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**Project ID:** FY20-SW-007

**ARS Agreement #:** 59-0206-0-150

**Research Category:** VDHR-SWW

**Duration of Award:** 1 Year

**Project Title:** Double Haploids to Expedite Development of FHB Resistant Soft Winter Wheat Varieties

## PROJECT 2 ABSTRACT

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In 2003 and 2009 and more recently in 2014 and 2015, scab epidemics devastated much of the wheat crop in the southeastern US, resulting in significant losses in yield and quality. In the Southern Soft Wheat Variety Development and Host Resistance Cooperative Project, information provided from extensive and collaborative field screening and genetic characterization of both exotic and native Fusarium head blight (FHB) resistance in breeding lines, commercial cultivars, and mapping populations is now being deployed through marker-assisted (MAS) and genomic (GS) selection, resulting in the stacking of complementary FHB resistance genes. Despite these collaborative efforts, the long life cycle (8-12 months) of winter wheat compared to spring wheat (3-4 months) and other crops is still a constraint to breeders. The process of inbred line development can be expedited through the use of doubled haploid technology, where inbred lines can be produced in 12-18 months and will reduce the variety development time from 8-10 years to 4-5 years.

Each year the southern VDHR breeding programs make hundreds of crosses to combine FHB resistance genes and other traits of interest. For this proposal, each program (AR, VA, LA, GA, and SC) will use one or more of these crosses to develop 300+ double haploid lines per year. These lines will be genotyped in collaboration with the Eastern Regional Small Grains Genotyping Lab (Raleigh) and field evaluated across multiple locations through exchange and coordination among regional breeding programs.

The proportion of DH lines derived from sources of FHB resistance within the Southern VDHR coordinated project is increasing each year. Currently, there are 368 DH lines in advanced testing, 736 DH lines in observation level testing and ~6500 DH lines in the head-row stage. Many of these have resulted from DH exchange between programs. The majority of these lines contain multiple FHB resistance genes and are combined with other favorable agronomic traits.

This proposal addresses Research Priorities: 1) Increase and document acreage seeded to varieties with improved FHB resistance; 2) Increase efficiency of coordinated project breeding programs, and; 3) Implement new breeding technologies and germplasm.