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Project ID: 0405-BA-016 **FY03 ARS Agreement #:**

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

Project Title: To Enhance Variety Development of Scab Resistant Varieties.

PROJECT 2 ABSTRACT
(1 Page Limit)

The long-term goals of this project are to: 1. develop elite winter wheat varieties that are resistant to Fusarium head blight (FHB, scab) using conventional breeding (**part of the Scab Initiative's effort on plant breeding and variety development**), 2. determine the level of FHB and need for FHB resistant varieties in dryland and irrigated wheat production in the central and northern hard winter wheat region, and 3. to screen experimental lines in hard winter wheat regional nurseries to identify the level of FHB resistance within the existing elite winter germplasm of the Great Plains (**part of the Scab Initiative's effort on plant breeding and variety development and also part of the germplasm introduction and enhancement efforts)**. In 2003, 24 (5%) of 466 tested samples were found to have significant FHB infections. The growing conditions for 2003 would be considered as a moderately dry year with barely enough moisture to grow a wheat crop and insufficient moisture to grow rainfed, summer annual crops. Seventy-two lines were identified as having potential FHB tolerance based on field data collected in 2003. The best lines for FHB tolerance and agronomic performance will be retested in 2004. The need for FHB tolerant lines is because approximately 1,000,000 wheat acres can be affected by FHB in wet years and approximately 75% of the wheat land was planted to cultivars developed by the University of Nebraska/USDA cooperative wheat improvement program. We continue to incorporate our new transgenic sources of FHB tolerance into adapted cultivars. In our conventional breeding program, we continue to use the elite germplasm developed in over programs and the exotic germplasm identified in the germplasm identification efforts. In the 2003-2004 season will plant 80 out of 819 F_2 bulks and 33 out of 750 F_3 bulks that were deliberately made for FHB tolerance. The F_3 bulks had widely varying grain yield in the F_2 as would be expected when the main sources of FHB tolerance were spring or unadapted soft wheat lines. Though our work is cut out for us to obtain winterhardy, FHB tolerant lines with excellent quality, we believe that we have an adequate crossing program to incorporate sufficient genetic diversity into our selection protocols to be successful. Approximately 1000 headrows were selected from F_3 bulks grown in 2002-2003 which was similar in number to our selections in 2002. The number of FHB headrows that were harvested in 2003 is being tabulated. The final number is not yet determined as we use a two stage selection procedure (field selection followed by seed quality selection). We currently have 3 lines (out of 285) that are ready to be planted in our first state-wide observation nursery (F_6 generation) and entered into our FHB nursery testing. These lines have passed the first microquality tests and our field screens for adequate winterhardiness, maturity, test weight, etc. We have initiated a collaboration with Dr. Guihua Bai and will test our lines with microsatellite markers to determine if they have the expected genes from the parents and to identify the marker diversity in known regions containing FHB quantitative trait loci.