

Hard red spring wheat and barley tolerance to postemergence herbicides at Crookston, MN - 2003. Durgan, Beverly R., Jochum J. Wiersma, James H. Cameron, 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 Crookston, MN on a Donaldson/Wheaton loam. Following soybeans, the experimental area was chisel plowed last fall. No nitrogen application was made in either the fall or spring as a soil test indicated no need to provide additional N. In the spring the experimental area was tilled with a field cultivator to prepare the seedbed. . The HRSW varieties 'Alsen', 'Briggs', 'Granite', 'Hanna', 'HJ98', 'Knudson', 'NorPro', 'Parshall', 'Reeder', 'Walworth', and '2375" and the spring barley varieties 'Lacey' and 'Robust' were seeded on April 29 at 105 lbs/A and 98 lbs/A for wheat and barley, respectively. All herbicide treatments were applied with a CO₂ powered backpack type sprayer delivering 10 gpa at 30 psi using 80015 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 8 by 8 ft. Herbicide treatments were applied May 29 and June 6. Environmental conditions are listed below. Crop injury was rated visually. Plant heights and grain yield were measured. Data is summarized by variety and is presented in the tables 1 through 7.

Treatment Date	May 29	June 6
Crop stage	3-4 leaf	4-5 leaf
Air Temperature (°F)	70	65
Rainfall before Application		
Week 1 (inch)	0.22	0.41
Rainfall after Application		
Week 1 (inch)	0.41	1.66
Week 2 (inch)	1.42	0.01

Difenzoquat caused severe injury on the HRSW varieties Alsen and Reeder, reducing yields 50-75% compared to the check. Moderate to severe difenzoquat injury on Parshall reduced its yield about 40% compared to the check. Difenzoquat caused light to moderate injury on the varieties HJ98, Knudson, NorPro, and 2375 but no significant yield reduction. Only slight injury was observed on the varieties Briggs, Granite, Hanna, and Walworth as a result of difenzoquat application.

The flucarbazone + 2,4-D ester treatments caused slight injury on both spring barley and HRSW varieties. In addition, AE F103060 treatments caused slight to moderate injury symptoms to all HRSW varieties. These injury symptoms were greatest following application and generally disappeared at the later rating dates. No significant yield differences were detected but the variability between replications resulted in a large LSD that may have masked treatment differences. The flucarbazone + 2,4-D ester, clodinafop & CGA-185072, and AE F103060 treatments resulted in moderate to severe injury symptoms on both barley varieties. As with the HRSW varieties, yield variability made it difficult to determine significant differences between the treatments and the untreated check. Flucarbazone + 2,4-D ester did result in significantly lower yields of Robust. Injury with the flucarbazone + fenoxaprop & safener treatments were significantly less than the flucarbazone + 2,4-D ester treatments.

Generally, the other treatments resulted in little or no injury or yield reduction in tested HRSW varieties. Fenoxaprop & safener alone and difenzoquat caused the least injury on the tested spring barley varieties. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

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

Treatment	Rate (lb/A)	Alsen					Briggs						
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	0	0	92	75	0	0	2	0	84	75
Fenoxaprop & safener	0.167	0	2	0	0	88	71	3	0	0	0	90	77
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	8	2	2	0	88	71	12	2	3	0	88	76
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	10	8	2	7	85	68	8	8	0	5	87	76
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	3	2	0	5	90	79	0	2	0	2	83	78
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	3	2	2	0	91	76	5	2	0	0	90	79
Clodinafop & CGA-185072 ³	0.05	0	0	0	0	87	79	0	0	0	0	83	80
Clodinafop & CGA-185072	0.1	2	0	0	0	88	82	7	2	0	0	86	78
AE F103060 + adjuvant	0.0156 + 1.9%	5	5	0	2	91	79	13	3	7	2	92	78
AE F103060 + adjuvant	0.031 + 1.9%	10	10	0	3	89	77	13	10	2	3	87	75
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	5	53	77	70	43	--	5	12	5	85	77
Difenzoquat	1.5	--	7	57	88	59	34	--	7	17	7	81	79
Check		0	0	0	0	87	84	0	0	0	0	88	82
LSD (P=.05)		7	4	9	5	11	10	9	4	6	ns	ns	ns

