

Breeding Spring Wheat for Disease Resistance

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Reporting period: July 1, 2014 – June 30, 2015

Total project period: (Continuous)

Report type: Annual progress report

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 2014, as an example. Among these five experimental lines (SD4504, SD4508, SD4510, SD4514, and SD4546), four were among the top ten most resistant when average Disease Index, FDK, and DON concentration ranks were simultaneously considered (Table 1). Additionally, increasing levels, and documentation of, resistance to BLS has been accomplished through continual germplasm screening activities.

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 2015 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. Additional lines were tested for both FHB and BLS resistance which allows for identification of desirable breeding program parents as well as accumulation of data with which to make cultivar recommendations to growers.

Data:

TABLE 1. 2014 UNIFORM REGIONAL SCAB NURSERY FOR SPRING WHEAT PARENTS. MEANS AND RANKS OVER FIVE LOCATIONS.

ENTRY	DISEASE INDEX		FDK		DON	
	%	Rank	%	RANK	ppm	RANK
MN10021	7.0	1	6.4	1	1.8	1
MN11074	17.6	14	8.4	4	3.8	2
08S0036-19	18.0	15	15.9	21	4.3	3
SD4546	16.7	11	9.9	7	4.4	4
MN11405	11.0	3	8.6	5	4.6	5
MN10388	11.6	4	7.0	2	4.9	6
SD4510	15.0	8	12.9	12	4.9	7
12-14-172	20.5	21	16.5	23	5.0	8
SD4514	11.7	5	14.4	15	5.1	9
SD4508	15.5	9	12.6	10	5.6	10
LNR10-0176	17.3	13	15.8	19	5.8	11
LNR10-0177 RS6	19.1	17	14.5	16	5.9	12
12-14-147	17.1	12	12.6	11	6.4	13
MN11397-1	15.8	10	14.7	17	6.4	14
07S0211-23	18.8	16	15.7	18	6.7	15
SD4504	14.5	7	15.9	20	6.7	16
08S0094-9	19.6	18	16.2	22	6.8	17
07S0274-2	14.0	6	11.3	8	7.0	18
Bacup	26.2	25	20.8	25	7.2	19
ND2710	8.3	2	8.4	3	7.3	20
12-14-81	19.7	19	8.7	6	7.5	21
12-14-97	19.8	20	13.9	13	8.3	22
LNR10-0177	27.2	26	24.6	26	8.8	23
07S0208-27	23.2	23	25.6	27	9.3	24
12-14-158	21.4	22	12.1	9	9.4	25
BIO-08228	24.7	24	14.0	14	10.4	26
2375	31.2	27	18.3	24	14.2	27
Oslo	43.2	28	43.6	28	14.9	28
Wheaton	51.6	29	38.9	29	15.5	29
Mean	19.9		15.8		72	