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Project Title: Identifying Sources of FHB Resistance in Diverse Wheat Germplasm for the Southeast

PROJECT 1 ABSTRACT
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The goal of this project is to evaluate wheat sources of Fusarium head blight (FHB; *i.e.* scab) resistance to identify new FHB resistant varieties adapted to South Carolina and other states in the southeastern US. To meet this goal, two objectives are proposed:

1) conduct a coordinated field trial in Florence, SC to screen elite varieties, advanced breeding lines, and diverse germplasm for FHB resistance, and
2) implement greenhouse crossing to intercross lines that exhibit FHB resistance.

To advance the development of varieties with host plant resistance to FHB, an inoculated field nursery in Florence, SC will be established to evaluate FHB resistance across advanced breeding lines, segregating populations, and doubled haploids. Specific traits that will be evaluated include an overall FHB index rating as well as individual FHB incidence ratings (type I resistance), FHB severity ratings (type II resistance), and percentage of *Fusarium*-damaged kernels (FDK, type III resistance). Grain samples from each breeding line will also be sent to a DON testing facility for accurate measures of deoxynivalenol. Plant material to be evaluated in the study includes entries in the Uniform Southern Scab Nursery, Uniform Southern Soft Red Winter Wheat Nursery, Gulf Atlantic Wheat Nursery, and multiple SunGrains nurseries. The project will focus on advanced breeding lines and cultivars that are close to becoming commercially available, and data generated will serve as an important resource for growers to make informed decisions on cultivar selection for their farms. In addition, doubled haploids, segregating populations, and a small number of diverse lines with potential new FHB resistance genes will be screened in the nursery to support ongoing breeding efforts to improve resistance levels in wheat.

Data on FHB resistance collected from the SC scab nursery will be distributed to the wheat breeding community. As no FHB field evaluations are currently performed in the state, information on both (1) stability of FHB resistance in different genetic backgrounds in an additional production environment and (2) yield and quality data of advanced breeding lines with FHB resistance in SC will be beneficial. To also serve the wheat breeding community, crosses between elite parents with levels of FHB resistance will be made. The primary output from this objective will be F_1 seed from targeted crosses that will be segregating for multiple FHB resistance QTL. Generated F_1 seed will be a valuable genetic resource to enable recurrent selection for FHB resistance from segregating population head-rows, development of three-way crosses, and production of double haploid populations. Seed will be maintained and made available to wheat breeders upon request. Bulk and subsequent single-plant selections will be planned post-project duration in multiple SC environments to work toward releasing adapted varieties with increased FHB resistance.

Host plant resistance remains the most economical and sustainable approach to control scab in wheat. This project aims to develop information and genetic resources and that will be useful to the breeding community to develop and release varieties with improved FHB resistance to increase grower profitability and allow more production of high-quality US soft red winter wheat for foods and feedstuffs.