

Project Title: Herbicide Injury Potential to Montana Spring Wheat Varieties

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Objective: To evaluate herbicide tolerance among genetically diverse spring wheats

#### Results:

Eight spring wheats were evaluated for their tolerance to Everest and Silverado. Non-treated controls were included for each cultivar in order to assess crop damage. This study was conducted at Kalispell and Huntley, Montana. At Kalispell, the cultivars were planted on April 19, 2006 at a seeding rate of 90 lb/ac in 6" rows to a depth of 2 inches. At Huntley, the cultivars were planted on April 15, 2006 at a seeding rate of 100 lb/ac. Everest and Silverado were applied on May 19, 2006 at Huntley and on May 16, 2006 at Kalispell. At the time of application, wheat plants were about 4 inches tall and at the 4-leaf stage at both locations.

Both Silverado and Everest caused crop injury at Kalispell. Symptoms were generally more severe with Silverado. Injury symptoms mainly took the form of stunting, with herbicide effects being most evident at the June 23 rating (Table 1). Height reductions were observed with all cultivars, but more so for Choteau and MTHW0202. For these cultivars, plant heights were reduced by approximately 10 cm. The heights of Outlook, MT0260 and MT0245 were hardly affected.

The yields of Outlook, MT0260 and MT0245 were unaffected by the herbicide treatments (Table 2). The yields of all other cultivars were reduced by at least 8 bu/A. The negative effect of herbicide applications on yield was especially apparent for Choteau and MTHW0202. For these two cultivars, herbicide applications reduced yields by approximately 14 bu/A. Yield reductions of 14 bu/A were also observed with McNeal, even though stunting was less apparent. Overall, there was a strong association between stunting and yield loss.

Results differed somewhat at Huntley (Table 3). Generally, injury was less at Huntley compared to Kalispell. Further, while Silverado caused the greatest injury at Kalispell, Everest was the most phytotoxic herbicide at Huntley. There was general agreement between the two locations regarding cultivar susceptibility, with injury being most severe for Choteau, followed by MTHW0202 and McNeal. Yields were variable at Huntley and herbicide effects were not apparent.

#### Summary:

The extent of herbicide-induced crop injury varied by location, with damage being more apparent at Kalispell than Huntley. Silverado was generally more phytotoxic at Kalispell, while Everest caused the greatest degree of injury at Huntley. However, there was general agreement between the two locations regarding cultivar susceptibility, with injury being most severe for Choteau, MTHW0202 and McNeal.

Table 1. Crop injury and plant height in spring wheat cultivars as influenced by Everest and Silverado herbicides at Kalispell, MT during 2006 season.

