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Project Title: Developing Doubled Haploids to Expedite Variety Development in SRWW.

PROJECT 3 ABSTRACT

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Currently, production of soft red winter wheat (SRWW) cultivars having moderate FHB resistance derived predominantly from native sources, and fungicide applications offer the primary means of disease control. However, neither control strategy provides optimal protection in years of severe epidemics. Enhanced efforts are needed to develop cultivars and readily available superior parental lines having gene *Fhb1* and other validated QTL derived from exotic and native resistance sources. One of the main objectives of the Variety Development and Host Resistance (VDHR) research area is to increase the efficiency of coordinated project breeding programs at developing and releasing FHB-resistant varieties. Doubled haploids (DH) allow quick introgression of resistance genes and can significantly shorten variety development time. We plan to expand the use of this technique for the whole Southern SRWW region by the coordinated development of at least five breeding populations per year through DH production followed by collaborative genotyping and phenotyping across the region once the DH lines are developed and seed is increased for testing. This project will quickly provide inbred breeding lines having several diverse FHB resistance genes (exotic and native) to five breeding programs for testing in the Southern SRWW region. We plan to use the Heartland Plant Innovations doubled haploid facility at Kansas State University. Depending on the cross, 200 to 300 DH lines will be developed for each population. Single Nucleotide Polymorphism (SNP) genotyping will be conducted at the USDA-ARS genotyping lab using an Illumina Infinium SNP assay. Seed of each DH line will be increased and subsequently distributed to cooperators for planting at five locations (AR, GA, LA, NC, and VA). This project was developed through the cooperation of these breeding programs in the Southern region and will be a source of outstanding SRWW lines selected for FHB resistance that will be available and freely shared with other wheat breeders and has great potential to deliver high-impact FHB resistant varieties in a short period of time.