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Research Category: **VDHR-SWW** **Duration of Award: 1 Year**

Project Title: Developing FHB-Resistant Wheat Cultivars for the Midsouth.

PROJECT 2 ABSTRACT

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The best hope for growers to overcome Fusarium Head Blight (FHB) is through resistant varieties. However resistant varieties are useless if they are too costly in terms of yield reduction. This project focuses on development of wheat varieties that are not only FHB-resistant but also contain the necessary attributes to make them competitive with other varieties on the market. Parents for crossing will be genotyped for markers linked to FHB resistance genes, and subsequent segregating populations will be enriched using MAS.

To provide breeders with new sources of FHB resistance in adapted backgrounds and with resistance to other important diseases, lines from the germplasm enhancement program have been selected for agronomic traits and for resistance to FHB and contemporary races of leaf rust, stripe rust, and Septoria tritici blotch. The wheat breeding program at Louisiana State University has collaborated closely with this project, and this collaboration has been mutually beneficial. Markers for resistance genes *FHB1, FHB2, and FHB3* will be used to select and pyramid these genes as appropriate for particular populations and lines

To assist southern breeders with developing FHB-resistant varieties, this project will evaluate entries in the Uniform Southern FHB Nursery for type I resistance, a combination of types I and II resistance, and grain DON level in the greenhouse and for FHB severity, percentage of scabby kernels, and mycotoxin level in inoculated, irrigated field nurseries at two locations. Advanced lines from the Arkansas and Louisiana breeding programs developed for resistance to FHB also are included in these field nurseries. To provide clientele with FHB resistance ratings for local varieties, this project will evaluate 22 of the most commonly grown varieties in Arkansas for FHB resistance (severity, scabby kernels, and mycotoxins) in the field at two locations and report the results on the University of Arkansas Cooperative Extension Service website.

Graduate student research that is part of this project will be conducted on a susceptible check and 15 adapted FHB-resistant lines with diverse sources of resistance and similar flowering dates. This research will i) determine levels of mycotoxin resistance, resistance to initial infection (type I), and resistance to spread of infection within spikes (type II) resistance to both DON and NIV chemotypes of the pathogen, ii) improve the methodology for quantifying type I resistance and resistance to mycotoxins, iii) determine the response to application of pure DON into florets at flowering time in relation to the presence of resistance gene *FHB1*, and iv) develop methodology to evaluate resistance to resistance to kernel infection and mycotoxin accumulation when infection occurs near harvest time and use this methodology to quantify levels of resistance in the 16 lines.