PI: Anne McKendry **PI's E-mail: mckendrya@missouri.edu**

Project ID: FY10-NW-011 **FY09 ARS Agreement #: 59-0206-9-077**

Research Category: **VDHR-NWW** **Duration of Award: 1 Year**

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

PROJECT 2 ABSTRACT

(1 Page Limit)

Since FHB resistance was introduced as an objective at Missouri in1993 many 'native' sources of resistance have been identified and three FHB resistant cultivars have been released that are currently grown both in Missouri and in surrounding states. The identification of native sources of resistance within the Missouri 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. 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. In the Preliminary 5-State Nursery, in which Bess is our check variety, MO 080104 from this pedigree had the lowest incidence (20%) and severity (15%), lowest index (3.1%), 13% FDK (beaten by Bess with 10%) and the lowest ISK (16) in the nursery. It yields very well (finishing 3rd across all locations), has excellent test weight, has the maturity of Bess and is shorter than Bess. 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. Our objectives over the next two years will be to: (1) Continue our history of designing crosses that include FHB-resistant parents with native and/or exotic sources of resistance. Choice of parental material will be informed by agronomic type, resistance level, type of resistance, adaptation, nursery data and (when available) marker data to pyramid genetically different FHB sources; (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. Where lines have both agronomic performance and FHB resistance, they will be entered into the Northern and Preliminary Scab Nurseries and other relevant breeding nurseries. Typically we screen about 1000-1200 lines/year in both the greenhouse and field but in this proposal, more will be included from our mass-selection study; (3) haplotype, using all known FHB resistance markers, lines with superior levels of resistance shown by pedigree analysis to differ from known sources of resistance; (4) 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%; (5) derive lines from 134 FHB populations that have been subjected to 4-5 cycles of mass selection and begin performance and FHB evaluations; (6) continue development of recombinant inbred lines; Bess/MO 94-317 for validation of Truman markers (currently in the F4); MO 080104/MO 94-317 (and 2 sibs) (in the F2). 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.