

Project FY22-SW-011: Evaluation and Development of FHB-Resistant Wheat Varieties for the Midsouth

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

- I. Develop and release high-yielding, FHB-resistant cultivars.
- II. Increase breeding efficiency through collaborative phenotyping, marker development and introgression of new genes using marker-assisted (MAS) and genomic selection (GS).
- III. Screen and report the reactions of breeding lines and currently grown commercial cultivars to FHB using misted inoculated nurseries

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

What were the major activities?

- I. We prepared the inoculum for the inoculation process. The source inoculum, including 11 different isolates, was increased in a petri dish and preserved for the inoculation. Corn seeds were purchased and sterilized to be used as the medium. We made enough inoculum to be used in two locations and 1440 entries.
- II. A total of 1440 entries, including the Arkansas Advanced line, the SunGrain consortium lines including GWAN, Sunpre, SunWheat, Eastern Nursery region, Uniform Southern Nursery region USSN, and checks including “Pat” and “CG514W” were tested via RCBD model with three replications and two locations in Arkansas, Newport and Fayetteville. The inoculum was prepared, added to corn, and applied to the field on March 29 (Fayetteville) and April 2 (Newport). The misting system was set up in both locations to increase the chance of injection. The phenotypic data were collected on April 11, 18, and 24 (Fayetteville) and April 11 and 24 in Newport. We rated each line from 0 (high tolerance) to 9 very susceptible.
- III. The following activities were performed after submitting the 2022-23:
 - a) We continued testing the seeds from the harvested lines via FDK and DON. The results showed the severity of the disease on the seeds.
 - b) We received seeds from the University of Arkansas Extension Service and the University of Arkansas Department of Pathology for FDK and DON evaluations.

What were the significant results?

- I. The results on Arkansas lines showed various reactions, from susceptibility to high tolerance to FHB disease. However, we noted that most lines showed moderate tolerance to the FHB lines.
- II. Overall, disease pressure in Newport was higher than in Fayetteville in the 2023-24 season. This is possibly due to the environmental temperature and the rainfall differences between these two locations.

List key outcomes or other achievements.

No immunity or full resistance to FHB. We identified several lines that showed high tolerance to FHB. This information can be added to the package release of potentially released cultivars, or the lines can be used as parental lines for developing new high-yield lines.

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

I trained employees to increase isolates in petri-dish, make inoculum, organize seeds in the cell planter, and set up the misting system, and harvest techniques. Furthermore, I will train them to evaluate FDK after harvesting and collecting seeds.

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

The data from lines sent by different states and Arkansas variety testing, Arkansas extension center, and University of Arkansas Wheat Pathology lab will be tested via field, FDK, and DON. Then, the results will be reported to the communities of interest mentioned above.

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

I plan to continue working on the sample seeds harvested from the tested lines for FDK and DON and increase the inoculum for next year's inoculation.