Weed Control in Small Grains

Hard red spring wheat and barley tolerance to postemergence herbicides at Rosemount, MN - 2005. 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 and a plant growth regulator. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil. Following soybeans, the experimental area was chisel plowed in the fall of 2004. In the spring of 2005, the area received 75 lbs/A N then was disked, field cultivated, and harrowed. The HRSW varieties 'Alsen', 'Banton', 'Briggs', 'Freyr', 'Granger', 'Granite', 'HJ98', 'Knudson', 'Oklee', 'Steele-ND', and 'Ulen' and the spring barley varieties 'Lacey' and 'Robust' were seeded on April 29 at 85 lb/A and 90 lbs/A for HRSW and spring barley, respectively. Bromoxynil at 0.38 lb ai/A was applied postemergence on June 3 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 11001 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 31. 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 31
Temperature (°F)	
air	77
Relative Humidity (%)	30
Soil Moisture	dry to 0.75"
Wind (mph)	3-7 S
Sky	50% clouds
Rainfall before application	
Week 1 (inch)	0.61
Rainfall after application	
Week 1 (inch)	0.42
Week 2 (inch)	1.16
Barley	
Lacey	
leaf no.	5
height (inch)	10-12
tillers	2
Robust	
leaf no.	4
height (inch)	8-10
tillers	1
Wheat	
Alsen	
leaf no.	4.5 -5
height (inch)	5-7
tillers	2
Banton	
leaf no.	4.25-5
height (inch)	6-8
tillers	2
Briggs	
leaf no.	5
height (inch)	8-9
tillers	2-3

Wheat (cont.)	
Freyr	
leaf no.	4-5
height (inch)	7-9
tillers	1
Granger	
leaf no.	4.5-5
height (inch)	6-8
tillers	2-3
Granite	
leaf no.	5
height (inch)	6-8
tillers	2-3
HJ98	
leaf no.	4.5-5
height (inch)	8-9
tillers	2-3
Knudson	
leaf no.	5
height (inch)	7-9
tillers	2-3
Oklee	
leaf no.	4
height (inch)	6-8
tillers	1
Steele-ND	
leaf no.	4.5-5
height (inch)	8-9
tillers	2-3
Ulen	
leaf no.	4.5-5
height (inch)	8-10
tillers	2-3

Flucarbazone + NIS (both rates) and AE F130060 + adjuvant (2X rate) caused the greatest injury symptoms in HRSW. This injury was highest at the earlier rating date. The varieties ‘HJ98' and ‘Knudson’ were most affected and yielded lower as a result. Grain yield of the other varieties tested were not affected. The addition of fenoxaprop & safener to flucarbazone + NIS (1X rate) generally resulted in less wheat injury compared to flucarbazone + NIS alone. Injury ratings of trinexapac-ethyl reflect shortening of the crop at those rating dates. Flucarbazone, clodinafop, and AE F130060 are not labeled for use in barley and these compounds all resulted in significantly high injury to the barley. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN -2005 (Durgan, Wiersma, and Miller).

		Alsen						Banton					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	3	0	0	0	33	52	0	0	0	0	36	54
Fenoxaprop & safener	0.167	3	0	0	0	32	52	2	0	0	0	35	54
Flucarbazone + NIS[2]	0.027 + 0.25%	17	5	3	8	32	50	18	3	5	8	34	48
Flucarbazone + NIS	0.054 + 0.25%	28	13	8	12	32	50	33	8	10	12	34	49
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	3	0	0	2	33	55	13	0	0	2	37	50
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	3	2	0	5	32	52	15	0	0	5	36	54
Clodinafop & cloquintocet [3]	0.05	0	0	0	0	33	53	0	0	0	0	36	54
Clodinafop & cloquintocet	0.1	2	0	0	0	33	54	0	0	0	0	35	50
Trinexapac-ethyl[4]	0.1116	2	3	0	2	32	51	17	8	7	2	34	53
Trinexapac-ethyl	0.2232	5	8	10	10	31	54	17	20	22	8	31	48
AE F130060 + adjuvant [5]	0.00222 + 1.9%	7	0	2	2	33	52	10	2	2	2	34	51
AE F130060 + adjuvant	0.00445 + 1.9%	20	7	5	7	32	48	22	5	7	7	35	46
A12303 + A12127 [7]	0.053 + 0.75%	3	0	0	0	33	58	0	0	0	0	36	55
A12303 + A12127	0.106 + 0.75%	3	0	0	0	32	48	2	2	0	0	34	52
Check		0	0	0	0	35	55	0	0	0	0	36	58
LSD (P=.05)		10	5	3	6	ns	ns	14	3	5	5	2	ns

