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ARS Agreement #: 59-0206-9-070

Research Category: VDHR-SPR

Duration of Award: 1 Year

Project Title: Breeding and Genetic Investigations of FHB Resistance in Spring Wheat.

PROJECT 1 ABSTRACT

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This grant addresses the VDHR research priorities of: increasing acreage planted to varieties exhibiting improved FHB resistance; increasing efficiency of individual breeding programs' to develop and release FHB resistant varieties; and developing new breeding technologies and germplasm to further enhance short term and long term improvement of FHB resistance and to efficiently introgress effective resistance genes into breeding germplasm.

The specific objectives of this grant are to:

- 1) Develop Fusarium head blight resistant wheat germplasm and varieties adapted for commercial production in Minnesota and the surrounding region
- 2) Characterize the level of FHB resistance of all wheat varieties grown in the region
- 3) Use FHB markers to characterize potential parental lines and utilize MAS to increase frequency of FHB QTLs in advanced lines

Crosses will be made between and among FHB resistance sources and regionally adapted germplasm. We plan to screen about 3,000 breeding lines from our program, including about 2,100 F₆ lines, 600 preliminary yield trial lines, 300 advanced yield trial lines and varieties, and 100 other lines with very high levels of FHB resistance. We will also screen the Uniform Regional Scab Nursery in two field nurseries. We will use two misted, inoculated field nurseries to evaluate FHB reaction of breeding lines, and varieties and germplasm in regional nurseries.

Approximately 25 named varieties and 10-15 pre-release lines from U of MN, NDSU, and SDSU are tested each year for overall performance and disease resistance at 12 Minnesota locations. The data of released varieties will be summarized over all years available to determine their scab resistance rating that is published each year in the Minnesota Extension Service's *Varietal Trials Results* book and also published online at <http://www.maes.umn.edu/vartrials/swht/index.asp>.

We plan to submit all lines that are candidates for entry in preliminary yield trials to the USDA-ARS Genotyping Center in Fargo, ND to characterize them for *Fhb1*, the 5AS QTL, and 6-10 markers for other important genes. This will result in approximately 10,000 marker data points per year. In addition, we plan to use markers to select for FHB QTL in segregating generations of selected populations. An additional 3,000 marker datapoints will be generated from the early generation selections.