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Project Title: Coordinated Evaluation and Utilization of Marker Assisted Selection.

PROJECT 4 ABSTRACT
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The objectives of this project are to 1) evaluate the effectiveness of use of FHB-resistance QTL in the NWW breeding programs through marker assisted selection (MAS); 2) quantify the effects of these QTL in reducing FHB and DON; and 3) measure their impact on other key traits such as yield and milling and baking quality. Numerous recombinant inbred lines (RIL) from crosses with an array of parents homozygous for the resistance alleles at Fhb1 and other QTL from breeding nurseries in KY, MO, IN, IL, MI, OH and NY were genotyped at Fhb1 and other resistance QTL at the USDA-ARS *Eastern Regional Small Grains* Genotyping Lab, Raleigh, NC. This material was phenotyped for FHB traits, and in some cases yield and other agronomic traits in the individual Co-PI's scab and yield nurseries. Based on genotypic and phenotypic data, a number of pairs of sister lines, homozygous for resistance and susceptibility alleles at each QTL were identified in each breeding program. Seed of these lines was distributed to Co-PIs for planting in a 2 year multi-location study involving FHB phenotyping, yield testing and milling and baking quality analysis.

Seventy lines (5 pairs of lines homozygous positive and homozygous null at the resistance QTL of interest x 7 breeding programs) were grown in agronomic tests in KY and MI and in scab nurseries in MO, IL, IN, and OH in 2010-2011. These lines have been planted for a second year's evaluation and will be phenotyped in the summer 2012 (scab, agronomic and milling quality phenotype). Outputs will include information on the effect of genetic background on QTL expression, sharing of lines to use as parents, and possible identification of lines worthy of joint germplasm and/or cultivar release.