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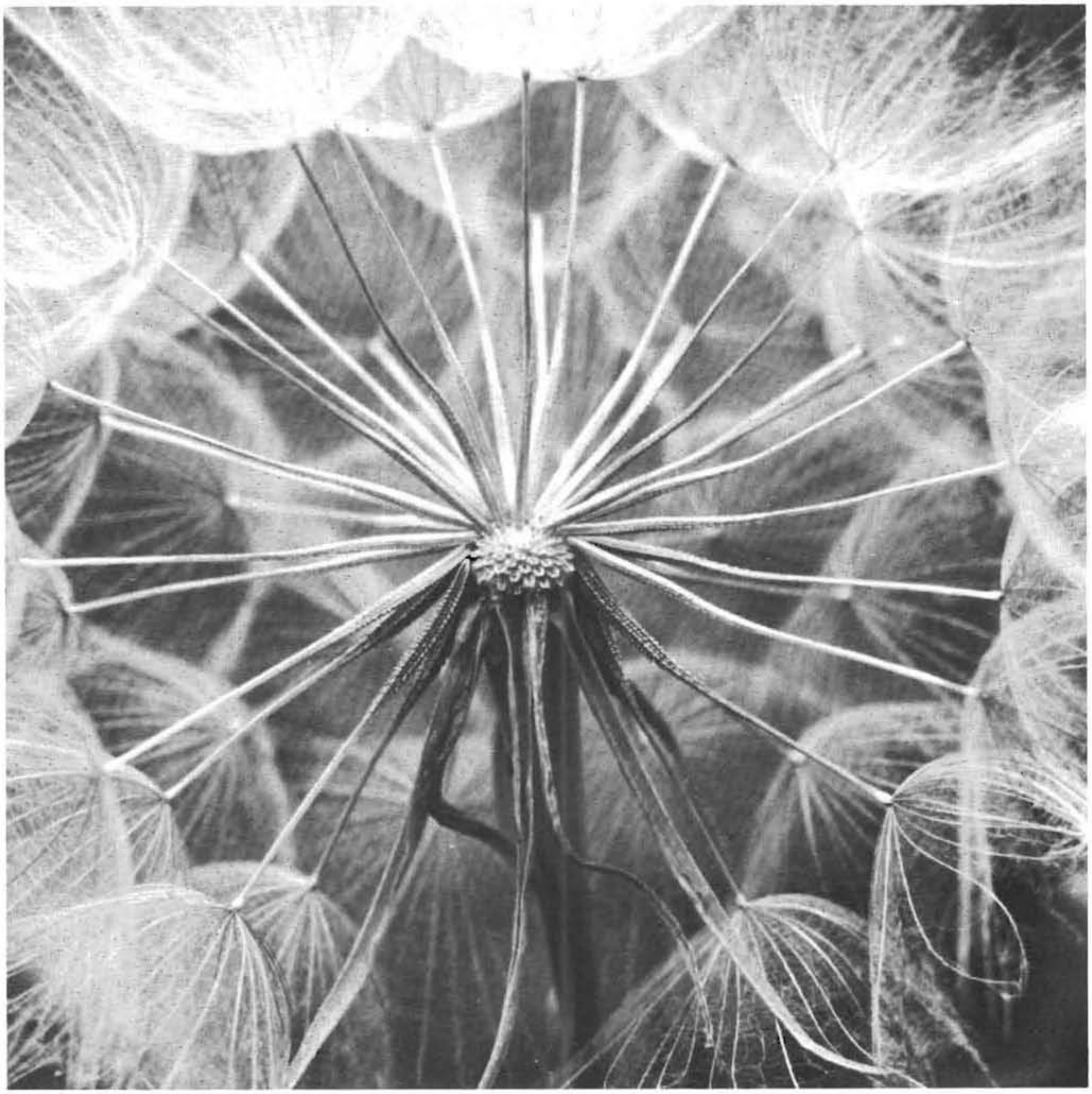

Spokane, Washington March 13,14,15, 1984

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FOREWORD

The Western Society of Weed Science 1984 Research Progress Report is a compilation of brief reports and recent investigations by weed scientists in the Western U.S. The primary function of this volume is to facilitate interchange of information within the weed science community; it is not meant to serve as a means of presenting conclusions, endorsements or recommendations to the general public or anyone else. In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION. This represents an effort by the WSWS to make available effective research, improve communication among scientists having common interests, minimize duplication of effort, and to promote a sharing of ideas.

This 1984 Western Society of Weed Science Research Progress Report is prepared by photoreproduction of the reports as submitted by the authors, without retyping or significant editorial changes. Content, format and style of each paper or report are the sole responsibility of the author(s). In the interest of information exchange, reports were accepted for printing except for profound deviations from WSWS editorial rules.

The accumulation of reports and some index work was the responsibility of the seven project chairmen. Final responsibility of putting the indices and reports together belongs to the research section chairman, who appeals for indulgence in the measure with which it has been granted.

Recognition and credit must go to the members of the Western Society of Weed Science whose efforts are reflected in the reports contained herein.

Darlene M. Frye
Chairman, Research Section
Western Society of Weed Science
1984

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PROJECT 1.

PERENNIAL HERBACEOUS WEEDS

Rodney G. Lym - Project Chairman

Control of seaside arrowgrass in a mountain meadow. Alley, H.P. Arrowgrass is a serious weed component in the mountain meadow areas of the state of Wyoming. In addition to lowering the quality of the harvested hay there is a potential of death loss to cattle grazing the infested areas or consuming forage harvested from the infested meadows. There is not an effective and predictable herbicide available, other than reasonably high rates of 2,4-D, for control of this species.

A herbicide evaluation test was established September 21, 1982 on a dense stand of seaside arrowgrass that was growing on a site where the native forage species had been removed by a previous application of pronamide. The arrowgrass infesting the area was 3 to 4 in. tall and in a vigorous but stunted growth at time of treatment. All treatments were applied with a CO_2 pressurized, 6-nozzle boom knapsack unit in 40 gpa solution. Treatments were 9 x 30 ft in size and replicated three times in a randomized complete block.

Visual evaluations on August 8, 1983 showed that only chlorsulfuron exhibited any activity on the arrowgrass. Rates as low as 0.125 lb ai/A gave 95% reduction in stand. Further evaluations are necessary to determine efficacy of specific rates. (Wyoming Agric. Ext. Sta., Laramie, WY 82071, SR 1248.)

Seaside arrowgrass control

Treatment[1]	Rate lb ai/A	Percent[2] Control
2,4-D amine	2.0	0
2,4-D amine	4.0	0
2,4-D amine	6.0	0
picloram	0.25	0
picloram	0.5	20
Chlorsulfuron + X-77	0.0625	82
Chlorsulfuron + X-77	0.125	95
Chlorsulfuron + X-77	0.25	99
dicamba	1.0	0
dicamba	2.0	0

[1] Herbicides applied September 21, 1982.
[2] Visual evaluations August 8, 1983.

Effect of herbicide treatments on field bindweed control. Flom, D. G., D. C. Thill, and R. H. Callihan. A field study was conducted near Lewiston, Idaho to evaluate the effectiveness of fall applied herbicides on field bindweed control in fallow. Herbicide treatments were applied to established field bindweed in the full bloom stage of development on September 11, 1982. Granular herbicide was applied broadcast using a cyclone spreader and all other herbicides were applied broadcast with a CO_2 pressurized backpack sprayer calibrated to deliver 10 gpa at 35 psi and 3 mph. Treatments were applied when the air temperature was 55 F, soil temperature was 59 F at a depth of five inches, and the relative humidity was 82%. The experimental design was a randomized complete block with four replications and individual plots measured 10 by 30 feet in size.

Field bindweed was visually evaluated for vegetative top growth control on June 25, 1983 using a scale of 0 to 100% with 0 equal to no visible field bindweed control as compared to untreated plots. Treatments resulting in better than 85% field bindweed control were glyphosate at 3.0 lb ae/A, granular dicamba at 4.0 lb ai/A, dicamba + 2,4-D at 1.0 + 3.0 lb ai/A, and dicamba + glyphosate at 0.5 + 1.5 lb ae/A. Treatments containing DPX-T6376 at 0.016 lb ai/A, either alone or in combination with glyphosate at 0.75 lb ae/A or dicamba at 0.5 or 1.0 lb ai/A, did not result in adequate field bindweed control in this study. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Field bindweed control at Lewiston, Idaho.

Treatment	Rate	Weed control
	(lb ai/A)	(%)[1]
dicamba (4EC)	1.00	50
dicamba (4EC)	2.00	78
dicamba (10G)	4.00	93
dicamba (4EC) +	0.50	
glyphosate[2,3]	1.50	89
dicamba (4EC) +	1.00	
glyphosate	0.75	69
dicamba (4EC) +	0.50	
2,4-D amine	1.50	81
dicamba (4EC) +	1.00	
2,4-D amine	3.00	93
glyphosate	3.00	93
DPX-T6376 (75DF) +	0.016	
glyphosate	0.75	46
DPX-T6376 (75DF) +	0.016	
dicamba (4EC)	0.50	41
DPX-T6376 (75DF) +	0.016	
dicamba (4EC)	1.00	45
DPX-T6376 (75DF)	0.016	10
check	-	-
$LSD_{(0.05)}$		28

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[1] Herbicide treatments applied on September 11, 1982 and evaluated June 25, 1983.

[2] Glyphosate and DPX-T6376 treatments applied with 0.5% v/v X-77 surfactant.

[3] Glyphosate rates reported as acid equivalent (ae).

Field bindweed control in cropland. Mitich, L.W. and N.L. Smith. Field bindweed is a serious weed in cropland in California and is difficult to control. The objective of this experiment at the UC Davis Experimental Farm was to compare dicamba, glyphosate and SC 0224 alone and in tank mixes for bindweed control and evaluate soil residual characteristics of these materials that could affect subsequent crops. Applications were made with a CO_2 sprayer calibrated to deliver 30 GPA on September 21, 1982, to a uniform stand of bindweed that had been sprinkler irrigated (8 inches applied) on September 1. Four replications were used, individual plot size was 20 by 25 ft. The site was left undisturbed over the winter except for a mowing to control annual weeds. Bindweed control was evaluated the following spring and all treatments exhibited at least 90% control. The experimental site was rototilled, beds formed and processing tomatoes planted in May 1983. Uncontrolled and seedling bindweed plants were removed by hand hoeing and cultivation throughout the growing season. There were no observable herbicide symptoms on the crop. Yields taken at the conclusion of the experiment indicated no reduction from any herbicide application. (University of California Cooperative Extension, Davis, CA 95616)

Field bindweed control in cropland

Herbicide	Rate lb/A	Bindweed control[1] 5/10/83	Tomato yield[2] 9/29/83
Dicamba	2	9.8	33.5
Dicamba	4	9.9	31.3
Dicamba + glyphosate	0.5 + 2	9.7	37.0
Dicamba + glyphosate	1 + 2	9.7	36.8
Dicamba + SC 0224	1 + 2	9.3	38.2
SC 0224	4	9.0	33.4
Glyphosate	4	9.2	37.1
Control		0.5	32.9

Data is average of four replications.

[1] Average of four replications where 0 = no control; 10 = complete control.

[2] Yield expressed in lbs. fruit per plot, average of four replications.

Field bindweed control in pasture. Whitesides, R.E. and T.L. Nagle. A field bindweed experiment was established during the summer of 1982 in eastern Washington to evaluate 2,4-D low volatile ester (LVE) and glyphosate applied at different growth stages of the bindweed. Herbicide application was made (a) when bindweed plants were vegetative and no floral structures were detectable on the vines (numerical code 30-39), (b) when less than half of the primary buds on the longest vine had already flowered (numerical code 51-54), and (c) in the late floral stage when plants were still flowering but more than half of the primary buds had already flowered and were producing seed (numerical code 55-59). Bindweed density at treatment time was 7 plants per square foot based on three random counts in each of four untreated control plots. Twelve months later, the density in the control plots had decreased to 6 plants per square foot. The treated area was fenced for the duration of the experiment. All observations were visual estimates of the treated plots compared to the untreated control. The experiment was replicated four times.

At every evaluation date, regardless of growth stage at application, control with 2,4-D LVE (3.0 lb ae/A) was better than, or equal to, glyphosate (3.0 lb ae/A). Optimum bindweed control from both treatments was obtained when herbicide treatment was made in the mid to late floral period. (Department of Agronomy and Soils, Washington State University, Pullman 99164-6420)

Field bindweed control in pasture

	Field bindweed contol - Visual Evaluation [b]		
	1982	1983	
Treatment[a]	Sept. 3	July 7	Sept. 3
Pre-bloom June 24, 1982			
2,4-D LVE	8	5	5
Glyphosate	5	3	3
Early-Bloom July 15, 1982			
2,4-D LVE	8	8	5
Glyphosate	6	7	3
Late-bloom July 27, 1982			
2,4-D LVE	10	8	8
Glyphosate	8	8	3

[a] All herbicide rates were 3.0 lb ae/A

[b] Rating scale - 0 = no control, 10 = complete kill

Response of field bindweed and a lentil rotation crop to herbicides for perennial weed control. Callihan, R.H., C.H. Huston, and D.C. Thill. The effects of fall-applied triclopyr, glyphosate, and dicamba on subsequently planted spring lentils (*Lens culinaris* Merck.) and field bindweed (*Convolvulus arvensis* L.) control were examined. Triclopyr (emulsifiable concentrate 4 lb/gal), glyphosate (water soluble 4 lb/gal), and dicamba (emulsifiable concentrate 4 lb/gal) plus glyphosate tank-mix treatments were applied on November 15, 1982, prior to a killing frost. The experimental design was a randomized complete block design with plots 10 feet by 32 feet. All treatments were broadcast at 20 gpa using a backpack sprayer equipped with 5002 flatfan nozzles at 40 psi. Air temperature was 10 C with a relative humidity of 30% and soil temperature of 10 C. The soil at the study site was a Naff-Thatuna silt loam. In April 1983, the site was cultivated and 'Laird' lentils were planted were planted on April 20, 1983, in 7 inch rows. The entire study site was treated on April 25 with a preemergence broadcast application of 3.0 lb/A dinoseb (amine salt 3 lb/gal) to control annual weeds.

Lentil stand counts and visual evaluations for crop injury and field bindweed control were made on May 19. The 2 lb/A trichlopyr treatment provided excellent control (98%) while 1 lb/A triclopyr, 3 lb/A glyphosate, and the tank-mix of 1.5 lb/A glyphosate plus 0.5 lb/A dicamba all provided good control (91, 89, and 90%, respectively). Two lb/A triclopyr caused a slight early season stunting of the lentils. No injury was present with the other treatments. There were no differences in lentil stand among treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Response of field bindweed and lentil rotation crop to herbicides for perennial weed control.

Treatment[1]	Appl. Time	Rate	Lentil Response Plants per 2.5 ft^2	Lentil Response Vigor Reduction	Fibi Control
		(lb/A)	(No.)	(%)	(%)
Triclopyr	post	1.0	19.8	0	91
Triclopyr	post	2.0	22.0	5	98
Glyphosate + Dicamba	post	1.5 0.5	21.8	0	90
Glyphosate	post	3.0	22.3	0	89
Check	-	-	18.8	-	-
LSD (0.05)	-	-	3.4	3	10

1) R-11 was applied at 0.5% of spray volume in all herbicide treatments.

Effect of herbicide treatments on Canada thistle control. Flom, D. G., D. C. Thill, and R. H. Callihan. A field study was initiated near Tensed, Idaho to evaluate the effectiveness of fall-applied herbicides on Canada thistle control in wheat stubble. Herbicide treatments were applied to established Canada thistle in wheat stubble on October 5, 1982. The Canada thistle vegetation consisted primarily of regrowth from axillary buds on mature stems. Granular herbicide was applied broadcast using a cyclone spreader and all other herbicides were applied broadcast with a CO_2 pressurized backpack sprayer calibrated to deliver 10 gpa at 35 psi and 3 mph. Treatments were applied when the air temperature was 54 F, soil temperature was 49 F at a depth of 5 inches and a relative humidity of 64%. The experimental design was a randomized complete block with four replications and individual plots measured 10 by 30 feet in size. All plots were disced, cultivated twice, and harrowed in the spring. Spring barley (var. Steptoe) was planted in April, 1983. Triallate at a rate of 1.0 lb ai/A was applied and incorporated twice with a harrow to control wild oat.

Canada thistle was visually evaluated for vegetative regrowth control on August 8, 1983, using a scale of 0 to 100% with 0 equal to no visible Canada thistle control as compared to untreated plots. Treatments resulting in 75% or better Canada thistle control were granular dicamba (10G) at 4.0 lb ai/A and dicamba (4EC) at 2.0 lb ai/A. Plots were harvested using a Hege plot combine on September 2, 1983. All herbicide treatments resulted in grain yield and test weights not different from the check, except chlorsulfuron applied at 0.031 lb ai/A. (Idaho Agricultural Experimental Station, Moscow, Idaho 83843)

Canada thistle control and spring barley grain yield at Tensed, Idaho.

Treatment	Rate	weed control	grain yield	test weight
	(lb ai/A)	(%)[1]	(T/A)	(lb/bu)
dicamba (4EC)	1.00	28	1.62	44.3
dicamba (4EC)	2.00	75	1.92	44.9
dicamba (10G)	4.00	83	1.90	44.2
dicamba (4EC) +	0.50			
glyphosate[2,3]	1.50	58	1.78	44.8
dicamba (4EC) +	1.00			
glyphosate	0.75	44	1.99	44.4
dicamba (4EC) +	1.00			
2,4-D amine	3.00	26	1.91	44.9
glyphosate	1.50	56	1.83	45.4
chlorsulfuron	0.016	40	1.71	44.8
chlorsulfuron	0.031	0	1.44	43.7
chlorsulfuron +	0.016			
dicamba (4EC)	0.50	40	1.62	44.8
chlorsulfuron +	0.016			
dicamba (4EC)	1.00	41	1.70	45.0
chlorsulfuron +	0.75			
glyphosate	0.75	53	1.76	44.7
check	-	-	1.88	45.8
$LSD_{(0.05)}$		33	0.34	1.6

[1] Herbicide treatments applied on October 5, 1982 and evaluated on August 8, 1983.

[2] Glyphosate and chlorsulfuron treatments, including tank mixtures, were applied with 0.5% v/v X-77 surfactant.

[3] Glyphosate rates reported as acid equivalents (ae).

Longevity of Canada thistle shoot control in a crested wheatgrass pasture. Alley, H. P. Plots were established in 1979 to compare the efficacy and longevity of Canada thistle shoot control resulting from applications of chlorsulfuron, tebuthiuron, Dowco 290 (M-3972) and the combination of Dowco 290/2,4-D amine (M-3785) as compared to picloram. At time of treatment, August 6, 1979, the Canada thistle was in full bloom and growing under extreme drought conditions. Plots were one treatment per block, 2.7 x 18.3 m in size. Treatments, except tebuthiuron 20P, was applied in 374 L/ha water carrier. The soil was classified as a loam (45.0% sand, 33.2% silt, 21.8% clay) with 4.4% organic matter and a 7.3 pH.

Visual Canada thistle shoot control evaluations and grass damage have been evaluated each year since the herbicide treatments were applied. Chlorsulfuron at all rates of application, Dowco 290 (M-3972), tebuthiuron 20P, the combination of Dowco 290/2,4-D amine (M-3875) and picloram have maintained 95 to 100% shoot control for four years. Dowco 290 (M-3972) and the combination of Dowco 290/2,4-D amine were the only treatments not reducing the crested wheatgrass stand. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1254.)

Longevity of Canada thistle shoot control

Treatment	Rate kg/ha	Percent Control				Observations
		1980	1981	1982	1983	
chlorsulfuron	0.28	100	100	100	100	No grass damage
chlorsulfuron	0.56	100	100	100	100	80% reduction of grass
chlorsulfuron	1.12	100	100	100	100	80% reduction of grass
chlorsulfuron	2.24	100	100	100	100	80% reduction of grass
tebuthiuron 20P	1.12	0	40	95	100	95% reduction of grass
tebuthiuron 20P	2.24	50	90	100	100	Bare ground
tebuthiuron 20P	4.48	80	100	100	100	Bare ground
Dowco 290 (M-3972)	1.12	100	100	95	95	No grass damage
Dowco 290 (M-3972)	2.24	100	100	100	100	No grass damage
Dowco 290 + 2,4-D amine	0.56 + 2.24	100	90	100	100	No grass damage
Dowco 290 + 2,4-D amine	1.12 + 4.48	100	100	100	100	No grass damage
picloram	2.24	100	100	100	100	50% reduction of grass

Effect of original treatments, retreatments and combinations on leafy spurge contorl as evaluated by live shoot regrowth. Ferrell, M. A. and H. P. Alley. This experiment, located near Devil's Tower National Mounument, was established for accumulation of original/retreatment efficacy data for control of leafy spurge. Five successive years of data have been collected since the experiment was established in the spring of 1978.

Original treatments were made May 25, 1978, when the leafy spurge was in the pre-bud to bloom stage of growth. Liquid formulations were applied with a garden tractor mounted spray unit delivering 128 gpa water carrier. The granular formulation was applied with a hand operated centrifugal granular spreader. Retreatments were made June 12, 1979, May 13, 1980, May 20, 1981 and May 19, 1982. The retreatments of picloram at 0.5 and 1.0 lb ai/A were terminated with the 1981 retreatment. Retreatments were made with a 13 nozzle truck mounted sprayer delivering 32 gpa water carrier in 1979, 1981 and 1982 and 40 gpa in 1980. Leafy spurge was in the bud to flower stage-of-growth and 8-14 inches in height each year that retreatments have been applied. Plots were 11 by 22 ft. arranged in a split block design with two replications. Soil was a sandy loam (65% sand, 23% silt and 11% clay) with 1.5% organic matter and a pH of 7.7.

Percent shoot control is based on reduction of live leafy spurge shoots per square foot recorded from treatment plots as compared to the untreated (check) plots. The retreatments with picloram at 1.0 lb ai/A, applied over all original treatments, is maintaining 100% shoot control as evaluated in 1983. The 0.5 lb ai/A of picloram is somewhat less effective but is still maintaining 93 to 100% shoot control except where the original treatment was the light rate of dicamba. The original treatments, without a retreatment program, are being reinfested to a point that retreatment programs would have to be considered. The retreatments of 2,4-D amine, dicamba and the combination of dicamba/2,4-D have not been as effective as the light rates of picloram. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1239.)

