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Project Title: Developing and Evaluating Wheat Lines for FHB Resistance in Atlantic Coastal Plain

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) remains a critical challenge for US wheat producers. Fortunately, recent research has identified several genetic sources of host plant resistance to this devastating disease, which is caused by the fungus *Fusarium graminearum*. Breeding programs must now incorporate these FHB resistance genes into wheat varieties that are adapted and high yielding across production regions.

As such, this work aims to accelerate winter wheat variety development efforts by incorporating advanced genomics and field screening methods that recently became available for applied use in breeding programs. The **goals of this project** are to (1) screen commercially available wheat cultivars for FHB resistance and (2) develop advanced breeding lines with increased FHB (aka scab) resistance.

Screening for scab resistance includes evaluating lines in the field and with genetic markers, which helps to identify the mechanisms underlying resistance. Now that a mist-irrigated, inoculated nursery to screen FHB has been established in South Carolina as a result of previous USWBSI funding, the Clemson Small Grains Breeding Program can effectively evaluate thousands of wheat lines on an annual basis to support the southern winter wheat community. In addition to field screening, each line will be tested for the presence of genetic markers by the Eastern Regional Small Grains Genotyping Lab (Raleigh, NC). This project will also expand the ability of breeding programs to measure Fusarium-damaged kernels (FDK), an important trait to determine FHB resistance, by using a digital imaging platform. Using this advanced platform to measure FDK will speed up the screening process to allow for faster results and more lines to be tested in a given year. Finally, grain samples from 350 advanced breeding lines will be analyzed for levels of deoxynivalenol (DON), a toxin produced by the fungus that can be harmful to humans and animals at high concentration.

Stakeholder benefit

Expediting development of wheat cultivars with increased scab resistance and overall performance for the Atlantic Coastal Plain will benefit wheat growers in the region. Increasing the number of adapted FHB resistant cultivars that reach commercial availability will increase wheat acreage planted to resistant cultivars and thus improve overall productivity and quality of soft red winter wheat in the region. This increased volume of healthy wheat in the marketplace benefits end-users and consumers.