

Split Applications of Grass and Broadleaf Herbicides in Wheat

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Field studies were conducted to evaluate the effects of split applications of grass and broadleaf herbicides with and without methylated seed oil (Scoil) in wheat. '2375' wheat was seeded on May 12 in seven inch rows at a rate of 1.8 bushels per acre. Herbicides were applied with a backpack CO₂ sprayer delivering 10 gpa at 30 psi using 8015 nozzles spaced 19 in. apart. Treatments were applied to the center 6 2/3 ft of 8 ft wide plots 20 ft in length. Soil and application information is contained in Table 1. Four experiments were conducted, each in a split plot arrangement of a randomized complete block with three replications. Grass herbicides were the whole plots and subplots were treatment combinations of rates, adjuvants and broadleaf herbicides. The herbicide application dates depended on the number of applications to be made. If Scoil **was not** added to the mixture, treatments with one application were applied on June 16, treatments with two applications were applied on June 11 and 16, and treatments with three applications were applied at all three dates. If Scoil **was** added to the mixture treatments with one application were applied on June 5, and treatments with two applications were applied on June 11 and 16, and treatments with three applications were applied at all three dates. Grass herbicide rates were selected to be moderately effective on wild oat to aid in showing the effects of adjuvants and timings.

Table 1. Plant development stages and environmental conditions at each herbicide application date

	June 5	June 11	June 16
<u>Plant stage</u>			
Wheat	2.4 lf	3.5 lf	4.5 lf
Wild oat	2-2.5 lf	3-4 lf	4-5 lf
Buckwheat	coty-2 lf	1-3 lf	2-5 lf
Foxtail	2 lf	2-4 lf	3-5 lf
Pigweed	coty- 2 lf	2-3 lf	4-5 lf
<u>Weather conditions</u>			
Temperature	65	60	70
Sky	clear	clear	clear
Wind speed	6-7	2-3	4-5
Wind direction	N	W	S
Relative humidity	70	70	36

Results across experiments

In general, split applications increased weed control compared to single applications and three applications were slightly more effective than two applications (Fenoxaprop & 2,4-D & MCPA is exception). Two applications with Scoil (applied rate is two-thirds of total rate) were on average superior to a single application at the full rate. A single application at a one-third rate with Scoil provided better weed control than expected and it is conjectured this is because smaller plants are more easily controlled than larger ones. Comparisons, within a broadleaf

herbicide, between three applications with and without Scoil show the relative differences between the adjuvants.

Wheat injury was highest with tank mixes containing Carfentrazone-ethyl or Dicamba and were somewhat higher with the addition of Scoil, at equal rates.

Imazamethabenz

Split applications improved wild oat control but did not change foxtail or wild buckwheat control compared to single applications at the one pint rate (Table 5, Figure 1). Wild oat control was improved with split applications with both NIS and Scoil as adjuvants. Imazamethabenz applied twice with Scoil (two-thirds the 1 pt rate) was equal to or better than a single application at one pt. Antagonism of wild oat control from Imazamethabenz with Dicamba and Carfentrazone-ethyl was reduced with split applications. Foxtail were reduced in height and vigor with Imazamethabenz applications and control was similar across treatments except for tank mixes with MCPA which reduced control. Wild buckwheat populations in this trial were variable.

Clodinafop

Clodinafop gave very good wild oat and foxtail control at the rates used in this trial. Single applications of Clodinafop at 4 oz often provided complete wild oat control with the exception of tank mixes with Dicamba. Split applications reduced wild oat antagonism with Dicamba treatments. Foxtail control with Clodinafop was improved with split applications when Thifensulfuron + tribenuron was the tank mix partner but not with the other broadleaf herbicides. Wheat injury from Carfentrazone-ethyl was reduced with split applications compared to Carfentrazone-ethyl applied once at 9.7 oz.

Tralkoxydim

Split applications generally improved both grass and broadleaf weed control compared to single applications at full rates, irrespective of adjuvant (exception is Thifensulfuron + tribenuron). Single applications of Tralkoxydim at 1.2 oz on two-leaf wild oat and foxtail control provided control equal to Tralkoxydim at 3.6 oz applied on four to five-leaf wild oat. Wild oat and foxtail control was reduced with split applications with Thifensulfuron + tribenuron with and without Scoil.

Fenoxaprop & 2,4-D & MCPA

Fenoxaprop & 2,4-D & MCPA did not respond to split applications similar to the other grass herbicides. Wild oat and foxtail control was either the same or reduced with split applications of Fenoxaprop & 2,4-D & MCPA. Wild oat control was antagonized with the addition of Dicamba. The addition of Scoil did not enhance the efficacy of Fenoxaprop & 2,4-D & MCPA.

