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Research Area: VDUN

Project Title: Selective Breeding for Scab Resistance in Soft Red Winter Wheat.

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PROJECT 2 ABSTRACT

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The overall project goal is to accelerate development of adapted and commercially viable scab-resistant SRW wheat varieties by identifying and incorporating diverse types of resistance into elite genotypes. The specific objectives of this project are to: 1) evaluate newly developed scab-resistant and/or scab-tolerant wheat lines for effectiveness of scab resistance and other important agronomic traits; 2) evaluate backcross progeny for scab resistance and resemblance to recurrent parents to accelerate development of scab-resistant lines; and 3) identify and select scab-resistant wheat lines derived from crosses among adapted and non-adapted lines possessing diverse types of resistance.

Up to 150 advanced lines from our program and two Uniform Scab Nurseries will be evaluated for Type II scab resistance in greenhouse tests. FHB resistant F₂ progeny selected from one BC₅F₁ and 17 BC₄F₁ populations will be evaluated in headrows for agronomic traits and similarity to recurrent parents at Warsaw, VA. Near-isogenic FHB-resistant wheat genotypes derived from these populations will provide breeding programs with adapted Type II resistant parents with superior combining ability. Nine DNA markers associated with scab resistance on three chromosome regions were developed and utilized in the selection of backcross progeny and for genotyping advanced lines.

In field tests, up to 250 genotypes, representing commercial SRW wheat cultivars and elite lines from numerous U.S. states will be evaluated for scab resistance in an inoculated trial. Such tests have led to the identification and release of adapted scab-resistant cultivars such as Roane, Ernie, and McCormick, a recent release from our program. Fifty-nine new wheat lines developed in our program will be evaluated at Blacksburg in a replicated disease assessment test and in a non-replicated observation yield test at two locations. Twelve of our scab-resistant lines will be evaluated in replicated yield trials at three locations in Virginia and in Uniform FHB Nursery tests at multiple locations.

Approximately 4400 F₄-F₈ lines and 3200 backcross progeny will be evaluated in headrows for agronomic traits and resistance to other prevalent diseases at Warsaw, VA. A total of 135 doubled haploid lines, selected on the basis of FHB resistance and agronomic type, will be evaluated for scab resistance at Blacksburg, VA and for other agronomic traits at Warsaw, VA in 2003. Nearly 150 segregating populations developed to incorporate and combine Type II and other types of resistance into SRW wheat backgrounds will be evaluated in an irrigated scab nursery at Mt. Holly, VA in 2003. In early generations heads will be selected from populations possessing desirable agronomic traits and resistance to scab. Individual head selections in later generations will be planted and evaluated in headrow tests at Warsaw, VA. Selected lines will be evaluated for FHB resistance and agronomic performance in replicated tests prior to release.