[1] Puma 1E.
[2] NIS = Class Preference nonionic surfactant.
[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.

Table 2. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		Briggs						Freyr					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	2	0	0	0	32	49	5	0	0	0	35	55
Fenoxaprop & safener	0.167	2	0	0	0	31	54	3	0	0	0	35	55
Flucarbazone + NIS[2]	0.027 + 0.25%	20	10	0	10	33	50	12	3	2	8	34	52
Flucarbazone + NIS	0.054 + 0.25%	33	12	7	13	31	51	15	10	8	12	34	50
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	0	0	0	2	31	54	5	0	0	2	35	52
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	3	0	0	5	31	53	3	0	0	5	34	49
Clodinafop & cloquintocet [3]	0.05	3	2	0	0	31	55	0	0	0	0	33	52
Clodinafop & cloquintocet	0.1	2	0	2	0	32	49	2	0	0	0	34	50
Trinexapac-ethyl[4]	0.1116	7	2	3	2	33	52	3	5	0	2	34	49
Trinexapac-ethyl	0.2232	15	20	17	15	30	50	7	12	20	8	32	46
AE F130060 + adjuvant [5]	0.00222 + 1.9%	8	5	2	2	32	50	15	3	8	2	33	44
AE F130060 + adjuvant	0.00445 + 1.9%	15	5	0	7	31	53	20	5	8	7	33	43
A12303 + A12127 [7]	0.053 + 0.75%	0	0	0	0	32	62	0	0	0	0	34	51
A12303 + A12127	0.106 + 0.75%	0	0	0	0	33	53	2	0	0	0	34	58
Check		0	0	0	0	32	57	0	0	0	0	35	55
LSD (P=.05)		8	3	5	7	ns	ns	5	4	5	5	ns	ns

[1] Puma 1E.
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[5] Destiny adjuvant distributed by Agriliance, LLC.
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Table 3. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		Granger						Granite					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	2	0	0	0	38	56	0	0	0	0	33	43
Fenoxaprop & safener	0.167	2	0	0	0	36	58	0	0	0	0	33	44
Flucarbazone + NIS[2]	0.027 + 0.25%	13	7	2	8	37	53	17	3	0	8	33	47
Flucarbazone + NIS	0.054 + 0.25%	30	10	7	12	35	48	25	3	3	8	32	43
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	3	0	0	2	38	58	0	0	0	5	33	48
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	3	0	0	5	37	51	0	0	0	8	32	47
Clodinafop & cloquintocet [3]	0.05	2	0	0	0	36	58	0	0	0	0	32	45
Clodinafop & cloquintocet	0.1	0	0	0	0	35	55	0	0	0	0	32	40
Trinexapac-ethyl[4]	0.1116	3	5	0	2	37	53	3	8	7	2	30	42
Trinexapac-ethyl	0.2232	10	17	18	5	37	55	20	23	27	8	27	41
AE F130060 + adjuvant [5]	0.00222 + 1.9%	7	2	2	2	37	55	10	0	2	2	33	47
AE F130060 + adjuvant	0.00445 + 1.9%	20	3	2	7	37	48	17	2	3	7	31	37
A12303 + A12127 [7]	0.053 + 0.75%	3	0	0	0	38	54	0	0	0	0	32	48
A12303 + A12127	0.106 + 0.75%	3	3	0	0	37	38	0	0	0	0	32	45
Check		0	0	0	0	38	58	0	0	0	0	34	46
LSD (P=.05)		5	4	3	5	ns	ns	9	4	5	5	2	ns

[1] Puma 1E.
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[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.

