**PI: Karl Glover** **PI's E-mail: karl.glover@sdstate.edu**

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**Project Title: Spring Wheat Breeding for Scab Resistance in South Dakota.**

## PROJECT 1 ABSTRACT

(1 Page Limit)

Within the past decade, severe scab epiphytotics have been incited by *Fusarium graminearum* on wheat, (*Triticum aestivum* L.) durum, and barley (*Hordeum vulgare* L.) in most regions of the United States where growing conditions remain warm and humid during the flowering and grain fill periods. Yearly economic losses to growers caused by this disease have approached or surpassed $500 million on several occasions since 1993. The overall goal of this proposed work is the production of commercially viable spring wheat cultivars that minimize economic loss through increased levels of scab resistance. Past efforts aimed at accomplishing this goal by the spring wheat breeding program at South Dakota State University (SDSU) have proven worthwhile. Several advanced breeding lines and cultivars have been created with elevated levels of scab resistance and yield potential. These materials have been developed as the result of a germplasm screening component within our program that has allowed for identification and selection of the most resistant material. The objectives of this research are to 1) continue operations involved with increasing acreage planted with varieties with improved FHB resistance to reduce DON in the US grain supply, 2) increase efficiency of coordinated project breeding programs to develop and release FHB resistant varieties, and 3) develop new breeding technologies and germplasm to further enhance short term and long term improvement of FHB resistance and to efficiently introgress effective resistance genes into breeding germplasm. The first objective will largely be addressed through accumulation of phenotypic data. Specifically, observations pertaining to FHB resistance and DON accumulation levels will be gathered from among entries in several breeding program and cooperative nurseries. This allows for selection of the most resistant materials to be perpetuated within the program, used as parents, etc. The second goal will be addressed through continued testing of the URSN and through collaborations between this and other research programs. This collection of resistance phenotype data helps to allow new QTLs and unique QTL combinations to be brought in to this and other breeding programs. Finally, the third objective will be accomplished through creation of segregating populations, continued operation of established inoculated and mist-irrigated field and greenhouse screening nurseries, and marker-assisted selection. In the end, these activities should enhance FHB resistance levels beyond what is presently available. Results from cooperative and commercial cultivar trials will be made available to other breeders and growers through inclusion of data in existing extension publications.