Leafy spurge shoot control

Original[1] Treatments lb ai/A	Percent Shoot Control																								
	Retreatment lb ai/A																								
	2,4-D amine 2.0				picloram (K salt) 0.5				picloram (K salt) 1.0				dicamba 4L 2.0				dicamba/2,4-D amine 1.0 + 2.0				Check				
	1980	'81	'82	'83	1980	'81	'82	'83	1980	'81	'82	'83	1980	'81	'82	'83	1980	'81	'82	'83	1979	1980	1981	1982	1983
picloram (K salt) 2.0	98	93	94	99	99	100	100	100	99	100	100	100	98	96	97	97	99	95	98	98	99	96	90	90	68
picloram (K salt) 1.0	76	84	83	86	96	99	99	98	99	100	100	100	96	90	96	95	99	89	98	94	97	94	84	78	80
picloram (K salt) 0.5	70	80	86	88	94	99	98	93	99	100	100	100	49	79	88	84	59	77	85	70	76	43	29	55	24
picloram (2% beads) 2.0	90	90	87	92	98	99	99	99	100	100	100	100	96	98	96	99	96	87	98	98	99	95	83	85	74
picloram (2% beads) 1.0	84	92	86	92	99	99	99	100	98	99	100	100	87	82	96	89	65	82	88	87	96	51	68	55	67
picloram (2% beads) 0.5	78	76	76	84	99	100	99	99	99	100	100	100	69	77	79	84	64	78	91	79	87	32	36	58	31
picloram/ 2,4-D amine 2.0 + 4.0	81	90	88	98	99	99	98	98	100	100	100	100	99	95	96	99	78	89	94	85	98	91	87	51	37
picloram/ 2,4-D amine 1.0 + 2.0	63	76	81	81	96	98	98	98	100	100	100	100	68	89	94	90	39	64	91	80	71	38	31	45	35
picloram/ 2,4-D amine 0.5 + 1.0	58	66	76	66	97	96	98	94	99	100	100	100	49	65	84	87	40	73	88	89	16	0	0	0	7
dicamba 4L 8.0	74	82	87	83	87	96	98	93	98	98	100	94	89	87	96	98	78	94	98	97	67	66	77	61	50
dicamba 4L 4.0	53	69	78	78	84	97	98	98	100	100	100	100	67	84	88	81	56	83	90	90	47	42	24	36	28
Check	9	58	62	78	96	99	97	98	93	100	100	100	72	85	92	95	11	63	84	66					

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[1] Original treatments May 25, 1978; retreatments June 21, 1979; May 13, 1980 and May 20, 1981; and May 19, 1982; evaluated in 1979 through 1983. Retreatments of Tordon 22K at 0.5 and 1.0 lb ai/A terminated with 1981 treatments.

Evaluation of original treatments, retreatments and combinations on the control of leafy spruge shoot regrowth. Ferrell, M. A. and H.P. Alley. Plots were established near Devil's Tower National Monument in 1980 to obtain efficacy data on original/retreatment combinations of picloram, dicamba and 2,4-D amine for the control of leafy spurge.

Original dicamba and picloram treatments were first applied May 15, 1980, to leafy spurge in the pre-bud to full-flower stage of growth. Retreatments have been applied June 10, 1981 (fall 2,4-D August 28, 1981) and May 18, 1982 (fall 2,4-D August 27, 1982). Liquid formulations were applied with a 13 nozzle truck mounted spray unit using 29 gpa water carrier each year. Granular formulations were applied with a hand operated centrifugal broadcaster. Plots were 21.5 by 258 ft. arranged in a completely randomized design with one replication. Soil classification was a sandy loam (55.4% sand, 32.2% silt, and 12.4% clay) with 0.6% organic matter and a pH of 7.8.

Shoot counts May 18, 1983, three years after application of original treatments, have shown picloram (K salt) at 1.0 and 2.0 lb ai/A and picloram (2% pellets) at 2.0 lb ai/A have maintained 94, 100 and 98% control, respectively. Two applications of 2,4-D amine applied both in the spring and fall have given more consistent leafy spurge shoot control than only the spring retreatment. This was more evident where the 2,4-D treatments were applied over the original dicamba treatments. Original treatments of dicamba are showing a decrease in shoot control except for dicamba 5G (5% pellets) at 6.0 lb ai/A which showed an increase in the 1983 evaluation. There is no apparent damage to grass three years after the original treatments. However, the first and second years after application grasses were prostrate in the treated areas. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1238.)

Leafy spurge shoot control

Original[1] lb ai/A	Percent Shoot Control[2]												
	Retreatment lb ai/A												
	2,4-D Amine 2.0		picloram (K salt) 0.5		dicamba 2.0		Check			picloram (K salt) 1.0		2,4-D Amine (S & F) 2.0	
	1982	1983	1982	1983	1982	1983	1981	1982	1983	1982	1983	1982	1983
dicamba 5G 6.0	76	83	93	69	80	74	80	68	93	99	99	91	99
dicamba 5G 8.0	96	90	97	96	96	100	99	84	81	100	100	97	100
picloram (2% pellet) 1.0	100	100	100	100	98	100	99	88	90	100	100	99	100
picloram (2% pellet) 2.0	100	99	100	100	100	99	100	100	98	100	100	100	91
dicamba 4L 6.0	68	29	83	75	78	99	74	68	40	100	99	91	97
dicamba 4L 8.0	83	91	98	87	96	100	94	72	46	100	99	95	100
picloram (K salt) 1.0	99	99	100	100	99	100	99	99	94	100	100	100	100
picloram (K salt) 2.0	100	100	100	100	100	100	100	99	100	100	100	100	100
Check *shoots/ft^2*	0	61	92	69	13	97	0 *20.0*	0 *10.9*	0 *10.4*	100	96	0	28

[1] Original treatments applied May 15, 1980; retreatments applied June 10, 1981 and August 28, 1981; May 18, 1982 and August 27, 1982. Retreatments of Tordon at 0.5 and 1.0 lb ai/A terminated with the 1981 retreatment.

[2] Evaluated May 19, 1981, May 18, 1982 and May 18, 1983.

Evaluation of mowing as a setup treatment prior to herbicide treatment for leafy spurge shoot control. Ferrell, M. A. and H. P. Alley. Plots were established near Hulett, Wyoming to determine the effectiveness of mowing, prior to treatment with herbicides, on controlling leafy spurge shoot regrowth.

Leafy spurge plants were mowed within 1 to 2 inches of ground level with a sickle bar mower June 30, 1982, 21 days prior to treatment with herbicides. The herbicide treatments were applied July 21, 1982, to a mature stand of leafy spurge 6-8 inches in height, with a 13-nozzle truck mounted sprayer using 23 gpa water carrier. Plots were 21.5 by 55 ft with one replication.

Shoot counts made May 19, 1983 indicated that mowing prior to herbicide treatment may have potential for reduced rates of chemical for leafy spurge shoot control. The treatment of 1.0 lb ai/A of 2,4-D LV ester was as effective as 0.5 lb ai/A of picloram. However, more data is necessary to fully evaluate the value of mowing as a setup treatment for controlling leafy spurge. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1235.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent[2] Shoot Control
dicamba	1.0	32
picloram (K salt)	0.5	86
2,4-DLVE	1.0	91
Check	---	
shoots/ft²		*23.2*

[1] Plots mowed June 30, 1982 and treatments applied July 21, 1982.
[2] Shoot counts May 19, 1983.

Evaluation of new herbicides for control of leafy spurge (*Euphorbia esula* L.). Ferrell, M. A. and H. P. Alley. Effective control of leafy spurge is expensive and difficult. This experiment was established to evaluate new herbicides that might provide more effective control of leafy spurge.

Plots were established June 16, 1982, 5 miles south of Hulett, Wyoming along the Belle Fourche River on a dense stand of leafy spurge in the bud to full flower stage-of-growth and 12-18 inches in height. Treatments were applied with a 6-nozzle knapsack spray unit using 40 gpa water carrier. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. Soil was a loam (38% sand, 47% silt and 15% clay) with 1.8% organic matter and a pH of 7.8.

Shoot counts were made May 18, 1983 with percent shoot control computed as a comparison to the check. One year after treatment UC 77179 at the 6.0 lb ai/A rate controlled 96% of the shoot growth when compared to the check. However, application at this rate resulted in severe grass damage. Applications at the higher rates of PPG 1259 also resulted in grass damage with none of the rates controlling leafy spurge shoot growth. DPX-T 6206, DPX-T 6376 and DPX-4189 also did not show promise for control of leafy spurge. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1236.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent Shoot Control[2]	Observations
DPX-T 6376 70WP + X-77	0.031	13	
DPX-T 6376 70WP + X-77	0.062	19	
DPX-T 6376 70WP + X-77	0.125	35	
DPX-T 6376 70WP + X-77	0.25	52	
DPX-T 6206 70WP + X-77	0.031	24	
DPX-T 6206 70WP + X-77	0.062	42	
DPX-T 6206 70WP + X-77	0.125	61	
DPX-T 6206 70WP + X-77	0.25	30	
chlorsulfuron + X-77	0.031	25	
chlorsulfuron + X-77	0.062	42	
chlorsulfuron + X-77	0.125	30	
chlorsulfuron + X-77	0.25	21	
PPG 1259 3F	1.0	22	
PPG 1259 3F	2.0	20	Slight grass damage
PPG 1259 3F	4.0	8	Moderate grass damage
UC 77179 80%WP	0.5	39	
UC 77179 80%WP	1.0	9	Slight grass damage
UC 77179 80%WP	2.0	30	Moderate grass damage
UC 77179 80%WP	4.0	87	Severe grass damage
UC 77179 80%WP	6.0	96	Severe grass damage
Check	---	0	
shoots/ft^2		*12.8*	

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[1] Treatments applied June 16, 1982. X-77 added at 0.125% v/v.
[2] Shoot counts May 18, 1983.

Evaluation of 2,4-D LV ester as a treatment prior to light rates of picloram for leafy spurge shoot control. Ferrell, M. A. and H. P. Alley. As costs of controlling leafy spurge increase new methods of treatment are being evaluated to decrease costs and improve control. This experiment was established to evaluate the use of 2,4-D LV ester as a setup treatment prior to the application of light rates of picloram (K salt).

Plots were established June 16, 1982, 5 miles south of Hulett, Wyoming along the Belle Fourche River, on a dense stand of leafy spurge in the bud to full bloom stage of growth and 12-18 inches tall. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water carrier. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. Soil was a loam (38% sand, 47% silt and 15% clay) with 1.8% organic matter and a pH of 7.8. Setup treatments with 2,4-D LV ester were made 1 day and 17 days prior to application of 0.5 and 1.0 lb ai/A picloram (K salt).

Shoot counts were made May 18, 1983 with percent shoot control computed as a comparison to the check. One year after application all picloram (K salt)/2,4-D LV ester setup combinations gave 100% shoot control. There was no difference in leafy spurge shoot control between the 1 day and 17 day setup treatments with 2,4-D LV ester. These results would indicate that 2,4-D LV ester as a setup, followed by low rates of picloram, may be an effective means of controlling leafy spurge shoot growth.

Treatments containing picloram showed slight grass damage at the lighter rates and moderate to severe damage with the heavier rates of picloram. There was more severe grass damage in the areas with the 17 day setup treatment with 2,4-D LV ester than at the 1 day setup. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1237.)

Leafy Spurge Shoot Control

Treatment[1]	Rate lb ai/A	Percent[2] Shoot Control	Observations
1 Day Setup 2,4-D LVE[3]			
2,4-D LVE + picloram (K salt)	0.062 + 0.5	100	Slight grass damage
2,4-D LVE + picloram (K salt)	0.125 + 0.5	100	
2,4-D LVE + picloram (K salt)	0.25 + 0.5	100	
2,4-D LVE + picloram (K salt)	0.0625 + 1.0	100	Moderate grass damage
2,4-D LVE + picloram (K salt)	0.125 + 1.0	100	Slight to moderate grass damage
2,4-D LVE + picloram (K salt)	0.25 + 1.0	100	Slight grass damage
17 Day Setup 2,4-D LVE[4]			
2,4-D LVE + picloram (K salt)	0.0625 + 0.5	100	Moderate grass damage
2,4-D LVE + picloram (K salt)	0.125 + 0.5	100	Slight grass damage
2,4-D LVE + picloram (K salt)	0.25 + 0.5	100	Slight grass damage
2,4-D LVE + picloram (K salt)	0.0625 + 1.0	100	Severe grass damage
2,4-D LVE + picloram (K salt)	0.125 + 1.0	100	Severe grass damage
2,4-D LVE + picloram (K salt)	0.25 + 1.0	100	Severe grass damage
Check			
shoots/ft^2		*11.9*	

[1] Treatments applied June 16, 1982.
[2] Shoot counts May 18, 1983.
[3] Plots treated with 2,4-D LVE 1 day prior to treatment with Tordon 22K.
[4] Plots treated with 2,4-D LVE 17 days prior to treatment with Tordon 22K.

Control of wild licorice--one and two years following treatment. Alley, H. P. and R. E. Vore. Herbicides were applied to a mature stand of wild licorice on July 10, 1981 to evaluate the efficacy of several herbicides. Herbicides were applied with a CO_2 pressurized 6-nozzle knapsack unit calibrated to deliver 40 gpa solution.

Visual evaluations for percentage shoot control were made on July 22, 1982 and August 31, 1983 approximately one and two years following treatment. When evaluated one year following treatment the shoot control evaluations indicated that 2,4-D, picloram and dicamba were effective treatments; however, when evaluated two years following treatment only the high rate of picloram, 0.5 lb ai/A, was maintaining any appreciable control. On all other treated plots, the wild licorice had recovered and/or reinfested the areas. (Wyoming Agric. Ext. Sta., Laramie, WY 82071, SR 1255.)

Wild licorice control in native pasture

Treatment[1]	Rate lb ai/A	Percent Control[2]	
		1982	1983
2,4-D (alkanolamine)	1.0	75	20
2,4-D (alkanolamine)	2.0	83	20
2,4-D (dimethyl & diethyanolamine)	1 pt	70	20
2,4-D (dimethyl & diethyanolamine)	2 pt	70	20
picloram	0.625	50	20
picloram	0.125	50	30
picloram	0.25	85	50
picloram	0.5	95	80
dicamba	1.0	85	30
dicamba	2.0	90	50
chlorsulfuron	0.0625	60	0
chlorsulfuron	0.125	65	20
chlorsulfuron	0.25	70	40

[1] Treatments applied July 10, 1981.

[2] Visual evaluations July 22, 1982 and August 31, 1983.

PROJECT 2.

HERBACEOUS WEEDS OF RANGE AND FOREST

Tom D. Whitson - Project Chairman

Long term Spotted knapweed control with picloram. Chicoine, T. K., P. K. Fay, and L. O. Baker. Spotted knapweed (*Centaurea maculosa Lam.*) is spreading rapidly on rangeland in Montana. Picloram (4-amino-3,5,6-trichloropicolinic acid) provides excellent control of the plant. The following experiment was established to determine the longevity of spotted knapweed control by 0.28 kg/ha of picloram.

Picloram was applied at 0.28 kg/ha on 5-21-79 alone and in combination with 1.12 and 2.24 kg/ha of 2,4-D amine ((2,4-dichlorophenoxy) acetic acid)). A second application of picloram + 2,4-D amine (0.28 + 2.24 kg/ha) was made on 6-13-79. The treatments were applied with a CO_2 pressurized backpack sprayer in 187 L water per ha to 2.4 by 7.6 m plots. The experiment was established near Harlowton and Ovando, MT with 3 replications at each location. Spotted knapweed stand density counts and herbage production data were taken on 8-4-82, and 7-30-83.

Thirty-eight months after application, 0.28 kg/ha of picloram reduced the density of mature spotted knapweed plants by an average of 95 and 100% at Harlowton and Ovando, respectively (Table 1). Removal of spotted knapweed resulted in a 200 to 400% increase in perennial grass production at Harlowton and a 600% increase at Ovando (Table 2).

Fifty months after application, picloram residues still reduced the density of mature spotted knapweed plants 88 and 99% at Harlowton and Ovando, respectively (Table 3). The slight (12%) reinfestation at Harlowton severely decreased perennial grass production. Long term spotted knapweed control allowed a 300 to 400% increase in perennial grass production 50 months after the application of picloram (Table 4). (Montana Agricultural Experiment Station, Bozeman, MT 59717.)

Table 1: Spotted knapweed stand densities on August 4, 1982, 36 months after treatment at Harlowton, Ovando, and Stevensville.

Herbicide Treatment	Rate (kg/ha)	Date of treatment	No. of Mature Plants (Immature Plants) per 0.5 meter^2 Harlowton	 Ovando	 Stevensville
2,4-D amine + picloram	2.24 0.28	5-21-79	3.0 (64.9)	0.0 (0.0)	0.6 (2.3)
2,4-D amine picloram	2.24 0.28	5-21-79	1.1 (49.1)	0.0 (0.0)	0.6 (1.1)
Picloram	0.28	5-21-79	5.2 (66.2)	0.0 (0.0)	1.6 (4.4)
2.4-D amine + picloram	2.24 0.28	6-13-79	1.6 (65.1)	0.0 (0.0)	0.0 (2.2)
Control	-		47.2 (513.6)	46.6 (679.2)	24.0 (72.1)
LSD .05			2.4 (79.3)	3.4 (203.2)	2.2 (12.6)

Table 2: Herbage production on August 4, 1982, 38 months after herbicide treatment for spotted knapweed control at Harlowton, Ovando, and Stevensville.

Herbicide Treatment	Rate (kg/ha)	Date of Treatment	Spotted Knapweed (Perennial Grass) Herbage (kg/ha) Harlowton	Ovando	Stevensville
2,4-D amine + picloram	2.24 0.28	5-21-79	223.8 (2155.4)	0.0 (1758.1)	37.9 (1272.2)
2,4-D amine + picloram	1.12 0.28	5-21-79	217.8 (1314.9)	0.0 (1746.4)	135.8 (821.2)
Picloram	0.28	5-21-79	73.4 (1938.8)	0.0 (1732.2)	25.9 (1393.4)
2,4-D amine + picloram	2.24 0.28	6-13-79	108.4 (1755.4)	0.0 (1853.4)	13.3 (1382.2)
Control	-		2100.5 (433.3)	3264.3 (253.2)	2470.6 (177.6)
LSD .05			277.2 (125.6)	727.6 (148.9)	252.0 (177.6)

Table 3: Spotted knapweed plant density on July 29 and 30, 1983, 50 months after herbicide application at Harlowton and Ovando.

Herbicide Treatment	Rate (kg/ha)	Date of Treatment	Number of mature plants per 0.5 meter^2 Harlowton	Ovando
2,4-D amine + picloram	2.24 0.28	5-21-79	8.0	0.9
Picloram	0.28	5-21-79	9.0	0.0
2,4-D amine + picloram	1.12 0.28	5-21-79	6.3	0.6
2,4-D amine + picloram	2.24 0.28	6-13-79	7.7	1.0
Control	-		64.6	57.3
LSD .05			17.3	5.2
C.V.%			48.1	23.8

Table 4: Spotted knapweed and perennial grass herbage production on July 29 and 30, 1983, 50 months after herbicide application at Harlowton and Ovando.

			Spotted Knapweed (Perennial Grass) Herbage Production (kg/ha)	
Herbicide Treatment	Rate (kg/ha)	Date of Treatment	Harlowton	Ovando
2,4-D amine + picloram	2.24 0.28	5-21-79	728.4 (931.2)	39.8 (1352.2)
2,4-D amine + picloram	1.12 0.28	5-21-79	621.8 (486.2)	0.9 (1558.8)
Picloram	0.28	5-21-79	845.8 (885.4)	52.7 (1552.4)
2,4-D amine + picloram	2.28 0.28	6-13-79	645.4 (1166.8)	50.1 (1468.8)
Control	-		1280.2 (100.7)	965.1 (319.0)
LSD .05			463.6 (1005.2)	169.0 (596.0)
C.V.%			28.4 (57.3)	31.4 (22.3)

Carryover effects of picloram and fertilizer on spotted knapweed infested rangeland. Huston, C.H., R.H. Callihan, R.H. Sheley, and D.C. Thill. A study was initiated at Hayden Lake, Idaho to determine the efficacy of picloram and fertilizer alone and in combination for restoring spotted knapweed (*Centaurea maculosa* Lam.) infested rangeland. Picloram at 0.38 lb/A, and fertilizer at two rates (125 lb/A of 20-10-10-6.5 to provide nitrogen at 62.5 lb/A, and 125 lb/A of 20-10-10-6.5 plus 184 lb/A of 34-0-0 to provide 125.0 lb/A of nitrogen) were applied. Plots were factorially arranged in a randomized complete block design with four replications. Picloram was applied with a backpack sprayer calibrated to deliver 20 gpa at 40 psi using 8002 flatfan nozzles. Fertilizer was broadcast with a cyclone spreader. Spring treatments were applied in May, and fall treatments on October 25, 1982.

Spring treated plots were harvested on July 10, 1982, and both spring and fall treated plots were harvested on August 15, 1983. Samples were oven dried, separated into weed and grass components, and weighed.

1982 Results

Picloram significantly reduced spotted knapweed yields, regardless of the fertilizer treatment. Neither fertilizer rate significantly changed knapweed yield when applied with picloram, however, a trend of knapweed increase was evident with increasing nitrogen.

Fertilizers increased knapweed yield when applied without picloram. The low fertilizer rate increased knapweed yield by 1056 lb/A over treatments without fertilizers. The high rate of fertilizer increased knapweed by another 563 lb/A.

Picloram without fertilizers did not significantly increase grass yields over the control. Both fertilizer rates significantly increased grass yield over the control, and picloram treatments alone.

Treating plots with picloram and fertilizer had an interactive effect on increasing grass yield. The addition of picloram to plots treated with 62.5 lb/A of nitrogen doubled grass yields over treatments without picloram, and gave a 5-fold increase over the yield from picloram treatments alone. The combination of picloram with 125 lb/A nitrogen doubled the grass yields over that from the picloram plus 62.5 lb/A nitrogen treatment.

In summary, picloram alone adequately controlled spotted knapweed but did not increase forage yields. Fertilizers alone increased both knapweed and forage yields. Combining picloram and fertilizers controlled knapweed while significantly increasing forage yields.

