

PI: Anne McKendry**PI's E-mail: mckendrya@missouri.edu****Project ID: FY14-NW-004****ARS Agreement #: New Agreement (Expiring 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 1 ABSTRACT**

(1 Page Limit)

Significant yield losses caused by *Fusarium graminearum* Schwabe (teleomorph *Gibberella zeae* (Schwein.), the pathogen known to cause Fusarium head blight (FHB) or scab in wheat (*Triticum aestivum* L), continue to cause crop losses in Missouri, particularly where FHB resistant varieties are not planted. The focus on 'native' resistance in the Missouri program has accelerated the development FHB resistant varieties four of which have been released including Ernie, Bess, Truman, and MO 080104. The resistance in each of these varieties is highly functional in years where FHB is a problem; lessening yield losses and enhancing marketability of the grain (due to lower DON). Both of these factors strengthen the overall wheat economy in areas where they are grown. We continue to discover novel sources of FHB resistance in genetic backgrounds adapted to the soft red winter wheat growing areas. Once identified, we have successfully used these new sources in combination with other well established sources in our program and have clearly shown that native sources have good heritability, can be controlled by genes with major effects, and frequently produce offspring with acceptable levels of resistance compared with our resistant check Truman. Missouri germplasm is routinely shared with other interested breeders through the Northern and Preliminary Northern FHB nurseries and often through other cooperative nurseries including the 5-State and Uniform Eastern Soft Red Winter Wheat Nurseries. Missouri lines also serve as checks in all three of the uniform scab nurseries. The resistance in most Missouri lines builds on the resistances in the Truman family, Ernie, and/or the MO 080104 family of lines as well as other less documented Missouri sources. We have, however, also used native resistances from Illinois, Purdue and Ohio as well as exotic sources from CIMMYT, Brazil, Japan, China and Europe (Romania, Hungary, and Italy). In FY14 and FY15, many of the breeding lines being evaluated have these more exotic sources combined with native sources in 3- and 4-way crosses. Our overarching goals continue to be the improvement of FHB resistance, particularly DON levels, in agronomic backgrounds that are earlier, shorter, higher yielding, and with better end-use quality than the Truman background. I am now building on the MO 080104 family of lines because of their superior agronomic performance coupled with their high level of resistance. Most if not all of the MO 080104 family carry *Ppd-D1a* for photoperiod insensitivity and thus are broadly adapted across the region. They also carry *Sbmv1* for resistance to soilborne viruses, are moderately resistant to stripe rust and carry some tolerance to acid soils. Therefore, they are well positioned to contribute to the USWBSI objective of lessening the threat of FHB across the soft red winter wheat region. Specific objectives of this project for 2014/2015 include: (a) the continued design of crosses that combine FHB-resistant parents with native and/or exotic sources of resistance; (b) systematic screening of advanced breeding lines for all 4 types of FHB resistance and verification of resistance levels in lines with putative resistance identified in previous years of screening; (c) increasing a mapping population for MO 080104 which carries no known markers for FHB with the ultimate goal in FY15 of phenotyping this population in both the field and greenhouse environments; (d) greenhouse and field screening of 300 F7 RILs of a mapping population developed from the cross Bess/MO 94-317 to validate Truman FHB markers as Bess is a full sib of Truman that has FHB resistance.