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## PROJECT 1 ABSTRACT

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*Fusarium graminearum* Schwabe (teleomorph *Gibberella zea* (Schwein.)), (scab) is an increasingly important problem in the north-central region of the United States. Yield losses in Missouri alone have exceeded \$400 million dollars since 1990. Host resistance is considered the most practical and effective means of control but breeding has been hindered by a lack of effective resistance genes and by the complexity of the resistance in identified sources. The identification of different sources of resistance and their incorporation into adapted wheat varieties is critical to the continued improvement of *Fusarium* head blight resistance in winter wheat. We hypothesize that the identification and verification of resistance in lines that are geographically diverse may add new sources of resistance that can be used in breeding programs. By May 2003, we will have completed greenhouse and field evaluations of approximately 4262 accessions from Asia, Brazil, Italy and Eastern Europe. From Asia and Italy, 38 accessions were identified with intermediate good levels of type II resistance and/or low incidence. Approximately 2700 lines from the Balkans, Bulgaria, Hungary, and Romania have been preliminarily screened and accessions with intermediate to excellent levels of resistance are in various stages of verification. Of these, approximately 100 lines have very good levels of resistance (type II = 10%) while approximately 250 additional lines have type II values between 10% and 20%. Lines from Poland, Ukraine, and Czechoslovakia will be evaluated in 2002/03. This proposal seeks to continue evaluation of new accessions including those from Russia (268) Switzerland (325), Austria (111) and as yet unscreened accessions from China (213). We also propose to evaluate approximately 70 winter wheat hexaploids from the Sando collection that contain potential sources from the related species. In addition, this proposal will facilitate introduction into the US of lines identified through the CIMMYT/USWBSI partnership. Approximately 72 are anticipated in 2002/03 from: China, Romania, Ukraine, Korea, Uruguay, and Argentina. Finally, we will undertake molecular genetic diversity analyses of approximately 200 of the geographically diverse lines identified at the Missouri germplasm center that carry putative scab resistance genes. Using AFLP markers, we will screen populations for polymorphisms. Presence absence data for individual fragments across lines will be collected and cluster analysis will be performed on the data to generate a tree indicative of relatedness. A set of 200 lines identified from among 243 lines introduced from CIMMYT was similarly evaluated using AFLPs in 2002. In 2003, 100 simple sequence repeat (SSR) primers will be screened against these lines including those markers that we know are linked to resistance genes such as the defining markers for the 3BS QTL in Sumai 3 and the 2AS markers in Freedom. This research will provide preliminary data to better select among the many resistant sources identified by the germplasm evaluation program at Missouri.