Project FY22-SW-006: A Double Haploid Initiative to Speed Development of FHB Resistant Soft Winter Wheat.

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

The overarching goal of this proposal is to use traditional breeding techniques, a misted-nursery, and marker-assisted selection (MAS) to develop FHB resistant SRWW cultivars and to share germplasm with other Southern U.S. programs. Our specific objectives are to: 1) develop DH lines that combine multiple effective FHB resistance genes/QTL. 2) utilize marker assisted selection (MAS) to enrich topcross F1 populations for those genes/QTL. 3) Share new DHLs with VDHR-SWW breeders. and 4) enter promising FHB-resistant lines into Southeastern University Grains (SunGrains) scab nurseries to facilitate development of resistant cultivars. This project will use doubled haploid to accelerate the FHB resistant cultivar development.

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

What were the major activities?

Six F1 crosses with a total of 155 F1 seeds were sent to the wheat genetic program led by Shuyu Liu at Texas A&M AgriLife Research at Amarillo in the spring of 2021. Five F1 crosses with 111 seeds in fall 2022 and five F1 crosses with 124 seeds in fall 2023 were sent to Amarillo for DHL development with Fhb1 gene. A set of 934 embryos were cultured in 2023 and 995 embryos were cultured in 2024. Two hundred seventy-nine haploid plants were produced and 156 DHLs were harvested in 2023, seed was increased in the Amarillo GH and harvested for Russell Sutton.

What were the significant results?

A set of 150 DHLs were harvested so far and 75 DHLs were sent to Russell for seed increase in the fall of 2023 so yield trails and scab test can be conducted in the spring of 2025. About 156 DHLs from 2023 with increased seeds will be shared with Russell. Two hundred ninety-one haploid plants were produced in 2024 and 77 were treated so far.

List key outcomes or other achievements.

DHL were screened in the field in 2024 and harvested for seed increases. Some will be advanced and shared with cooperators in SunGrains as seed amounts allow. More DHLs are currently in the process of development.

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

The DHL development was conducted by PhD students, postdocs and undergraduate students. They were trained very well on this process. They can work independently to set up a DHL development program.

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

The harvested seeds will be shared with the Texas A&M AgriLife Research soft wheat breeder Russell Sutton.

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

We will have all the DHLs for the 2023 and 2024 harvested for fall of 2024 planting. The first set of 75 DHLs developed in 2022 and about 150 DHLs from 2023 will be in yield trials.