Table 4. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		HJ98						Knudson					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	8	0	0	0	33	52	5	0	0	0	35	66
Fenoxaprop & safener	0.167	7	0	0	0	33	42	3	0	0	0	34	65
Flucarbazone + NIS[2]	0.027 + 0.25%	27	13	7	8	31	35	27	8	13	8	32	59
Flucarbazone + NIS	0.054 + 0.25%	40	15	13	15	30	28	33	8	12	13	32	56
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	17	2	0	2	33	46	12	2	2	2	33	62
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	18	0	0	5	33	40	8	2	0	5	31	56
Clodinafop & cloquintocet [3]	0.05	3	0	0	0	33	45	0	0	0	0	32	63
Clodinafop & cloquintocet	0.1	3	0	0	0	34	44	0	0	0	0	33	62
Trinexapac-ethyl[4]	0.1116	2	3	5	2	33	51	3	2	2	2	31	61
Trinexapac-ethyl	0.2232	13	10	10	3	33	57	8	10	12	8	32	63
AE F130060 + adjuvant [5]	0.00222 + 1.9%	28	2	3	2	32	42	20	5	5	2	33	58
AE F130060 + adjuvant	0.00445 + 1.9%	33	12	12	8	30	34	35	13	18	7	30	50
A12303 + A12127 [7]	0.053 + 0.75%	5	2	0	0	34	51	3	0	0	0	33	58
A12303 + A12127	0.106 + 0.75%	3	0	0	0	34	46	2	0	0	0	32	61
Check		0	0	0	0	34	53	0	0	0	0	33	64
LSD (P=.05)		13	4	4	5	2	12	8	5	3	5	ns	8

[1] Puma 1E.
[2] NIS = Class Preference nonionic surfactant.
[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.

Table 5. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		Oklee						Steele-ND					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	2	0	0	0	35	62	2	0	0	0	32	59
Fenoxaprop & safener	0.167	3	0	0	0	34	64	3	0	0	0	34	50
Flucarbazone + NIS[2]	0.027 + 0.25%	20	10	3	10	32	54	18	8	7	8	31	54
Flucarbazone + NIS	0.054 + 0.25%	28	12	13	12	31	53	28	15	12	13	31	54
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	3	3	0	2	34	67	3	0	0	5	32	56
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	3	3	0	5	33	65	7	0	0	8	31	54
Clodinafop & cloquintocet [3]	0.05	0	0	0	0	33	61	2	0	0	0	33	56
Clodinafop & cloquintocet	0.1	0	0	0	0	32	59	3	0	0	0	33	54
Trinexapac-ethyl[4]	0.1116	8	8	0	2	31	62	3	2	2	2	34	58
Trinexapac-ethyl	0.2232	13	20	23	10	30	62	5	8	8	8	33	57
AE F130060 + adjuvant [5]	0.00222 + 1.9%	12	5	0	2	33	59	7	2	0	2	33	56
AE F130060 + adjuvant	0.00445 + 1.9%	15	5	3	7	30	56	22	8	2	7	32	46
A12303 + A12127 [7]	0.053 + 0.75%	3	0	0	0	34	58	0	0	0	0	35	57
A12303 + A12127	0.106 + 0.75%	2	2	0	0	33	54	2	0	0	0	33	59
Check		0	0	0	0	34	59	0	0	0	0	35	59
LSD (P=.05)		6	5	5	5	3	7	8	4	3	4	ns	ns

[1] Puma 1E.
[2] NIS = Class Preference nonionic surfactant.
[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.

