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Project Title: Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.

PROJECT 1 ABSTRACT

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During the 2003 wheat season, a severe epidemic of scab occurred in Georgia. Numerous producers had difficulty in marketing their grain due to high DON concentration that was above the 2% level established by the millers in the state. The overall goal of the project is to develop soft red winter wheat cultivars with scab resistance and improved yield potential for commercial use in the lower Southeastern United States. The specific objectives of this project are to: 1. identify, incorporate, and pyramid resistance to FHB in elite lines using conventional breeding and double-haploid; 2. transfer resistance into adapted cultivars by using DNA marker for markers-assisted selection. These objectives will help to accelerate the development of resistance cultivars to Fusarium head blight (part of the breeding and variety development of the Scab Initiative).

Several wheat sources from diverse origin with FHB resistance have been transferred into elite lines that are adapted to the Southeast. Segregating populations from these crosses of scab resistant germplasm with adapted cultivars and elite lines will be evaluated in the field for scab resistance. Several breeding lines, GA941318E22, GA941320E24, GA941470E18, and GA941523E21, from the University of Georgia have been identified with good scab resistance. These breeding lines and cultivars were crossed with our adapted scab resistant lines and will be backcrossed to recurrent parent. About 550 wheat lines will be evaluated for scab resistance in a misted, inoculated trial. Resistant sources to scab from other breeding programs have been crossed and backcrossed to elite lines adapted to the southeast which have excellent leaf rust and powdery mildew resistance, agronomic or milling and baking traits for soft red winter wheat. About 120 wheat elite lines and the two uniform FHB nurseries will be evaluated for Type II resistance to FHB. The resistant lines will be used as parents in the breeding program. Five lines from our elite nursery were identified in 2005 with good FHB resistance. These five lines will be further evaluated in the greenhouse. Progeny from several backcrosses will be individually evaluated in the greenhouse for type II resistance. Type-II resistance will be transferred resistance into adapted cultivars and elite lines by backcrossing and double haploid techniques. Five lines with good disease and insect resistance will be evaluated in the Southern Scab Nursery.

SSR markers will be employed to investigate the transferring of QTLs from donor parents to elite lines. Breeding lines containing known QTLs for scab resistance in their pedigrees will be evaluated for appropriate SSR markers. SSR markers will also be used on backcross and F2 populations to identify FHB resistance derived from exotic sources (Sumai 3 and N7840 on 3BS (Xgwm 533, Xgwm 493, XBARC133), 5AL, and native sources. The most productive, multiple pest resistant cultivars and elite lines developed at UGA will be used as recurrent parents in a marker-assisted backcrossing program.