Cultivar	Treatment	Crop injury			Plant height (cm)			
		%	%	%	5/30/06	6/13/06	6/23/06	7/19/06
		5/23/06	5/30/06	6/12/06				
Choteau	Untreated	0.0	0.0	0.0	21.4	44.0	62.3	87.5
	Everest	25.0	15.0	11.8	16.6	39.0	52.5	82.3
	Silverado	35.0	15.0	13.0	18.3	38.8	55.3	83.0
Hank	Untreated	0.0	0.0	0.0	22.6	46.5	65.5	86.8
	Everest	16.3	11.3	8.8	19.9	45.3	60.5	85.5
	Silverado	20.0	12.5	7.5	18.3	45.5	62.0	85.0
McNeal	Untreated	0.0	0.0	0.0	18.6	44.3	63.3	93.5
	Everest	17.5	11.3	10.0	19.6	41.3	59.0	90.3
	Silverado	22.5	12.5	8.0	18.3	42.8	57.5	86.8
Outlook	Untreated	0.0	0.0	0.0	17.4	39.3	58.0	90.3
	Everest	18.8	8.8	13.0	13.9	37.3	55.3	87.8
	Silverado	18.8	13.8	10.0	17.0	39.5	57.3	89.8
Reeder	Untreated	0.0	0.0	0.0	23.4	48.8	68.0	93.0
	Everest	16.3	11.3	6.3	20.9	43.8	62.0	93.0
	Silverado	17.5	11.3	5.5	22.6	47.3	62.5	88.3
MT0245	Untreated	0.0	0.0	0.0	20.6	45.8	60.8	92.0
	Everest	15.0	8.8	6.3	19.4	43.5	58.3	93.3
	Silverado	16.3	12.5	7.5	22.3	45.3	59.8	91.0
MT0260	Untreated	0.0	0.0	0.0	23.3	43.5	62.3	92.0
	Everest	11.3	10.0	6.8	21.1	44.3	59.3	93.3
	Silverado	15.0	12.5	8.8	21.6	43.8	58.8	90.8
MTHW0202	Untreated	0.0	0.0	0.0	22.6	51.3	70.5	87.0
	Everest	15.0	11.3	11.3	20.9	45.8	59.8	84.5
	Silverado	17.5	15.0	8.8	21.9	46.0	62.0	85.0
LSD (0.05)	Herbicide (A)	2.7	2.3	2.5	1.1	1.2	1.7	1.6
	Cultivar (B)	4.4	NS	NS	1.8	2.0	2.8	2.6
	AxB	NS	NS	NS	NS	NS	NS	NS

NS: Not significant ( $P>0.05$ ).

Table 2. Chlorophyll content (SPAD), yield and other agronomic data in spring wheat cultivars as influenced by Everest and Silverado herbicides at Kalispell, MT during 2006.

Cultivar	Treatment	SPAD		Stripe rust	Heading	Yield	Grain Moisture	Test weight	Protein
				%	Julian	bu/ac	%	lb/bu	%
		6/13/06	7/6/06	6/22/06		-----	8/7/06	-----	
Choteau	Untreated	47.9	46.7	7.5	169.3	84.0	10.0	61.9	14.5
	Everest	47.1	43.7	9.5	171.5	72.4	9.9	61.3	14.8
	Silverado	46.7	46.4	6.8	170.8	70.1	10.1	60.4	14.9
Hank	Untreated	48.0	46.1	6.5	166.8	81.6	10.1	59.4	13.2
	Everest	49.1	46.2	5.0	167.8	74.2	10.2	58.6	13.4
	Silverado	47.5	46.8	5.3	168.3	71.5	10.2	59.1	13.2
McNeal	Untreated	45.8	44.7	13.8	172.3	70.9	10.0	59.7	13.2
	Everest	47.4	46.4	16.3	172.8	65.2	10.3	58.9	13.3
	Silverado	44.7	44.5	18.8	174.3	56.2	9.8	58.0	14.2
Outlook	Untreated	42.0	45.3	13.8	174.5	73.7	10.3	59.7	13.3
	Everest	43.2	44.1	13.8	174.5	71.9	10.5	58.5	13.5
	Silverado	42.2	43.2	12.5	175.0	75.2	10.8	59.1	13.3
Reeder	Untreated	42.8	43.9	5.3	168.5	90.2	11.6	61.8	14.0
	Everest	43.1	43.6	5.3	169.3	83.1	11.9	60.8	14.4
	Silverado	41.6	43.8	8.0	169.5	82.4	12.2	61.3	14.3
MT0245	Untreated	40.0	42.7	7.8	171.5	90.1	11.1	61.6	13.5
	Everest	38.5	41.4	6.3	172.5	88.2	11.1	61.4	13.6
	Silverado	39.1	40.8	9.0	171.8	90.3	12.0	61.0	13.5
MT0260	Untreated	44.3	45.9	11.0	172.3	85.8	11.9	61.0	12.5
	Everest	44.7	46.2	16.3	172.5	82.3	12.1	60.6	12.8
	Silverado	45.7	45.1	14.5	173.8	81.2	11.9	60.7	12.8
MTHW0202	Untreated	49.0	45.5	2.8	164.0	87.0	10.0	62.2	12.9
	Everest	48.1	48.4	3.0	164.8	71.6	9.5	61.4	13.2
	Silverado	47.0	48.9	6.3	164.3	74.8	9.8	61.9	13.1
LSD (0.05)	Herbicide (A)	NS	NS	NS	0.4	3.5	NS	0.4	0.1
	Cultivar (B)	1.8	2.1	4.3	0.7	5.7	0.5	0.6	0.2
	AxB	NS	NS	NS	NS	NS	NS	NS	0.4

NS: Not significant (P>0.05).

