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PROJECT 2 ABSTRACT

(1 Page Limit)

Fusarium graminearum Schwabe (teleomorph *Gibberella zeae* (Schwein.), (scab) is an increasingly important problem in the north-central region of the United States. Yield losses in Missouri are difficult to quantify but are thought to have exceeded \$400 million dollars since 1990. Losses in 1990 and 1991 alone were estimated to have cost the wheat industry in excess of \$250 million. The identification of different sources of resistance is critical to the continued improvement of *Fusarium* head blight resistance in winter wheat. Their identification in adapted soft red winter wheat will accelerate the development of scab resistant varieties and provide more immediate relief to wheat growers in scab years. In August of 2003, the University of Missouri Agricultural Experiment Station announced the release of 'Truman' soft red wheat, which was released for its broad-based resistance to *Fusarium* head blight. In addition, Truman had excellent levels of performance in Missouri commercial trials where it either won or was in the top yield group (not different from Pioneer Variety 25R37), Truman finished second in the Eastern Soft Red Winter Wheat Nursery in 2001. Its adaptation in the Northern Corn Belt States suggests that it should be of immediate value to wheat growers in these areas that are often affected by scab. Ongoing work suggests screening our advanced lines is a valid approach. Verifications of lines preliminarily screened in 2001 identified 52 lines in which disease spread less than 2 spikelets in the inoculated head of which 36 lines had a spread of less than 1.5 spikelets and 15 lines had a spread of less than 1 spikelet and were considered equal to Ning 7840, and Sumai 3, which had mean spreads of 0.9 and 0.7 spikelets, respectively. The *Fusarium* head blight indices (FHBI) in these lines were also good. 84 lines had a FHBI equal to or better than Ernie (20%). Of these lines, 41 had a FHBI <10%, 23 had an FHBI between 10% and 15% while the FHBI of the remaining 20 lines ranged from 15%-20%. These appear to be sources different from Ernie as they represented 55 different pedigrees, only 13 of which contained Ernie. The objectives of this proposal therefore, are: (1) to continue to identify useful, novel sources of scab resistance through greenhouse and field screening of all advanced breeding lines in the Missouri wheat breeding program; (2) to identify and/or confirm further useful sources of scab resistance through field and greenhouse evaluation of the Northern and Southern Winter Wheat Scab Nurseries; (3) to continue to incorporate and pyramid new sources of resistance, as they are verified, into elite Missouri soft red winter wheat breeding lines; and (4) to characterize the genetics of resistance to scab in Truman. Preliminary evaluation of all lines that are moved from preliminary, yield nurseries (PYNs) to advanced, multi-location, replicated testing (AYTs) will be followed by verification of resistance data and pedigree analysis to determine relationships among identified sources. Conventional 6-generation means analyses will be used to study resistance in Truman. Population development was initiated in 2003 and results will be used to complement molecular work on a doubled haploid set of lines expected to begin in 2004/2005. The combined results of these genetic analyses should aid in the exploitation of this source of resistance in breeding programs nationally.