1983 Results

Treatment with picloram significantly reduced knapweed yields from a mean of 3029 lb/A for those treatments not receiving picloram to 1117 lb/A for those receiving picloram. Grass yields were greatly increased, but not significantly, with the treatments containing picloram compared to those treatments without picloram. Without picloram, knapweed and grass yields tended to increase with increasing fertilizer rate. Although there was not a significant interaction between picloram and fertilizer, those treatments receiving both tended to result in lower knapweed yields compared to those receiving picloram alone. Forb yields were not significantly affected by treatment compared to the untreated checks. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Carryover effects of 1982 picloram and fertilizer treatments on spotted knapweed, grass, and forb yields in 1983

	Treatment		Time of	1983 dry weight		
	Picloram	Fertilizer	application	Spkw	Grasses	Forbs
	(lb/A)	(lb N/A)		-------(lb/A)---------		
	0.00	0.0	Spring	1602	324	26
	0.00	62.5	Spring	1541	237	0
	0.00	125.0	Spring	4202	361	3
	0.38	0.0	Spring	1968	826	3
	0.38	62.5	Spring	918	696	11
	0.38	120.0	Spring	1027	485	52
	0.00	0.0	Fall	2831	398	59
	0.00	62.5	Fall	3803	351	18
	0.00	125.0	Fall	4224	1612	0
	0.38	0.0	Fall	1160	525	85
	0.38	62.5	Fall	656	1727	87
	0.38	125.0	Fall	972	1260	141
$LSD_{0.05}$	-	-	-	3065	1345	137
Picloram as main effect	0.00	-	-	3029	576	17
	0.38	-	-	1117	920	63
$LSD_{0.05}$	-	-	-	1042	NS	NS

The longevity of spotted knapweed seeds in Montana soils. Chicoine, T. K. and P. K. Fay. Spotted knapweed (Centaurea maculosa Lam.) is spreading rapidly in Montana. The plant relies heavily on seed production for reproduction and dissemination. The following experiments were established to determine the longevity of spotted knapweed seeds in Montana soils.

Burial study. Polyvinyl-chloride (PVC) pipe (7.62 cm diam.) was cut into 2.54 cm rings. Nylon window screen (16 mesh) was cemented to the bottom of each ring. Each ring was filled with soil from the prospective burial site. One hundred spotted knapweed seeds placed on top of the soil, and the top of the rings closed with nylon window screen. Fifty rings were buried 1.5 cm deep on 30.5 cm centers with 5 replications at Bozeman and Three Forks, MT. Rings were recovered on 6 different dates.

Cultural Practice Study. The decline of the soil seed reservoir under a naturally occurring spotted knapweed infestation after seed production had been arrested was monitored. Individual field plots were rolled, harrowed, burned, and mowed in an attempt to increase germination. Six 25.6 cm^2 soil cores were taken to a depth of 7.6 cm in each plot on 6-20-82, 4-20-83, and 10-10-83 to monitor seed reservoir declines. Spotted knapweed seeds were separated from the soil through a series of screenings, washings, and an air separation. Germination tests were then performed on the recovered seeds. Seed production on the treated plots was blocked on 6-20-82 and 6-15-83 with applications of 2.24 kg/ha of 2,4-D amine ((2,4-dichlorophenoxy) acetic acid) in 142 l of water per ha using a CO_2 pressurized backpack sprayer. The experiment was put out at Ovando and Harlowton, MT.

Recoveries made from the burial study up to 6-20-83 (9 months of burial) had very little germination of the buried seeds (Table 1). There was an increase in germination after 12.5 months of burial at the Three Forks location. This was probably due to the buried rings acting as a runoff trap for summer and fall rains at that location. Seeds which had not germinated in the field maintained about 90% viability after 12.5 months of burial.

Seed reservoirs declined 72 and 81% 15 months after seed production was stopped at Harlowton and Ovando, respectively. The combination of the cultural practices plus spraying with 2,4-D did not cause a greater decline in the seed reservoir than spraying along (Table 2). Stand density counts taken on 6-13-83 show that the various treatments did not increase the germination of seedlings at either location (Table 3).

After two seasons in which seed production was blocked 53 to 238 viable spotted knapweed seeds per 0.5 m^2 remained in the soil reservoir. (Montana Agricultural Experiment Station, Bozeman, MT 59717.

Table 1: Germination and viability of spotted knapweed seeds in a seed burial study established on September 21, 1982 at Bozeman and Three Forks, MT.

Date of Recovery	Field Germination %		Viability % of Dormant Seed	
	Bozeman	Three Forks	Bozeman	Three Forks
11-11-82	0.6a[1]	0.8a	99.2a	99.2a
4-07-83	16.7b	12.3c	98.4a	100.0a
5-02-83	11.9b	6.5b	96.8a	100.0a
5-16-83	17.3b	7.1b	99.2a	99.2a
6-02-83	10.7b	4.3b	87.2b	90.4a
10-10-83	11.1b	33.7d	91.4a	95.6a

[1] Numbers in a column followed by same letter are not different at the 0.05 level of significance.

Table 2: Changes in the soil reservoir of spotted knapweed seeds 10 and 15 months after seed production was stopped on 6-20-82, and various cultural practices were applied to increase seed germination at Harlowton and Ovando, MT.

Cultural Practice Treatment	Viable spotted knapweed seed per 0.5 m^2					
	Harlowton			Ovando		
	6-20-82	4-20-83	10-10-83	6-20-82	4-20-83	10-10-83
Harrowing	615a[1]	140b	107b	549a	41b	86b
Rolling	865a	195b	238b	463a	53b	64b
Burning	789a	203b	201b	439a	96b	109b
Mowing	843a	301a	246b	447a	22b	164b
Sprayed Check	248a	92b	115b	502a	96b	53b
Control	523a	564a	1214a	603a	607a	635a
C.V.	30.3%	15.3%	15.9%	16.5%	14.5%	13.8%

[1] Numbers followed by the same letter do not differ significantly at the 0.05 level.

Table 3: Seedling and mature plant density of spotted knapweed on June 13, 1983 one year after treatment with 2,4-D amine at Harlowton and Ovando, MT.

Treatment	Mature plants/0.5 m^2		Seedlings/0.5 m^2	
	Harlowton	Ovando	Harlowton	Ovando
Harrowing	0.0a[1]	7.3a	2.0a	19.7a
Rolling	0.0a	7.7a	1.7a	14.7a
Burning	0.0a	6.7a	12.8a	22.8a
Mowing	0.0a	7.9a	3.6a	24.6a
Sprayed Check	0.0a	0.0a	2.0a	14.2a
Control	31.2b	29.7b	88.9b	903.8b

[1] Numbers in columns followed by same letter do not differ at the 0.05 level of significance.

Comparison on control of leafy spurge with SULV and 2,4-D amine on different application dates. Maxwell, B.D., and P. K. Fay. 'Ded-weed SULV' is a 2,4-D amine formulation formerly sold by the Thompson-Hayward Chemical Company. We wanted to determine if SULV is more effective for leafy spurge control than conventional amine formulations. We were also interested in the effect of application time on control of leafy spurge with the 2,4-D formulations.

Three rates of application (.5, 1, and 2 lbs A.I./A) of each formulation were applied on four different dates (5-11-82, 6-17-82, 7-22-82, 8-15-82) to moderate infestation (4-8 plants/ft^2) of leafy spurge. The chemicals were applied with a backpack sprayer with CO_2 propellant using an average of 14 gallons per acre of water carrier. Plots were 7 ft by 20 ft arranged in randomized block design with three replications.

Visual ratings of percent leafy spurge control as compared to a check treatment were made on September 1, 1982; June 12, 1983 and September 1, 1983. There was no consistent difference between SULV and amine at any of the rates that were tested. Both formulations, only provided acceptable control of leafy spurge regrowth the same season as appliction, and only on the June, July and August applications.

Leafy Spurge Shoot Control

Herbicide	Rate Lb A.I./A	Date of application	% Control 9-1-82	% Control 6-12-83	% Control 9-1-83
2,4-D SULV	.5	5-11-82	5.0	8.3	.0
2,4-D SULV	1	5-11-82	40.0	21.7	4.3
2,4-D SULV	2	5-11-82	39.3	36.7	9.0
2,4-D Amine	.5	5-11-82	34.3	38.3	3.3
2,4-D Amine	1	5-11-82	11.0	18.3	1.7
2,4-D Amine	2	5-11-82	23.3	11.7	3.3
2,4-D SULV	.5	6-17-82	81.0	23.3	2.7
2,4-D SULV	1	6-17-82	94.0	18.7	3.3
2,4-D SULV	2	6-17-82	90.0	35.0	10.7
2,4-D Amine	.5	6-17-82	82.7	26.7	3.0
2,4-D Amine	1	6-17-82	85.0	28.3	1.7
2,4-D Amine	2	6-17-82	83.7	23.3	5.0
2,4-D SULV	.5	7-22-82	45.0	7.7	.0
2,4-D SULV	1	7-22-82	97.3	25.7	3.7
2,4-D SULV	2	7-22-82	99.3	30.7	3.3
2,4-D Amine	.5	7-22-82	48.3	36.0	3.3
2,4-D Amine	1	7-22-82	58.3	36.7	6.7
2,4-D Amine	2	7-22-82	70.0	20.0	1.7
2,4-D SULV	.5	8-15-82	96.7	66.0	3.3
2,4-D SULV	1	8-15-82	96.3	40.0	1.7
2,4-D SULV	2	8-15-82	98.3	37.3	9.3
2,4-D Amine	.5	8-15-82	76.0	23.3	3.3
2,4-D Amine	1	8-15-82	96.7	25.7	6.7
2,4-D Amine	2	8-15-82	89.7	31.7	6.7
Check			.0	.0	.0
		C.V. -	26.45	83.68	130.31
		LSD 5% -	28.51	36.87	8.36

The effect of pulling for control of leafy spurge regrowth. Maxwell, B.D. and P. K. Fay. It has been observed that leafy spurge is easy to pull from the ground and that with pulling significant damage can be incurred by the root. Pulling machines would be designed for use in pastures and have the potential of providing control equivalent to a 2,4-D application.

To quantify root damage and the energy required to pull leafy spurge plants, measurements were taken on the stem diameter, root diameter, length of root material pulled, and foot-pounds required to pull each plant from the ground. With a pull of 4 to 6 ft lbs, 2.4 to 4.8 cm of root material was removed.

A timing experiment was established to determine if there is an optimum time of year to pull leafy spurge so that there is minimal regrowth. Plots 7 ft by 15 ft were hand pulled every two weeks throughout the growing season in 1982. Rating measurements were taken on September 1, 1982; June 12, 1983 and September 1, 1983. The percent control of leafy spurge was measured by counting the number of regrowth stems per square foot. Visual ratings would have provided higher control ratings on the June pulling dates due to the stunted nature of the regrowth stems. The best long term control was produced on plots pulled on June 17, 1982. The timing trial was repeated over the 1983 growing season at a different site.

Hand Pulling Leafy Spurge

Pulling date	% Control 9-1-82	% Control 6-12-82	% Control 9-1-83
6-1-82	36.0	9.0	5.0
6-17-82	71.0	35.0	25.0
6-30-82	94.3	35.0	5.7
7-19-82	93.7	26.7	11.7
8-3-82	94.7	21.7	5.0
LSD	18.05	21.57	14.37

A third experiment was initiated in June, 1983 to compare the effect of machine pulling of leafy spurge with mowing, herbicide applications, and applications of herbicide to regrowth after pulling and mowing. Two different designs of pulling machines were tested, and two herbicides, 2,4-D amine at 2 lb A.I. per acre rate, and Tordon at .5 lb A.I. per acre rate. Preliminary data collected on August 11, 1983 indicated that 2,4-D amine alone and machine pulling and mowing with an application of 2,4-D amine to regrowth provided the best control of leafy spurge.

Effect of picloram and fertilizer on meadow hawkweed and grass yields over a two-year period. Callihan, R.H., C.H. Huston, R.L. Sheley, and D.C. Thill. A study to determine the efficacy of picloram and fertilizer treatments in meadow hawkweed (*Hieracium pratense* Tausch.) infested rangeland was conducted at Benewah, Idaho. Picloram at 0.38 lb/A and two fertilizer rates (125 lb/A of 20-10-10-6.5 for 62.5 lb N/A, and 125 lb/A of 20-10-10-6.5 plus 184 lb/A of 34-0-0 for 125 lb N/A) were applied alone and in combination. The experimental design was a randomized complete block, factorially arranged and replicated four times.

Picloram was applied with a backpack sprayer equipped with 8002 flatfan nozzles and calibrated to deliver 20 gpa at 40 psi from a CO_2 source. Treatments were applied on May 20, 1982. Plots were harvested on July 10, 1982 and on July 25, 1983. The samples were air-dried and weighed.

1982 Results

Picloram, with or without fertilizer, controlled meadow hawkweed. All treatments including picloram were completely devoid of hawkweed. Fertilizer did not affect hawkweed yield. The high fertilizer treatment more than doubled the yield of grass; the low fertilizer rate did not result in significantly lower yields than those resulting from the high fertilizer treatment. Combining picloram and fertilizers did not have a synergistic effect on controlling hawkweed or increasing forage grasses.

1983 Results

Meadow hawkweed yields in spring picloram treatments (28 lb/A for no fertilizer and 0 lb/A for low and high fertilizer) were significantly lower than those treatments not receiving picloram, and tended to be lower than yields of fall picloram treatments (734 to 1172 lb/A). Hawkweed yields in fall picloram treatments did not differ significantly from those not receiving picloram, except the spring and fall low fertilizer treatments which were higher (4810 and 2588 lb/A, respectively).

Grass yields in fall and spring picloram plus high fertilizer, and the spring picloram low fertilizer treatments were significantly greater than the check. Spring and fall high fertilizer, spring picloram alone, and fall picloram low fertilizer treatments tended to produce greater grass yields than the check, spring and fall low fertilizer, or fall picloram alone treatments.

Other forb yields did not differ among treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843).

Carryover effects of 1982 picloram and fertilizer treatments on meadow hawkweed, grass and forb yields in 1983.

	Treatment		Time of application	1983 Yield (dry weight)		
	Picloram (lb/A)	Fertilizer (lb N/A)		Meha	Grasses (lb/A)	Other Forbs
	0.00	0.0	Spring	1599	1774	9
	0.00	62.5	Spring	2588	1223	0
	0.00	125.0	Spring	1788	2589	0
	0.38	0.0	Spring	28	3170	0
	0.38	62.5	Spring	0	4095	0
	0.38	125.0	Spring	0	3977	0
	0.00	0.0	Fall	1843	586	43
	0.00	62.5	Fall	4811	1148	0
	0.00	125.0	Fall	1751	3410	15
	0.38	0.0	Fall	1154	1561	0
	0.38	62.5	Fall	1172	2823	0
	0.38	125.0	Fall	734	4687	0
LSD 0.05	-	-	-	1867	2331	NS
0.10	-	-	-	1553	1939	NS

Rehabilitation treatments for yellow starthistle-infested rangeland.

Callihan, R.H., C.H. Huston, R.L. Sheley, and D.C. Thill. This study was established near Culdesac, Idaho to determine the effect of picloram and fertilizer on intermediate wheatgrass (*Agropyron intermedium* (Host) Beauv.) seeded in yellow starthistle (*Centaurea solstitialis* L.) infested rangeland. On April 5, 1983, the entire plot was tilled with a tandem disc to prepare a seedbed and remove presently growing annual grasses. Plot design was a split plot with fertilizer and/or picloram constituting the main effects. Half of each plot was broadcast seeded with 15 lb/A intermediate wheatgrass on April 7. The seed was harrowed in prior to fertilizer or herbicide treatment. Picloram (water soluble 2.2 lb/gal) treatments of 0.25 lb/A were broadcast sprayed on April 7 using a backpack sprayer equipped with 8002 flatfan nozzles and calibrated to deliver 20 gpa. Air temperature was 15 C with soil temperature of 13 C and relative humidity of 60%. Fertilizer (50 lb/A NH_3NO_2-N) was broadcast with a cyclone spreader on April 7. Plots were harvested on August 15 using a 0.75 m^2 hoop. Forage samples were separated, dried, and weighed.

Plots seeded with intermediate wheatgrass and treated with both picloram and fertilizer produced the highest (774 lb/A) wheatgrass yield. Seeded plots treated with picloram alone had higher yields than those receiving fertilizer alone or neither picloram or fertilizer. The appearance of small amounts of wheatgrass in the unseeded plots was due to contamination during the harrowing.

Picloram significantly reduced yellow starthistle yields, while seeding and fertilizer did not significantly influence yellow starthistle yields or interact with picloram in affecting the yields.

Annual grasses, predominantly medusahead (*Taeniatherum asperum* (Sim.) Nevski) and downy brome (*Bromus tectorum* L.) yields were highest in the picloram treated plots. Seeding or fertilizer alone did not significantly affect annual grass yields. Moth mullein (*Verbascum blattaria* L.) yields were not affected by treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

First-year effects of reseeding, picloram and fertilizer on yields of component species (yellow starthistle and intermediate wheatgrass)

	Treatment		Forage Dry Weights (lb/A)			
Seed	Picloram	Nitrogen	Yst[1]	Angr[2]	Inwh[3]	Momu[4]
0	0.00	0	3335	195	0	65
0	0.00	50	4901	77	2	26
0	0.25	0	412	429	10	142
0	0.25	50	328	359	33	87
15	0.00	0	4282	137	33	0
15	0.00	50	4076	174	7	39
15	0.25	0	334	241	585	91
15	0.25	50	523	259	774	101
$LSD_{0.05}$			1576	268	170	154

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[1] Yellow starthistle (Centaurea solstitialis).

[2] Annual grasses = medusahead (Taeniatherum asperum) and downy brome (Bromus tectorum).

[3] Intermediate wheatgrass (Agropyron intermedium).

[4] Moth mullein (Verbascum blattaria).

Longterm effects of herbicides applied at a series of yellow starthistle growth stages. Huston, C.H., D.L. Zamora, R.H. Callihan, and D.C. Thill. The efficacy of several herbicides applied at different growth stages of yellow starthistle (Centaurea solstitialis L.) was examined near Lapwai, Idaho. The soil is in the Gwin-Lapwai series with a pH of 7.0 and organic matter of 4.5%. The first herbicide treatments were applied October 30 and November 5, 1981, just after yellow starthistle emergence. Air temperature on October 30 was 10 C with relative humidity of 95% under cloudy skies. November 5 was cloudy with an air temperature of 9 C and relative humidity of 90%. On March 26, 1982, the second series of treatments was applied to yellow starthistle in the early rosette stage of growth. Air temperature was 15 C with relative humidity of 85% and cloudy skies. Yellow starthistle plants in the late rosette stage were treated on June 11. Air temperature was 21 C with relative humidity of 45% and clear skies. On June 30, herbicide treatments were applied while yellow starthistle was in the bolting stage. Air temperature was 28 C with relative humidity of 20%. The final treatments were applied on July 20, while yellow starthistle was flowering. Air temperature was 29 C with relative humidity of 15%.

1982 Evaluation

Weed control resulting from the early postemergence treatments was visually evaluated on March 29, 1982. All rates of picloram (2.2 lb/gal) and 2,4-D (propylene glycol butyl ether ester 4.0 lb/gal) provided excellent control while both 0.25 and 0.50 lb/A dicamba (emusifiable concentrate 4.0 lb/A) and 0.50 oz/A DPX-5648 (75% sprayable) provided good control. DPX-5648 at 0.13 oz/A provided inadequate control. When evaluated on June 11, the picloram treatments continued to provide excellent control. Yellow starthistle plants emerged throughout the spring and consequently all other treatments provided less control than on March 29. The 0.50 lb/A dicamba and 2,4-D treatments still provided good control. Early rosette treatments were evaluated on June 11. All picloram treatments provided excellent control, 0.5 lb/A dicamba good control, and all other treatments unsatisfactory control. Late rosette applications were evaluated on July 20. Picloram treatments still produced excellent control of yellow starthistle while the 0.25 and 0.50 lb/A dicamba and 0.50 lb/A 2,4-D treatments provided fair control. DPX-5648 at both 0.13 and 0.50 oz/A provided no control. Herbicide treatments applied during the bolt stage were evaluated on July 20. All picloram rates provided good control while both the dicamba and 2,4-D treatments provided fair to poor control. Both DPX-5648 treatments provided no control. When applied during flowering all herbicides tested produced poor control of yellow starthistle. The picloram and dicamba treatments produced slight epinasty while 2,4-D and DPX-5648 provided no control.

1983 Evaluation

The study was re-evaluated on July 8, 1983 to determine residual herbicidal control of yellow starthistle and annual grass (primarily downy brome (Bromus tectorum L.). One year after application, 0.25, 0.38, and 0.5 lb/A picloram were the only treatments providing adequate starthistle control. However, there was a significant interaction between time of application and degree of control with all three rates. Excellent control (97-100%) continued to result from the 0.5 lb/A picloram applied during the early rosette stage and with all three rates when applied during the late rosette, bolt, and flowering stages. Picloram at 0.25 lb/A applied during the early rosette stage, and 0.38 lb/A picloram applied during the emergence and early rosette stages provided fair to good (72-88%) starthistle control. Picloram treatments of 0.25 and 0.5 lb/A applied during emergence gave poor residual control. The 0.25 lb/A dicamba treatment applied during the late rosette stage produced fair (82%) control. All other herbicide treatments resulted in poor starthistle control (0-68%) regardless of application time. When averaged across all application times, all three picloram treatments resulted in significantly greater annual grass growth than the other chemical treatments or the untreated check. However, within all three picloram rates, treatment at time of emergence resulted not only in less starthistle control than the other application dates, but also resulted in significantly less grass growth. Neither dicamba treatment differed significantly from the check, but both resulted in significantly more grass than the 2,4-D or DPX-5648 treatments. The 0.25 and 0.56 lb/A dicamba treatments applied during the late rosette stage resulted in significantly greater grass growth than the other dicamba treatments. Treatment with 2,4-D at early rosette or flowering resulted in less grass growth than the check. All DPX-5648 treatments resulted in significantly less grass growth than the check. Time of DPX-5648 application did not significantly influence grass growth. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Carryover effect of 1982 herbicide treatment and application timing on yellow starthistle and annual grass growth - 1983 results

Treatment	Application Time Emergence	 Early Rosette	 Late Rosette	 Bolting	 Flowering	LSD 0.05
Untreated check						
% Yst control	-					
Angr growth[1]	2					
Picloram (0.25 lb/A)						
% Yst control	54	77	98	100	100	16
Angr growth	3.2	4.0	4.0	3.8	4.0	0.5
Picloram (0.38 lb/A)						
% Yst control	73	88	100	100	100	16
Angr growth	2.8	4.0	4.0	4.0	4.0	0.6
Picloram (0.50 lb/A)						
% Yst control	40	99	100	98	100	24
Angr growth	2.5	4.0	4.0	4.0	4.0	0.7
Dicamba (0.25 lb/A)						
% Yst control	21	28	82	5	15	38
Angr growth	2.0	2.2	3.8	2.8	2.5	1.0
Dicamba (0.50 lb/A)						
% Yst control	68	20	30	15	28	45
Angr growth	2.5	2.2	3.2	2.5	2.2	1.5
2,4-D (0.50 lb/A)						
% Yst control	30	13	29	5	0	39
Angr growth	2.2	1.2	2.8	2.2	1.5	1.5
DPX-5648 (1/8 oz/A)						
% Yst control	2.8	5	0	5	0	25
Angr growth	1.8	1.0	1.2	1.2	1.7	1.0
DPX-5648 (1/2 oz/A)						
% Yst control	18	25	10	18	43	35
Angr growth	1.2	1.2	1.0	1.8	0.2	1.2
LSD (0.05)						
% Yst control	45	26	26	18	28	
Angr growth	1.0	0.9	0.9	1.3	0.5	

[1] Annual grass on a scale from 0 to 4 (0 = no grass, 4 = maximum growth).