Table 2. Weed control with Clodinafop herbicide with combinations of broadleaf herbicides, adjuvants and timings.

Treatment	Rate (lb/A)	# apps	Injury	Wild oat		Foxtail		Buckwheat	
				6/27	7/29	6/27	7/29	6/27	7/29
Clodinafop + Bromoxynil & MCPA + Score	0.062 + 0.25 & 0.25 + 1%	1	0	90	90	92	95	97	
Clodinafop + Bromoxynil & MCPA + Score	0.031 + 0.125 & 0.125 + 0.5%	2	3	100	93	93	95	100	
Clodinafop + Bromoxynil & MCPA + Score	0.021 + 0.083 & 0.083 + 0.33%	3	3	100	95	97	88	100	
Clodinafop + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	1	3	90	85	72	40	80	
Clodinafop + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	2	0	100	92	93	95	100	
Clodinafop + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	3	3	100	95	92	100	100	
Clodinafop + Thifensulfuron & tribenuron + Score	0.062 + 0.01 & 0.005 + 1%	1	3	97	73	80	43	98	
Clodinafop + Thifensulfuron & tribenuron + Score	0.031 + 0.005 & 0.003 + 0.5%	2	3	100	85	90	67	100	
Clodinafop + Thifensulfuron & tribenuron + Score	0.021 + 0.003 & 0.0017 + 0.33%	3	0	100	90	97	63	100	
Clodinafop + Thifensulfuron & tribenuron + Scoil	0.021 + 0.003 & 0.0017 + 2%	1	3	88	80	92	52	97	
Clodinafop + Thifensulfuron & tribenuron + Scoil	0.021 + 0.003 & 0.0017 + 2%	2	0	97	88	83	73	97	
Clodinafop + Thifensulfuron & tribenuron + Scoil	0.021 + 0.003 & 0.0017 + 2%	3	7	100	93	97	87	100	
Clodinafop + Dicamba + Score	0.062 + 0.125 + 1%	1	10	78	85	93	53	93	
Clodinafop + Dicamba + Score	0.031 + 0.0625 + 0.5%	2	7	90	90	92	70	88	
Clodinafop + Dicamba + Score	0.021 + 0.042 + 0.33%	3	3	98	90	97	88	98	
Clodinafop + Dicamba + Scoil	0.021 + 0.042 + 2%	1	0	68	77	78	53	82	
Clodinafop + Dicamba + Scoil	0.021 + 0.042 + 2%	2	7	88	92	93	82	97	
Clodinafop + Dicamba + Scoil	0.021 + 0.042 + 2%	3	3	100	93	95	93	100	
Clodinafop + Carfentrazone-ethyl + Score	0.062 + 0.4 + 1%	1	28	100	87	88	68	97	
Clodinafop + Carfentrazone-ethyl + Score	0.031 + 0.2 + 0.5%	2	17	97	97	92	98	97	
Clodinafop + Carfentrazone-ethyl + Score	0.021 + 0.133 + 0.33%	3	15	100	93	90	100	93	
Clodinafop + Carfentrazone-ethyl + Scoil	0.021 + 0.133 + 2%	1	18	82	92	83	73	92	
Clodinafop + Carfentrazone-ethyl + Scoil	0.021 + 0.133 + 2%	2	13	100	93	92	88	97	
Clodinafop + Carfentrazone-ethyl + Scoil	0.021 + 0.133 + 2%	3	17	100	95	94	98	97	
Clodinafop + MCPA + Score	0.062 + 0.5 + 1%	1	3	100	92	93	53	82	
Clodinafop + MCPA + Score	0.031 + 0.25 + 0.5%	2	0	100	92	95	57	83	
Clodinafop + MCPA + Score	0.021 + 0.167 + 0.33%	3	0	100	90	93	57	90	
Clodinafop + MCPA + Scoil	0.021 + 0.167 + 2%	1	7	83	83	85	50	77	
Clodinafop + MCPA + Scoil	0.021 + 0.167 + 2%	2	5	90	93	78	53	82	
Clodinafop + MCPA + Scoil	0.021 + 0.167 + 2%	3	3	100	93	93	70	90	
LSD (0.05)			10	14	9	15	25	16	

Score = seed oil from Novartis

Scoil = methylated seed oil from Agsco

Table 3. Weed control with tralkoxydim herbicide with combinations of broadleaf herbicides, adjuvants and timings.

