

Project Abstract

Project Title:	Evaluation and Development of FHB-Resistant Wheat Varieties for the Midsouth	
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Fusarium head blight (FHB) is one of the major fungal diseases that negatively impact wheat yield and quality. The most common causal pathogen in Arkansas is *Fusarium graminearum*. Therefore, Fusarium head blight is a significant constraint to profitable wheat production when weather conditions are favorable for disease. Growing moderate resistant varieties is the critical component for managing FHB. The FHB resistance is a quantitative trait, and QTL associated with FHD resistance should be integrated into adapted, high-yielding varieties. Fusarium head blight (FHB) is one of the major fungal diseases that negatively impact wheat yield and quality. The most common causal pathogen in Arkansas is *Fusarium graminearum*. Therefore, Fusarium head blight is a significant constraint to profitable wheat production when weather conditions are favorable for disease. Growing moderate resistant varieties is the critical component for managing FHB. The FHB resistance is a quantitative trait, and QTL associated with FHD resistance should be integrated into adapted, high-yielding varieties.

The Arkansas Wheat Breeding Program has developed a number of wheat lines with high resistance to FHB through intensive phenotypic evaluation in two inoculated nurseries in Fayetteville and Newport, Arkansas. We apply marker-assisted selection (MAS) for exotic (i.e., *Fhb1*) and native resistance genes. Also, we perform genomic selection (GS) to pyramid sources of resistance and expedite the development of resistant germplasm and cultivars. Our goal is to integrate genetic sources associated with FHB into the wheat germplasm and develop wheat lines that can be used in Arkansas and other wheat-growing regions in the United States.

Objectives of this proposal are; 1) Develop and release high yielding, FHB resistant cultivars adapted to Arkansas and the mid-south, 2) Screen and report the reactions of breeding lines and currently grown commercial cultivars to FHB using misted inoculated nurseries.

200-300 crosses or top crosses will be made each year to target FHB resistance. Nearly 4600 unique genotypes will be evaluated in two misted and inoculated FHB nurseries, including ~3,000 F_{4:5} progeny rows, 500 Arkansas advanced breeding lines, and 1,100 cooperative nursery or state variety trial lines.

This proposal addresses the following Research Goals 1) Increase and document the number of varieties with improved FHB resistance, 2) Increase efficiency of coordinated breeding programs to develop and release FHB resistant varieties, and 3) Evaluate and implement new breeding technologies and develop germplasm.