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**Project Title:** Development of Scab Resistant Soft Red Winter Wheat Varieties.

## PROJECT 2 ABSTRACT

(1 Page Limit)

Scab or Fusarium head blight (FHB) is a severe disease of wheat and results in significant loss of grain yield and reduced grain quality. As in 2003, damage due to scab in 2004 was very severe in several parts of the Eastern soft winter wheat region, including northern Illinois, Wisconsin, Michigan and Kentucky. Thus, for the second year in a row scab caused significant economic losses to producers and the wheat milling industry. Therefore, the development of wheat varieties with high levels of scab resistance continues to be of paramount importance. The long-term objective of this project is to develop soft red winter wheat genotypes with excellent resistance to scab combined with resistance to other diseases, high yield potential, and all of the other traits required in a successful variety. This is also one of the central goals of the U.S. Wheat and Barley Scab Initiative. The short-term objectives for our project are: 1) To combine genes for scab resistance from diverse sources, 2) To identify breeding lines with better resistance to scab than any of the parents (transgressive segregants), and 3) To evaluate doubled haploid lines and identify scab resistant lines. Although higher levels of scab resistance are needed, the level of scab resistance currently available must also be introgressed into commercial varieties. Combining scab resistance with the high yield potential (and many other traits) required in commercial varieties is important.

We plan to accomplish the following during the upcoming year. Additional crosses will be made involving scab resistant and adapted parents. Numerous crosses have been made with the objective of combining different types of scab resistance from different sources. We are intercrossing scab resistant lines and plan to make some sib-crosses in a few selected crosses to combine scab resistance with other desirable traits. Data will be collected on scab resistance of breeding lines in our program and lines in the Uniform Scab Nurseries using needle inoculation in the greenhouse and a misted, inoculated nursery in the field. Putatively scab resistant lines will be selected based on greenhouse and field evaluations. Individual plants will be selected from segregating populations in the field. Breeding lines previously identified as being scab resistant will be evaluated further, and these lines will also be evaluated for numerous other traits. Doubled haploid lines will be evaluated in the mist-irrigated inoculated scab evaluation nursery and in performance trials at four locations. We have developed an index (ISK index) as an alternative to the commonly used FHB index. We are using this index to aid in the selection of wheat breeding lines with several types of scab resistance. We are beginning to use marker assisted selection for the 3BS scab resistance QTL to aid in identifying headrows that carry the 3BS QTL.