

Hard red spring wheat and barley tolerance to postemergence herbicides at Rosemount, MN - 2003. Durgan, Beverly R., Jochum J. Wiersma, and Douglas W. Miller. This experiment was designed to evaluate the tolerance of selected Hard Red Spring Wheat (HRSW) and barley varieties to various postemergence herbicides. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil. Following soybeans, the experimental area was chisel plowed in the previous fall. In the spring, the area received 50 lbs/A N then was disked, field cultivated, and harrowed. The HRSW varieties 'Alsen', 'Briggs', 'Granite', 'Hanna', 'HJ98', 'Knudson', 'NorPro', 'Parshall', 'Walworth', and '2375' and the spring barley varieties 'Lacey' and 'Robust' barley were seeded on April 24 at 85 lb/A and 90 lbs/A for HRSW and spring barley, respectively. 'Reeder' wheat was seeded on May 2 at 85lb/A. Bromoxynil at 0.25 lb ai/A was applied postemergence on May 29 to control broadleaf weeds. Herbicide treatments were applied to a 7.5 ft strip with a tractor mounted sprayer delivering 10 gpa at 35 psi using 8001 flat fan nozzles. The experimental design was a strip plot with three replications. Varieties were seeded in strips randomized within each replication. Herbicide treatments were applied across all varieties. Each herbicide x variety plot was 12 feet wide by 12 feet long. Herbicide treatments were applied May 23 and June 2. Environmental conditions at application are listed below. Crop injury was visually rated. Crop height and yields were measured. Data is summarized by variety and is presented in Tables 1 to 7.

Treatment Date	May 23	June 2
Temperature (°F)		
air	57	70
soil	--	--
Relative Humidity (%)	--	29
Dewpoint (°F)	--	38
Soil Moisture	moist	dry
Wind (mph)	--	7-10 S
Sky	thin clouds	cloudy
Rainfall before application		
Week 1 (inch)	0.18	0.15
Rainfall after application		
Week 1 (inch)	0.31	0.36
Week 2 (inch)	0.38	0.43
<u>Barley</u>		
<u>Lacey</u>		
leaf no.	3	5-6
height (inch)	7-10	10-13
tillers	0	0-1
<u>Robust</u>		
leaf no.	3	5-6
height (inch)	6-9	10-13
tillers	0	0-1
<u>Wheat</u>		
<u>Alsen</u>		
leaf no.	4	5-6
height (inch)	4-6	8-10
tillers	2	2
<u>Briggs</u>		
leaf no.	3-4	6
height (inch)	4-6	11-14
tillers	1-2	2
<u>Granite</u>		
leaf no.	3-4	5-6
height (inch)	4-6	10-12
tillers	1-3	2-3

Wheat (cont.)

Hanna		
leaf no.	3	5-6
height (inch)	4-6	9-12
tillers	1-2	2-3
HJ98		
leaf no.	3-4	5
height (inch)	5-7	9-12
tillers	1-2	1-2
Knudson		
leaf no.	3	5
height (inch)	5-7	10-13
tillers	1	2
NorPro		
leaf no.	3	5-6
height (inch)	5-7	9-11
tillers	0-1	2
Parshall		
leaf no.	3	5-6
height (inch)	4-6	9-11
tillers	1-2	2
Reeder		
leaf no.	2	4-5
height (inch)	3-5	6-8
tillers	0-1	2-3
Walworth		
leaf no.	3-4	5
height (inch)	5-7	11-14
tillers	0-2	1-2
2375		
leaf no.	3-4	5-6
height (inch)	5-7	12-14
tillers	0-2	1-2

Difenzoquat severely injured the HRSW varieties Alsen, Parshall, and Reeder resulting in a significant yield reduction for these varieties compared to the untreated checks. In addition, difenzoquat caused moderate injury to the varieties Briggs, Hanna, HJ98, Knudson, NorPro, Walworth, and 2375 resulting in an average yield reductions of 10 bu/A. The variety Granite showed the greatest tolerance to the difenzoquat treatments. The treatment flucarbazone + 2,4-D ester caused slight to moderate injury on all the HRSW varieties. The injury symptoms were generally a stunting of growth with some chlorosis and were greatest at the high rate. No significant yield reductions were observed at the labeled rate with this treatment on any of the selected HRSW varieties. When using the high rate of flucarbazone + 2,4-D ester, grain yield of HJ98 and Hanna were significantly lower than the untreated checks. The flucarbazone + fenoxaprop & safener treatments showed little or no injury compared to the flucarbazone + 2,4-D ester treatments as described above. All other treatments resulted in little or no injury to the HRSW varieties.

