PI: Sunish K Sehgal **PI's E-mail: Sunish.Sehgal@sdstate.edu**

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Project Title: Enhancing FHB Resistance and Reducing DON in Winter Wheat for South Dakota.

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) caused by *Fusarium graminearum* Schwabe [teleomorph *Gibberella zeae (*Schwein) Petch] is a periodic disease in South Dakota. FHB is not only devastating due to disease losses but the presence of its mycotoxin, deoxynivalenol (DON) in infected grain reduces its marketability as it poses a significant threat to human health. It is therefore strategic that varieties with good level of FHB resistance be made available to producers in South Dakota. Our primary goal is to rapidly develop and release new winter wheat varieties with enhanced FHB resistance and reduced DON content, and to develop those varieties such that they exhibit excellent agronomic performance in South Dakota. The breeding program will perform crosses to pyramid *Fhb-1, Fhb6* and other resistance gene/ QTLs into South Dakota breeding materials along with native and new sources of resistance to FHB. Sources of resistance will include Lyman, Everest, and Overland, as well as some of the program's most advanced breeding lines that express resistance to FHB. Some sources of resistance are being introgressed into advanced breeding lines adapted to South Dakota whereas sources like Wesley-*Fhb1* is already adapted to SD and the region, and therefore, their use in crosses is expected to result in the quick development of varieties with enhanced FHB resistance and excellent agronomic performance. Lines with resistance are advanced through various yield trial nurseries, where they will be evaluated in an inoculated mist-irrigated field nursery. To help with selecting the most resistant line, the incidence, severity, and FHB index will be determined, and Fusarium damaged kernels (FDK) and DON content will also be analyzed. In addition, breeding lines and released cultivars from other public and private breeding programs will be evaluated in a mist-irrigated and inoculated FHB field nursery and in several environments where FHB is expected to occur naturally. Data on FHB resistant varieties will be made available to other participating breeding programs, regional producers and end-use stakeholders through field day oral presentations, county extension presentations on varieties, and SDSU Crop Performance Test (CPT) publications. Additionally, varieties and the data supporting their described resistance to FHB will be reported on ScabSmart, in producer trade magazines, and in professional scientific journals as part of the variety registration process.