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Project Title: Accelerated Breeding for Scab Resistance in Soft Red Winter Wheat and Barley.

PROJECT 1 ABSTRACT
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The overall project goal is to accelerate development of adapted and commercially viable scab resistant small grain varieties by identifying, incorporating and pyramiding diverse types of resistance into elite genotypes. The specific objectives of this project are to: 1) Incorporate and combine scab resistance genes from newly-developed scab resistant and/or scab tolerant soft red winter (SRW) wheat lines into commercially viable SRW and specialty wheat varieties; 2) Evaluate backcross derived wheat lines, originating from crosses between adapted SRW wheat lines with non-adapted Type II resistance sources, for scab resistance and agronomic performance to accelerate development of scab resistant wheat lines and varieties and; 3) Expand breeding activities to incorporate FHB resistance into winter barley.
To develop high yielding, scab resistant SRW wheat lines, we have deployed a combination of top-cross, doubled haploid, backcross, and molecular-marker assisted breeding methods. Type II scab resistance from diverse sources, such as W14, Shaan85, Futai8944, Futai8945, Futai8946, Ning9016, Ning7840, Yumai 7, Er-Mai 9, Wuhan 1, and VR95B717, has been successfully transferred into adapted SRW wheat backgrounds Roane, Ernie, Pioneer 2684, Renwood 3260, Madison, Jackson, and a Sisson sib. In the 2005 crop year, 64 advanced lines will be evaluated in Scab Preliminary Tests and 359 lines in Scab Observation Tests for yield performance at two locations. All lines in these two nurseries also will be evaluated for scab resistance in replicated disease assessment trials at Blacksburg, VA. An additional 200 SRW wheat genotypes, including entries in the two Uniform Scab Nurseries, plus entries from Virginia's State Wheat Trial, will be evaluated for scab resistance in replicated disease assessment tests at Blacksburg, VA. In headrow tests, 3,600 topcross and backcross derived lines will be evaluated and selected based on agronomic traits and resistance to other prevalent diseases at Warsaw, VA prior to being evaluated for FHB resistance in replicated disease assessment tests the following year at Blacksburg, VA. A total of 100 wheat populations (28 F_2, 47 F_3, 9 F_4, 9 F_5, 5 F_6, 1 F_7 and 1 BC_3F_4) will be planted in 160 ft^2 blocks and evaluated in an irrigated scab nursery at Warsaw, VA this fall. Approximately 250 advanced lines from our program (Parental lines and Scab Preliminary Test) and from two Uniform Scab Nurseries will be evaluated for Type II resistance in greenhouse tests. Barley varieties previously identified as having FHB resistance, such as Atahualpa, Coolie, Frederickson, and MN-Brite have been used as parents in our breeding program. Populations comprised of these and other FHB resistant parents will be evaluated in an irrigated scab nursery at Blacksburg, VA this spring. In addition, 47 entries from Virginia's State Barley Test, and 62 new winter barley germplasm lines previously selected for FHB resistance by Dr. Steffenson will be further evaluated for resistance in an inoculated, mist-irrigated field nursery at Blacksburg, VA in 2005.