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PROJECT 1 ABSTRACT

(1 Page Limit)

Development of high-yielding, well-adapted Fusarium head blight (FHB) resistant varieties is an essential component in reducing substantial economic losses due to FHB. This research addresses the following research priorities of the U.S. Wheat and Barley Scab Initiative Action Plan: development and release of varieties with improved FHB resistance, introgression of FHB resistance into breeding germplasm, and development and mapping of markers for sources of FHB resistance. Each year to create genetic variability to work with we make crosses involving one or more FHB resistance sources. Many of the resistance sources we are now using are breeding lines from our program or other soft red winter wheat programs, and many crosses now involve more than one FHB resistance source. We will evaluate six regional nurseries and all University of Illinois breeding lines in the misted, inoculated FHB field nursery. Corn kernels on which the fungus that causes FHB has been cultured are used to inoculate the nursery. The irrigation and inoculation used increase the disease severity in the evaluation nursery. The percentage of heads that show symptoms and how much of a head is infected will be determined for all of the breeding lines. Grain samples are harvested, and percentage of Fusarium damaged kernels (FDK) is determined. Because the fungus produces a toxic called deoxynivalenol (DON) grain samples are sent to the DON evaluation lab at the University of Minnesota for determination of DON level in the grain. Breeding lines from the University of Illinois program have regularly been among the most resistant lines in the northern soft wheat nurseries. There are currently at least five University of Illinois breeding lines with FHB resistance in commercial production or in various stages of regional evaluation and seed increase. We also evaluate Illinois Variety Trial entries in the FHB nursery. We believe this activity is very important to achieve the # 1 Goal of the Variety Development and Host Resistance section of the U.S. Wheat and Barley Scab Initiative action plan to "increase acreage planted with varieties exhibiting improved FHB resistance". Producers can access this data on the University of Illinois Variety Testing website at http://vt.cropsci.uiuc.edu/wheat.html.

We are also working with populations which have genes for FHB resistance from two or more sources. The goal of this research is to identify breeding lines with a higher level of resistance to FHB than those that are currently available. We will select adapted breeding lines from these populations; however, the objective is slightly different with these populations because the expected outcome is parent development rather than lines that have potential as varieties. We are using selection based on phenotype (resistance we observe in the field or the greenhouse), but we also use molecular markers in some of these populations to select lines that carry genes for FHB resistance. We are using molecular markers in several other projects to enhance the efficiency of the breeding program and speed up the rate of development of FHB resistant varieties. We cooperate with Gina Brown-Guedira at the USDA Genotyping Center at Raleigh, NC on several of these projects. We determine which plants carry the FHB resistance gene, remove plants that do not appear to carry the gene, and harvest the remaining plants in bulk to advance the population.