Project FY22-DU-009: Developing FHB Resistant Winter Durum to Increase Crop Diversity in US Great Plains

---

1. **What are the major goals and objectives of the research project?**
   The major goal of our project is to develop winter durum varieties and germplasm. The specific objectives are to 1) Evaluate winter durum germplasm and lines in preliminary observation trials for FHB resistance and advance superior lines for variety development; (2) introgress FHB resistance into elite winter durum adapted to the US Great Plains.

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

   What were the major activities?

   In the third year of the project, 26 winter durum breeding lines were evaluated in the field FHB nursery. More than 55 new crosses were developed among elite lines in 2024-25 and populations advanced to the next generation. Of these 15 backcrosses involved FHB resistance sources 10Ae564, 15En279, 15En88 (spring durum). More than 23 durum breeding lines were evaluated in an early observation trial (EOT) and 20 new winter durum lines were advanced to Preliminary Yield Trials (PYT) and 6 lines to Advanced Yield Trials (AYT) for 2025.

   What were the significant results?

   Twenty new winter durum lines were advanced to Preliminary Yield Trials (PYT) evaluated at three locations Winner, Pierre, and Brookings in summer 2024. The yields in the experimental line ranged from 28 bu/acre to 74 bu/acre. Six lines were evaluated in Advanced Yield Trials (AYT) for 2024 at three locations with grain yields ranging from 45 to 72bu/acre.

   Twenty-six winter durum lines were evaluated in FHB Nursery in 2024. The disease index ranged from 47% to 90% in durum breeding lines whereas the susceptible hard red winter wheat checks Overley and Flourish showed a disease index of 65% and 67 %, respectively. Three durum lines showed moderate resistance and lower DON (Fig 1).

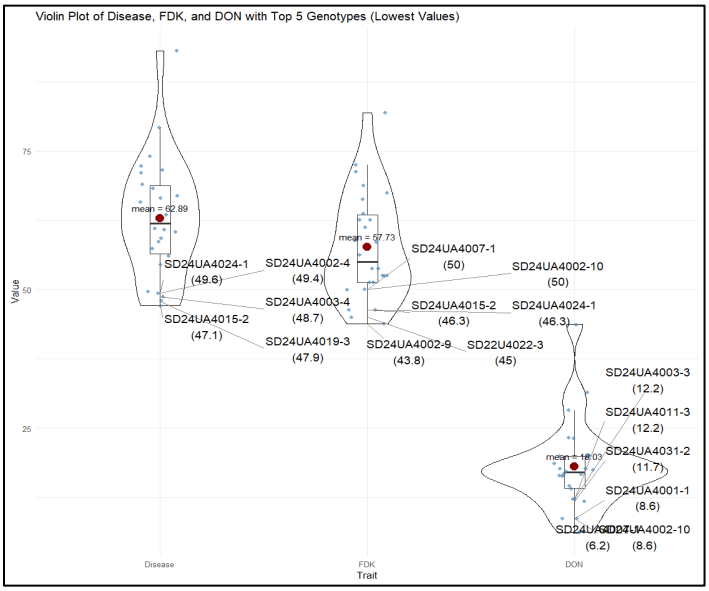

Figure 1. Distribution of FHB diseases, FDK and DON in winter durums evaluated in 2024

List key outcomes or other achievements.

In the third year of the project, 20 new winter durum lines were advanced to Preliminary Yield Trials (PYT) and 6 to Advanced Yield Trials (AYT) and notably three durum lines showed moderate resistance and lower DON values will be advanced the breeding program and re-evaluated in 2025.

3. **What opportunities for training and professional development has the project provided?**
   A postdoc is partially (~10%) supported through this grant. Research was presented at 2024 FHB forum and McFadden Symposium at UNL.

4. **How have the results been disseminated to communities of interest?**
   The results from this project were shared through field days and social media.

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
   We will continue to 1) Evaluate winter durum lines in preliminary and advanced trials for FHB resistance and advance superior lines for variety development; (2) introgress FHB resistance into elite winter durum adapted to the US Great Plains.