Dyers woad control. Chase, R. L. Applications of several herbicides and herbicide combinations were applied to dyers woad at three growth stages; rosette, bud, and full flower. Treatments were applied with a bicycle sprayer in 20 gallons per acre. Plots were 11 X 60 feet. There were no replications. Surfactant (X-77) was added to all treatments at .5%.

Treatments resulted in good control in the rosette stage with the exception of dicamba alone. In the bud stage all treatments with the exception of 2,4-D alone and dicamba alone gave good control. With dyers woad it is often difficult to see plants until they flower. Therefore, the treatments in full flower are especially important. Chlorsulfuron and amitrole treatments gave the greatest reduction (90-100%) in number of pods produced when the herbicides were applied in the full flower stage.

Looking at all three stages of growth, treatments containing chlorsulfuron and/or amitrole were very effective in either killing the plant or preventing pod production. (Utah State University Extension, Logan, Utah 84322)

Control of dyers woad at 3 growth stages

Treatment	Rate lb/A	% control	% reduction in # of pods	
		rosette[1] June 14, 1983	bud[2] June 21, 1983	flowering[3] July 21, 1983
2, 4-D	.5	80	30	80
2, 4-D + amitrole	.5 .125	99	95	100
2, 4-D + amitrole	.50 .25	99	95	100
2, 4-D + dicamba	.50 .25	90	95	80
2, 4-D + dicamba	1.00 .50	99	95	75
2, 4-D + dicamba	2.00 1.00	99	95	75
2, 4-D + dicamba	.50 1.00	99	95	60
dicamba	.50	40	50	0
dicamba	1.00	60	66	0
dicamba + amitrole	.50 .25	70	99	90
chlorsulfuron	.75 oz.	100	99	99
chlorsulfuron + amitrole	.5 .125	100	99	99
chlorsulfuron + amitrole	.75 oz. .125	100		
chlorsulfuron + dicamba	.75 oz. .50	100		
chlorsulfuron + amitrole	.38 oz. .25	-	99	100
chlorsulfuron + dicamba	.38 oz. .50	-	95	90

1. Treatments made April 29, 1983
2. Treatments made May 20, 1983
3. Treatments made June 2, 1983

Pasture weed control in Idaho. Beck, K.G., D.C. Thill, and R.H. Callihan. Experiments were established to determine the longterm effects of various herbicide applications on weed control and yield in pastures at Weiser and Bonners Ferry in 1981 and at Viola in 1982 (see p.24 WSWS Research Progress Report, 1982 and p.37 WSWS Research Progress Report, 1983).

In the sub-irrigated pasture located at Bonners Ferry, no differences in forage yield were observed two years after herbicide application (Table 1). However, yield of weeds were different. All rates of picloram produced the lowest yield of weeds. Common dandelion control was best (>90%) with picloram. Control of broadleaf plantain was variable among treatments. Differences observed at this location were most likely due to changes in vegetative make-up that occurred across the experiment caused by increased grass growth as induced by deferred grazing and high rainfall.

No differences due to herbicide treatments were observed for yield of forage or weeds two years after application in an irrigated pasture at Weiser (Table 2). Also, no differences in control for curly dock, common dandelion, or broadleaf plantain were recorded. The wide variation in the experiment with respect to control and yield was likely due to differential vegetative make-up across the plots caused by flood irrigation and deferred grazing rather than herbicide treatment.

In a dryland pasture at Viola, no differences in yield of forage or weeds and no differences in control of prickly lettuce or Canada thistle were observed one year after herbicide application (Table 3). Alfalfa injury was greatest with the three rates of picloram. The Palouse Prairie receives an average of 20 to 25 inches of rainfall annually and this, coupled with no grazing at Viola, could have affected the outcome of the experiment. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Influence of various herbicides and tank mixes on weed control and on yield of forage and weeds on dryland pasture at Bonners Ferry, Idaho.

		Control		Yield[1]	
	Rate[2]	Coda	Blpl	Forage	Weeds
Treatment	(lb a.i./A)	---------%---------		------(lb/A)---------	
dicamba	0.125	56	70	852	471
dicamba	0.25	45	79	873	255
dicamba	0.50	58	81	1074	242
dicamba	1.0	54	48	1306	400
dicamba	2.0	54	69	1259	325
dicamba + 2,4-D	0.125 + 0.375	48	75	1126	214
dicamba + 2,4-D	0.25 + 0.50	50	95	1143	167
dicamba + 2,4-D	0.25 + 0.75	54	60	1017	131
dicamba + 2,4-D	0.50 + 1.0	56	89	964	104
dicamba + 2,4-D	0.50 + 1.5	51	74	1423	154
dicamba + 2,4-D	1.0 + 2.0	50	81	1157	310
dicamba + 2,4-D	1.0 + 3.0	60	98	964	199
2,4-D	0.375	44	100	887	200
2,4-D	0.75	61	100	1003	383
2,4-D	1.5	33	78	915	477
2,4-D	3.0	49	96	672	225
picloram	0.25	96	48	773	29
picloram	0.50	99	99	851	30
picloram	1.0	99	88	836	3
check	-	-	-	1046	84
LSD (0.05)		40	38	NS	251

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[1] Oven dry weight.

[2] Treatments applied 5-14-81.

Table 2. Influence of various herbicides and tank mixes on weed control and on yield of forage and weeds on irrigated pasture at Weiser, Idaho.

		Control			Yield[1]	
	Rate[2]	Cudo	Coda	Blpl	Forage	Weeds
Treatment	(lb a.i./A)		(%)		(lb/A)	
dicamba	0.25	30	47	0	1249	134
dicamba	0.50	8	72	17	1362	79
dicamba	1.0	30	85	38	665	72
dicamba	2.0	28	67	17	954	125
dicamba	4.0	47	90	55	1210	53
dicamba + 2,4-D	0.25+0.375	33	47	47	1174	27
dicamba + 2,4-D	0.50+0.50	0	63	42	1320	61
dicamba + 2,4-D	0.50+0.75	47	47	58	775	12
dicamba + 2,4-D	1.0+1.0	0	50	47	909	114
dicamba + 2,4-D	1.0+1.5	50	58	42	1082	18
dicamba + 2,4-D	2.0+2.0	8	47	33	852	64
dicamba + 2,4-D	2.0+3.0	55	30	30	1195	39
2,4-D	0.375	28	25	25	951	8
2,4-D	0.75	17	72	55	1022	197
2,4-D	1.5	0	55	30	992	73
2,4-D	3.0	8	77	55	834	41
picloram	0.25	0	60	33	1094	83
picloram	0.50	25	47	42	927	32
picloram	1.0	17	72	72	1645	80
check	-	-	-	-	1082	68
$LSD_{(0.05)}$		NS	NS	NS	NS	NS

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[1] Oven dry weight.

[2] Treatments applied 4-30-81.

Table 3. Influence of various herbicides and tank mixes on weed control and on yield of forage and weeds on dryland pasture at Viola, Idaho.

		Crop Injury	Control		Yield[1]	
	Rate[2]	Alfalfa	Prle	Cath	Forage	Weeds
Treatment	(lb a.i./A)	(%)			(lb/A)	
dicamba	0.125	1	44	85	2819	110
dicamba	0.25	0	35	45	2751	278
dicamba	0.50	16	51	58	2287	129
dicamba	1.0	10	58	0	3512	352
dicamba	2.0	10	40	0	3851	251
dicamba + 2,4-D	0.125+0.375	3	51	33	3909	226
dicamba + 2,4-D	0.25+0.50	10	40	5	2528	457
dicamba + 2,4-D	0.25+0.75	3	35	-	2743	348
dicamba + 2,4-D	0.50+1.0	13	33	0	3666	219
dicamba + 2,4-D	0.50+1.5	26	61	0	3541	299
dicamba + 2,4-D	1.0+2.0	53	36	53	3282	260
dicamba + 2,4-D	1.0+3.0	30	38	13	2523	456
2,4-D	0.375	3	48	0	2610	283
2,4-D	0.75	3	60	90	3776	72
2,4-D	1.5	16	70	15	3721	184
2,4-D	3.0	28	46	0	2998	255
picloram	0.25	61	75	0	3252	114
picloram	0.50	98	100	95	3167	21
picloram	1.0	100	100	100	2500	17
check	-	-	-	-	2320	534
LSD(0.05)		30	NS	NS	NS	NS

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[1] Oven dry weight.

[2] Treatments applied 6-3-82.

PROJECT 3.

UNDESIRABLE WOODY PLANTS

Jim W. Budzynski - Project Chairman

Herbicide control evaluations on plains pricklypear. Ferrell, M. A. and H. P. Alley. Infestations of pricklypear can be a serious problem on rangelands, especially during periods of drought and overgrazing. This experiment was established to compare various rates of triclopyr, Dowco 290 (M-3972) and various formulations of picloram for the control of plains pricklypear cactus.

Plots were established June 3, 1982 on a mature stand of pricklypear in full bloom. The grass was 2 to 4 inches in height and in good condition. Liquid formulations were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier. Granular material was applied with a hand operated centrifugal granular applicator. Plots were 9 x 30 ft arranged in a randomized complete block design with three replications. Soil was a clay loam (36% sand, 37% silt and 27% clay) with 1.8% organic matter and a pH of 7.9.

Visual control estimates and forage production clippings were made on July 11, 1983, 13 months after treatment. There was no apparent grass damage from any treatment. Forage production increased from 256 lb/A air dry forage in the check to as high as 482 lb/A air dry forage in the treatment where picloram (K salt) was applied at 2.0 lb ai/A. Picloram (K salt) applied at 1.0 and 2.0 lb ai/A were the only treatments effectively controlling pricklypear, one year after application, with 77 and 97% control respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1253 .)

Plains pricklypear control

Treatment[1]	Rate lb ai/A	Percent[2] Control	Air Dry[2] Forage lbs/A	Observations
triclopyr (4E)	0.25	0	274	No apparent grass damage in any plot
triclopyr (4E)	0.50	3	338	
triclopyr (4E)	1.0	0	430	
Dowco 290 (M-3972)	0.25	0	304	
Dowco 290 (M-3972)	0.50	0	340	
Dowco 290 (M-3972)	1.0	7	400	
picloram (K salt)	1.0	77	430	
picloram (K salt)	2.0	97	482	
picloram (2% pellets)	0.25	23	446	
picloram (2% pellets)	0.50	37	402	
picloram (10% pellets)	0.25	22	244	
picloram (10% pellets)	0.50	30	276	
Check	---	--	256	

[1] Treatments applied June 3, 1983.
[2] Percent control and forage production evaluations July 11, 1983.

Greasewood (Sarcobatus vermiculatus) control evaluations. Ferrell, M. A. and H. P. Alley. Plots were established June 30, 1981 to compare treatments of two formulations of 2,4-D, 2,4,5-T ester and picloram on the effectiveness of control on greasewood.

Treatments were applied to greasewood in the pre-bud to full-bloom stage of growth with a 13 nozzle truck mounted sprayer in 32 gpa water carrier. Plots were 21.5 by 500 ft with one replication. Uniform herbicide application was difficult due to the height of the greasewood and the limitations of boom height.

Complete defoliation was apparent soon after treatment in 1981 and greasewood appeared dead. However, one year after evaluation in 1982 plant counts showed resprouting of greasewood in all treatments with very little control. Visual evaluations made in 1983, two years following treatment, showed a maximum of only 50 and 60% greasewood kill with 2,4-D LV ester and picloram (K salt), respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1245.)

Greasewood control

Herbicides[1]	Rate lb ai/A	Percent Control[2] 1982	1983	Observations
2,4-D LV ester	2.0	10	50	Top Kill - resprouting and recovery.
2,4-D SULV amine	2.0	20	30	
2,4,5-T ester	2.0	10	60	
picloram (K salt)	0.5	5	20	

[1] Applications June 30, 1981.

[2] Control evaluations: plant counts August 2, 1982; visual control evaluations September 10, 1983.

Evaluation and comparison of herbicide formulations for control of big sagebrush and resulting forage production. Ferrell, M. A., H. P. Alley and T. D. Whitson. Various rates of DPX-T 6376, DPX-T 6206, PPG 1259, dicamba, 2,4-DLV ester, 2,4,5-T ester, tebuthiuron, UC 77179, triclopyr, triclopyr plus 2,4-DLV ester and Dowco 290 (M-3972) were compared to evaluate their effectiveness for the control of big sagebrush (Artemisia tridentata Nutt.).

Plots were established June 10, 1982 near Hudson, Wyoming on a dense stand of big sagebrush. The sagebrush, 8-16 inches in height, was in the full leaf stage with an understory of actively growing grasses 2-4 inches high. Liquid formulations were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier. Granular matieral was applied with a hand operated centrifugal granular applicator. Plots were 9 x 30 ft and arranged in a randomized complete block design with three replications. Soil was a sandy loam (70% sand, 22% silt and 8% clay) with 0.8% organic matter and a pH of 6.5.

Visual estimates of sagebrush and grass damage were made on May 23, 1983, one year following treatment. Forage production measurements were taken on July 19, 1983. The herbicides PPG 1259, UC 77179, and tebuthiuron 20P resulted in considerable grass damage and reduction in stand, especially at the higher rates of application. Treatments giving the highest percentage sagebrush control with the least grass damage were; DPX-T 6376 at 0.5 lb ai/A, DPX-T 6206 at 0.125 and 0.5 lb ai/A, 2,4-D ester and 2,4,5-T ester at 1.0 and 2.0 lb ai/A, and triclopyr at 0.5 and 1.0 lb ai/A. (Wyoming Agr. Exp. Sta., Laramie, WY 82071, SR 1234.)

Sagebrush control, forage production and grass damage

Herbicide[1]	Rate lb ai/A	Percent[2] Control	Air Dry Forage lb/A	Observations
DPX-T 6376 70% WP + X-77	0.031	54	526	
DPX-T 6376 70% WP + X-77	0.062	86	628	
DPX-T 6376 70% WP + X-77	0.125	87	530	
DPX-T 6376 70% WP + X-77	0.5	100	586	
DPX-T 6206 70% WP + X-77	0.031	68	494	
DPX-T 6206 70% WP + X-77	0.062	68	748	
DPX-T 6206 70% WP + X-77	0.125	91	564	
DPX-T 6206 70% WP + X-77	0.125	98	504	
PPG 1259 FL	1.0	100	532	20 - 50% grass reduction
PPG 1259 FL	2.0	100	102	80 - 90% grass reduction
PPG 1259 FL	4.0	100	94	90 - 95% grass reduction
dicamba 4DMA	1.0	0	344	
dicamba 4DMA	2.0	38	432	
2,4-D ester	1.0	63	506	
2,4-D ester	2.0	98	564	
2.4,5-T ester	1.0	93	436	
2.4,5-T ester	2.0	98	802	
tebuthiuron 20P	0.125	35	418	
tebuthiuron 20P	0.25	75	406	20% grass reduction
tebuthiuron 20P	0.5	92	210	50% grass reduction
tebuthiuron 20P	0.75	99	132	50% grass reduction
tebuthiuron 20P	1.0	99	120	65-75% grass reduction
UC 77179	0.5	91	126	35-65% grass reduction
UC 77179	1.0	100	352	90% grass reduction
UC 77179	2.0	100	0	99-100% grass reduction
UC 77179	4.0	100	0	100% grass reduction
UC 77179	6.0	100	0	100% grass reduction
triclopyr 4E	0.25	38	604	
triclopyr 4E	0.5	96	622	
triclopyr 4E	1.0	94	762	
triclopyr 4E/2,4-D ester	0.5 + 1.0	89	356	
Dowco 290 (M-3972)	0.25	8	476	
Dowco 290 (M-3972)	0.5	33	506	
Dowco 290 (M-3972)	1.0	43	442	
Check	---	---	304	

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[1] Herbicide treatments applied June 10, 1982.

[2] Visual control evaluations May 23, 1983 and production measurements July 19, 1983. Production from 2.5 ft diameter quadrat per replication.

Evaluation of fall and spring applications of tebuthiuron 10P and 20P formulations for big sagebrush (Artemisia tridentata Nutt.) control and forage production. Ferrell, M. A, H. P. Alley and T. D. Whitson. Plots were established June 24, 1980 and September 6, 1980 near Kaycee, Wyoming, on a mature stand of sagebrush to evaluate two formulations of tebuthiuron applied at various rates. The understory of grass was 4-6 inches in height at the time of the June treatment and mature when the September treatments were applied. Treatments were applied with a hand opeated centrifugal granular applicator. Plots were 33 by 33 ft and arranged in a randomized complete block design with three replications. The soil was a loam (47% sand, 32% silt and 21% clay).

Visual control estimates and forage prodcuction clippings were made on July 21, 1983. Three years after treatment all rates are still showing grass damage, especially at the higher rates in both spring and fall applications. The grass damage is not reflected in the forage yields. Three years after application the rate of 0.5 lb ia/A of both the 10P and 20P formulations are maintaining 94 to 100% control with little difference between the 10P and 20P formulations or between the spring and fall application dates. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1240.)

Sagebrush control, forage production and grass damage

Treatment	Rate lb ai/A	Percent[3] Control	Pounds Air Dry[3] Forage/A	Percent[3] Grass Damage
Spring Treatment[1]				
tebuthiuron 10P	0.25	83	563	0 - 25
tebuthiuron 10P	0.5	98	729	20 - 30
tebuthiuron 10P	0.75	98	540	15 - 30
tebuthiuron 10P	1.0	100	428	20 - 35
tebuthiuron 20P	0.25	62	388	10 - 15
tebuthiuron 20P	0.5	94	550	5 - 25
tebuthiuron 20P	0.75	100	413	5 - 30
tebuthiuron 20P	1.0	99	604	20 - 35
Check	---	0	619	0
Fall Treatment[2]				
tebuthiuron 10P	0.25	65	541	10 - 15
tebuthiuron 10P	0.5	96	657	20 - 30
tebuthiuron 10P	0.75	100	277	25 - 30
tebuthiuron 10P	1.0	100	527	50 - 75
tebuthiuron 20P	0.25	80	640	5 - 20
tebuthiuron 20P	0.5	100	717	10 - 40
tebuthiuron 20P	0.75	100	131	25 - 80
tebuthiuron 20P	1.0	100	651	40 - 80
Check	---	0	283	0

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[1] Spring treatments applied June 24, 1980.

[2] Fall treatments applied September 6, 1980.

[3] Percent control, forage production and grass damage evaluations July 21, 1983.

Forage production and big sagebrush (Artemisia tridentata Nutt.) control from areas treated with tebuthiuron 20P five years following treatment. Ferrell, M. A., H. P. Alley and T. D. Whitson. Plots were established November 11, 1978 40 miles south of Ten Sleep, Wyoming, on a mature sagebrush and grass stand. Treatments were applied by air plane equipped with a granular applicator supplied by Elanco Products, Inc. Plot size was 11.3 acres and was replicated once. The soil was a loam (41% sand, 45% silt and 14% clay) with 4.9% organic matter and a pH of 6.8.

Percent control consisted of point transects August 5, 1981 and July 13, 1982 and a visual evaluation July 20, 1983. Forage production evaluations were also made at these times by forage harvests. Evaluations three years following treatment indicated considerable damage to the grass. Forage production measurements five years following treatment show tebuthiuron treated plots producing from 145 to 364% more grass than the untreated area. Sagebrush control, five years following treatment, ranged from a low of 30% on the area treated with tebuthiuron 20P at 0.31 lb ai/A to a 95 and 98% control for the 0.67 and 0.94 lb ai/A, respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1241.)

Forage production and sagebrush control

Treatment[1]	Rate lb ai/A	Percent Control				Oven-dry Forage (lb/A)		
		1979	1981	1982	1983	1981	1982	1983
tebuthiuron 20P	0.31	40	69	33	30	382 b[3]	518 a[3]	390
tebuthiuron 20P	0.67	70	96	100	95	715 a	690 b	738
tebuthiuron 20P	0.94	80	99	96	98	552 ab	566 c	512
Check	---	--	--	---	--	308 b	266 d	159

[1] Treatments applied November 11, 1978.

[2] Forage clipped from same areas in 1981, 1982, 1983.

[3] Means in the same columns followed by the same letters are not significantly different at the 5% level according to Duncan's New Multiple Range Test.

Evaluation of fall and spring applications of tebuthiuron 10P and 20P formulations for mountain big sagebrush (Artemesia tridentata vaseyana (Rydb.)Beetle) control and forage production. Ferrell, M. A., H. P. Alley and T. D. Whitson. Plots were established May 29, 1980 and September 16, 1980 20 miles north of Laramie, Wyoming, on mature stands of sagebrush 8 to 12 inches in height. The understory of grasses was 4 to 6 inches in height at the time of May treatment and mature when the September treatments were applied. Treatments were applied with a hand operated centrifugal granular applicator. Plots were 18 by 30 ft and arranged in a randomized complete block design with three replications. The soil was a sandy loam (60% sand, 24% silt and 16% clay).