Treatment	Rate (lb/A)	# apps	Injury	Wild oat		Foxtail		Buckwheat	
				<u>6/27</u>	<u>7/29</u>	<u>6/27</u>	<u>7/29</u>	<u>6/27</u>	<u>7/29</u>
Tralkoxydim + Bromoxynil & MCPA + Supercharge	0.062 + 0.25 & 0.25 + 0.5%	1	0	67	73	82	73	80	
Tralkoxydim + Bromoxynil & MCPA + Supercharge	0.09 + 0.125 & 0.125 + 0.5%	2	0	77	83	83	100	97	
Tralkoxydim + Bromoxynil & MCPA + Supercharge	0.021 + 0.083 & 0.083 + 0.5%	3	0	87	85	88	100	100	
Tralkoxydim + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	1	3	70	80	78	33	50	
Tralkoxydim + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	2	0	93	92	88	90	95	
Tralkoxydim + Bromoxynil & MCPA + Scoil	0.021 + 0.083 & 0.083 + 2%	3	2	93	88	88	100	97	
Tralkoxydim + Thifensulfuron & tribenuron + Supercharge	0.18 + 0.01 & 0.005 + 0.5%	1	3	70	53	58	63	88	
Tralkoxydim + Thifensulfuron & tribenuron + Supercharge	0.09 + 0.005 & 0.003 + 0.5%	2	12	67	60	60	83	92	
Tralkoxydim + Thifensulfuron & tribenuron + Supercharge	0.06 + 0.003 & 0.0017 + 0.5%	3	10	73	67	65	90	93	
Tralkoxydim + Thifensulfuron & tribenuron + Scoil	0.06 + 0.003 & 0.0017 + 2%	1	7	72	57	60	70	75	
Tralkoxydim + Thifensulfuron & tribenuron + Scoil	0.06 + 0.003 & 0.0017 + 2%	2	10	63	67	65	88	98	
Tralkoxydim + Thifensulfuron & tribenuron + Scoil	0.06 + 0.003 & 0.0017 + 2%	3	18	53	75	63	97	93	
Tralkoxydim + Dicamba + Supercharge	0.18 + 0.125 + 0.5%	1	8	62	70	75	58	80	
Tralkoxydim + Dicamba + Supercharge	0.09 + 0.0625 + 0.5%	2	12	70	85	77	68	88	
Tralkoxydim + Dicamba + Supercharge	0.06 + 0.042 + 0.5%	3	15	83	90	88	80	93	
Tralkoxydim + Dicamba + Scoil	0.06 + 0.042 + 2%	1	3	77	70	82	53	70	
Tralkoxydim + Dicamba + Scoil	0.06 + 0.042 + 2%	2	23	73	88	88	72	93	
Tralkoxydim + Dicamba + Scoil	0.06 + 0.042 + 2%	3	15	80	92	88	77	93	
Tralkoxydim + Carfentrazone-ethyl + Supercharge	0.18 + 0.4 + 0.5%	1	32	68	78	60	60	43	
Tralkoxydim + Carfentrazone-ethyl + Supercharge	0.09 + 0.2 + 0.5%	2	20	80	82	77	70	70	
Tralkoxydim + Carfentrazone-ethyl + Supercharge	0.06 + 0.133 + 0.5%	3	22	82	83	72	67	78	
Tralkoxydim + Carfentrazone-ethyl + Scoil	0.06 + 0.133 + 2%	1	25	65	82	80	63	53	
Tralkoxydim + Carfentrazone-ethyl + Scoil	0.06 + 0.133 + 2%	2	23	78	87	80	78	73	
Tralkoxydim + Carfentrazone-ethyl + Scoil	0.06 + 0.133 + 2%	3	37	88	88	86	97	87	
Tralkoxydim + MCPA + Supercharge	0.18 + 0.5 + 0.5%	1	3	68	80	88	48	43	
Tralkoxydim + MCPA + Supercharge	0.09 + 0.25 + 0.5%	2	8	80	88	87	40	47	
Tralkoxydim + MCPA + Supercharge	0.06 + 0.167 + 0.5%	3	0	87	82	87	23	47	
Tralkoxydim + MCPA + Scoil	0.06 + 0.167 + 2%	1	0	80	72	83	17	37	
Tralkoxydim + MCPA + Scoil	0.06 + 0.167 + 2%	2	0	83	88	87	33	42	
Tralkoxydim + MCPA + Scoil	0.06 + 0.167 + 2%	3	3	97	90	92	43	55	
LSD (0.05)			10	19	19	11	25	17	

Supercharge = seed oil from Zeneca

Scoil = methylated seed oil from Agsco

Table 4. Weed control with fenoxaprop & 2,4-D & MCPA herbicide with combinations of broadleaf herbicides, adjuvants and timings.