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

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

Treatment	Rate (lb/A)	Granite					Hanna						
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	0	0	82	66	0	0	5	0	100	74
Fenoxaprop & safener	0.167	3	0	0	0	83	70	2	0	2	0	102	73
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	8	2	3	0	84	68	7	2	0	0	101	72
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	10	10	0	5	82	67	7	12	0	5	101	70
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	7	2	2	2	89	73	2	2	2	5	102	60
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	5	2	0	0	82	71	7	2	0	0	102	70
Clodinafop & CGA-185072 ³	0.05	2	0	2	0	91	76	0	0	0	0	97	73
Clodinafop & CGA-185072	0.1	2	0	0	0	87	75	7	0	0	0	100	80
AE F103060 + adjuvant	0.0156 + 1.9%	8	5	3	0	89	72	18	3	8	3	99	71
AE F103060 + adjuvant	0.031 + 1.9%	15	7	2	5	80	71	20	10	3	5	98	73
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	5	8	2	86	72	--	5	10	10	100	74
Difenzoquat	1.5	--	7	17	5	82	75	--	7	8	15	100	79
Check		0	0	0	0	85	74	0	0	0	0	99	76
LSD (P=.05)		8	4	7	ns	ns	ns	11	3	ns	6	ns	ns

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

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

Treatment	Rate (lb/A)	HJ98						Knudson					
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	0	0	89	90	0	0	0	0	88	79
Fenoxaprop & safener	0.167	3	2	0	0	89	76	2	0	2	0	90	80
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	7	2	3	3	84	78	7	2	2	5	87	68
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	3	8	2	5	86	73	8	7	0	7	90	73
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	2	2	0	3	81	78	2	2	0	0	81	72
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	2	2	0	0	86	84	2	0	2	0	87	79
Clodinafop & CGA-185072 ³	0.05	2	0	0	0	84	75	0	0	2	0	88	80
Clodinafop & CGA-185072	0.1	2	0	0	0	95	86	2	2	0	3	85	81
AE F103060 + adjuvant	0.0156 + 1.9%	27	10	0	5	87	74	15	3	0	2	91	82
AE F103060 + adjuvant	0.031 + 1.9%	25	10	5	10	89	82	18	10	0	8	89	79
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	5	18	12	87	83	--	5	12	17	84	79
Difenzoquat	1.5	--	7	23	27	84	82	--	7	35	33	81	77
Check		0	0	0	0	85	87	0	0	0	0	89	85
LSD (P=.05)		10	4	7	8	ns	ns	8	4	14	11	ns	ns

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

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

Treatment	Rate (lb/A)	NorPro						Parshall					
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	5	0	85	77	0	0	3	0	98	74
Fenoxaprop & safener	0.167	2	0	0	0	86	71	7	0	2	0	97	74
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	7	2	2	3	88	71	8	2	2	0	99	78
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	5	7	5	7	85	64	8	10	0	7	97	76
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	3	2	0	0	81	63	2	2	2	3	98	81
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	2	0	2	0	87	76	7	2	2	0	101	78
Clodinafop & CGA-185072 ³	0.05	0	0	0	0	81	67	0	0	0	0	97	86
Clodinafop & CGA-185072	0.1	2	0	0	2	85	74	7	0	0	0	102	81
AE F103060 + adjuvant	0.0156 + 1.9%	17	7	0	0	87	69	13	3	2	2	100	82
AE F103060 + adjuvant	0.031 + 1.9%	18	10	2	2	86	70	13	8	0	3	100	76
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	5	27	10	85	65	--	5	37	43	92	58
Difenzoquat	1.5	--	7	40	25	81	65	--	7	43	52	88	54
Check		0	0	0	0	83	78	0	0	0	0	101	88
LSD (P=.05)		9	4	13	5	ns	ns	10	3	15	6	6	11