Table 3. Crop injury, yield and grain quality in spring wheat cultivars as influenced by Everest and Silverado herbicides at Huntley, MT during 2006 season.

Cultivar	Treatment	Crop injury (%)					Yield bu/ac	Test weight lb/bu	Grain moisture %	Protein %
		5/26/06	6/2/06	6/9/06	6/16/06	7/14/06				
Choteau	Untreated	0.0	0.0	0.0	0.0	0.0	94.1	62.9	9.7	12.7
	Everest	30.0	33.8	28.8	25.0	18.8	96.1	63.6	9.8	12.2
	Silverado	1.3	2.5	0.0	0.0	0.0	106.1	63.1	9.7	12.3
Hank	Untreated	0.0	0.0	0.0	0.0	0.0	113.6	62.1	9.5	11.9
	Everest	0.0	0.0	0.0	0.0	0.0	118.3	61.9	9.6	11.6
	Silverado	0.0	0.0	0.0	0.0	0.0	110.0	61.8	9.4	11.7
McNeal	Untreated	0.0	0.0	0.0	0.0	0.0	103.0	61.3	9.4	11.8
	Everest	16.7	18.4	11.7	10.0	8.4	100.1	60.3	9.5	12.9
	Silverado	2.5	0.0	0.0	0.0	0.0	95.7	61.1	9.3	12.6
Outlook	Untreated	0.0	0.0	0.0	0.0	0.0	95.9	62.2	9.3	11.5
	Everest	16.3	13.8	6.3	4.3	3.8	91.9	62.0	9.4	11.9
	Silverado	0.0	1.3	0.0	0.0	0.0	113.9	61.4	9.5	11.9
Reeder	Untreated	0.0	0.0	0.0	0.0	0.0	100.9	63.3	9.8	12.0
	Everest	9.5	7.8	5.8	5.8	6.3	95.1	63.5	9.8	11.7
	Silverado	0.0	0.0	0.0	0.0	0.0	110.0	63.2	9.6	12.4
MT0245	Untreated	0.0	0.0	0.0	0.0	0.0	110.1	62.6	10.0	11.2
	Everest	7.8	7.5	3.3	4.5	5.0	83.2	62.6	10.0	11.7
	Silverado	1.3	1.3	0.0	0.0	0.0	98.3	62.4	9.9	11.8
MT0260	Untreated	0.0	0.0	0.0	0.0	0.0	90.6	63.0	10.6	11.3
	Everest	10.0	7.5	2.5	2.0	2.0	120.7	62.7	10.9	11.7
	Silverado	0.0	0.0	0.0	0.0	0.0	88.1	63.1	10.1	11.1
MTHW0202	Untreated	0.0	0.0	0.0	0.0	0.0	78.9	62.7	9.9	12.0
	Everest	8.3	7.0	10.5	9.5	7.0	93.4	63.5	9.7	11.6
	Silverado	0.0	0.0	0.0	0.0	0.0	93.7	64.0	9.8	11.6
LSD (0.05)	Herbicide (A)	1.2	1.1	1.2	1.1	1.0	NS	NS	NS	
	Cultivar (B)	1.9	1.8	2.0	1.8	1.6	12.6	0.9	0.3	
	AxB	3.3	3.1	3.4	3.0	2.8	21.9	NS	NS	

NS: Not significant ( $P>0.05$ ).