The Response of 13 Hard Red Spring and 5 Durum Wheat Cultivars to Wheat Streak Mosaic

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Thirteen hard red spring and five durum wheat cultivars were tested for reaction to infection with wheat streak mosaic virus (WSMV) in 1985. Twelve of these 18 cultivars had been previously tested for reaction to WSMV in 1984 (2). The study to determine spring wheat cultivar response to wheat streak mosaic was continued to examine new variety releases and to provide second year data for some of the most commonly grown spring wheats.

Increased plantings of winter wheat in eastern North Dakota have resulted in isolated severe outbreaks of wheat streak mosaic in winter wheat. This disease can also move into spring wheat and was confirmed in hard red spring wheat and durum in eastern North Dakota in 1986, with potentially severe losses. Information is needed about which spring wheats are tolerant to WSMV.

Materials and Methods

Thirteen hard red spring (HRS) and five durum cultivars (Table 1) were planted under field conditions at Fargo in paired four-row plots and randomized in four replications. The two center rows of one of the paired plots were mechanically inoculated with juice from WSMV infected wheat plants when the plants were in the early two-leaf stage. Inoculation was done with a paint spray gun at 60 psi nozzle pressure. Two weeks following inoculation, plants showed typical symptoms for the virus disease and less than one percent of the plants escaped infection. The symptomless plants were rouged.

Yield was measured by weighing the harvested seed from the two WSMV inoculated rows and the two center rows form the non-inoculated plots. Yield reductions were determined by comparing yields of the inoculated vs non-inoculated plots. Thousand kernel weights were determined for each plot by weighing 1000 kernels.

Results and Discussion

Symptoms of the virus were more severe in all inoculated plots as compared to symptoms observed in similar trials in 1983 and 1984, and yields were correspondingly lower. This can be attributed in part to better inoculating equipment. Oslo, Norak, Buckshot and Butte HRS yields were affected least by WSMV. However, under conditions of this test, the range in yield reduction of these cultivars was still from 33 to 54 percent as compared to non-inoculated controls (Table 1). The most WSMV tolerant durum cultivars tested were Ward with a 70 percent yield reduction and Cando with a 74 percent yield reduction. Vic, Monroe and Lloyd all had yield reductions greater than 90 percent when compared to the healthy checks.

WSMV infections also significantly reduced seed weight (thousand kernel weight). Seed weight of six HRS cultivars, Butte, Oslo, Alex, PR 2369, Buckshot and Norak, was reduced between 16 and 20 percent with WSMV infections. The seed weight of WSMV inoculated Olaf was 51 percent less than healthy checks. The seed weight of the remaining HRS cultivars was reduced 23 to 28 percent with WSMV infection. The seed weight of WSMV infected Ward durum was reduced 36 percent compared to healthy checks, and this was the least seed weight reduction of the durum cultivars.

Most varieties tested both in 1984 and 1985 responded similarly each year in yield reduction and seed weight reduction due to WSMV infection. However, Vic durum was more severly affected in the 1985 trials than in the 1984 trials (2).

These results do not reflect the yield losses or reduction in seed weight that would occur under natural conditions. Natural infections generally would be less severe. However, legitimate comparisons can be made on the relative performance of the cultivars at most levels of WSMV infection. Growers planting hard red spring or durum cultivars in those areas subject to severe losses from wheat streak mosaic virus, or overplanting with spring wheats in winter killed areas in winter wheat fields should consider using the more WSMV tolerant cultivars. Other management practices that help control wheat streak mosaic are described in extension circular PP-646 revised (1).

Literature Cited

1. McMullen, M.P. and R.G. Timian. 1986. Wheat Streak Mosaic. North Dakota Extension Circ. PP-646 revised. 4p.
2. Timian, R.G. and H.A. Lamey. 1985. An update on wheat streak mosaic virus in North Dakota. North Dakota Farm Research 42:20 & 27.

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Table 1. The yield and thousand kernel weight (1000 K W)of virus free and WSMV infected spring and durum wheat cultivars in field trials at Fargo, ND, 1985.

Cultivar	Yield bu/A Virus free control	Yield bu/A WSMV inoculated	Yield reduction %	1000 K W (gm) Virus free control	1000 K W (gm) WSMV inoculated	Weight reduction %
			SPRING WHEAT			
Butte	56.0	25.6**	54	30.6	25.1**	18
Oslo	72.2	48.7**	33	34.4	27.9**	19
PR 2369	66.1	33.5**	49	32.1	25.6**	20
Olaf	60.7	1.3**	98	31.5	15.3**	51
Guard	68.5	21.3**	69	33.3	25.8**	23
Marshall	68.2	21.6**	68	29.8	21.5**	28
Alex	56.9	6.9**	88	29.7	24.7**	17
Stoa	64.2	14.4**	78	30.7	22.1**	28
Buckshot	67.9	34.5**	49	32.5	26.8**	18
Norak	69.6	44.1**	37	33.2	27.4**	17
WM 99 AR	65.3	21.1**	68	38.6	29.4**	24
Success	66.7	20.5**	69	31.9	23.6**	26
Katepwa	60.5	23.0**	62	32.1	23.5**	27
	LSD for Yield 5% - 5.2 1% - 7.0			LSD for Kernel Weight 5% - 2.7 1% - 3.6		
			DURUM WHEAT			
Ward	68.9	20.9**	70	40.5	25.8**	36
Vic	71.7	1.2**	98	45.6	18.9**	59
Cando	82.4	21.0**	75	37.6	20.7**	45
Lloyd	79.0	4.4**	94	43.4	19.0**	56
Monroe	74.5	1.0**	99	46.7	15.1**	68
	LSD for Yield 5% - 5.9 1% - 8.1			LSD for Kernel Weight 5% - 3.5 1% - 4.8		

**Significant at the 1.0% level as indicated by the paired t test.