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

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) continues to be a problem throughout the Midwest and resistant varieties remain the most economical approach for addressing this problem. The FHB resistance in most of the Missouri lines builds on the resistances in the Truman family, Ernie, and/or the MO 030291 family of lines (including MO 080104). Our basic hypothesis is that by using these native resistances as a base for improving FHB resistance in our breeding program we should be able to get resistant cultivars into the market place more rapidly. Our best native resistances appear to be broad based with low severity and incidence, good kernel quality retention under disease pressure, and low toxin (DON) levels in the harvested grain. Since the release of Truman in 2005, we have designed crosses among lines that carry our own native sources of FHB resistance and lines carrying exotic or genetically diverse sources of resistance from other soft red winter wheat breeding programs as well as sources from Asia, South America, Eastern Europe, and CIMMYT. In 2012, MO 080104 was licensed and since that time, we have licensed 6 other proprietary lines, that range in resistance from levels approximately equal to Truman (2 lines), Bess (1 line) and Ernie (3 lines). These lines include a grazing variety that combines resistance in Truman with that of a South Korean variety (Seu Seun 6). Within the FY18-FY19 timeline, the objectives of my FHB breeding project will therefore continue to be to: (1) combine genetically different introduced sources of resistance with U.S. native resistance. Choice of parental material will be informed by yield, test weight, maturity, height, FHB resistance and resistance to other relevant diseases; (2) add further genetic diversity to our program through hybridization of our advanced lines with the best of 300 doubled haploid lines acquired from Dr. Van Sanford of the University of Kentucky, that contain important FHB resistance QTL in adapted soft red winter wheat backgrounds; (3) systematically screen all advanced lines for FHB resistance by evaluating incidence, severity, FDK, and DON in greenhouse and field inoculated, and misted, FHB nurseries; (4) a final objective of this project, although funded separately by the USWBSI will be to screen 600 plots (2 replications of a 300 entry panel) of hard red winter wheat in collaboration with Dr. Stephen Baenziger of the University of Nebraska. The Missouri breeding project should continue to produce high yielding FHB resistant lines that will lessen the risk the risk of Fusarium head blight to the wheat economy of the soft red winter wheat region. It will also produce germplasm and/or cultivars that will be shared with interested breeders across the region through cooperative FHB nurseries.