Treatment	Rate (lb/A)	# apps	Injury <u>6/27</u>	Wild out <u>7/29</u>
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA	0.066 & 0.087 & 0.26 + 0.25 & 0.25	1	3	84
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA	0.033 & 0.044 & 0.13 + 0.125 & 0.125	2	0	73
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA	0.022 & 0.029 & 0.087 + 0.083 & 0.083	3	3	65
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.083 & 0.083 + 2%	1	3	68
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.083 & 0.083 + 2%	2	3	80
Fenoxaprop & 2,4-D & MCPA + Bromoxynil & MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.083 & 0.083 + 2%	3	0	77
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + NIS	0.066 & 0.087 & 0.26 + 0.01 & 0.005 + 0.125%	1	0	73
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + NIS	0.033 & 0.044 & 0.13 + 0.005 & 0.003 + 0.125%	2	3	75
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + NIS	0.022 & 0.029 & 0.087 + 0.003 & 0.0017 + 0.125%	3	0	78
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + Scoil	0.022 & 0.029 & 0.087 + 0.003 & 0.0017 + 2%	1	3	73
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + Scoil	0.022 & 0.029 & 0.087 + 0.003 & 0.0017 + 2%	2	0	70
Fenoxaprop & 2,4-D & MCPA + Thifensulfuron + tribenuron + Scoil	0.022 & 0.029 & 0.087 + 0.003 & 0.0017 + 2%	3	0	67
Fenoxaprop & 2,4-D & MCPA + Dicamba	0.066 & 0.087 & 0.26 + 0.125	1	10	60
Fenoxaprop & 2,4-D & MCPA + Dicamba	0.033 & 0.044 & 0.13 + 0.0625	2	20	58
Fenoxaprop & 2,4-D & MCPA + Dicamba	0.022 & 0.029 & 0.087 + 0.042	3	10	65
Fenoxaprop & 2,4-D & MCPA + Dicamba + Scoil	0.022 & 0.029 & 0.087 + 0.042 + 2%	1	3	57
Fenoxaprop & 2,4-D & MCPA + Dicamba + Scoil	0.022 & 0.029 & 0.087 + 0.042 + 2%	2	18	65
Fenoxaprop & 2,4-D & MCPA + Dicamba + Scoil	0.022 & 0.029 & 0.087 + 0.042 + 2%	3	20	62
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl	0.066 & 0.087 & 0.26 + 0.4	1	25	73
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl	0.033 & 0.044 & 0.13 + 0.2	2	30	67
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl	0.022 & 0.029 & 0.087 + 0.133	3	23	70
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl + Scoil	0.022 & 0.029 & 0.087 + 0.133 + 2%	1	27	75
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl + Scoil	0.022 & 0.029 & 0.087 + 0.133 + 2%	2	27	65
Fenoxaprop & 2,4-D & MCPA + Carfentrazone-ethyl + Scoil	0.022 & 0.029 & 0.087 + 0.133 + 2%	3	37	70
Fenoxaprop & 2,4-D & MCPA + MCPA	0.066 & 0.087 & 0.26 + 0.5	1	7	88
Fenoxaprop & 2,4-D & MCPA + MCPA	0.033 & 0.044 & 0.13 + 0.25	2	0	77
Fenoxaprop & 2,4-D & MCPA + MCPA	0.022 & 0.029 & 0.087 + 0.167	3	8	80
Fenoxaprop & 2,4-D & MCPA + MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.167 + 2%	1	0	82
Fenoxaprop & 2,4-D & MCPA + MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.167 + 2%	2	3	78
Fenoxaprop & 2,4-D & MCPA + MCPA + Scoil	0.022 & 0.029 & 0.087 + 0.167 + 2%	3	7	85
LSD (0.05)			10	19

Scoil = methylated seed oil from Agsco
NIS = R-11 surfactant from Wilbur Ellis

Table 5. Weed control with imazamethabenz herbicide with combinations of broadleaf herbicides, adjuvants and timings.

