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

PROJECT 1 ABSTRACT

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Broadly adapted cultivars from our program are been grown in areas where the potential exists for high incidence of scab. The specific objectives of the project are: (1) to identify, incorporate, and pyramid resistance to FHB in elite lines and (2) to 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.

Scab resistant cultivars that have combined resistance to leaf and stripe rust have been lacking in the southeast. Several wheat sources from diverse origin with FHB resistance have been transferred into elite lines that are adapted to the Southeast. Breeding lines, GA941318E22, GA941320E24, GA941470E18, and GA941523E21, have been identified with native source of scab resistance and rust resistance. These breeding lines and cultivars were crossed with our adapted scab resistant lines and were backcrossed to recurrent parent. About 120 F_{4:8} wheat elite lines and the two uniform FHB nurseries were evaluated for Type II resistance to FHB. The resistant lines were used as parents in the breeding program. Five lines from our elite nursery were identified in 2005 with good FHB resistance. SSR markers were employed to investigate the transferring of QTLs from donor parents, W14 and Futai 8944, to elite lines. Breeding lines containing known QTLs for scab resistance in their pedigrees were evaluated for appropriate SSR markers. SSR markers were used on backcross and F₂ populations to identify FHB resistance derived from exotic sources (Sumai 3 and N7840 on 3BS (*Xgwm* 533, *Xgwm* 493, *XBARC* 133), 5AL (*Xgwn* 156, *BARC* 100 and *BARC* 186) and native sources. Marker assisted selection (SSR) is being employed on backcross and double haploid lines to identify FHB resistance derived from exotic and native sources. DNA samples were extracted from 147 DH plants generated from 8 crosses. Fifty-six plants showed positive for the QTL on 3BS with markers, *Xgwm* 533 and *BARC* 133. The plants were also identified for the other QTLs on chromosome 5AL and 2BS. Pyramiding of FHB resistant QTLs on chromosome 3BS, 5A and 2A from two Virginia resistant lines VA01W-461 and VA10W-476, derivative of Sumai3 into local adapted line 'AGS2000' by backcrossing integrated with double haploid and marker assisted selection methods is progressing. The use of marker assisted selection with the SSR markers help promote pyramiding major QTL's and accelerate the development of releases of scab resistant wheat cultivars to growers. 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.