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

## **PROJECT 2 ABSTRACT**

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Scab or Fusarium head blight (FHB) is a severe disease of wheat and results in significant loss of grain yield and reduced grain quality. 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), 3) To release breeding lines for commercial production, 4) To evaluate uniform nurseries in the FHB field nursery, and 5) To provide data for scab resistance of current varieties to producers. 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. We are continuing to use the ISK index, which we developed as an alternative to the commonly used FHB index, as an aid in the selection of wheat breeding lines with several types of scab resistance and as a result have been selecting lines that have a combination of low incidence, low severity and low percent shriveled kernels. We will also continue to evaluate the DON level present in breeding lines. Current soft red winter wheat varieties will again be evaluated in the scab evaluation field nursery for resistance to scab, and the information will be made available to producers in the Illinois Variety Trial Report and on the University of Illinois Variety Testing website. We are cooperating with the USDA Genotyping Center in Raleigh, NC and using marker assisted selection in several specific projects involving backcross populations with several sources of scab resistance. This selection is primarily based on markers for the 3BS locus, and secondarily several other loci on other chromosomes.