Visual control estimates and forage production clippings were made on July 8, 1983. Three years following tebuthiuron application rates higher than 0.5 lb ai/A resulted in considerable grass damage. However, the grass damage is not reflected in the forage yields. Spring treatments of tebuthiuron 10P and 20P pellets were more effective than fall applications, especially at the lower rates of application. Rates of 0.5 lb ai/A appear to be the optimum and effective application rate, resulting in 98% control for the spring application of both the 10P and 20P formulations of tebuthiuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1242.)

Sagebrush control, grass production and grass damage

Treatment[1]	Rate lb ai/A	Percent[3] Control	Pounds Air Dry[3] Forage/A	Percent[3] Grass Damage
Spring Treatment				
tebuthiuron 10P	0.25	88	478	0 - 10
tebuthiuron 10P	0.5	98	704	10 - 40
tebuthiuron 10P	0.75	99	626	40 - 60
tebuthiuron 10P	1.0	100	968	20 - 85
tebuthiuron 20P	0.25	83	420	0 - 10
tebuthiuron 20P	0.5	98	488	10 - 30
tebuthiuron 20P	0.75	96	630	30 - 50
tebuthiuron 20P	1.0	100	692	35 - 70
Check	---	0	212	0
Fall Treatment[2]				
tebuthiuron 10P	0.25	68	528	0
tebuthiuron 10P	0.5	90	692	10 - 20
tebuthiuron 10P	0.75	96	720	30 - 50
tebuthiuron 10P	1.0	99	402	65 - 80
tebuthiuron 20P	0.25	68	474	0
tebuthiuron 20P	0.5	91	746	10 - 30
tebuthiuron 20P	0.75	95	788	25 - 40
tebuthiuron 20P	1.0	98	494	35 - 65
Check	---	0	220	0

[1] Spring treatments applied May 5, 1980.

[2] Fall treatments applied September 16, 1980.

[3] Pecent control, forage production and grass damage evaluations July 8, 1983.

Evaluation of applications of 10P and 20P formulations of aerial applied tebuthiuron for big sagebrush (Artemisia tridentata Nutt.) control and forage production. Ferrell, M. A, H. P. Alley and T. D. Whitson. Plots were established October 21, 1980 near Kaycee, Wyoming, on a mature sagebrush stand with an understory of mature grass. Treatments were applied by airplane with a granular applicator developed by Elanco Products, Inc. Plots were 6.2 acres in size with one replication.

Visual control estimates and forage production clippings were made July 21, 1983. All rates are showing 90% or better control of sagebrush with apparently no difference between the 10P and 20P formulations, three years after application. However, heavy grass damage was evident where application rates exceeded 0.55 lb ai/A of tebuthiuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1243.)

Big sagebrush control and forage production

Treatment[1]	Rate lb ai/A	Percent Control[2]	Pounds air dry Forage/A[2]	Grass Damage
tebuthiuron 20P	0.30	90	450	Moderate grass damage
tebuthiuron 20P	0.60	95	192	Heavy grass damage
tebuthiuron 20P	0.90	98	98	Heavy grass damage
tebuthiuron 20P	1.2	98	296	Heavy grass damage
tebuthiuron 20P 3/16" pellet	0.90	95	---	Heavy grass damage
tebuthiuron 10P	0.28	95	---	
tebuthiuron 10P	0.55	95	---	Moderate grass damage
tebuthiuron 10P	0.83	99	---	Heavy grass damage
tebuthiuron 10P	1.10	100	---	Heavy grass damage
Check	----	---	408	

[1] Treatments applied October 21, 1980.

[2] Percent control, forage production and grass damage evaluations July 21, 1983.

Evaluations of DPX-T 6376 for control of Douglas rabbitbrush (Chrysothamnus visidiflorus) and mountain big sagebrush (Artemisia tridentata vaseyana (Rydb.)Beetle). Ferrell, M. A., H. P. Alley and T. D. Whitson. Plots were established September 29, 1981 on a fully developed rabbitbrush and sagebrush stand in order to make evaluations for various rates of DPX-T6376. Treatments were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier. Plots were 9 by 30 ft and arranged in a randomized complete block design with three replications. The soil was a sandy loam (60% sand, 24% silt and 16% clay) with 1.7% organic matter and a pH of 6.9.

Visual sagebrush control estimates were made on July 8, 1983 and September 8, 1983 for the rabbitbrush. Control of sagebrush decreased in 1983 from what it was in 1982. However, control of rabbitbrush was comparable between years resulting in 92 and 93% control at the 1.0 lb ai/A rate for 1982 and 1983, respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1244.)

Percent control of Douglas rabbitbrush and mountain big sagebrush

Herbicide[1]	Rate lb ai/A	Percent Control[2]				Observations
		Sagebrush		Rabbitbrush		
		1982	1983	1982	1983	
DPX-T6376 75%WP	0.25	72	55	28	30	No apparent grass damage
DPX-T6376 75%WP	0.5	77	60	70	65	No apparent grass damage
DPX-T6376 75%WP	1.0	93	82	92	93	No apparent grass damage

[1] Herbicides applied September 29, 1981.

[2] Visual evaluations July 9, 1982. July 8, 1983 for sagebrush and September 8, 1983 for rabbitbrush.

Conifer release with split applications of triclopyr. Stovicek, R. F., R. H. Callihan, and D. C. Thill. A study was established in the White Pine Gulch area fifty miles north of Moscow, Idaho, to evaluate the efficacy of split and single applications of triclopyr ester applied in the spring and fall. Applications were made May 25 and August 23, 1982, to a clearcut that had been burned in 1979 and planted with ponderosa pine (Pinus ponderosa Dougl.) and Douglas fir (Pseudotsuga menziesii Franco) in 1980. Ponderosa pine survival on the site was low, but a large number of naturally occurring lodgpole pine (Pinus contorta Dougl.) were present at the time of application. Spring treatments of triclopyr ester were applied at 1.12 and 2.24 kg/ha, fall applications were applied at 0.56 and 1.12 kg/ha, and split applications were applied spring and fall at 2.24 + 1.12 kg/ha and 1.12 + 0.56 kg/ha. Plots were 3 by 30 m, arranged in a randomized complete block design with four replications. Herbicides were applied with a backpack sprayer calibrated to deliver 187 L/ha at 2.8 kg/cm^2.

The 2.24 kg/ha spring applications resulted in greater snowbrush ceanothus (Ceanothus velutinus Dougl.) control than that resulting from other treatments, with the exception of the split applications. No difference occurred between the single and split applications applied at the same rate during the spring season. A trend indicates that increased control of snowbrush ceanothus may be achieved by applying 1.12 + 0.56 kg/ha triclopyr during the spring and fall relative to the control obtained by 1.12 kg/ha rate applied during the spring only.

Triclopyr control of redstem ceanothus (Ceanothus sanguineus Pursh) was better than 75% for all treatments, but no difference existed among treatments. Ninebark (Physocarpos malvaceus (Green) Kuntz) and Rocky Mountain Maple (Acer glabrum Torr.) were inadequately controlled, (less than 50% control for both species) and did not differ from the check. Bracken fern (Pteridium aquilinum (L.) Kuhn.) and pachistima (Pachistima myrsinites Pursh) both appear to be highly resistant to triclopyr; bracken fern is a potentially serious problem in conifer release or establishment after being released from competition. Douglas fir seedlings were not damaged by any rate applied during the spring or fall. Both lodgepole pine and ponderosa pine were extremely sensitive to spring applications of triclopyr ester, with less apparent damage from fall applications. Fall applications produced a visually vivid reduced rate of control of the entire weed complex. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Effect of triclopyr ester on snowbrush ceanothus.

Season Applied	Rate	Control[1]
	(kg/ha)	(%)
Spring	2.24	80.5
Spring + Fall	2.24 + 1.12	77.5
Spring + Fall	1.12 + 0.56	57.5
Spring	1.12	33.8
Fall	0.56	30.0
Fall	1.12	12.5
	$LSD_{.05}$	35.5

[1] As a percent control of check.

Control of Coyote brush (Baccharis consanguinea), French broom (Cytisus monspessulanus), and Eucalyptus (Eucalyptus globulus) with glyphosate. B. G. Mortensen, J. W. Budzynski, and D. J. Stroud. Numerous plots were established in the East Bay Regional Park District to evaluate topical control of Coyote brush, French broom, and eucalyptus resprouts.

Topical treatments were put out with backpack sprayers on a spray-to-wet basis, ensuring complete coverage. French broom and Coyote brush were sprayed at a wide range of plant stages and heights. Eucalyptus resprouts were sprayed at small stages (0 to 4 feet of regrowth) and large stages (4 to 10 feet of regrowth).

Results showed that all Coyote brush and French broom plants were completely (98-100%) controlled with either 1% or 2% solutions of glyphosate. Complete coverage was essential. When coverage was incomplete, 2% solutions performed better than 1% solutions. Larger eucalyptus resprouts (4 to 10 feet of regrowth) were 90% controlled with a 1% solution and 100% controlled with 2%, 5%, 10%, and 15% solutions. Resprouts smaller than 4 feet, however, were poorly (10-15%) controlled at 1%, 2%, 5%, 10%, and 15% solution rates. Apparently a substantial commitment to shoot growth is necessary for eucalyptus resprout control to be effective. (East Bay Regional Park District, Oakland, CA 94619)

PROJECT 4.

WEEDS IN HORTICULTURAL CROPS

Linda Willitts - Project Chairman

Screening new herbicides for weed control in horticultural crops. Lange, A. H. and W. D. Edson. A Hanford fine sandy loam soil at the Kearney Agricultural Center, Parlier, CA was prepared for planting in February 1983. Varieties used in this trial were 1/2 inch Durado plums, 3/8 inch Malling 110 apple rootstock, 1/2 inch black walnut rootstock, 1/2 inch O'Henry peach on nemaguard, 1/2 inch French prune on nemaguard, 5/8 inch Bartlett pear on Pyrus betulfolia rootstock, 3/8 inch Wonderful pomegranate seedlings, 1/4 inch Rough lemon rootstock and 1/2 inch bare rooted pistachio (Reps. 1 & 2 with P. integerrima and Reps. 3 & 4 with P. terebinthus). All were planted and sprinkled in on April 2, 1983. Ruby Cabernet and Thompson seedless grapes were also included in this trial. Acala cotton and Jamboree sweet corn were seeded through all plots on April 21, 1983. The cotton was replanted with new seed on May 20, 1983. Transplant tomatoes and direct seeded watermelons were planted

On April 22 all preemergence herbicides were applied and sprinkled in with 1-1/4 acre inch of water. On June 2 the postemergence herbicides were applied over the germinated weeds and row crops so as to hit about 6-8 inches of the trunks of the deciduous trees. This spray contacted about 3/4 of the citrus foliage and about half the pomegranate foliage. A 3-nozzle boom sprayed the chemical 5 feet on each side of the tree row in 50 gal/A of water. The weeds present in approximate order of prevalence were lambsquarters, lovegrass, hairy crabgrass, cupgrass, pigweed, yellow nutsedge, volunteer barley, sowthistle and puncturevine. Only sethoxydim and fluazifop-butyl received an added 0.5 percent oil surfactant mixture.

The preemergence herbicides showing significant injury to cotton were R 40244 at 4 Lb/A (only) and metolachlor at both 4 and 16 Lb/A. Both preemergence growth regulators EL 500 and PP 333 were hard on germinating cotton. Oxyfluorfen was outstandingly safe on germinating cotton even at 8 Lb/A. All the postemergence herbicides were phytotoxic to cotton except sethoxydim and fluazifop-butyl. SC 1056 was intermediate. Of the preemergence herbicides R 40244 and prodiamine were toxic (particularly at the higher rates) to corn. All postemergence herbicides were quite toxic to corn.

All preemergence herbicides did a good job of controlling lambsquarters. The postemergence herbicides PPG 1728, sethoxydim and fluazifop-butyl were weak on lambsquarters. All preemergence herbicides gave considerable control of annual grasses (lovegrass, cupgrass and crabgrass). The weakest were the growth regulators. All postemergence herbicides were active on grass except PPG 1728. SC 1056 was only partially active. All preemergence herbicides showed some activity on puncturevine and weakest was metolachlor. Most active was R 40244. Of the postemergence herbicides sethoxydim and fluazifop-butyl were weakest and SC 0224 was most active. The dinitro analine herbicides were quite weak on volunteer barley whereas most others were quite active. Yellow nutsedge, the most important weed species, showed resistance to most herbicides with exception of metolachlor EL 500 and R 40244 preemergence. Of the postemergence herbicides SC 0224 was most active followed by AmHo 0661 and SC 1056. The later seemed to control nutsedge selectively in most crops and weeds. Pigweed was controlled by most preemergence herbicides with PP 333 being the weakest. Both PPG 1728 and SC 1056 were somewhat weak at burning down this species.

All preemergence herbicides appeared to be safe on newly planted trees. EL 500 and PP 333 caused severe stunting which did not show in the early ratings. Likewise the early ratings did not show significant injury from postemergence herbicides except on citrus which received considerable spray on the foliage. Here AmHo 0661 at both rates caused considerable injury. Most of the preemergence herbicides were safe on grapes with only a small early effect of R 40244 and metolachlor at the high rates. Of the postemergence herbicides AmHo 0661 was most toxic. SC 0224 was also damaging at both rates.

Most preemergence herbicides showed some damage on tomato transplants, particularly at the higher rate. Most safe was oxyfluorfen suggesting little vertical movement in the soil. Most toxic was R 40244. Of the postemergence herbicides both sethoxydim and fluazifop-butyl were safe. The good nutsedge herbicide, SC 1056, was quite toxic on tomatoes, but SC 0224 and AmHo 0661 were even more toxic. All preemergence herbicides showed considerable phytotoxicity to direct seeded watermelons. Least active was RH 0265. Both sethoxydim and fluazifop-butyl were quite safe on watermelon. SC 1056 showed some possibilities. Most phytotoxic were again SC 0224 and AmHo 0661 in direct seeded watermelons. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

Table 4.

The effect of several preemergence and postemergence herbicides on weed control and vigor of total growth on several orchard tree species (425-73-501-100-1-83).

				Average Vigor[1]									
	Herbicides	Lb/A	Weed Control	Apple	Pear	Walnut	Pistachio	Almond	Peach	Plum	Prune	Pomegranate	Citrus
Pre-	Simazine	2	4.0	5.8	8.5	5.8	7.0	8.0	7.8	9.2	7.8	8.0	9.2
	Prodiamine	4	7.2	6.2	9.0	6.8	6.0	8.8	9.2	9.2	9.2	7.0	9.0
	Prodiamine	16	9.0	9.0	9.0	7.0	9.2	7.8	9.5	9.8	9.0	9.8	9.8
	Pendimethalin	4	8.2	8.2	6.5	5.2	5.5	6.8	8.2	8.5	7.2	6.2	9.5
	Pendimethalin	16	9.5	6.2	8.5	7.0	8.8	8.8	8.8	9.5	8.0	9.2	10.0
	Metolachlor	4	5.8	6.0	7.5	5.5	5.8	7.0	8.2	8.5	8.0	8.2	8.8
	Metolachlor	16	7.8	9.2	7.5	7.8	8.8	6.5	8.8	9.0	8.5	8.8	8.5
	Oxyfluorfen	2	6.8	8.0	7.2	7.5	6.0	8.2	9.0	9.0	8.5	10.0	9.0
	Oxyfluorfen	8	9.5	4.8	9.2	6.8	9.0	8.0	8.5	10.0	9.2	9.2	9.5
	RH 0265	2	4.8	6.2	7.8	7.0	5.5	6.8	7.8	7.5	8.0	7.2	8.2
	RH 0265	8	7.2	3.5	9.5	6.2	7.0	8.5	8.5	9.0	9.0	9.0	8.8
	R 40244	1	7.0	8.0	8.8	5.8	6.5	6.0	8.2	7.8	8.2	9.2	9.8
	R 40244	4	9.0	6.5	8.8	8.0	3.5	8.0	9.0	9.0	8.2	8.0	9.2
	EL 500	1	6.5	6.5	6.0	5.2	5.2	4.8	6.2	6.5	5.2	7.2	8.2
	EL 500	4	9.0	7.0	6.2	3.8	6.5	3.5	4.2	4.2	4.8	6.2	8.8
	PP 333	1	6.5	8.2	8.2	7.2	4.8	5.5	6.5	8.0	6.8	7.8	8.0
	PP 333	4	7.8	7.0	7.8	5.5	3.8	4.5	5.5	7.0	6.5	8.2	9.0
Post-	PPG 1728	24g	3.8	6.5	6.5	5.0	3.8	4.8	5.0	5.2	5.5	8.0	8.0
	PPG 1728	96g	5.8	7.8	2.8	6.5	7.5	7.0	8.0	7.8	6.2	7.8	8.0
	AmHo 0661	1	7.5	5.8	7.5	7.2	5.5	7.8	7.5	8.5	8.2	7.2	7.2
	AmHo 0661	4	7.2	4.5	8.5	8.0	6.5	8.2	8.5	8.2	7.8	7.2	1.2
	Sethoxydim+Pace	1+5%	5.8	7.0	7.2	7.2	7.8	7.0	8.5	9.0	8.5	9.0	9.2
	Sethoxydim+Pace	4+5%	7.0	7.5	7.2	6.5	6.5	6.2	8.0	8.0	7.2	8.0	8.8
	Fluazifop-butyl+Pace	1+5%	6.8	5.2	8.2	7.2	1.8	8.2	8.5	7.8	7.5	8.0	8.5
	Fluazifop-butyl+Pace	4+5%	7.8	8.0	9.0	7.0	5.5	7.2	7.2	8.0	7.0	8.2	8.2
	SC 0224	4	5.5	6.2	8.5	6.8	8.0	7.5	7.8	7.5	8.2	6.5	8.2
	SC 0224	16	6.0	7.8	6.0	6.2	2.2	7.5	8.0	8.0	7.5	2.2	7.2
	SC 1056	1/4	1.0	5.0	6.5	4.5	7.8	4.0	5.5	5.5	5.5	6.0	7.5
	SC 1056	1	3.5	5.5	6.8	5.8	4.5	7.2	8.0	8.0	8.0	7.0	8.0
	Check (Paraquat+Pace)	(1+5%)	3.2	7.8	7.2	3.2	6.8	7.5	5.8	9.0	8.5	9.0	7.8

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[1] Average of 4 replications where 0 = no effect and 10 = best weed control or best, most vigorous growth. Evaluated 10/18/83. Applied 4/22/83 and 6/2/83, i.e., pre- and post-, respectively.

Flower Seed Production. Cudney, D. W., J. L. Bivins, J. S. Reints, C. L. Elmore. High labor costs make it imperative that less expensive and more reliable means of weed control be found if the California flower seed industry is to survive. In an attempt to achieve these means, four herbicide trials utilizing preplant, preemergence, and postemergence herbicides were established in southern California in order to ascertain safety (phytotoxicity) of the commonly used herbicides.

The first was established in the Lompoc area of Santa Barbara County in 1980. The four most commonly used preplant herbicides were evaluated on 40 flower varieties. Plots were established on 30-inch double-row beds with two seedlines per bed in a silty clay soil. Herbicides were incorporated 1 1/2 inches immediately after application and furrow irrigated. Emergence and vigor of the varieties varied significantly. Some species showed poor germination and were rated highly on the phytotoxicity scale even in the checks (see Table 1). Of the four herbicides tested--Devrinol, Tillam, Lasso, and Furloe--all were phytotoxic to two or more species. The Devrinol-Tillam combination showed the least phytotoxic effects.

The second trial was a preemergence test established in Chino in 1980 on a sandy loam soil and sprinkler irrigated during germination, followed by furrow irrigation. Twenty varieties were planted, however, five failed to emerge sufficiently to allow ratings to be made. Again, emergence and vigor of the flower species was variable as is indicated by the phytotoxicity ratings for the check. Nineteen chemcial treatments were made, and comparisons were made among Treflan, Kerb, Eptam, Devrinol, Dual, Ronstar, Tok, Surflan, Betasan, Simazine, and Furloe. All herbicides exhibited extreme phytotoxicity on one or more species. Treflan appeared to be safest on the greatest number of species, and Simazine was phytotoxic on all species tested (Table 2).

In 1981 a third trial was conducted in Chino utilizing 11 herbicide treatments and 14 flower varieties with the herbicides applied preemergence utilizing sprinkler irrigation for incorporation. All herbicide treatments gave phytotoxic effects on at least one or more species. Goal applied at 1 lb per acre was phytotoxic on all species. The 2 lb application of Devrinol seemed to show least phytotoxicity, however, it was phytotoxic to at least 50 percent of the species tested. There was variability in germination and vigor of the species within this trial, as can be seen by the phytotoxicity ratings for the checks (Table 3).

A fourth trial was established in the Chino location in 1983. It compared both preemergence and postemergence herbicides (Table 4). Preemergence applications of Prowl, Dacthal, Lasso, Kerb, Nortron, Devrinol, Eptam, and Ronstar were compared on ten commonly grown flower species. Postemergence applications of Fusilade, Poast, and bromoxynil were also compared. There was less variability in the emergence and vigor of the test species, as can be seen by the check ratings. All preemergence herbicides gave significant phytotoxicity to two or more species. Prowl applied at .75 lb and Nortron applied at 1 lb ai per acre seemed to be the safest on the most species, whereas Dacthal was extremely phytotoxic to four of the ten species.

