PI: Anne McKendry **PI's E-mail: mckendrya@missouri.edu**

Project ID: 0405-MC-034 **FY03 ARS Agreement #: 59-0790-9-052**

Research Area: **GIE** **Duration of Award: 1 Year**

Project Title: Winter Wheat Germplasm Introduction and Evaluation.

PROJECT 1 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 Missouri 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. Verifications in 2003 of resistances identified in 2002 identified 31 lines with a mean spread of less than 1 spikelet in 695 accessions originating from 9 countries in Eastern Europe. An additional 37 lines had a spread of 1.0-1.5 spikelets. Fusarium head blight indices (FHBI) in this set of germplasm included 70 lines with an index of less than 10% of the inoculated spike. An additional 43 accessions had a FHBI of between 10% and 15%. The susceptible check in this set of lines had a spread of 12.6 spikelets and a FHBI of 85% while the resistant checks Ernie and Sumai 3 had a mean spread of 2.8 spikelets and 0.9 spikelets and a FHBI of 25% and 6%, respectively. In the field, 74 accessions had a scab index (incidence x severity) less than 10% while 13 additional lines had a scab index between 10% and 15%. The susceptible check in this nursery had a field index of 67% disease while the resistant check had a field index of 12%. A third generation of screening will further verify these data. We have been successful in identifying high levels of resistance in many accessions; however, many are tall and late and will require significant pre-breeding to incorporate resistance into adapted backgrounds. This proposal seeks to evaluate scab resistance in 739 accessions originating from countries we have yet to sample (France – 405 accessions; Germany – 268 accessions) and from countries where a preliminary sample identified resistance in more agronomically desirable genotypes. The latter group will include 36 accessions from Italy, Japan, and Korea. A second objective will be to coordinate the introduction, quarantine, increase, and distribution of resistant wheat germplasm, identified through the collaborative agreement between the USWBSI and CIMMYT. We anticipate receiving approximately 100 breeding lines that contain multiple sources of diverse resistance. Finally, Missouri is in a unique position to conduct genetic analyses on these newly identified sources of resistance. Molecular genetic diversity will continue and should aid breeders in choosing accessions among these diverse sources of resistance for inclusion in their breeding programs.