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FY03 ARS Agreement #: 59-0790-9-025

Research Area: VDUN

Duration of Award: 1 Year

Project Title: Assessing the Breeding Value of Fusarium Head Blight Resistance Genes.

PROJECT 3 ABSTRACT
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Screening wheat lines for resistance to Fusarium head blight (FHB) is both time and resource-intensive, is confounded by environmental factors, and needs to be repeated over environments. Our research group is investigating DNA markers as a tool to augment the screening of germplasm for resistance to this disease. As part of another USWBSI grant to map FHB QTL in the resistance sources Fujian 5114 and Wuhan 3, new putative QTL have been located that explain as much as 20 to 25% of the FHB resistance in greenhouse and field testing. Because these two resistance sources have been used as parents in our breeding program, we are poised to develop QTL-NILs for these genes. The objectives of this research are to:

1. Develop near-isogenic lines of major QTLs identified in the resistance sources Fujian 5114 and Wuhan 3.
2. Determine the effects of Fusarium head blight resistance QTL derived from Fujian 5114 and Wuhan 3 in multiple genetic backgrounds.

Three QTL will be pursued during FY04, the chromosome 5BL QTL from Fujian 5114, and two QTL from Wuhan 3, on 5AS and one putatively located on chromosome 1D. Genetic mapping in the Fujian 5114 and Wuhan 3 populations is ongoing, so if good flanking markers are obtained for additional QTL, we will initiate QTL-NIL development from those as well. QTL-NIL will be developed by recovery of homozygous lines after self pollination of single F₄ or F₅ plants heterozygous for DNA markers flanking the QTL. These materials will be derived from the U of MN breeding program and have acceptable agronomic characteristics.

All NIL pairs will be tested twice for FHB resistance under greenhouse conditions, beginning as soon as adequate seed of homozygous classes for the QTL-NIL are available. Each genotype will be represented by 20 to 30 inoculated spikes. These same materials will be tested for their FHB reaction in replicated field tests in inoculated, misted nurseries at Crookston and St. Paul in 2004. This proposal relates to the overall objectives of the U.S. Wheat and Barley Scab Initiative by helping to develop resistant varieties more quickly and efficiently, and specifically to the Variety Development and Uniform Nurseries Area priority on "Research to evaluate and improve selection efficiency for FHB resistance using novel methodologies..."