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Project Title: Development of Hard Spring Wheat Cultivars Resistant to Scab Disease.

PROJECT 1 ABSTRACT

(1 Page Limit)

Scab or Fusarium head blight (FHB) is a major wheat disease in the spring wheat region. Combating this disease while protecting our environment by growing genetically resistant and adapted cultivars is the most efficient, economical, and safe strategy. Moderately resistant HRSW cultivars developed by the NDSU breeding program, including Elgin-ND, Prosper, Barlow, Faller, Howard, Glenn, Steele-ND, and Alsen; are grown extensively in ND and MN. In the past six years, these cultivars were grown on more than 50% of North Dakota wheat acres, which is approximately six million acres annually. Additional acreages grown to these cultivars are also found in MN and SD. However, new adapted cultivars with different and/or higher resistance levels, combining different sources of resistance to FHB and other diseases are needed. Therefore, the specific objectives of this project are to (1) continue developing adapted HRSW cultivars that have resistance to FHB and other diseases such as rusts as well as agronomic and quality attributes; (2) identify and introgress novel FHB resistance that reduces disease infection and DON accumulation into adapted HRSW germplasm base; and (3) use novel tools such as molecular markers to facilitate screening of FHB resistant genotypes. To achieve these objectives, adapted superior genotypes will be used to develop segregating populations for selection and advancement of elite lines that combine FHB and other diseases resistances with desired agronomic and quality traits. Advanced genotypes will be tested in multiple field trials in ND to identify improved lines. The continuous search of new sources of resistance, particularly type I resistance coupled with appropriate breeding strategies and selection methodologies are needed. Appropriate field and greenhouse evaluation for FHB resistance and the newly identified molecular markers – mainly QTL's located in chromosomes 3BS and 3A are useful tools to select efficiently and to combine several types of resistance to FHB with other economical-value traits. In addition, we will use the off-season nurseries in New Zealand, Puerto Rico, and Arizona to accelerate the generation advance and seed increase for ND trials. This project has a continued goal of developing superior HRSW cultivars with resistance to FHB as a control measure to minimize the negative effects of FHB on the production, export, processing, and consumption of HRSW.