The flucarbazone and clodinafop & CGA-185072 treatments caused the greatest injury on the two selected barley varieties. However, only the high rate of flucarbazone + 2,4-D ester on both varieties and the high rate of clodinafop & CGA-185072 on Lacey significantly reduced yields compared to the untreated checks. Fenoxaprop & safener and AE F103060 caused light to moderate injury but no significant yield reductions in barley. The difenzoquat treatments also caused moderate injury symptoms on barley. The variety Lacey had significantly lower yields compared to the untreated check due to difenzoquat injury while the variety Robust did not. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	Alsen					Briggs				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
		-----	(%)	-----			-----	(%)	-----		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	2	0	0	28	37	2	2	0	33	39
Fenoxaprop & safener	0.167	3	0	0	29	41	2	2	2	33	50
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	12	2	3	28	43	8	5	7	34	47
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	12	10	7	26	37	15	10	10	33	40
Flucarbazone + fenoxaprop & safener + NIS	0.041 + 0.25%	0	0	0	29	41	0	0	2	34	45
Flucarbazone + fenoxaprop & safener + NIS	0.063 + 0.25%	0	2	0	28	43	0	2	2	35	44
Clodinafop & CGA-185072 ³	0.05	0	0	0	29	43	0	2	0	35	49
Clodinafop & CGA-185072	0.1	0	0	0	29	40	2	2	0	34	43
AE F103060 + adjuvant	0.0156 + 1.9%	0	2	2	29	42	0	2	0	35	45
AE F103060 + adjuvant	0.031 + 1.9%	0	2	2	28	40	0	7	2	33	42
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	55	67	22	21	--	27	32	29	36
Difenzoquat	1.5	--	62	85	19	13	--	23	42	29	36
Check		0	0	0	31	43	0	0	0	35	46
Check		0	0	0	29	45	0	0	0	35	46
LSD (P=.05)		4	14	13	3	8	5	11	8	3	9

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 2. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	Granite					Hanna				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
		-----	(%)	-----			-----	(%)	-----		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	0	0	0	28	44	2	0	0	36	38
Fenoxaprop & safener	0.167	0	0	0	30	41	2	0	0	35	44
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	7	2	5	30	41	8	7	3	38	45
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	15	13	7	28	37	20	13	15	34	37
Flucarbazone + fenoxaprop & safener + NIS	0.041 + 0.25%	0	0	0	29	38	0	0	0	39	43
Flucarbazone + fenoxaprop & safener + NIS	0.063 + 0.25%	0	2	3	30	38	0	2	0	38	42
Clodinafop & CGA-185072 ³	0.05	0	0	0	29	42	0	0	0	38	48
Clodinafop & CGA-185072	0.1	0	0	0	28	37	3	0	0	39	44
AE F103060 + adjuvant	0.0156 + 1.9%	0	2	0	28	45	0	2	0	38	43
AE F103060 + adjuvant	0.031 + 1.9%	0	2	0	29	43	0	5	2	37	40
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	10	10	26	41	--	17	12	35	37
Difenzoquat	1.5	--	10	17	25	34	--	20	22	32	37
Check		0	0	0	29	48	0	0	0	38	46
Check		0	0	0	27	44	0	0	0	39	45
LSD (P=.05)		4	4	7	ns	ns	6	9	7	4	6

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 3. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	HJ98					Knudson				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	5	0	0	29	42	3	0	0	26	45
Fenoxaprop & safener	0.167	5	0	0	28	45	5	0	0	26	41
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	22	5	5	29	45	8	3	5	27	45
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	40	10	12	27	37	25	12	10	26	42
Flucarbazone + fenoxaprop & safener + NIS	0.041 + 0.25%	2	0	0	28	46	0	2	0	26	46
Flucarbazone + fenoxaprop & safener + NIS	0.063 + 0.25%	3	2	0	29	46	0	3	2	28	43
Clodinafop & CGA-185072 ³	0.05	0	0	0	29	47	0	0	0	27	48
Clodinafop & CGA-185072	0.1	3	3	3	29	45	0	0	0	28	46
AE F103060 + adjuvant	0.0156 + 1.9%	2	2	0	27	44	0	3	0	27	44
AE F103060 + adjuvant	0.031 + 1.9%	5	7	8	26	40	0	5	5	26	44
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	22	23	25	36	--	25	32	24	36
Difenzoquat	1.5	--	23	33	26	37	--	25	47	23	35
Check		0	0	0	28	47	0	0	0	28	49
Check		0	0	0	30	45	0	0	0	28	49
LSD (P=.05)		7	9	5	ns	7	7	14	7	2	7

