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Project Title: Development of Scab Resistant Soft Wheats Adapted to the Southeast.

PROJECT 1 ABSTRACT

(1 Page Limit)

Scab epidemics were devastating in Georgia and the Southeast since 2014 which resulted in significant economic losses. The development of FHB resistant varieties with the level as Truman/Bess and/or Fhb1 is needed. Our objectives are to enhance the development of high yielding soft red winter wheat varieties with improved FHB resistance and end-use quality, to generate populations for marker assisted selection with QTL associated with both native and exotic FHB resistance, and to introgress two or more known FHB resistance QTL by using marker assisted selection.

Elite breeding germplasm derived from Truman/ Bess, Jamestown, Neuse, and MD08-26-H2-7 have shown high levels of FHB resistance and increased grain yields. To continue improvement for FHB resistance, numerous bi-parental, 3-way and 4-way crosses will be made annually between elite breeding lines and native sources of FHB resistance. Segregating breeding populations will be evaluated and advanced to select desirable pure lines with improved over-all agronomic performance and disease resistance. FHB resistance from breeding program in Illinois, Ohio, Missouri and Kentucky with Rht1 background will be transferred into Rht2 elite breeding lines adapted to the Southeast.

Increase efficiency of coordinated project breeding programs to develop and release FHB resistant varieties will continue through the collaborative efforts between the University of Georgia and Louisiana State University, North Carolina State University, Virginia Tech, University of Arkansas and the USDA-ARS Genotyping Center, Raleigh, NC. These efforts include assistance in phenotyping of mapping populations and elite breeding lines; cooperative evaluation of nurseries including the Southern Uniform Scab and the Uniform Southern Wheat; the exchange of resistance germplasm, crosses, and double haploid lines; and joint evaluation of these germplasm sources. Data and DON samples from the Uniform Southern FHB nursery grown in Georgia will be submitted.

Marker assisted selection (MAS), and Double Haploid (DH) will be employed to identify and incorporate resistant germplasm that combine improved FHB resistance with other disease and insect resistance. DH lines from Jamestown, PIO 26R32, and MD03W61-09 (Fhb1) will be selected and evaluated for yield. Selected DH lines will be harvested and seed shared with other cooperators. Marker-assisted selection will be used including MAS enrichment of F1's, early generation screening, and haplotypes parents for crossing. Marker Assisted Backcrossing (MABC) of QTL (Fhb1, 5AS, 2DL), 1B, 6A (Jamestown), 1A, 4A, 6A (Neuse), 2B, 3B (Bess) and 3BL (Massey) into SRWW background will be performed using high yielding and moderately resistant FHB lines.