Table 6. Hard red spring wheat tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		Ulen					
		Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	7	0	0	0	33	54
Fenoxaprop & safener	0.167	3	2	0	0	34	49
Flucarbazone + NIS[2]	0.027 + 0.25%	8	8	8	8	34	53
Flucarbazone + NIS	0.054 + 0.25%	23	12	12	12	32	48
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	3	2	2	5	35	51
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	3	2	0	8	34	50
Clodinafop & cloquintocet [3]	0.05	2	0	0	0	35	49
Clodinafop & cloquintocet	0.1	0	0	0	0	36	49
Trinexapac-ethyl[4]	0.1116	2	2	0	2	33	50
Trinexapac-ethyl	0.2232	5	12	15	13	31	52
AE F130060 + adjuvant [5]	0.00222 + 1.9%	5	0	3	2	35	49
AE F130060 + adjuvant	0.00445 + 1.9%	13	5	7	7	32	43
A12303 + A12127 [7]	0.053 + 0.75%	5	0	0	0	34	55
A12303 + A12127	0.106 + 0.75%	2	0	0	0	36	49
Check		0	0	0	0	36	57
LSD (P=.05)		7	5	5	7	ns	ns

[1] Puma 1E.
[2] NIS = Class Preference nonionic surfactant.
[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.

Table 7. Barley tolerance to postemergence herbicides at Rosemount, MN - 2005 (Durgan, Wiersma, and Miller).

		Lacey						Robust					
		Injury						Injury					
Treatment	Rate	6/8	6/16	6/22	7/9	Height	Yield	6/8	6/16	6/22	7/9	Height	Yield
	(lb/A)	---------- (%) ----------				(inch)	(bu/A)	---------- (%) ----------				(inch)	(bu/A)
Fenoxaprop & safener[1]	0.084	7	2	0	0	35	72	7	0	0	0	39	55
Fenoxaprop & safener	0.167	8	2	0	0	36	67	8	0	0	0	37	65
Flucarbazone + NIS[2]	0.027 + 0.25%	33	43	40	38	27	45	37	47	38	37	28	40
Flucarbazone + NIS	0.054 + 0.25%	33	42	42	45	28	48	37	48	42	45	28	37
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.041 + 0.25%	25	35	28	28	30	46	27	40	32	28	31	46
Flucarbazone + fenoxaprop & safener + NIS	0.027 + 0.063 + 0.25%	25	33	32	30	30	51	23	33	35	32	30	39
Clodinafop & cloquintocet [3]	0.05	37	27	30	32	33	55	38	27	30	30	36	50
Clodinafop & cloquintocet	0.1	40	27	38	30	31	49	40	32	40	30	34	47
Trinexapac-ethyl[4]	0.1116	10	8	8	22	33	81	7	8	5	22	35	59
Trinexapac-ethyl	0.2232	18	23	23	38	27	65	8	20	25	32	31	71
AE F130060 + adjuvant [5]	0.00222 + 1.9%	25	22	20	20	33	60	20	25	25	22	35	48
AE F130060 + adjuvant	0.00445 + 1.9%	37	23	30	25	32	63	32	27	28	27	32	51
A12303 + A12127 [7]	0.053 + 0.75%	0	0	0	0	37	67	2	0	0	0	39	67
A12303 + A12127	0.106 + 0.75%	3	0	0	3	37	73	2	0	3	3	38	67
Check		0	0	0	0	38	79	0	0	0	0	38	62
LSD (P=.05)		12	7	8	12	2	14	14	6	8	12	3	14

[1] Puma 1E.
[2] NIS = Class Preference nonionic surfactant.
[3] Discover NG 0.5E.
[4] Palisade EC growth regulator.
[5] Destiny adjuvant distributed by Agriliance, LLC.
[7] A12127 = adjuvant.