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 4. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	NorPro					Parshall				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	2	0	0	26	40	2	0	0	34	41
Fenoxaprop & safener	0.167	2	0	0	26	42	3	0	0	25	42
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	8	5	5	27	41	7	5	5	35	40
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	13	12	12	25	38	10	28	7	33	36
Flucarbazone + fenoxaprop & safener + NIS	0.041 + 0.25%	2	0	0	27	45	0	0	0	35	41
Flucarbazone + fenoxaprop & safener + NIS	0.063 + 0.25%	2	0	0	27	43	0	2	0	34	39
Clodinafop & CGA-185072 ³	0.05	0	0	0	27	43	0	0	2	33	40
Clodinafop & CGA-185072	0.1	0	0	0	27	42	0	0	0	33	41
AE F103060 + adjuvant	0.0156 + 1.9%	0	2	2	27	42	0	2	2	34	40
AE F103060 + adjuvant	0.031 + 1.9%	0	2	5	26	38	0	2	3	32	37
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	18	18	25	39	--	53	68	26	21
Difenzoquat	1.5	--	17	30	24	34	--	42	77	24	16
Check		0	0	0	27	45	0	0	0	34	38
Check		0	0	0	28	48	0	0	0	34	39
LSD (P=.05)		4	11	7	ns	7	3	24	11	4	6

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 5. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	Reeder					Walworth				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	0	0	0	28	39	3	2	0	31	43
Fenoxaprop & safener	0.167	0	0	0	28	37	5	2	0	31	44
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	3	3	8	27	34	15	7	5	29	43
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	13	10	13	26	33	27	13	10	29	43
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	0	0	0	28	37	0	2	0	30	45
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	0	2	3	28	36	0	3	2	31	45
Clodinafop & CGA-185072 ³	0.05	0	0	0	28	39	3	0	0	32	43
Clodinafop & CGA-185072	0.1	0	2	0	28	37	2	3	3	31	42
AE F103060 + adjuvant	0.0156 + 1.9%	0	2	0	28	39	2	3	0	31	45
AE F103060 + adjuvant	0.031 + 1.9%	0	2	0	28	38	10	7	8	30	43
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	53	62	21	18	--	17	20	29	40
Difenzoquat	1.5	--	78	88	16	6	--	20	33	29	35
Check		0	0	0	29	44	0	0	0	32	42
Check		0	0	0	30	40	0	0	0	31	44
LSD (P=.05)		6	18	19	3	6	8	10	8	ns	ns

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 6. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	2375				
		Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12		
<u>Postemergence May 23</u>						
Fenoxaprop & safener ¹	0.084	3	0	0	29	45
Fenoxaprop & safener	0.167	5	0	0	32	45
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	15	13	8	31	43
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	30	20	17	30	39
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	7	2	3	32	42
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	0	2	0	32	44
Clodinafop & CGA-185072 ³	0.05	0	2	0	30	47
Clodinafop & CGA-185072	0.1	0	2	0	29	46
AE F103060 + adjuvant	0.0156 + 1.9%	0	2	0	31	49
AE F103060 + adjuvant	0.031 + 1.9%	0	2	0	31	46
<u>Postemergence June 2</u>						
Difenzoquat	1.0	--	25	33	27	34
Difenzoquat	1.5	--	27	57	26	30
Check		0	0	0	31	49
Check		0	0	0	30	45
LSD (P=.05)		8	16	9	ns	6

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.

Table 7. Barley tolerance to postemergence herbicides at Rosemount, MN -2003 (Durgan, Wiersma, and Miller).

Treatment	Rate (lb/A)	Lacey					Robust				
		Injury			Height (inch)	Yield (bu/A)	Injury			Height (inch)	Yield (bu/A)
		6/2	6/15	7/12			6/2	6/15	7/12		
		-----	(%)	-----			-----	(%)	-----		
<u>Postemergence May 23</u>											
Fenoxaprop & safener ¹	0.084	7	2	0	30	66	7	0	2	28	53
Fenoxaprop & safener	0.167	12	8	12	29	64	10	3	2	32	58
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	40	50	48	23	63	45	57	48	23	48
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	45	48	63	20	46	47	73	67	20	35
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	37	45	48	24	65	35	55	47	21	52
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	38	42	48	24	64	35	50	43	22	56
Clodinafop & CGA-185072 ³	0.05	45	30	42	25	66	48	27	37	31	63
Clodinafop & CGA-185072	0.1	47	55	43	25	60	47	57	43	26	53
AE F103060 + adjuvant	0.0156 + 1.9%	13	5	5	28	66	23	10	5	30	59
AE F103060 + adjuvant	0.031 + 1.9%	20	28	27	28	71	20	32	22	29	55
<u>Postemergence June 2</u>											
Difenzoquat	1.0	--	18	17	27	58	--	25	15	26	50
Difenzoquat	1.5	--	20	23	27	55	--	20	17	27	48
Check		0	0	0	30	74	0	0	0	29	54
Check		0	0	0	32	71	0	0	0	32	55
LSD (P=.05)		14	27	20	4	9	16	18	12	4	10

¹ Puma 1E.² NIS = Class Preference nonionic surfactant.³ Discover 0.5E.