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Project Title: Development of Scab Resistant Soft Red Winter Wheat Varieties.

PROJECT 1 ABSTRACT

(1 Page Limit)

Development of high-yielding, well-adapted Fusarium head blight (FHB) resistant varieties is an essential component in reducing the damage and substantial economic losses due to FHB when susceptible varieties are grown in years that favor FHB infection. This research addresses the following research priorities of the USWBSI 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 we make at least 200 two-way and 200 three-way or four-way soft red winter wheat crosses involving one or more sources of FHB resistance. 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 source of FHB resistance.

We will evaluate the FHB resistance of breeding lines in six cooperative nurseries and the Illinois Wheat Variety Trial. We will evaluate all University of Illinois breeding lines in a misted, inoculated FHB field nursery at Urbana, IL. Approximately 2500 rows will be evaluated in the replicated FHB nursery. Grain spawn (corn kernels cultured with 6-10 FHB isolates) will be used to inoculate the nursery which will be mist-irrigated during flowering. Data will be collected on incidence, severity and percent FDK, FHB and ISK (incidence/severity/kernel shriveling) indexes will be calculated and samples will be sent for DON evaluation. Data and germplasm will be shared with other breeding programs within the subregion and across the region. Producers will not adopt FHB resistant breeding lines unless they are yield competitive; therefore, breeding lines will be evaluated for an array of traits at multiple locations. We have several three-way crosses involving three FHB resistant lines in which we are working on pyramiding genes for FHB resistance. As part of the wheat breeding program we will select adapted breeding lines from these populations; however, the objective is slightly different in that the expected outcome is for parent development rather than expecting to select lines that have potential as varieties. We are using molecular markers in several projects to attempt to enhance the efficiency of the breeding program and speed up the rate of development of FHB resistant varieties. In 2011 -2012 we will focus our routine marker assisted selection (MAS) on three-way crosses, using MAS for enrichment in the F₁. Breeding lines from the University of Illinois program have regularly been among the most resistant lines in the regional cooperative FHB resistance evaluation nurseries. There are currently at least eight University of Illinois breeding lines with FHB resistance in commercial production or in various stages of advanced or regional evaluation and seed increase.