB severity (at only 1%), and low DON accumulation.
- 3) **Two-row Barley Performance:** The two-row barley line, DH160754, showed minimal FHB severity and only 6 ppm DON.

List key outcomes or other achievements.

- 1) **Enhanced Understanding:** After four years of FHB screening, we developed a comprehensive understanding of the FHB resistance levels within the UCD barley population.
- 2) **Identification and Introduction:** Several lines with moderate tolerance were identified, and resistance traits from non-UCD sources have been successfully introduced to the breeding population. More selection and improvement are ongoing.

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 FHB resistance and DON concentration data have been systematically managed and stored by the central database of the project.

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

- 1) **Identify Resistance:** Combine the five years of FHB screening data using linear mixed models to determine resistance levels of the UCD barley materials.
- 2) **FHB screening:** Continue evaluating FHB resistance of new UCD barley breeding lines (100 plots) by collaborating with the University of Minnesota in this project.
- 3) **Genomics-Assisted Breeding:** Genotype the barley lines with FHB data and integrate genotypic and phenotypic data to enhance data-driven selection within breeding populations.
- 4) **Advance Breeding Populations:** Continue advancing the breeding populations with improved FHB resistance at UC Davis.