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## PROJECT 1 ABSTRACT

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*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 introduction in germplasm acquired from countries where scab is a common threat or from breeding programs globally, should enable us to identify sources of resistance that differ from those identified in North American breeding programs. We hypothesize that where genes are different and are combined with those locally discovered; we should be able to enhance scab resistance in resulting breeding lines by improving resistance per se, improving resistance under higher inoculum loads, or by enhancing the stability of resistance over broad geographical areas. Previous work in this area has successfully identified several new sources of resistance from broad geographical regions. Four objectives are proposed for 2005 including: (1) further evaluation of lines from eastern Europe, particularly from Turkey (415 accessions), and the Czech Republic (48); (2) verification (prior to introgression) of lines having excellent levels of field and greenhouse resistance under inoculation; (3) introgression of identified verified winter wheat sources of resistance into widely adapted soft red winter wheat cultivars; (4) genetic analysis of verified sources of resistance through population development for both conventional and molecular genetic analyses. Introgression was initiated in 2003 with accessions from Asian and Italy including: Seu Seun 6 (S. Korea), Quaderna and Colorben 4 (Italy) and two Chinese landraces (Chow and Cltr9429). In 2004, introgression was initiated for land races from Bosnia and Herzegovina, Yugoslavia, and Macedonia. In addition, crosses were made with one cultivar from Hungary. In 2005, lines selected for introgression will include Brazil 8 and 15, Argentina bulk 8, line 101 and 1, Japan 8 and CIMMYT 30 and 22. Additional lines with stable resistance will be identified in the spring of 2005 following field evaluations. Doubled haploid production for genetic analyses of resistance in Seu Seun 6 (S. Korea), Quaderna and Colorben 4 (Italy) and two Chinese landraces (Chow and Cltr9429) is completed or nearing completion. Phenotyping will commence in 2005. Population development for genetic analyses of all sources of resistance identified for introgression is underway. Phenotyping of all materials for identification, and verification of resistance will be conducted under artificial inoculation with *Fusarium graminearum* in the greenhouse and field. Inoculation of segregating plots will be conducted under high disease pressure in the field. This research should lead to new and useful sources of scab resistance for US wheat breeders.