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PROJECT 1 ABSTRACT

(1 Page Limit)

The LSU AgCenter wheat breeding and variety development program develops and releases wheat varieties that are widely grown across the Gulf Coast region. Louisiana producers have experienced decreased yields and inability to market low quality, 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. 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. 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 project are to: 1) develop and release high-yielding FHB resistant varieties; 2) increase efficiency of coordinated breeding programs through sharing of F1s and DH populations, regional testing, marker development, genomic selection, introgression of useful genes using MAS-population enrichment, and Kasp-marker screening of regional nurseries and breeding lines; and 3) to help growers make wise variety choices by providing accurate data on resistance of available varieties through screening of varieties and advanced breeding lines for FHB reaction.

The regional FHB nursery, statewide trials, and advanced LSUAC breeding lines will be evaluated at three locations in misted nurseries inoculated with scabby corn. FDK and DON will be determined on ~2,000 samples from these nurseries. First-year observation yield trials with "FHB parentage" will be screened in-house for major FHB QTL and evaluated in misted nurseries. A Genomic Selection Preliminary Yield Trial of 600 entries will utilize a combination of field screening and yield data, misted nursery data, molecular markers for major QTL, and genomic selection for advancement decisions. Approximately 500 new crosses will be made. FHB resistance will be incorporated by crossing parents from the USFHBN and other FHBR sources to elite, adapted lines. F1 plants with a FHB resistant parentage will be top-crossed to develop F1 populations for marker assisted population enrichment. FHB resistant lines 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. These topcrosses will emphasize combining three or four of the most effective FHB genes (Fhb1, Fhb-Ck9511, Fhb1AN, FhbJT1B, Fhb4AN, Fhb5AN, Fhb2BB).

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. Selected F2 – F4 segregating populations will be planted in a spaced grid to permit genotyping and permit individual plant selection.