Postemergence treatments of Poast and Fusilade were entirely safe on all species tested. Bromoxynil applied at a .25 lb ai per acre rate gave significant burning to the foliage of the flower species and retarded growth somewhat, however, plants appeared to recover quickly. (University of California Cooperative Extension, Batchelor Hall Extension, Riverside CA 92521)

Table 1. Average Phytotoxicity Ratings*

	Treatment and (Rate)						
Variety	Devrinol (4)	Tillam (6)	Devrinol + Tillam (4 + 6)	Lasso (2)	Lasso (4)	Furloe (4)	Check
1. Alyssum snowcloth	1.3	9.7	10.0	10.0	10.0	4.3	1.0
2. Alyssum royal carpet	6.0	10.0	10.0	10.0	10.0	9.0	5.0
3. Calendula dwarf mix	3.0	1.0	5.3	1.3	2.0	1.0	1.0
4. Carnation chabaud mix	9.7	5.0	10.0	5.3	3.7	10.0	4.3
5. Chrysanthemum coronarium	5.3	1.3	5.3	5.0	9.3	1.7	1.7
6. Dianthus chinensis double mix	10.0	4.3	10.0	2.3	4.0	10.0	2.7
7. Dimorphotheca aurantiaca	8.0	4.0	9.0	5.3	6.3	4.0	2.0
8. Eschscholzia mission bells	10.0	1.0	10.0	3.0	3.7	6.7	1.0
9. Gaillardia picta double mix	10.0	7.0	10.0	10.0	10.0	6.0	7.3
10. Gilia leptantha purpurea	9.7	9.7	10.0	10.0	10.0	7.0	1.0
11. Gloriosa daisy	7.0	3.0	8.3	5.7	9.0	1.7	1.0
12. Gypsophilia covent garden	9.7	2.0	10.0	3.3	5.3	9.3	1.7
13. Helichrysum semi dwarf mix	10.0	5.3	10.0	8.7	8.3	2.3	1.3
14. Hollyhock Indian spring	4.0	3.7	6.0	2.7	5.3	2.3	1.3
15. Linum rubrum	6.7	1.3	9.3	3.7	6.0	9.7	1.3
16. Linaria fairy bouquet	5.3	1.3	6.3	9.7	9.3	5.7	1.3
17. Mignonette N.Y. market	4.0	9.0	9.7	5.7	8.3	3.3	2.0
18. Myosotis blue bird	8.3	5.0	8.3	9.3	10.0	7.3	3.7
19. Nemesia dwarf globe mix	7.7	10.0	9.7	9.3	10.0	5.3	1.7
20. Nemophilia insignis blue	7.0	2.0	5.3	9.3	10.0	9.7	2.3
21. Oenothera missouriensis	9.7	8.7	10.0	9.3	9.0	10.0	8.3
22. Poppy gartford gts.	10.0	10.0	10.0	10.0	10.0	10.0	3.7
23. Poppy double Shirley mix	9.7	5.7	10.0	10.0	10.0	10.0	2.7
24. Queen Anne's lace	10.0	6.3	10.0	8.0	10.0	7.3	2.7
25. Scabiosa oxford blue	7.7	8.3	9.0	8.0	8.0	8.3	2.7
26. Schizanthus angel wings	1.7	8.0	6.3	8.7	9.7	7.0	1.3
26. Silene armeria dwarf	10.0	8.7	10.0	8.0	10.0	10.0	3.7
27. Aster bouquet mid blue	4.3	7.7	7.0	6.7	6.7	5.3	2.7
28. Candytuft dwarf fairy mix	4.0	8.7	9.3	6.7	6.7	7.7	2.7
29. Cosmos lemon yellow crest	3.3	2.3	4.0	2.3	2.0	2.6	1.7
30. Dahlia border jewels	9.7	3.0	9.0	3.7	2.0	2.0	2.0
31. Marigold crackerjack	6.7	2.3	8.3	2.0	4.0	2.7	1.3
32. Marigold red brocade	6.0	1.3	8.0	2.7	5.6	2.7	1.3
33. Zinnia canary bird	2.0	2.3	2.7	1.7	4.0	1.0	1.3
34. Zinnia pink buttons	6.7	7.0	9.3	3.3	8.0	5.0	5.0
LSD (.05)	2.4701	2.7946	2.1200	2.9984	2.2994	2.6678	2.1380

*1 = no control or phytotoxicity, 10 = all plants dead.

Table 2. Average Phytotoxicity Ratings*

Treatment and (Rate)

Variety Phytotoxicity Ratings	Treflan (1)	Treflan (2)	Kerb (1)	Kerb (2)	Eptam (2)	Eptam (4)	Devrinol (2)	Devrinol (4)	Dual (2)	Dual (4)	Ronstar (1)	Ronstar (2)	Tok (4)	Surflan (2)	Surflan (4)	Betasan (6)	Eptam + (2) Treflan (1)	Simazine (2)	Furloe (4)	Check	LSD (.05)
1. Shasta daisy	1.5	.8	.5	.8	5.0	7.8	.3	2.5	5.8	8.5	6.8	7.3	5.0	2.0	3.3	.0	5.3	10.0	1.3	.8	2.0556
2. Cosmos yellow ribbons	1.8	3.3	1.5	1.8	5.8	5.5	2.0	3.8	4.5	5.5	5.0	5.3	4.0	2.3	3.8	1.5	3.3	9.5	1.8	1.5	1.8193
3. Echinacea	.5	.3	.5	1.0	7.8	8.8	1.3	1.5	7.3	9.0	6.0	6.0	4.8	1.3	2.3	.0	7.5	10.0	1.3	1.0	1.5989
4. Gaillardia	1.5	2.0	.5	1.3	7.5	9.8	1.3	3.0	6.5	9.5	7.5	7.0	2.3	1.8	2.0	2.0	8.0	10.0	1.5	1.0	1.8528
5. Sunflower	.3	.3	.5	.3	.0	.8	.3	.3	.8	1.3	1.0	1.0	.5	.3	.3	.3	.8	10.0	.3	.0	0.8207
6. Marigold	.0	.8	.5	.3	3.3	8.8	1.0	1.5	2.5	5.8	2.0	6.3	1.8	.0	.5	.5	4.3	10.0	.3	.0	1.7356
7. Zinnia	.0	.8	.8	.0	3.3	8.8	.3	1.0	2.8	6.0	4.0	7.3	3.0	.8	1.5	.5	4.8	10.0	.3	.0	2.2356
8. Gypsophila	1.5	10.0	10.0	10.0	1.5	9.3	.8	6.0	3.0	2.5	1.3	1.8	.8	3.5	9.3	.5	8.8	10.0	10.0	.0	2.7931
9. Celosia	2.5	3.0	6.5	9.5	10.0	10.0	8.5	6.0	7.0	8.0	9.3	9.8	10.0	5.5	7.8	7.5	10.0	10.0	6.5	3.5	2.6117
10. Globe mallow	1.8	1.8	2.3	5.3	4.8	7.3	2.0	5.0	5.8	8.0	5.8	9.0	9.5	3.5	6.5	2.5	6.0	9.0	8.5	1.3	2.4278
11. Salvia pitcheri	3.3	3.5	6.8	8.5	9.3	9.8	5.8	4.3	4.3	9.5	3.8	5.0	4.0	3.8	5.5	3.3	9.3	10.0	8.0	4.3	2.1452
12. Bells of Ireland	.5	2.5	2.8	6.5	9.5	10.0	3.0	2.5	9.5	10.0	3.8	5.8	10.0	4.0	7.0	1.0	9.8	10.0	2.8	.3	1.6873
13. California poppy	.5	.5	5.5	8.0	4.8	9.0	7.8	9.0	5.5	7.3	1.8	6.3	1.5	.0	.5	.3	6.8	10.0	10.0	.3	2.1464
14. Pansy	1.5	3.3	7.3	9.0	5.0	8.0	5.5	6.3	2.5	2.0	9.0	10.0	9.8	4.8	4.3	2.0	7.3	10.0	10.0	3.8	2.1716

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*1 = no control or phytotoxicity, 10 = all plants dead.

Table 3. Average Phytotoxicity Ratings*

	Treatment and (Rate)											
Variety	Ronstar (1)	Ronstar (2)	Lasso (3)	Lasso (6)	Surflan (1)	Surflan (2)	Goal (.5)	Goal (1)	Devrinol (2)	Devrinol (4)	Eptam (3)	Check
1. Cosmos lemon twist	3.5	5.0	2.0	3.5	4.8	1.0	5.5	5.0	3.8	3.8	3.3	2.0
2. Echinacea purpurea	3.0	2.8	6.3	7.8	3.3	2.0	8.3	9.0	2.5	1.8	5.3	.5
3. Tahoka daisy	4.5	9.3	10.0	10.0	8.5	8.5	9.8	10.0	8.5	8.3	6.8	5.8
4. Ratibida red	4.3	6.5	8.8	10.0	4.5	3.3	9.3	10.0	3.8	2.8	4.3	2.8
5. Rudbeckia hirta	5.3	6.3	7.8	9.8	3.0	3.0	9.3	10.0	4.5	4.0	3.3	2.8
6. Zinnia gold medal mix	3.8	7.3	7.0	8.3	4.3	7.0	8.5	9.3	4.3	2.8	4.5	1.8
7. Kochia childsii	9.5	9.8	6.5	6.8	9.5	9.8	9.3	10.0	3.0	5.0	4.5	1.5
8. Atriplex semibaccata	9.8	10.0	8.3	9.3	8.8	10.0	8.8	10.0	7.0	7.0	3.5	3.3
9. Celosia fairy fountains pink	9.8	10.0	9.0	9.5	9.8	9.8	9.8	9.8	8.0	7.5	9.3	5.8
10. Bells of Ireland	6.0	7.3	7.0	8.8	7.0	8.8	8.5	9.3	2.5	4.0	5.5	2.5
11. California poppy	8.5	9.3	8.5	8.8	6.3	5.0	9.8	10.0	9.0	9.3	5.8	2.3
12. Pansy trimardeau mix	10.0	10.0	6.0	8.8	7.5	9.3	9.0	10.0	5.8	6.3	7.0	4.0
13. Sisyrinchium bellum	8.0	7.8	8.0	9.8	3.5	4.3	9.5	9.5	8.8	9.3	6.8	2.3
14. Verbena starlight	7.8	9.5	8.5	10.0	6.5	8.0	8.3	9.5	2.3	2.5	8.5	2.3

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*1 = no control or phytotoxicity, 10 = all plants dead.

Table 4. Preemergence and Postemergence Herbicide Trials--Average Phytotoxicity Ratings*

	Preemergence Treatment and (Rate)															Postemergence Treatment and (Rate)							
Variety	Prowl (.75)	Prowl (1.5)	Dacthal (10)	Dacthal (15)	Lasso (3)	Lasso (4)	Kerb (1)	Kerb (2)	Nortron (1)	Nortron (1.5)	Devrinol (2)	EPTC (4)	Ronstar (.5)	Check	LSD (.05)	Fusilade (.5)	Fusilade (1)	Poast (.5)	Poast (1)	Bromoxynil (.25)	Bromoxynil (.5)	Check	LSD (.05)
1. Cosmos	2.3	2.0	1.8	1.8	2.8	3.8	2.0	1.5	4.8	4.5	2.3	2.8	2.0	1.8	1.3086	1.0	1.5	1.0	1.0	3.0	3.8	1.3	0.9224
2. Echinacea	1.0	1.3	1.0	1.0	2.8	7.0	1.0	1.3	1.0	1.3	3.0	3.5	1.3	1.0	1.5004	1.0	1.0	1.0	1.0	3.0	4.5	1.0	0.3244
3. Ratibida	6.0	6.0	5.3	5.0	9.8	10.0	5.8	5.3	4.5	6.0	7.8	8.5	7.3	3.8	2.8954	1.0	1.0	1.0	1.0	5.0	6.8	1.0	2.1294
4. Rudbeckia	2.5	5.8	4.3	4.3	10.0	10.0	5.0	6.5	7.5	9.0	8.8	9.0	7.0	3.3	2.4110	1.0	1.0	1.0	1.0	3.0	6.0	1.0	1.4141
5. Zinnia	1.8	2.0	4.3	4.5	4.5	8.5	1.8	2.3	1.5	3.8	2.0	3.5	2.5	1.8	1.9820	1.0	1.0	1.0	1.0	3.3	4.3	1.0	0.5849
6. Kochia	4.5	9.8	10.0	10.0	8.3	9.3	7.5	8.5	3.0	4.3	2.8	8.3	6.8	2.0	2.5797	1.0	1.0	1.0	1.0	3.0	3.5	1.0	0.3244
7. Celosia	6.5	9.3	10.0	10.0	7.8	9.5	5.8	8.5	10.0	10.0	2.5	6.5	5.5	1.0	2.6568	1.0	1.0	1.0	1.0	2.3	2.8	1.0	0.5997
8. Bells of Ireland	1.0	2.0	10.0	10.0	6.8	8.5	8.3	9.3	1.0	1.5	1.0	4.0	1.8	1.0	1.7558	1.0	1.0	1.0	1.0	3.3	3.8	1.0	0.7314
9. Calif. poppy	1.3	1.3	2.0	2.0	6.0	9.0	5.8	8.3	6.0	7.8	7.8	5.8	2.5	1.0	2.3297	1.0	1.0	1.0	1.0	2.3	3.8	1.0	0.5697
10. Verbena	9.8	7.8	10.0	10.0	9.0	9.0	9.3	10.0	6.8	8.0	3.5	5.5	6.3	2.0	2.9738	1.0	1.0	1.0	1.0	4.3	6.8	1.0	0.3861

*1 = no control or phytotoxicity, 10 = all plants dead.

Crabgrass control with UC 77892 in turf. Anderson, J.L. Replicated plots of UC 77892 at 4.5, 5.6, and 6.7 kg/ha were established in vigorous Kentucky bluegrass turf in Salt Lake City on May 4, 1983 and in a weak mixed grass turf in Logan, Utah on May 9, 1983. The plots were overseeded with large crabgrass May 4 and May 10, 1983 respectively. On May 19 no crabgrass seedlings were observed in any of the Salt Lake plots, including the untreated plots (or at anytime during the summer); however, dandelions in the treated plots appeared nearly dead, and without blossoms, whereas dandelions in the untreated plots were blossoming profusely. By the end of the summer there were healthy dandelions in all Salt Lake plots.

In the Logan study crabgrass failed to become established in the plots treated just prior to overseeding, whereas a good stand of crabgrass developed in the untreated plots. A second series of UC 77892 plots at the same rates was established on May 28, 1983 at Logan in turf that had been overseeded with crabgrass May 10th. UC 77892, especially at the 6.7 kg rate, gave initial supression of crabgrass but failed to eliminate it.

A greenhouse study was conducted to determine the effective timing of UC 77892 treatment for control of crabgrass. Flats of field soil were seeded to crabgrass, Kentucky bluegrass and "Elka" ryegrass on August 31. In addition, the soil had a natural population of oxalis, redroot pigweed, purslane, stinkgrass and shepherdspurse. A surface application of UC 77892 at 4.5 kg/ha on September 1 prevented any seedling emergence during the 2 1/2 month duration of the study. A 4.5 kg treatment September 6 allowed some ryegrass seedlings to emerge, but these subsequently died. A 4.5 kg treatment September 10, subsequent to ryegrass and crabgrass emergence, controlled all vegetation except perennial ryegrass. The September 17 treatment, subsequent to seedling emergence, controlled oxalis, redroot pigweed, purslane and shepherdspurse seedlings, but not crabgrass, Kentucky bluegrass nor perennial ryegrass. On September 26, October 2 and October 10 plots were treated with 4.5 and 9 kg/ha UC 77892. The seeded or indigenous grasses survived both rates at each treatment date. Redroot pigweed and oxalis tolerated the October 2 and October 10 treatments. Only purslane was controlled as late as October 10 by either rate.

It would appear that UC 77892 might provide effective control of crabgrass in established turf if treatment preceeds or follows seedling emergence by only a few days. In addition, the treatment appears to have some broadleaf activity, especially in the early seedling stages. (Utah State University, Logan, Utah 84322)

Oxalis Control in Bluegrass. Cudney, D. W., J. A. Van Dam, J. S. Holt, J. S. Reints, and C. L. Elmore. Oxalis (*Oxalis corniculata* L.) has been a major problem in turf production in southern California. Since silvex was removed from the market for use on turf, no currently available herbicide has given adequate control.

Two trials were established in southern California to evaluate herbicides and combinations of herbicides which had previously shown benefit. Both trials were located in Claremont on bluegrass (*Poa pratensis*). Plots were 3 ft by 10 ft in size and chemicals were applied with a CO_2 backpack sprayer and 8004 nozzles at a spray volume of 60 gal/A. Four replications of each treatment were made. Both bluegrass and oxalis were in established, uniformly mixed stands. Plots were evaluated 6 weeks after application. Trial 2 was also evaluated 3 months after application.

The herbicides which proved to be the most helpful were triclopyr and combinations of 2,4-D and MSMA. NAA had shown some promise in previous trials but failed to give control in either trial. 2,4-D alone gave no control of oxalis. MSMA showed significant oxalis activity alone and in combination with 2,4-D. (University of California Cooperative Extension, Riverside CA 92521)

Table 1. Bluegrass/Oxalis Weed Plots, Claremont.

Treatment	Rate lbs ai/A	Turf Phytotoxicity Rating*	Control Rating*
1. Trimec 697†	1.7 gal	1.25	8.25
2. Trimec BL ester§	4 pt	1.25	2.50
3. Trimec BL§	4 pt	1.25	1.75
4. EL 500	1 lb	1.75	4.25
5. Triclopyr	.5 lb	1.50	8.75
6. Triclopyr	.1 lb	1.75	8.50
7. Triclopyr + 2,4-D	.5 + 1	1.25	8.75
8. 2,4-D	1	1.00	1.75
9. NAA 1% + Surfactant	1%	1.25	4.25
10. NAA 1% + 2,4-D	1% + 1	1.00	5.00
11. MSMA	2	1.25	4.00
12. Check		1.00	1.00
LSD (5%)		0.3980	2.1539

*1 = no control or phytotoxicity, 10 = all controlled.
†2,4-D @ .8 + MCPP @ .8 + dicamba @ .2 + MSMA @ 3 lbs. ai/A.
§2,4-D @ 1.0 + MCPP @ .5 + dicamba @ .1 lbs. ai/A.

Table 2. Bluegrass/Oxalis Weed Plots, Claremont*

Treatment	Rate lbs ai/A	Control Rating† (2 Weeks)	Control Rating† (3 Months)
1. Trimec + 697†	1.7 gal	8.50	7.00
2. Trimec BL ester§	4 pt	1.75	1.75
3. Trimec BL§	4 pt	1.50	1.25
4. EL 500	1 lb	4.00	3.00
5. Triclopyr	.25 lb	9.00	8.00
6. Triclopyr	.5 lb	9.00	9.00
7. Triclopyr + 2,4-D	.25 + 1	3.00	7.25
8. 2,4-D amine	1	1.25	1.25
9. MSMA	2	8.75	9.25
10. 2,4-D + MSMA	1 + 2	9.00	8.00
11. NAA ethyl ester	1%	2.50	2.75
12. NAA ethyl ester + surfactant	1% + .5%	2.00	1.75
13. NAA + 2,4-D	1% + 1	2.00	1.25
14. NAA + 2,4-D + MSMA	1% + 1 + 2	10.00	9.25
15. NAA salt + .5% surfactant	1% + 5%	1.75	1.25
LSD (5%)		2.1539	1.2996

*No significant phytotoxic effects to turf @ either rating.
1 = no control or phytotoxicity, 10 = all controlled.
†2,4-D @ .8 + MCPP @ .8 + dicamba @ .2 + MSMA @ 3 lbs. ai/A.
§2,4-D = 1.0, MCPP = .5, dicamba = .1.

Weed control with herbicides in crucifer crops. Crabtree, Garvin, Anna Muh, Wayne King, and Carol Garbacik. Crop response to herbicides and control of annual weeds (redroot pigweed and groundsel) were evaluated in 11 direct-seeded and 4 transplanted crucifer crops in 1983 field trials at Corvallis, Oregon. Selective weed control was generally more satisfactory with combinations that included metolachlor or propachlor than when these herbicides were used alone. At the application rates used in this study, herbicide combinations that included propachlor gave slightly better weed control, but also some evidence of crop injury (reduced yields) when compared with similar herbicide combinations that included metolachlor (Table 1). In an evaluation of crop tolerance to metolachlor and propachlor, transplanted crops showed considerable tolerance when these materials were applied soon after transplanting (Table 2). (Horticulture Department, Oregon State University, Corvallis, OR 97331)

Table 1. Results of herbicide combinations applied to direct-seeded cruciferous crops.

	Application		Ave. weed control rating[1]		Ave. yield (kg/plot)										
Herbicide	Rate (lbs ai/A)	time	Redroot pigweed	Groundsel	Radish	Daikon	Chinese cabbage	Kale	Turnip	Kohlrabi	Rutabaga	Broccoli	Cabbage	Brussels sprouts	Cauliflower
metolachlor napropamide	1.0 2.0	Pre[2] Pre	56	83	1.6	4.9	8.0	4.9	12.8	4.0	5.6	5.9	8.6	5.1	1.8
metolachlor trifluralin	1.0 0.5	Pre PPI	58	60	2.0	4.4	7.0	5.7	13.4	3.2	5.3	4.5	7.7	4.1	3.3
metolachlor napropamide trifluralin	1.0 2.0 0.5	Pre Pre PPI	59	95	2.8	6.1	8.7	4.9	15.5	3.5	5.5	5.3	7.1	5.9	2.8
propachlor napropamide	2.0 2.0	Pre Pre	48	96	2.3	4.5	8.4	4.2	15.2	4.0	4.9	4.2	6.1	6.3	3.0
propachlor trifluralin	2.0 0.5	Pre PPI	73	98	1.9	4.7	7.7	5.0	12.3	3.6	3.9	5.1	8.1	7.6	2.9
propachlor napropamide trifluralin	2.0 2.0 0.5	Pre Pre PPI	66	97	1.6	4.5	8.9	4.8	13.5	3.5	4.4	6.0	10.3	6.7	3.3
weeded check	---	---	100	100	2.1	4.0	8.4	5.0	14.7	4.7	5.1	5.8	9.2	9.2	2.8
least significant diff. (0.05)			---	---	0.9	2.2	2.4	1.8	2.4	1.1	1.5	1.9	2.3	2.3	1.2

[1] Combined stand reduction and growth reduction ratings, 0 = no effect, 100 = complete control.

[2] Pre = preemergence, PPI = preplant incorporated, powered horizontal rotary tiller.

Table 2. Tolerance of weeds and cruciferous crops to metolachlor and propachlor.

Herbicide	Application rate (lbs ai/A)	Ave. weed control rating[1/]		Ave. yield (kg/plot)							
				Broccoli		Cabbage		Brussels sprouts		Cauliflower	
		Redroot pigweed	Groundsel	Seeded	Transplant	Seeded	Transplant	Seeded	Transplant	Seeded	Transplant
metolachlor	1.0	44	43	3.2	---	5.9	---	5.3	---	1.6	---
metolachlor	1.5	---	---	---	5.9	---	12.2	---	18.3	---	19.4
metolachlor	2.0	79	82	6.2	---	10.0	---	6.0	---	2.8	---
metolachlor	3.0	81	89	5.8	6.2	8.1	12.5	7.7	18.1	2.7	17.3
propachlor	1.5	---	---	---	6.1	---	12.6	---	16.7	---	18.0
propachlor	2.0	43	93	4.1	---	6.7	---	5.0	---	2.2	---
propachlor	3.0	53	94	4.4	6.1	4.0	13.4	5.3	17.6	2.7	19.1
propachlor	4.0	63	97	4.0	---	7.4	---	3.6	---	1.7	---
weeded check	---	100	100	5.8	5.7	9.2	12.4	9.2	15.7	2.8	16.7
least significant diff. (0.05)		---	---	1.9	1.0	2.3	1.2	2.3	1.9	1.2	2.5

[1/] Combined stand reduction and growth reduction ratings, 0 = no effect, 100 = complete control.

