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PROJECT 1 ABSTRACT

(1 Page Limit)

In the US spring wheat (*Triticum aestivum* L.) region, Fusarium head blight (FHB) causes grain yield losses and losses due to the accumulation of fungal mycotoxins, such as deoxynivalenol (DON). A successful wheat breeding approach to reduce DON accumulation has been to pyramid different sources of host FHB resistance. We have developed doubled-haploid (DH) Alsen backcross (BC) lines, which combine FHB resistance QTL from Sumai 3 and *T. dicoccoides*. The overall objective is to release these DH lines to help address the grain yield loss and DON accumulation problems due to FHB. Greenhouse tests indicate that DH Alsen BC lines with both sources of FHB resistance exhibit lower FHB severity ratings and less Fusarium damaged kernels compared with lines with only the Sumai 3 source of resistance. An overarching objective for the Variety Development and Uniform Nurseries (VDUN) Research Program Area of the US Wheat and Barley Scab Initiative is the delivery of new FHB-resistant wheat and barley varieties and germplasm. A primary FY07 priority of the VDUN Research Program is the breeding and release of FHB-resistant wheat and barley varieties and germplasm that are adapted to FHB-threatened states. Objectives of this study are to; 1) apply additional molecular markers to the DH Alsen BC lines to confirm the presence of two different sources of FHB resistance QTL and possibly characterize the size of chromosome segment transfers from *T. dicoccoides*, 2) complete an additional two greenhouse evaluations and one field evaluation of the DH Alsen BC lines in comparison to controls to confirm if pyramiding the two sources of FHB resistance has resulted in the expression of an enhanced level of resistance, and 3) increase seed and evaluate the DH lines with both sources of FHB resistance for agronomic performance (i.e. yield, end use quality, and resistance to regional insects pests) with the intent to release them as germplasm. The null hypothesis being tested is that lines with both the Sumai 3 and *T. dicoccoides* sources of FHB resistance will not exhibit significantly reduced FHB damage compared with other genotypes as detected by severity ratings, visually diseased kernels, and DON content of grain after harvest. A graduate student project will entail growing the DH Alsen BC lines, some with the Sumai 3 QTL and some with the Sumai 3 and *T. dicoccoides* QTL, in randomized experimental designs in two greenhouse experiments. After spikes are inoculated and rating for severity, seed of inoculated spikes will be harvested and evaluated for visually diseased kernels and DON content. DH lines will be grown in an off-season Arizona (AZ) nursery to produce seed to plant replicated spring 2007 yield trial evaluations at separate locations in North Dakota and to test in the Uniform Regional Scab Nursery. Yield trial entries will be evaluated for agronomic performance and grain samples will be used to test for milling and baking quality in addition to visually diseased kernels and DON content. A germplasm release of lines with both sources of FHB resistance is planned for spring 2008.