Treatment	Rate (lb/A)	# apps	Injury	Wild out		Foxtail		Buckwheat	
				6/27	7/29	6/27	7/29	6/27	7/29
Imazamethabenz + Bromoxynil & MCPA +NIS	0.31 + 0.25 & 0.25 + 0.25%	1	0	83	68	60	98	100	
Imazamethabenz + Bromoxynil & MCPA +NIS	0.16 + 0.125 & 0.125 + 0.25%	2	3	95	68	60	100	100	
Imazamethabenz + Bromoxynil & MCPA +NIS	0.1 + 0.083 & 0.083 + 0.25%	3	0	95	70	57	100	100	
Imazamethabenz + Bromoxynil & MCPA + Scoil	0.1 + 0.083 & 0.083 + 2%	1	0	90	63	60	73	100	
Imazamethabenz + Bromoxynil & MCPA + Scoil	0.1 + 0.083 & 0.083 + 2%	2	0	95	68	68	100	100	
Imazamethabenz + Bromoxynil & MCPA + Scoil	0.1 + 0.083 & 0.083 + 2%	3	3	100	67	70	97	100	
Imazamethabenz + Thifensulfuron + tribenuron + NIS	0.31 + 0.01 & 0.005 + 0.25%	1	0	77	68	57	97	100	
Imazamethabenz + Thifensulfuron + tribenuron + NIS	0.16 + 0.005 & 0.003 + 0.25%	2	0	93	72	68	98	100	
Imazamethabenz + Thifensulfuron + tribenuron + NIS	0.1 + 0.003 & 0.0017 + 0.25%	3	0	97	73	60	98	83	
Imazamethabenz + Thifensulfuron + tribenuron + Scoil	0.1 + 0.003 & 0.0017 + 2%	1	0	95	72	65	97	98	
Imazamethabenz + Thifensulfuron + tribenuron + Scoil	0.1 + 0.003 & 0.0017 + 2%	2	0	97	68	68	100	100	
Imazamethabenz + Thifensulfuron + tribenuron + Scoil	0.1 + 0.003 & 0.0017 + 2%	3	0	97	73	60	98	100	
Imazamethabenz + Dicamba +NIS	0.31 + 0.125 + 0.25%	1	3	55	68	53	97	98	
Imazamethabenz + Dicamba +NIS	0.16 + 0.0625 + 0.25%	2	10	80	68	62	98	98	
Imazamethabenz + Dicamba +NIS	0.1 + 0.042 + 0.25%	3	12	93	68	60	93	98	
Imazamethabenz + Dicamba + Scoil	0.1 + 0.042 + 2%	1	3	57	70	57	80	90	
Imazamethabenz + Dicamba + Scoil	0.1 + 0.042 + 2%	2	7	78	68	57	83	98	
Imazamethabenz + Dicamba + Scoil	0.1 + 0.042 + 2%	3	15	75	70	53	87	97	
Imazamethabenz + Carfentrazone-ethyl +NIS	0.31 + 0.4 + 0.25%	1	18	72	70	57	80	77	
Imazamethabenz + Carfentrazone-ethyl +NIS	0.16 + 0.2 + 0.25%	2	13	85	75	53	90	77	
Imazamethabenz + Carfentrazone-ethyl +NIS	0.1 + 0.133 + 0.25%	3	8	93	70	60	87	77	
Imazamethabenz + Carfentrazone-ethyl + Scoil	0.1 + 0.133 + 2%	1	20	78	77	50	80	77	
Imazamethabenz + Carfentrazone-ethyl + Scoil	0.1 + 0.133 + 2%	2	23	93	73	60	87	77	
Imazamethabenz + Carfentrazone-ethyl + Scoil	0.1 + 0.133 + 2%	3	23	98	77	53	97	98	
Imazamethabenz + MCPA +NIS	0.31 + 0.5 + 0.25%	1	3	98	67	50	70	77	
Imazamethabenz + MCPA +NIS	0.16 + 0.25 + 0.25%	2	3	95	68	37	82	80	
Imazamethabenz + MCPA +NIS	0.1 + 0.167 + 0.25%	3	5	98	73	40	97	77	
Imazamethabenz + MCPA + Scoil	0.1 + 0.167 + 2%	1	3	88	65	37	77	60	
Imazamethabenz + MCPA + Scoil	0.1 + 0.167 + 2%	2	3	93	63	43	77	97	
Imazamethabenz + MCPA + Scoil	0.1 + 0.167 + 2%	3	0	100	72	40	100	87	
LSD (0.05)			7	16	7	15	21	30	

Scoil = methylated seed oil from Agsco
NIS = R-11 surfactant from Wilbur Ellis