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Project Title: Accelerating the Development of Scab Resistant Soft Red Winter Wheat.

PROJECT 1 ABSTRACT

(1 Page Limit)

The identification of native sources of resistance within the Missouri winter wheat breeding program has enabled us to have a productive pipeline of FHB resistant germplasm in adapted backgrounds which will continue to accelerate the release of FHB resistant varieties, thus meeting Variety Development and Host Resistance (VDHR) goals 1 and 2 of the 2007 USWBSI Action Plan. Best known among these resistant resources are Ernie, Bess and Truman, all of which are publically released cultivars that are grown on significant acreage both within Missouri and beyond its borders. Over the past five years, our crossing program has generally included at least one FHB resistant parent and often two or more sources of resistance. As an example, in 2006 and 2007 we have had a total of 1203 F₂ populations, 80% which have at least one FHB resistant parent, with Truman, Bess, Ernie, Roane, Patton, and Goldfield and several Illinois lines providing the basis of resistance. Additionally, we have heavily used lines from Argentina, Brazil, South Korea, Italy and China in specific 3- and 4-way crosses in highly adapted backgrounds to bring in different sources of resistance. In other early generations, 85% of our F₃ populations and 80% of F₄ populations have at least one FHB resistant parent. Although the 3BS sources of resistance has moved more slowly in our program because of adaptation problems and readily available native sources that generate more rapid progress, we currently have 148 F₅ crosses that involve 3BS in combination with other native sources of resistance. Whether or not these populations will lead to adapted, superior populations is yet to be determined, however, regardless of agronomic performance, lines derived from these populations will be cycled in to the program as germplasm for future crosses. The objectives of this proposal are aimed at further identification of potentially novel sources of resistance as well as pyramiding known sources into our genetic backgrounds that will ensure FHB resistant varieties well into the future. These objectives which are both specific to our program and collaborative across the region include: designing crosses that include FHB-resistant parents with native and/or Chinese sources of resistance, systematically screening all lines developed at the University of Missouri from preliminary yield testing (first test out of head row) and verification of FHB resistance through years of advanced yield testing, evaluating and sharing highly resistant lines with other USWBSI researchers through the U.S. Scab Nursery system, growing and evaluating others' material in both the Northern (Preliminary and Advanced) and Southern Scab Nurseries, screening commercial entries in the Missouri Winter Wheat Performance Nursery and disseminating that information to growers through the annual variety test book and through talks at field days focusing on the variety trials and haplotyping with all known FHB markers promising lines in the Missouri breeding program to aid in the identification of potentially unique sources of resistance. In collaboration with others we will also phenotype RILs developed in the Ernie background to contribute to a mapping project conducted by Dr. Shuyu Liu at Virginia Tech on type I resistance in that variety. Varieties released from these efforts will be released as public varieties with PVP protection and released to growers both in Missouri and in other states where they are adapted. Germplasm will be shared with any interested breeder within the initiative and will be available for research purposes under the conditions of the Wheat Breeders' Code of Ethics and the Plant Variety Protection Act.