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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 wheat breeding program has enabled us to have a productive pipeline of FHB resistant germplasm in adapted backgrounds that will continue to accelerate the release of FHB resistant varieties. We have built heavily on the Truman family base because of the extremely good resistance in that family and the broad adaptation of the lines in general, focusing on combining that source with other presumed genetically different resistances as well as early maturity, shorter stature, better milling and baking quality and better resistance to diseases such as barley yellow dwarf virus and leaf rust. Susceptible by susceptible crosses, however, still are yielding highly resistant offspring as evidenced by the pedigree L910097/MO 92-599. Several lines from this pedigree have been entered into the Northern Scab Nursery and have consistently been among the most resistant lines in the nursery. MO 080104 was entered into the Eastern Nursery in 2010 and finished second for grain yield, 3rd for test weight and 1st for FHB resistance. The family of lines carries Ppd-D1a for photoperiod insensitivity and so is very broadly adapted across the northern and southern soft red winter wheat region. Beyond FHB resistance that is comparable to Truman, MO 080104 has the maturity of Bess, is short (although it doesn't carry markers for Rht 1, 2 or 8), has stripe rust resistance, resistance to soilborne viruses, and tolerance to acid soils. The source of the resistance based on pedigree analysis, differs from other known sources and preliminary marker data indicates that it is not derived from FHB1, or regions on 2D or 5A. This line will become a check in the Eastern Nursery in 2012. Once released and where adopted, MO 080104 will lessen the threat of FHB while providing exceptional yield and test weight potential throughout the soft wheat region. Our objectives for 2011 are to: (1) continue our history of designing crosses that include FHB-resistant parents with native and/or exotic sources of resistance; (2) systematically screen all lines developed at the University of Missouri from preliminary yield testing and verify FHB resistance through years of advanced yield testing; (3) enter lines that combine FHB resistance with excellent agronomic performance into the Northern and Preliminary Scab Nurseries and other relevant breeding nurseries; (4) haplotype, using all known FHB resistance markers, lines with superior levels of resistance shown by pedigree analysis to differ from known sources of resistance; (5) compare and correlate type I field resistance ratings with our greenhouse spray technique in replicated experiments involving a diverse set of germplasm ranging in field type I reactions (20%-100%) and in the Truman RIL set which range in type I resistance from 20% to 100%; (6) continue development of recombinant inbred lines; Bess/MO 94-317 for validation of Truman markers (currently in the F4); (7) develop a doubled haploid mapping population for MO 080104. Results from objective 4 will be shared with interested breeders through the peer reviewed literature and at the Scab Forum. 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 breeders 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.