

# Breeding Spring Wheat for Disease Resistance

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Reporting period: July 1, 2013 – August 29, 2014

Total project period: (Continuous)

Report type: Annual progress report

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## **Research Summary:**

The general objective of this research program is to generate new hard red spring wheat germplasm with improved levels of resistance to regionally prominent diseases; primarily Fusarium head blight (FHB) and bacterial leaf streak (BLS). The germplasm is used specifically to increase the frequency of more resistant types for use as parents in the breeding program. Demonstration that the objective has been successfully accomplished with respect to FHB resistance can be illustrated by noting levels among Uniform Regional Scab Nursery entries submitted in 2012, as an example. Among these five experimental lines (SD4361, SD4366, SD4388, SD4394, and SD4397), three were among the top ten most resistant when average Disease Index, FDK, and DON concentration ranks were considered (Table 1). Additionally, increasing levels of resistance to BLS has been accomplished through mapping a resistance QTL in SD4205 and mapping of a second resistance source (SD4148) is underway.

## **Introduction:**

Specific objectives of this program are to 1). continuously create and evaluate hard red spring wheat germplasm populations for resistance to FHB and BLS, and 2). utilize line selections as parents to increase the frequency of resistant materials in the breeding program.

## **Description of Accomplishments:**

During the 2014 reporting period, thousands of experimental breeding lines were evaluated for resistance to FHB and/or BLS. Roughly 3,000 lines were evaluated only for FHB and were derived from the breeding program, other cooperating breeding programs, or as evaluations of released cultivars included in the SD Crop Performance Testing program. Approximately 3,000 additional lines were tested for both diseases as part of graduate student research projects. This resulted in data being collected for 6,000 additional rows because both FHB and BLS resistance can not be evaluated on the same plants. Data analysis is presently underway. Preliminary examination suggest that severity of both diseases was at a level where differentiation among genotypes will be possible.

**Data:**

TABLE 1. 2012 UNIFORM REGIONAL SCAB NURSERY FOR SPRING WHEAT PARENTS. MEANS AND RANKS OVER LOCATIONS.

ENTRY	DISEASE INDEX		FDK		DON	
	%	Rank	%	RANK	ppm	RANK
No. of Locations	4	4	4	4	4	4
MN09027	6.3	1	5.5	2	1.6	1
MN08166	8.1	3	6.9	8	1.6	1
SD4394	14.8	13	6.0	5	1.7	3
SD4397	11.0	6	5.9	4	2.1	4
SD4361	16.9	16	7.3	11	2.2	5
ND2710	6.6	2	7.1	9	2.3	6
11EXP13-107	15.9	14	4.6	1	2.3	6
N10-0176	11.6	8	20.3	20	2.7	8
MN09121	9.1	4	7.4	12	2.8	9
SD4366	16.2	15	7.8	14	3.0	10
MN08173	13.6	12	5.8	3	3.1	11
SD4388	19.3	19	8.8	16	3.2	12
11EXP13-78	11.1	7	6.8	7	3.5	13
11EXP13-105	9.7	5	8.8	16	3.6	14
Bacup	12.8	11	7.6	13	3.6	14
BW928	12.4	9	8.6	15	3.8	16
MN09071	17.1	17	6.5	6	4.2	17
11EXP13-43	12.6	10	7.2	10	4.6	18
2375	17.7	18	15.4	19	5.3	19
Oslo	34.2	21	21.7	21	7.6	20
11EXP13-65	23.8	20	11.7	18	7.8	21
Wheaton	36.3	22	33.0	22	9.7	22
Mean	14.8		9.8		3.7	