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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). SD0111-9 hard red winter wheat was released as 'Lyman' in 2008. It performed well in mist-irrigated nurseries during the last two years, and was the highest yielding line in the 2007 CPT Variety Trial. 'Lyman' has also shown good resistance to leaf rust. Newer experimental lines with tagged QTL resistance to FHB were advanced to the 2007-2008 PYT planted in six locations in South Dakota. The following nurseries were dormant seeded in the 2008 mist-irrigated FHB nursery: The Northern Regional Performance Nursery (NRPN), the Regional Germplasm Performance Nursery (RGON), the EYT, the Preliminary Yield Trial (PYT), the Advanced Yield Trial (AYT), and the CPT, in addition to the hard winter wheat scab nursery.