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**ARS Agreement #:** 59-0206-0-137

**Research Category:** VDHR-SWW

**Duration of Award:** 1 Year

**Project Title:** Development of FHB Resistant Wheat Varieties for the Gulf Coast

### PROJECT 1 ABSTRACT

(1 Page Limit)

Louisiana producers have experienced decreased yields and inability to market low quality, *Fusarium* damaged kernel percent (FDK) and DON-contaminated grain in recent years. FHB is a major factor in decreased wheat acreage in Louisiana and there are few varieties adapted to the Gulf Coast that have a significant level of FHB resistance. Louisiana wheat enters export markets through Mississippi River elevators so it is important that locally adapted, FHB-resistant varieties be identified and developed. Resistance to FHB is a complex trait that requires pyramiding of several QTL into adapted, disease resistant, and high-yielding varieties in order to achieve FHB resistance and widespread grower adoption. Development of FHB resistant wheat varieties with high yield, regional adaptation, and broad disease resistance is the major focus of the LSU wheat breeding program. 395 of the 472 (84%) and 411 of 461 (89%) of crosses made by the LSU breeding program in the spring of 2019 and 2020 included parents with good FHB resistance and/or known FHB QTL.

This proposal addresses all three VDHR research priorities. Misted and inoculated nurseries at three locations will be used to screen LSU breeding lines, regional yield nurseries and all entries in the statewide variety trials for FHB incidence, FDK and mycotoxin content (DON). FHB reaction of entries in statewide variety trials will be highlighted at grower field days and in publications to encourage planting of resistant wheat varieties (Pri 1). Data from regional trials will be included in nursery reports to assist breeders in selection of FHB breeding lines.

Approximately 500 crosses will be made to develop populations with good FHB resistance. Marker-assisted selection will be used to pyramid native and exotic FHB QTL (genes) into elite breeding lines. Double Haploid (DH) populations combining FHB QTL will be developed and shared with other VDHR-SWW breeders (Pri 2). DH crosses will combine *FHB1* and other FHB QTL with high yield and good agronomics. Populations with unique FHB resistance combinations will be made available to other breeders (Pri 2). We will coordinate a summer F1 nursery (Idaho) for SunGrains breeders to save a year in development of FHB varieties (Pri 2). A collaborative SunGrains genomic selection program will enhance selection for FHB resistance and reduced DON (Pri 3). Genomic selection will be carried out on a panel of 570 preliminary yield stage breeding lines. Kasp markers for *FHB1* and several other QTL will be run in-house on the same panel. PopVar will be used to aid crossing decisions to increase FHB resistance.