Project Abstract

Project Title:	Development of FHB Resistant Wheat Cultivars Adapted to the Gulf Coast Region.	
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The project goal is to screen and document FHB resistance of existing cultivars, and to use all available breeding tools to develop high-yielding FHB resistant cultivars adapted to the Gulf Coast region. The project addresses all three VDHR Priorities.

Specific Project Objectives are:
(1) Screen state performance trial entries, regional nurseries, and advanced breeding lines in inoculated misted nurseries to document FHB reaction.
(2) Screen segregating populations in FHB nurseries to select FHB resistant genotypes.
(3) Apply methods that reduce breeding cycle time to develop FHB resistant cultivars, including off-season nurseries, speed breeding, Double Haploids (DHs), and molecular markers.
(4) Utilize genomic selection as a key factor in FHB resistant line advancement and parent selection.
(5) Develop and share DHs with important FHB resistance pyramids.

Expected Outcome:
(1) Data on FHB, *Fusarium* damaged kernels (FDK), and DON of lines in replicated yield and state variety trials will be published and communicated to diverse clientele to encourage planting resistant cultivars that lower DON contamination.
(2) Genotypes in segregating populations that exhibit good FHB resistance will be advanced.
(3) Double haploids, offseason nurseries, and speed breeding will allow release of FHB resistant cultivars sooner than using the traditional breeding scheme.
(4) The GS scheme employed by SunGrains greatly increases selection accuracy in early yield trial, non-replicated breeding lines resulting in a high frequency of elite FHB resistant breeding lines entering regional yield trials and subsequently released as cultivars.
(5) DHs with pyramided FHB resistance genes will be released as cultivars quickly and provide producers more choices of resistant varieties.

Misted inoculated nurseries will be grown at three locations to screen regional nurseries, variety trials and breeding materials. Harvested samples will be quickly processed and all resulting data included in reports and publications used by growers and seedsmen to select resistant cultivars. The breeding program will make >500 crosses yearly that feed into three breeding channels: 1) Double Haploids for a few elite crosses, 2) Speed Breeding for selected crosses, and 3) offseason F1 nursery and traditional breeding scheme for most crosses. Bulks and mass selection will be performed in the F2 generation followed by pedigree selection in F3 through F5. First year observation yield plots will be tested at two locations, run with important FHB QTLs, and sequenced for genomic selection. Advanced yield testing will center around the four SunGrains regional trials, and DHs will be shared among all VDHR-SWW programs after initial culling.