Nightshade control in radish with herbicides applied and incorporated preplant. McMullin, W. G. and A. G. Ogg, Jr. Control of hairy nightshade in Saxa and Cherry Belle radish with herbicides applied preplant and incorporated was evaluated using two contrasting incorporation techniques On April 7, 1983, freshly plowed and packed soil was treated uniformly with trifluralin at 0.5 lb/A to control annual weeds other than nightshade. The same day, alachlor, metolachlor and chloramben were applied to plots 12.7 feet wide by 18 feet long with half of each plot incorporated 3 inches deep with a power-driven rotary tiller and the other half incorporated to one inch deep with two passes in opposite directions at 7 mph with a finger weeder. Immediately following herbicide incorporation, one row each of Saxa and Cherry Belle radish was seeded into each of the two differently incorporated plots. The test was conducted in Warden fine sandy loam with 0.9% organic matter and a pH of 6.5. The experiment was designed as a split plot with three replications.

All treatments controlled hairy nightshade effectively (Table 1). Alachlor at 2.0 and 2.5 lb/A rotary tilled three inches deep had good selectivity on Saxa and Cherry Belle radish. However, when incorporated shallowly with the finger weeder, alachlor at 2.5 and 4 lb/A injured both radishes significantly. When applied at 2.0 lb/A, and incorporated with the finger weeder, alachlor significantly injured only Cherry Belle. Metolachlor injured the radishes excessively regardless of the depth of incorporation. Chloramben at 3.0 lb/A was non-selective when incorporated three inches deep and improved only slightly when incorporated one inch deep. (USDA-ARS and Washington State University, Irr. Agric. Res. and Ext. Center, Prosser, WA 99350)

Table 1. Control of hairy nightshade in radish with herbicides applied and incorporated preplant.[1]

Herbicide	Rate lb/A	Radish stand[2]		Crop injury(%)		Nightshade control(%)	
		Rotary tiller	Finger weeder	Rotary tiller	Finger weeder	Rotary tiller	Finger weeder
				Cherry Belle Radish			
Alachlor	2.0	15 a	18 a	7 c	30 b	90 b	92 a
	2.5	22 a	18 a	0 c	55 a	95 ab	97 a
	4.0	15 a	20 a	30 b	52 a	97 a	99 a
Metolachlor	1.5	23 a	18 a	27 b	35 b	98 a	94 a
	2.25	21 a	16 ab	40 b	28 b	99 a	96 a
Chloramben	3.0	0 b	9 b	100 a	67 a	100 a	97 a
Nontreated	-	21 a	21 a	0 c	0 c	0 c	0 b
				Saxa Radish			
Alachlor	2.0	21 a	18 ab	7 cd	13 de	90 b	92 a
	2.5	20 a	18 ab	0 d	38 bc	95 ab	97 a
	4.0	21 a	19 ab	27 bc	48 ab	97 a	99 a
Metolachlor	1.5	20 a	21 a	18 bcd	20 cde	98 a	94 a
	2.25	21 a	20 ab	32 b	32 bcd	99 a	96 a
Chloramben	3.0	0 b	12 b	100 a	67 a	100 a	97 a
Nontreated	-	24 a	22 a	0 a	0 e	0 c	0 b

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[1] Within a radish variety, means within a column, followed by the same lower case letter, are not significantly different at the 5% level.

[2] Plant population per 1 meter of row.

Effects of preemergent herbicides on weed control in cucurbits. Anderson, J.L. and M.G. Weeks. The control of annual broadleaved weeds continues to be a problem for Utah's melon growers. A study was conducted at the Farmington, Utah Field Station to evaluate ethalfluralin and trifluralin treatments for weed control in cucurbits. Treatments were applied with a bicycle sprayer equipped with 8002 nozzles and calibrated to deliver 300 L/ha. Treatments were either incorporated with a rotary hoe immediately before planting or surface applied immediately after planting May 26, 1983. Soil was a sandy loam containing 1.1% organic matter. Plots 8 m wide, replicated 3 times, contained one row each of Boston Pickling cucumber, Crimson Sweet watermelon, 44-50 muskmelon, Pink Banana squash, and crenshaw. The spring and early summer of 1983 were above average in rainfall, and surface applied treatments gave better weed control than often is observed in Utah without mechanical incorporation.

All treatments controlled germinating weeds fairly well. Differences among treatments were not statistically significant. No treatment adequately controlled hairy nightshade. Chloramben combined with ethalfluralin or trifluralin reduced seedling vigor somewhat; however, vines recovered, and the only evidence of phytotoxicity observed later in the season was a week's delay in harvest. (Utah State University, Logan, Utah 84322)

Effect of preemergent herbicide treatments on weed control and cucurbit vigor

Treatment	Rate (kg/ha)	Application^x Method	Weed^y Control	Crop^y Vigor	Weeds Present
ethalfluralin	1.1	PPI	8.2 a	9.0 ab	NS, RT, BYG
ethalfluralin	1.7	PE	8.5 a	8.9 ab	NS, RP, RT, BYG
ethalfluralin + chloramben	1.1 + 1.7	PE	8.8 a	8.8 ab	NS, BYG
ethalfluralin + SD 95481	1.7 + 0.8	PE	8.5 a	9.1 ab	NS, RP
naptalam + SD 95481	3.4 + 1.1	PE	8.7 a	9.2 ab	NS, RP
trifluralin	0.8	PPI	7.7 a	9.5 ab	NS, BYG, RT, RP, P
trifluralin + chloramben	0.8 + 1.7	PPI	8.7 a	8.3 b	NS, SP, RT
check	-	-	2.7 b	9.9 a	NS, RT, BYG, RP, P, M, SP

[x] PPI = preplant incorporated, PE = surface applied immediately after planting

[y] values followed by common letter are not significantly different at 5% level by Duncan's multiple range test

[z] weeds present one month after treatment; BYG = barnyardgrass, NS = hairy nightshade, M = common mallow, P = purslane, RP = redroot pigweed, RT = Russian thistle, SP = shepherdspurse

Plastic Mulch/herbicide interactions in cantaloupes. Bell, C.E. A trial was conducted in the spring of 1983 in the Imperial Valley, California to evaluate herbicide activity on cantaloupes when applied under black plastic mulch.

The trial was initiated on January 27, 1983 at the University of California Imperial Valley Field Station. Five herbicide treatments were compared to an untreated control. The herbicide treatments were bensulide at 6 lbs. ai/A, naptalam at 4 lbs. ai/A, bensulide plus naptalam at 6 & 4 lbs. ai/A (respectively), napropamide at 1 lb. ai/A and ethafluralin at 1 lb. ai/A. Application was made to 40 inch beds with a CO$_2$ pressured sprayer using 8003LP nozzles in a spray volume of 26 gal./A. After treatment the herbicides were incorporated with a power tiller to a depth of 1 inch. The beds were then covered with 30 inch wide black 1 mil polyethylene plastic mulch, the edge of the plastic being held in place with soil on the shoulder of the bed. Plot size was 1 bed by 25 feet with 4 replications. The crop (cantaloupe var. topscore) was hand planted through the plastic, 1 foot apart with 2 seeds per hole. The crop was germinated using furrow irrigation.

Visual evaluation on March 11, 1983 indicated some activities of the herbicides that differ from results when no plastic mulch is used. Bensulide treatments, either alone or in combination with naptalam resulted in approximately 87% control of prostrate pigweed, a level of control not normally achieved with this herbicide. Conversly, naptalam, which normally provides excellent control of this weed only produced 27% control under the plastic mulch. Crop vigor was reduced by treatments of napropamide and ethfluralin. A visual evaluation of this vigor rated napropamide at 42.5% vigor when compared to the untreated control and ethafluralin at 60% of the control. As a more objective measure of vigor, the width of the oldest 2 true leaves of 6 plants per plot were measured. The average size of these leaves in the napropamide treatments were 42% of the size of the untreated control. In the ethafluralin treatment, the leaves were 59% of the control plants. A single harvest of the trial was made on June 10, 1983. No significant differences were noted. (University of California Cooperative Extension, Court House, El Centro, Cal. 92243).

Treatment	lb. ai/A	PPW1/ control(%)	BYG2/	Vigor3/	LW4/
Bensulide	6	87.5	100	10	49.68
Naptalam	4	27.5	77.5	10	50.2
Bensulide & Naptalam	6&4	87.5	100	10	50.13
Napropramide	1	100	100	4.25	20.93
Ethafluralin	1	100	100	6	29.78
Untreated Control	0	0	0	10	50.33

1/ Prostrate pigweed
2/ Barryardgrass
3/ 0=no growth, 10=Most vigorous growth,
4/ Width of oldest 2 true leaves at wides point in mm average of 6 plants per plot times 4 replications.

Post-emergence grass herbicides for newly planted asparagus. Bell, C.E., K. Little and A. Van Maren. Two post-emergence grass herbicides (sethoxydim and fluazifop-butyl) were compared in three experiments for efficacy and phytotoxicity in newly planted asparagus.

Trial #1 consisted of one application of these two herbicides at 3 rates (.5, 1.0 and 2.0 lb. ai/A) to newly emerged, direct seeded asparagus 4 to 6 inches tall. Application was made with a CO_2 pressurized sprayer using an 8004E nozzle at a spray volume of 29 gal/A. Plots were 1 bed by 25 feet with 4 replications. 1. qt./A of an adjuvant (non-phytotoxic crop oil) was added to each treatment. Application was made on March 30, 1983. There were no weeds present.

Trial #2 compared an application of these two herbicides to newly emerged, direct seeded asparagus (approximately 2 to 3 inches tall) at 2 rates (.3 and .6 lb. ai/A). Application was made with a CO_2 pressured sprayer with 8003LP nozzles at 18 gal/A spray volume. Plot size was 1 bed by 20 feet with 4 replications. 1 qt./A of a non-phytotoxic crop oil was added to each treatment as an adjuvant. Application was made on June 15, 1983. Weed present was junglerice, 10-12 inches tall, flower heads were just beginning to emerge.

Trial #3 utilized the same herbicides and rates as trial #2. The asparagus was transplanted seedlings, 2-3 inches tall, planted on May 1, 1983. Herbicide application was made on June 23, 1983. Plot size was 1 bed by 20 feet, with 4 replications. Application was made with a CO_2 pressured sprayer and an 8003E nozzle at a spray volume of 25 gal/A. A non-phytotoxic crop oil adjuvant was added to each treatment at 1 qt./A. Weed present was junglerice, 3 to 4 inches tall.

Results indicate the tolerance of asparagus to these herbicides. Trial #1 was observed on April 14, 1983 and June 21, 1983. No phytotoxicity was observed on either **date**. In trial #2, fluazifop-butyl treatments at both rates resulted in some slight yellowing. No phytotoxicity was observed from trial #3. Junglerice control varied with the herbicide, the rate and the stage of growth at time of application. These data are summarized in the following table. (University of California Cooperative Extension, Court House, El Centro, Cal., 92243).

		Percent Control*	
Treatment	rate (lb. ai/A)	Trial #2	Trial #3
Sethoxydim	.3	85	80
Sethoxydim	.6	90	92.5
Fluazifop-butyl	.3	70	17.5
Fluazifop-butyl	.6	70	72.5
Untreated Control		0	0

*Weed-junglerice

Herbicide evaluation in strawberries. Torell, J. M., W. M. Colt and S. A. Dewey. This study was initiated at the Southwest Idaho Research and Extension Center to study the effect of preemergence herbicides on weed control and phytotoxicity to various strawberry varieties. The varieties and herbicide treatments were randomized in blocks with the herbicides being applied at a right angle to the varieties. The varieties and herbicides were replicated three times. The herbicides were applied on April 28, 1983 with a handheld sprayer calibrated to deliver 281 ℓ/ha of carrier. The varieties studied in this experiment were: Hood, Olympus, Sequoia, Teoga, Shukson, Tufts, Northwest, Totem and Benton.

There was no apparent phytotoxicity from any of the herbicide treatments to any of the varieties. The 1.7 kg/ha rate of oryzalin provided the best weed control at both evaluation dates.

(Southwest Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

The Effect of Herbicides on Weed Control in Strawberries

		Stand Reduction[1/],[2/]					
	Rate	Colq		Piwe		Grass	
Treatment	kgai/ha	6-10	8-24	6-10	8-24	6-10	8-24
Napropamide	4.5	60	47	90	-	90	50
Oryzalin	0.8	62	58	70	-	75	58
Oryzalin	1.7	93	30	98	-	87	77
Napropamide + Oryzalin	4.5 + 1.7	62	0	88	-	62	0
Weedy Check		0	0	0	-	0	0

[1/] Visual evaluation 0-100 scale. Dates of evaluation are indicated below the weed abbreviations.

[2/] Weed abbreviations: Colq = common lambsquarters, Piwe = pigweed (redroot pigweed and Powell amaranth), Grass = barnyardgrass and green foxtail. Green foxtail was the predominant grass.

Yellow nutsedge control in potatoes. Collins, C.K. and P.J. Kloft. A herbicide trial was established on potatoes for yellow nutsedge control on Minto Brown Island, Salem, Oregon in plots 26 by 21 feet and replicated four times in a randomized block design experiment. Norchip variety potatoes were planted on May 21, 1983, on a nine inch drop, three feet rows, and fertilized with a commercial four row Lockwood planter. The potato seed became severely infested with Seed Piece Rot (Erwinia cartovora) and had to be replanted with Kennebec variety potato seed on May 27, 1983. Potatoes were not cultivated but hilled once on July 11, 1983. The soil was a sandy loam with 1.5% O.M. and Ph of 6.1. All treatments were broadcast applied with a four nozzle spray boom with 30 gallons water per acre. Pre plant treatments were incorporated with a twenty two foot disc six inches deep in two passes.

Metolachlor gave excellent yellow nutsedge control and good yields. EPTC extra showed good nutsedge suppression and significantly better herbicide activity over EPTC on soil treated with thiocarbamate herbicides for the previous two years. Bentazon appears to be somewhat phytotoxic to potatoes and maybe only useful for late season nutsedge control as harvest aid. R-40244 showed declining yearlong vein chlorosis on potato leaves with poor nutsedge control and good broadleaf weed control. Metolachlor plus combinations with metribuzin were helpful for broadleaf weed control and increased yield but did not significantly increase nutsedge control. MSMA was phtotoxic to potatoes and ineffective on nutsedge. Vernolate was only fair for nutsedge control. Yellow nutsedge nutlet counts showed a decrease in nutlets with repeated soil distturbance before a late season planting. (Collins Ag. Consultants, Inc. Hillsboro, Oregon 97123)

Table 1. Yellow nutsedge control in potatoes.

Herbicide	Rate lbs ai/A	Type applic.	Weed and Crop Rating 2/ nutsedge 7/5/83	crop 7/5/83	nutsedge 8/15/83	crop 8/15/83	yield 3/ 4/	nutlet count 4/ 5/
metolachlor	3	A	9.6	0	9.6	0	44.8 ab	3.0 a
metolachlor + metribuzin	3+0.5	A+B	9.3	0	9.7	0	49.5 a	5.0 a
metolachlor + metribuzin + metribuzin	3+0.5 +0.5	A+B+C	8.7	0	9.6	0	47.5 ab	3.3 a
metolachlor + metribuzin + bentazon 1/	3+0.5 +1	A+B+C	9.6	0	10.0	0.6	50.8 a	7.5 a
EPTC + metribuzin	4+0.5	A+B	1.5	0	0.3	0	43.0 abc	24.8 c
EPTC + bentazon + bentazon	4+1 +1	A+C+C	0	0	3.4	2.6	32.3 cde	15.0 abc
vernolate + metribuzin	4+0.5	A+B	5.3	0	6.1	0	46.5 ab	10.8 ab
check	-	-	0	0	0	0	31.5 de	20.0 bc
EPTC	6	A	4.9	0	6.4	0	36.0 bcde	7.3 a
EPTC extra	6	A	8.4	0	8.0	0	46.3 ab	4.8 a
EPTC extra	4	A	6.3	0	6.0	0	40.5 abcd	5.8 a
vernolate	6	A	5.8	0	6.0	0	43.3 abc	5.3 a
EPTC	4	A	2.4	0	0	0	40.7 abcd	16.3 abc
EPTC + R-40244	4+0.5	A	2.2	1.1	2.5	0.3	43.3 abc	5.5 a
EPTC + R-40244	4+0.75	A	5.4	2.2	2.9	2.1	44.8 ab	5.8 a
R-40244	0.75	A	4.5	1.9	4.1	0.9	49.5 a	6.8
MSMA	1.75+1.75	B+C	0	0	1.0	5.5	29.3 e	-
metribuzin	0.25	A	3.0	0	4.5	0	41.3 abcd	-
metribuzin	0.125	A	2.5	0	1.5	0	50.7 a	-
Check	-	-	0	0	0	0	19.3 f	-

A = Pre plant inc. May 16, 1983; B = Pre emer. May 27, 1983; C = Post emerg. July 12, July 25, Aug. 9, 1983.

1/ bentazon applied with Herbimax paraffinic oil surfactant at 1 qt/A.

2/ 0 = no effect; 10 = complete elimination.

3/ US #2 or better, lbs tubers/20 ft. row harvested September 23, 1983.

4/ Means in a column followed by the same letter do not differ significantly at P = 0.05 according to Duncan's multiple range test.

5/ based on one cubic foot soil per plot on September 23, 1983.

Grass control with herbicides in carrots and onions. Crabtree, Garvin, Anna Muh, Wayne King, and Carol Garbacik. In a 1983 field trial at Corvallis, OR, fluazifop and sethoxydim selectively controlled annual grasses, primarily barnyardgrass, in spring seeded carrots and onions when applied postemergence to the crop (3-4 leaf stage of carrots, 2-3 leaf stage of onions) and grass (2-4 leaf stage). Rates of fluazifop up to 0.5 or 1.0 lbs ai/A or sethoxydim up to 0.37 or 1.0 lbs ai/A did not reduce yields of carrots or onions when compared to a weeded check treatment. All herbicide sprays contained 1% crop oil. (Horticulture Department, Oregon State University, Corvallis, OR 97331)

Carrot and onion response to fluazifop and sethoxydim

Herbicide	Application rate (lbs ai/A)	Average yield (kg/plot)	
		Carrots	Onions
Fluazifop	0.125	20.5	1.6
Fluazifop	0.187	25.0	--
Fluazifop	0.250	23.8	2.3
Fluazifop	0.375	19.4	2.2
Fluazifop	0.500	27.0	2.2
Fluazifop	1.000	--	1.8
Sethoxydim	0.187	21.0	--
Sethoxydim	0.250	--	2.0
Sethoxydim	0.375	21.9	2.3
Sethoxydim	0.500	--	2.8
Sethoxydim	1.000	--	1.9
Weeded check	--	23.3	2.3
Least significant diff. (0.05)		5.8	0.9

Oxyfluorfen formulations and combinations for weed control in onions. Anderson, J.L. and M.G. Weeks. A study was conducted at the Farmington, Utah Field Station to compare oxyfluorfen 2E and 1.6E formulations applied singly or as a tank mix with grass herbicides and subsequent to preemergent herbicides. Treatments were applied with a bicycle sprayer equipped with 8002 nozzles calibrated to deliver 300 L/ha at 40 psi. Twelve rows of onions were planted April 19, 1983 in a sandy loam soil having a 1.1% organic matter content. Four rows were treated on May 5 with 8.4 kg/ha DCPA, four rows with 4.5 kg/ha propachlor, and four rows received no preemergence treatment. Postemergence treatments were applied across the twelve rows on June 2, 1983 when the onions were in the first true leaf stage.

The DCPA and propachlor preemergence treatments greatly reduced the weed population in the treated plots. The predominant weed in the oxyfluorfen plots with or without crop oil was barnyardgrass. The addition of sethoxydim or fluazifop-butyl greatly improved the weed control and onion yields. The highest yields, however, occurred where these combinations followed preemergence treatments. No phytotoxicity was observed in any plot. (Utah State University, Logan, Utah 84322)

Effects of preemergent and postemergence herbicide treatments on onion yields and weed control

Postemergence Treatment	Rate (kg/ha)	Ave.[x,y] Weed Control	Weeds[z] Present	Yield (kg/4m of row)[y]		
				postemergence treatment only	+ DCPA	+ Propachlor
oxyfluorfen (2E)	0.25	8.2 ab	SP,BYG,L,KW,RT,RP	5.6 b	7.8 bc	8.4 b
oxyfluorfen (2E) + .25% crop oil	0.28	7.2 b	BYG, L, SP	5.7 b	8.9 ab	8.8 b
oxyfluorfen (1.6E)	0.28	9.2 a	BYG,RT,VM	7.3 ab	7.9 bc	8.3 b
oxyfluorfen (1.6E) + .25% crop oil	0.28	8.0 ab	BYG,RT,P,RP,SP	6.1 b	9.0 ab	9.2 ab
oxyfluorfen (1.6E) + sethoxydim + crop oil	0.28 0.28	9.6 a	SP,BYG	7.6 ab	8.8 ab	8.6 b
oxyfluorfen (1.6E) +fluazifop-butyl	0.28 0.28	9.3 a	SP,L,RT	8.2 a	9.5 a	11.0 a
bromoxynil +sethoxydim	0.75 0.28	9.0 a	BYG,P	7.0 ab	8.5 abc	9.6 ab
bromoxynil +sethoxydim +.25% crop oil	0.75 0.28	9.3 a	P,BYG	6.1 b	10.0 a	9.7 ab
untreated	-	2.7 c	BYG,BM,SP,RT,L, RP,P,VM	2.6 c	6.9 c	4.5 c

[x] rated 0-10, 10 = no weeds in plot

[y] values within colums followed by a common letter are not significantly different at the 5% level by Duncan's multiple range test

[z] weeds present; BM = black mustand, BYG = barnyardgrass, KW = prostrate knotweed, L = common lambsquarters, P = purslane, RP = redroot pigweed, RT = Russian thistle, SP = shepherdspurse, VM = venice mallow

Evaluation of oxyfluorfen combinations for weed control in onions. Anderson, J.L. Oxyfluorfen alone and in combination was further evaluated for postemergent weed control in onions. Treatments were applied with a bicycle sprayer equipped with 8002 nozzles calibrated to deliver 300 L/ha at 40 psi. 'Colorado 6' onions at the first true leaf stage were treated May 23, 1983 at the Jack Stevenson farm in West Layton, UT and 'Merit' onions received the same postemergence treatments at the Kuch Sato farm in Corinne, UT on May 27, 1983. Onions at the Stevenson farm had received a preemergent treatment of DCPA whereas the Sato farm used no preemergence treatments. The Sato onions had a poor stand and a heavy weed infestation; the lambsquarters density was especially high. Heavier than normal precipitation during April and May activated the DCPA at the Stevenson plots, so few weeds were present in these onions. Plots were reevaluated two weeks after postemergence treatment prior to hand weeding. Data is from the Sato location only.

