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

PROJECT 1 ABSTRACT

(1 Page Limit)

The LSU AgCenter wheat breeding and variety development program develops and releases wheat varieties that are marketed commercially and are widely grown across the Gulf Coast region. Fusarium Headblight (FHB) occurs frequently in the rice growing area of Louisiana and can be important across the Gulf Coast region. FHB occurred statewide and caused very significant monetary, yield, and quality losses in 2015 and 2016. The most economical and effective means to prevent grower's losses and export market contamination from FHB is to develop and release high-yielding FHB-resistant varieties for the region. To this end, LA06146 with improved FHB resistance was released in 2015. Our goal is to accelerate development of FHB resistant wheat varieties adapted to the unique environment of the Gulf Coast.

Objectives of the LSU AgCenter (LSUAC) wheat breeding program, Fusarium Head Blight project are: to: 1) develop and release high-yielding FHB resistant varieties; 2) increase efficiency of coordinated breeding programs through sharing of DH populations, marker development and introgression of useful genes using MAS-population enrichment; and 3) screen varieties and advanced breeding lines for FHB reaction to help growers make wise variety choices and prevent losses to FHB.

Varieties and advanced breeding lines, including the USFHBN regional nursery, statewide variety trials, and all advanced LSUAC breeding lines will be evaluated at three Louisiana locations under controlled field conditions with corn/sorghum-based inoculation and timed misting (two locations) using two replications of 'headrows' in a Randomized Complete Block Design. Data on heading date, foliar diseases, and FHB will be collected from these trials and samples will be submitted for toxin analysis. Several replicated yield trials (AR and LSU trials) and non-replicated observation yield trials will be screened at two locations for FHB-specific crosses. All entries in these trials will be also evaluated in misted, inoculated nurseries at three locations and tested for the presence of major QTL for FHB resistance.

Crosses to incorporate FHB resistance are made in the greenhouse and field each year. FHB resistant lines selected from the USFHBN will be crossed to adapted lines that have high yield and good resistance to leaf and stripe rust. Two-way F1 plants with a FHB resistant parent will be topcrossed with elite LA lines in the greenhouse to set up F1 population enrichment via MAS next fall. The topcrosses will emphasize combining three of four of the most effective FHB genes (FHB1, FHB Ck9511, FHB 5AS, Jamestown).

Breeding lines in replicated FHB yield trials will be increased in breeder strips and blocks at two locations. Numerous early-generation populations and headrows will be evaluated for agronomic adaptation and disease resistance in Baton Rouge and Winnsboro.

Several additional doubled haploid populations have been created that contain effective FHB resistance genes and lines from these will be field-evaluated for resistance and agronomic potential, and shared with other breeders.