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

PROJECT 2 ABSTRACT

(1 Page Limit)

In 2003 and 2009 and more recently since 2014, scab epidemics devastated much of the wheat crop in the southeastern U.S. Currently, production of 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. Information provided from extensive and collaborative phenotypic and genotypic characterization of FHB resistance in breeding lines, commercial cultivars, and mapping populations can be deployed in marker assisted selection (MAS) and pyramiding of complementary FHB resistance genes concurrently with development of doubled haploid (DH) lines. This will greatly accelerate the development of wheat cultivars having enhanced levels of resistance to FHB and DON toxin.

Each year the southern breeding programs make multiple single and/or three way crosses to pyramid validated FHB QTL and other traits of interests. For this proposal, each program (AR, VA, LA, NC, GA) will use one or more of these crosses to develop 270 double haploid lines per year at Heartland Plant Innovations. These lines will be genotyped in collaboration with the Eastern Regional Genotyping Center and collaboratively phenotyped in future years of the project.

Previous years of this project have resulted in superior advance lines being identified. For example, twenty five superior DH lines derived from crosses having *Fhb1* and other QTL (Jamestown FHB-1B) were selected among headrows of three populations (MD03W61-09-7/Jamestown//GA04570-10E46, MD03-69-15/Yorktown, and Pioneer 25R32/ GA001138-8E36//VA09W-73) evaluated in the field at Warsaw, VA in 2014. These lines were evaluated in observation yield tests at two locations in Virginia in 2015. Seed of superior lines will be provided to other breeding programs. In Arkansas, 40 DH lines were selected from populations exchanged from VA, NC and LA. New DH lines currently being developed will have diverse pyramids of FHB resistance genes including *Fhb1* and QTL on chromosomes 2DL, 5AS (Ning 7840), 3BL (e.g. 3BSc of Massey), and 1B (Jamestown) combined with other favorable agronomic traits.