

PI: Neate, Stephen M.

PI's E-mail: stephen.neate@ndsu.edu

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Project Title: Accelerated Screening of Hordeum Germplasm for FHB Resistance.

PROJECT 2 ABSTRACT

Fusarium Head Blight (FHB), caused primarily by *Fusarium graminearum*, has caused serious yield and quality losses to barley in the Upper Midwest region of the USA since 1993. The disease also has raised public concerns regarding food safety due to contamination of grain by deoxynivalenol (DON), a mycotoxin produced by *F. graminearum*. Development of resistant cultivars is one of the best approaches for combating this disease. This is the North Dakota component of a collaborative project whose goal is to reduce the losses caused by FHB, especially quality discounts due to the accumulation of mycotoxins such as DON. The focus of this proposal is to identify novel FHB resistance alleles in Hordeum germplasm and facilitate their transfer into adapted breeding germplasm. Previous evaluations of Hordeum germplasm from various genebanks have identified very few sources of FHB resistance. To broaden the genetic base of FHB resistance in barley, additional sources of resistance need to be identified and exploited as soon as possible. We propose an accelerated and systematic screening effort of Hordeum germplasm from genebank collections around the world. For FY07, this component will: 1) evaluate 1,750 Hordeum accessions for reaction to FHB; 2) validate putative resistance sources in replicated experiments at multiple locations; and 3) characterize the uniqueness of the putative resistance sources with molecular markers. This is the first year of a proposed four-year plan to source and evaluate as much of the world's unscreened Hordeum germplasm as possible. We will employ all of our standard methods for planting, inoculum increase, inoculation, and disease assessment. Cultivated winter and wild Hordeum accessions will be evaluated in Hangzhou, China and cultivated spring accessions in nurseries at Fargo and Langdon, North Dakota. Accessions exhibiting resistance in the preliminary screening tests will be re-evaluated in replicated FHB nurseries at multiple locations and assayed for DON. Accessions exhibiting the highest levels of FHB resistance and lowest concentrations of DON will be immediately distributed to barley breeders for crossing. To assist in the selection of the most diverse sources, we will selectively genotype the putative resistance sources with informative microsatellite markers previously developed for FHB resistance alleles in barley. We also will develop a comprehensive database for all FHB and DON data collected and post it on the USWBSI website. Stakeholders will be informed of our activities at field days, producer/technical meetings, and also via barley council websites, bulletins and the USDA funded Barley Coordinated Agricultural Project. The information obtained from this study will have immediate practical applications for developing FHB resistant barley cultivars, thereby minimizing the devastating effects of this disease.