

PI: Ibrahim, Amir**PI's E-mail: Amir.Ibrahim@sdstate.edu****Project ID: FY07-IB-076****FY06 ARS Agreement #: 59-0790-4-130****Research Area: VDUN****Duration of Award: 1 Year****Project Title: Winter Wheat Breeding for Scab Resistance in South Dakota.****PROJECT 1 ABSTRACT**

(1 Page Limit)

South Dakota is the primary state in the US Great Plains hard winter wheat region that is threatened by Fusarium head blight (FHB) [caused by *Fusarium graminearum* Schwabe [teleomorph *Gibberella zeae* (Schwein) Petch]. Our long term objective is to continue to use traditional breeding techniques, aided by molecular marker selection (MAS), to develop and release FHB-resistant hard winter wheat varieties and germplasm with superior agronomic performance and end-use quality characteristics, excellent winter survival ability, and resistance to diseases prevalent in South Dakota and the northern Great Plains. Our specific objectives are to 1) use elite, FHB-resistant germplasm with tagged QTLs, in addition to indigenous native resistant sources, in developing populations segregating for FHB resistance and desirable agronomic traits, 2) screen segregating populations, advanced lines, and established varieties in our mist-irrigated nursery and greenhouse for the purposes of line advancement and releasing and providing growers with accurate FHB ratings on commonly grown varieties, 3) use MAS as a complementary tool to select FHB-resistant lines, and 4) enter promising resistant lines into regional nurseries to facilitate development of varieties with broad adaptation in collaboration with the University of Nebraska and Kansas State University (priorities of the U.S. Wheat and Barley Scab Initiative's effort on Variety Development and Uniform Nurseries program). 'Darrell' hard red winter wheat (HRWW) was released in 2006. It has the second best FHB rating among all Great Plains HRWW varieties tested in South Dakota during the last six years, next to 'Expedition'. It ranked top for yield in South Dakota Crop Performance Testing (CPT) Variety Trial in 2006 and had an exceptional three-year yield average. It had exceptional performance in the state of Nebraska in the Northern Regional Performance Nursery (NRPN) in 2003 and 2004. It has acceptable milling, good baking quality, and a good diseases package. 1,055 lines were dormant seeded in November 2005 in the mist-irrigated nursery in Brookings, SD. Due to excessive early spring rain, the seed failed to germinate and the nursery was lost for the first time in the last six years. A backup nursery consisting of 257 lines, including the NRPN, CPT, Advanced Yield Trial (AYT), and Preliminary Yield Trials (PYT) was transplanted in May 2006 and evaluated in July 2006. Four lines with promising FHB resistance were included in the 2007 CPT and 10 in the 2007 AYT. We included 15 experimental lines and checks in the 2006 Tri-state FHB Nursery (South Dakota, Nebraska, and Kansas). Based on preliminary FHB disease index% average from the Kansas and Nebraska sites, our lines SD97059-2, SD00111-9, 'Harding', SD03018, SD02480, Darrell, SD97380-2, SD01058, 'Expedition', SD03178, SD01122, SD03184, SD03144, 'Alice', and 'Wendy' ranked as numbers 1, 2, 3, 4, 6, 7, 11, 16, 18, 19, 20, 24, 29, 36, and 38, respectively. About 3,800 head-rows and 51 EYT entries with tagged FHB QTL sources were planted in '06 - '07 season. Best lines out of the head-row nursery will be included in the EYT in 2008. Resistant lines will be entered into regional nurseries to facilitate development of varieties with broad adaptation to the northern Great Plains.