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

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

Treatment	Rate (lb/A)	Reeder						Walworth					
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	0	0	95	84	0	0	2	0	92	87
Fenoxaprop & safener	0.167	0	0	0	0	99	76	0	0	0	0	95	82
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	10	2	0	3	97	72	7	2	3	0	94	79
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	8	10	0	7	97	73	10	8	0	7	93	81
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	0	2	0	5	95	74	0	2	3	0	92	85
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	5	2	0	0	94	78	5	0	0	0	94	81
Clodinafop & CGA-185072 ³	0.05	0	0	0	0	97	85	0	0	0	0	95	88
Clodinafop & CGA-185072	0.1	2	0	0	0	94	87	0	2	0	0	94	87
AE F103060 + adjuvant	0.0156 + 1.9%	12	3	2	2	80	79	13	3	0	2	89	85
AE F103060 + adjuvant	0.031 + 1.9%	17	10	0	5	82	76	17	10	0	5	94	80
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	5	63	87	77	34	--	5	7	8	90	83
Difenzoquat	1.5	--	7	63	90	75	22	--	7	10	13	89	83
Check		0	0	0	0	94	89	0	0	0	0	97	88
LSD (P=.05)		8	3	4	6	ns	12	3	5	7	6	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 Crookston, MN - 2003 (Durgan, Wiersma, Cameron, and Miller).

Treatment	Rate (lb/A)	2375					
		Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5		
<u>Postemergence May 29</u>							
Fenoxaprop & safener ¹	0.084	0	0	2	0	90	87
Fenoxaprop & safener	0.167	0	0	0	0	92	85
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	3	2	0	3	84	81
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	10	12	3	7	87	79
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	7	2	3	0	87	83
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	2	2	3	0	92	82
Clodinafop & CGA-185072 ³	0.05	2	0	0	0	88	82
Clodinafop & CGA-185072	0.1	2	0	0	0	93	85
AE F103060 + adjuvant	0.0156 + 1.9%	17	3	5	3	86	80
AE F103060 + adjuvant	0.031 + 1.9%	20	10	2	8	87	77
<u>Postemergence June 6</u>							
Difenzoquat	1.0	--	5	20	15	86	85
Difenzoquat	1.5	--	7	23	33	82	78
Check							
LSD (P=.05)		10	3	9	6	6	ns

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

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

Treatment	Rate (lb/A)	Lacey						Robust					
		Injury				Height (cm)	Yield (Bu/A)	Injury				Height (cm)	Yield (Bu/A)
		6/6	6/13	6/19	7/5			6/6	6/13	6/19	7/5		
		----- (%) -----						----- (%) -----					
<u>Postemergence May 29</u>													
Fenoxaprop & safener ¹	0.084	0	0	2	0	88	120	0	0	7	0	97	104
Fenoxaprop & safener	0.167	2	2	0	0	89	118	2	2	3	0	90	104
Flucarbazone + 2,4-D ester + NIS ²	0.027 + 0.5 + 0.25%	37	23	17	33	83	107	42	32	23	33	88	86
Flucarbazone + 2,4-D ester + NIS	0.054 + 0.5 + 0.25%	43	35	27	48	78	88	45	32	40	47	83	77
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.041 + 0.25%	17	10	13	13	85	113	20	13	17	27	95	89
Flucarbazone + fenoxaprop & safener + NIS	0.027 0.063 + 0.25%	15	10	3	3	92	117	18	10	5	3	94	103
Clodinafop & CGA-185072 ³	0.05	45	32	18	12	85	115	50	35	10	7	91	112
Clodinafop & CGA-185072	0.1	53	45	37	37	87	117	55	45	33	37	95	111
AE F103060 + adjuvant	0.0156 + 1.9%	47	28	17	7	87	117	48	35	17	7	95	114
AE F103060 + adjuvant	0.031 + 1.9%	48	33	17	15	87	112	53	40	17	15	89	111
<u>Postemergence June 6</u>													
Difenzoquat	1.0	--	8	5	0	84	108	--	8	5	0	92	112
Difenzoquat	1.5	--	7	5	0	88	121	--	7	10	0	93	107
Check		0	0	0	0	88	106	0	0	0	0	97	112
LSD (P=.05)		14	16	10	11	ns	ns	12	11	13	14	7	15

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