Bromoxynil provided better though incomplete control of lambsquarters than PPG 844 or oxyfluorfen this year. Oxyfluorfen or PPG 844 treatments without the addition of a grass killer or crop oil provided significantly less weed control than combination treatments. Oxyfluorfen + DPX-Y6202 caused a fairly severe twisting and stunting of onions in the Stevenson plots; however, the onions recovered later in the summer. In all, leaf twisting was observed in six out of 27 plots having oxyfluorfen combinations, one out of six bromoxynil plots, and three of six PPG 844 plots. (Utah State University, Logan, Utah 84322)

Effect of postemergent herbicide treatments on weed control

Treatment	Rate (kg/ha)	Avg.[y] Weed Control (%)	Weeds Present[z]
oxyfluorfen (2E)	0.28	67.7bc	L, G, CB, KW
oxyfluorfen (1.6E)	0.28	63.3c	L, G, CB, RP
oxyfluorfen + .25% crop oil	0.28	77.3abc	G, L, K, KW, SP
oxyfluorfen + diclofop-methyl	0.28+1.1	84.0ab	L, G, KW, CB
oxyfluorfen + Dowco 453	0.28+0.14	78.3abc	L, G, K, KW, RP, SP
oxyfluorfen + sethoxydim	0.28+0.28	86.7a	L, KW, K
oxyfluorfen + sethoxydim + .25% crop oil	0.28+0.28	91.3a	L, KW
oxyfluorfen + fluazifop-butyl	0.28+0.28	86.7a	L, KW, K, SP, RP
oxyfluorfen + fluazifop-butyl + .25% crop oil	0.28+0.28	90.0a	L, SP, KW, K
oxyfluorfen + DPX-Y6202	0.28+0.14	86.0a	L, K, G
bromoxynil + sethoxydim	0.75+0.28	95.3a	RP, G, P, L
bromoxynil + fluazifop-butyl	0.75+0.28	91.7a	G, L, SP, RP, KW
PPG 844	0.28	64.3c	G, L, KW
PPG 844 + sethoxydim	0.28+0.28	86.0a	L, KW
Untreated	---	0	L, G, RP, SP, K, KW, P

[y] percentages followed by a common letter are not significantly different at the 5% level according to Duncan's multiple range test.

[z] Weeds present (in approximate order of density); CB = cocklebur, G = annual grasses, K = kochia, KW = prostrate knotweed, L = lambsquarters, P = purslane, RP = redroot pigweed, SP = shepherdspurse

Evaluation of post-emergence grass herbicides for wild oat control in dehydrator onions. Bell, C.E. Several post-emergence grass herbicides were compared for control of wild oats in dehydrator onions, variety Creole.

Application was made on December 12, 1983 to emerged wild oats 8 to 12 inches tall with 3 to 4 tillers. The onions were in the 2 true leaf stage. Plot size was 1 bed by 25 feet with 4 replications. Applications was made with a CO_2 pressurized sprayer using an 8004E flat an nozzles at 25 gal/A of spray volume. Four herbicides (sethoxydim, fluazifop-butyl, CGA82725 and HOE - 00581) were applied at two rates (.3 & .6 lb. ai/A). In addition diclofop-methyl was applied at 3.0 lb. ai/A along with an untreated control. Each herbicide was mixed with an adjuvant (non-phytotoxic crop oil) at the rate of 1 qt./A. Oxyflurofen was applied broadcast at .25 lb. ai/A over the entire trial 24 hours after treatment.

Results indicate that three of these herbicides have the ability to completely control relatively large wild oats at a low rate. HOE - 00581 and diclofop-methyl resulted in 70 to 80% control of this grass at these rates. The oxyflourofen application did not diminish the activity of the grass herbicides, but rather-achieved a more rapid death of the weed. No phytoxivity was observed. (University of California Cooperative Extension, Court House, El Centro, Cal. 92243).

Treatment	rate (lb. ai/A)	Wild oat Control (%)
Sethoxydim	.3	100
Sethoxydim	.6	100
Fluazifop - butyl	.3	100
Fluazifop - butyl	.6	100
CGA - 82725	.3	100
CGA - 82725	.6	100
HOE - 00581	.3	77.5
HOE - 00581	.6	80
Diclofop-methyl	3.0	70
Untreated Control		0

Bentazon directed applications for yellow nutsedge control in yellow and red onions. Kloft, P.J., C.K. Collins, and R.L. Collins. Two trials were established at Gaston, Oregon in 4 by 20 ft. plots, replicated four times in a randomized block design experiment. The Benny Red onions were grown on eleven inch rows, silt loam soil, 8% OM, and Ph of 6.5. The yellow Progress onions were grown on nine inch rows, silt loam soil, 5% OM, and Ph of 6.3. All plots were sweep cultivated either two, three, or four times to delay nutsedge until such time that the onions were large enough to tolerate bentazon herbicide. The bentazon was applied at 0.5 lbs ai/A with Herbimax paraffinic oil surfactant at 1 qt./A. The nutsedge and onions had 6 to 16 and 3 to 4 true leaves respectively. All applications were directed toward the lower three inches of crop, using a single 8003 fan nozzle. Both trials received a total of nineteen inches of rain or sprinkler irrigation. Temperatures were generally less than 75°F on the first two application dates at both locations. The third application date had a temperature of 85°F.

Temperatures on the first two application dates were not conducive to the best results with bentazon, as a minimum of 75°F or above are necessary for its most effectiveness. Cultivation helps keep the nutsedge under control between the rows, but is ineffective in the onion row. Therefore it is necessary to apply the bentazon in the onion row to delay the nutsedge, even though it does not burn the sedge back to the soil. The bentazon accomplishes this task without damaging the onions. Only when the temperature reaches 80 to 85°F does the bentazon effectively burn the nutsedge back to the soil. Interestingly, the bentazon appears to kill any formed nutlets, for the most part. The attached tables show that bentazon plus cultivation gives better nutsedge control and higher yields than cultivation alone. Also, the more one cultivates, without the use of bentazon, the higher the yields. (Collins Ag. Consultants, Inc. Hillsboro, Oregon 97123).

Table 1. Effect of directed bentazon applications with tillage on red onions.

Herbicide[1]	Rate lb ai/A	No applic.	No cult.	nutsedge control[2]	crop[2]	lbs onions per plot[3] jumbo	medium	boiler	all sizes
bentazon	0.5	2	2	4.0	0	26.5ab[3]	53.6g	15.4bc	95.5
bentazon	0.5	2	3	3.75	0	28.6a	61.3a	17.6abc	107.5
bentazon	0.5	2	4	4.12	0	18.1bcd	53.1h	13.4c	84.6
bentazon	0.5	3	2	7.87	0	21.8abcd	60.5b	16.6bc	98.9
bentazon	0.5	3	3	7.37	0	28.9a	55.8d	16.5bc	101.1
bentazon	0.5	3	4	7.87	0	23.5abc	54.1e	17.3abc	94.9
check	-	-	2	0.0	0	13.3d	59.3c	19.9ab	92.4
check	-	-	3	0.0	0	14.1d	53.9f	21.4a	89.4
check	-	-	4	0.0	0	15.5cd	50.5i	17.4abc	83.4

Application dates: June 27, July 20, July 30, 1983.

Field planted May 1, 1983; harvested September 21, 1983.

Cultivation dates: May 26, June 7, June 24, July 1, 1983.

[1] All treatments applied with Herbimax paraffinic oil at 1 qt./A

[2] 0 = no effect; 10 = complete control.

[3] Means of four replicates. Means in a column followed by the same letter do not differ significantly at P = 0.05 according to Duncan's multi range test.

Table 2. Effect of directed bentazon applications with tillage on yellow onions.

Herbicide 1/	Rate lb ai/A	No applic.	No cult.	nutsedge control 2/	crop 2/	nutlet count 3/	lbs onions per plot 4/ jumbo	medium	boiler	all sizes
bentazon	0.5	2	2	3.62	0	35.3a	4.6abc	21.3abc	19.8a	45.6
bentazon	0.5	2	3	4.25	0	67.6ab	7.1abc	34.9a	19.5a	61.5
bentazon	0.5	2	4	4.5	0	57.6ab	9.5a	34.3a	19.3a	63.0
bentazon	0.5	3	2	6.25	0	28.6a	4.5abcd	27.6ab	22.1a	54.3
bentazon	0.5	3	3	7.0	0	41.3a	7.1abc	27.6ab	14.5a	49.3
bentazon	0.5	3	4	6.62	0	28.0a	7.9ab	27.1ab	14.3a	49.3
check	-	-	2	0.0	0	206.6c	0.0d	7.4c	17.3a	24.6
check	-	-	3	0.0	0	183.0c	0.4cd	14.4bc	22.5a	37.6
check	-	-	4	0.0	0	129.6bc	1.1cd	19.1abc	21.3a	41.5

Application dates: June 7, July 20, July 30, 1983.

Field planted May 1, 1983; harvested September 15, 1983.

Cultivation dates: May 28, June 10, June 23, July 12, 1983.

1/ All treatments applied with Herbimax paraffinic oil surfactant at 1 qt/A.

2/ 0 = no effect; 10 = complete control.

3/ Based on sample of one cubic foot soil per plot in 3 replicates only on October 5, 1983.

4/ Means of four replicates. Means in a column followed by same letter do not differ significantly at P = 0.05 according to Duncan's multi range test.

Multiple applications of fluazifop (Fusilade) and sethoxydim (Poast) for controlling quackgrass (Agropyron repen) in bulb onions. McReynolds, R.B. and R.D. William. Fluazifop and sethoxydim were evaluated in separate field trials for the control of quackgrass infesting bulb onions in the spring and summer of 1983. The trials were established June 2 in Marion County, Oregon on Woodburn silt loam soil. The sethoxydim trial was 3.65 m by 18 m and the fluazifop trial was 3.65 m by 36 m. Both trials were replicated three times in a randomized complete block design. Plots were adjacent to each other and occupied an area heavily infested with quackgrass. The herbicides were applied broadcast 30, 80, and 110 days after planting at 360 l/ha with a CO_2 powered backpack sprayer at 40 PSI. Onions were in the two to three true leaf stage at the first application. Grasses were 15 to 30 centimeters tall at first application.

Quackgrass control with sethoxydim was poor after three applications. Weed regrowth occurred after each application, although slight suppression was observed. Onion yields were reduced due to quackgrass competition.

Control with fluazifop was very good at rates of .28 Kg/ha or higher after two applications. Suppression was observed after one application, but some regrowth was noted. Quackgrass regrowth did not occur after the second application. (Oregon State University Cooperative Extension Service, Salem, OR 97301)

Multiple applications of fluazifop and sethoxydim for quackgrass control in bulb onions

fluazifop [a/]			sethoxydim [a/]		
Rate (Kg/ha)	Yield (m ton/ha)	Average weed control rating	Rate (Kg/ha)	Yield (m ton/ha)	Average weed control rating
Untreated	16.4 a	0	Untreated	17.0 a	0
.21	22.6 a	1.6	0.34	28.9 a b	2
.28	54.4 b	9.7	0.56	38.6 b	5.7
.41	50.8 b	9.6			
.56	58.2 b	9.7			
1.12	46.0 b	9.8			

[a/] Numbers followed by the same letter are not significantly different at the 0.5 level according to the Duncan's Multiple Range Test.

Tolerance of garlic to soil-applied herbicides. William, R.D. and D. Behrends. Trials were conducted in Linn County involving several herbicides applied pre- and postemergence to early and late varieties of garlic and on sandy and loam soils. Garlic yields and bulb size were reduced by 0 to 10% at normal application rates of napropamide (Devrinol) and pronamide (Kerb) in 3 experiments where 2 garlic varieties and pre- and postemergence treatments were evaluated. In contrast, yields were comparable for pendimethalin (Prowl), ethalfluralin (Sonalan), bensulide (Prefar), and chloroxuron (Tenoran). Early crop phytotoxicity ratings also were minimal for these treatments.

In the past, growers have expressed concern about increased *Botrytis* infections with the use of pronamide (Kerb). We observed a possible interaction in early spring, but were unable to verify the results by counting infected plants 3 weeks after the observation.

Garlic tolerance to soil-applied herbicides on loam soils
Linn County, OR

		Yield plot		
Herbicide	Rate (lbs ai/A)	Preemergence 'late' garlic	Postemergence 'late' garlic	Postemergence 'early' garlic
			(Kg/plot=67 ft^2)	
Check	--	9.0	9.2	6.0
Napropamide	1.0	6.2	9.2	6.5
Napropamide	2.0	7.8	10.1	4.9
Napropamide	4.0	6.3	8.0	5.8
Napropamide	8.0	4.8	8.0	4.9
Pronamide	0.5	6.4	8.6	6.5
Pronamide	1.0	6.9	8.0	5.0
Pronamide	2.0	6.0	7.7	6.3
Pronamide	4.0	1.8	3.8	4.3
Pronamide	8.0	1.0	4.1	1.1
Pendimethalin	1.0	8.6	8.4	4.5
Pendimethalin	1.5	7.8	8.1	5.9
Pendimethalin	2.0	8.5	10.7	6.6
Ethalfluralin	1.5	7.3	8.0	6.0
Bensulide	6.0	7.5	8.4	4.3
Chloroxuron	3.0	7.8	7.5	6.1
LSD	%5	2.3	2.3	2.2

Postemergence weed control in garlic. Zimmerman, M., R.D. William, and D. Behrends. In 1983, 2 applications each of oxyfluorfen, fluazifop, sethoxydim and bromoxynil were applied on June 4 and 30 in Central Oregon, and May 11 and June 3 in Western Oregon to evaluate weed control and possible crop injury.

Oxyfluorfen provided good control of broadleaf weeds, but caused slight scorching in the leaf axils of garlic which resulted in drooping leaves as they elongated. Yields and other parameters were not affected by oxyfluorfen. Grass control was excellent with sethoxydim and fluazifop with no visible crop injury. However, one plot was injured severely when fluazifop plus crop oil was inadvertantly applied to a bromoxynil treated plot. (Oregon State University Extension Service, OR 97331)

Postemergence weed control treatments in garlic
Jefferson and Linn Counties, OR

		W. Oregon[1]	Central Oregon[2]		
				Weed Ratings[3]	
Herbicide	Rate (lbs ai/A)	Bulb weight (Kg 67 ft^2)	Weight (Kg/100 bulbs)	Kentucky bluegrass	Broadleaf weeds
Check	--	5.0	6.5	0	0
Oxyfluorfen	0.12	--	6.4	--	6
Oxyfluorfen	0.25	6.8	6.6	--	8
Oxyfluorfen	0.5	6.6	6.0	--	8
Oxyfluorfen	1.0	6.1	--	--	--
Oxyfluorfen	2.0	4.8	--	--	--
Fluazifop	0.19	5.4	6.3	8	--
Fluazifop	0.25	6.2	6.5	8	--
Fluazifop	0.37	6.4	6.1	7	--
Fluazifop	0.50	6.8	7.0	8	--
Sethoxydim	0.2	7.2	6.6	7	--
Sethoxydim	0.3	6.4	6.4	6	--
Sethoxydim	0.4	6.8	6.7	6	--
Sethoxydim	0.5	7.5	6.2	8	--
Sethoxydim	1.0	6.4	--	8	--
Bromoxynil	0.25	--	6.5	--	8
Bromoxynil	0.5	--	6.4	--	5

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[1] Located near Dever-Conner, Linn Co., OR; harvested Aug. 5, 1983.

[2] Located near Madras, Jefferson Co., OR; harvested Aug. 22, 1983; plot size 67 ft^2.

[3] Ratings: 0=no control; 10=complete control; broadleaf weeds were nightshade, lambsquarter, and pigweed.

A comparison of tri-band fall-bed treatments for black nightshade control in tomatoes. Edson, W. D. and A. H. Lange. Single 4 inch bands were water-band treated with metham on 30 inch beds on October 15, 1982 on a Hanford fine sandy loam. The remainder of the bed was sprayed October 18 with 7 preemergence herbicides incorporated with winter rainfall. Because of the year's heavy rainfall, the furrows were full of water through most of the spring. About 100 seeds of black nightshade were seeded 3/8 inch deep across one spot on the bed prior to treatment. The first significant rain fall October 23. The air temperature at the time of application was in the 80-85 degree range.

The black nightshade control in the seedline was excellent from all rates of metham (Table 1). The black nightshade control from the preemergence herbicides on the shoulder of the bed was also good with chlorpropham and very poor from most other preemergence treatments. Both metolachlor and ethalfluralin have given excellent control of black nightshade in other tests. Metribuzin, diphenamid and napropamide have given good control of weeds other than nightshade. The effect on UC 82 tomatoes planted April 28, 1983 from all treatments was not apparent which probably reflects the long period of flooding where tomatoes could not be planted. Any difference that would have occurred earlier due to the various herbicides had long since disappeared. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

Table 1.
The effect of metham on black nightshade control in the seedline (425-73-513-186-1-83).

Herbicide	Gal/A	Acre Inch Water Applied for Incorporation	Average[1] Black Nightshade Control
Metham	25	1/8	9.8
Metham	25	1/4	10.0
Metham	50	1/8	10.0
Metham	50	1/4	10.0
Metham	100	1/8	10.0
Metham	100	1/4	10.0
Water Only	-	1/4	0.2
Check	-	-	0.1

1/ Average of 4 replications where 0 = no control and 10 = 100% control.

Table 2.
The effect of herbicide combination treatments on weed control as expressed by tomato stand and vigor (425-73-513-186-1-83).

		Average Seedline Treatment with Metham[1]							
		25		50		100		0	
Herbicide	Lb/A	1/8 A"	1/4 A"	1/8 A"	1/4 A"	1/8 A"	1/4 A"	No A"	1/4 A"
Metolachlor	4	6.8	8.5	6.8	6.3	7.5	7.5	8.5	7.8
Metolachlor	8	8.5	8.0	6.0	8.0	6.5	5.5	7.3	6.8
Ethalfluralin	2	8.5	8.3	6.8	7.8	8.5	6.0	7.8	7.0
Ethalfluralin	4	9.0	7.8	7.5	8.8	8.0	7.5	8.5	8.5
Chlorpropham	6	7.0	7.8	6.8	7.0	6.0	6.5	6.8	6.8
Chlorpropham	12	6.0	7.5	6.8	5.8	6.0	5.8	7.8	7.3
Pendimethalin	2	8.0	6.3	7.3	7.3	7.3	6.8	8.5	8.3
Pendimethalin	4	7.8	8.5	8.5	8.8	8.0	8.5	8.5	8.0
Metribuzin	1/2	7.0	7.3	6.3	6.5	6.8	6.5	7.5	6.8
Metribuzin	1	7.0	6.3	7.0	7.8	5.8	7.3	5.8	5.8
Diphenamid	8	7.3	8.3	8.5	7.5	7.3	8.5	8.3	7.3
Diphenamid	16	6.5	7.5	6.3	6.5	7.3	6.0	7.0	6.8
Napropamide	2	7.5	7.8	6.5	7.0	8.3	7.8	7.3	7.8
Napropamide	4	7.8	8.3	8.8	7.5	7.3	8.0	7.0	7.5
Check	-	7.5	6.5	6.3	7.3	7.5	5.8	7.3	8.0
Average		7.6		7.8		7.1		7.4	

1/ Average of 4 replications where 0 = no stand, no vigor, plant dead and 10 = most vigorous, healthy growth.

The effect of repeated sprays of acifluorfen on UC 82 tomato seedlings starting in the cotyledon stage. Lange, A. H., W. D. Edson and D. May. Acifluorfen was applied to young UC 82 seedlings (seeded February 23, 1983) beginning March 15, 1983 when the tomatoes were in the cotyledonary stage. A second application was delayed until March 29 because of wet soil when 1/16 Lb/A was applied to the previously treated tomatoes and to a new set now in the first true leaf. The black nightshade was in the fourth true leaf stage. The next application was applied to untreated plots on April 5 when the tomatoes were in the 1-2 true leaf stage and the repeated application to these plots were made April 12. The tomatoes were then in the 2-3 true leaf stage and the surviving black nightshade in the eighth true leaf.

The results suggest better black nightshade control with the earlier applications but too much injury when sprays were started when the tomatoes were in the cotyledons. Even at this early stage, however, the 1/64 Lb/A followed by the 1/16 Lb/A 2 weeks later (instead of 1 week) gave little injury, excellent black nightshade control and one of the highest harvest weights per plot.

When spraying was commenced later the tomatoes were more tolerant, the data shows good yield at 1/4 Lb/A (single application) in the first true leaf stage, but the margin of safety may have been considerably less. The good black nightshade control also masked some of the phyto occurring at 1/4 Lb/A. Another high yielding treatment was 1/8 Lb/A followed 1 week later with 1/16 Lb/A when the tomatoes were in the 1-2 leaf stage. Considering that UC 82 is one of the more sensitive varieties and these plots received considerable spring rain as well as sprinkler irrigation, the results represent relatively conservative conclusions. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of timing and rate on the vigor of nightshade infested processing tomatoes (425-10-513-186-7-83).

	Lb/A Timing of Spray				Average[1] Tomato Vigor		Average	
Herbicides	3/15	3/19	4/5	4/12	4/29	5/20	No. of Plant/ Plot	Tomato Weight/ Plot
Acifluorfen	1/64	1/16			6.0	6.7	8.0	665
Acifluorfen	1/32	1/16			4.7	4.7	5.7	367
Acifluorfen	1/16	1/16			3.7	4.0	3.7	251
Acifluorfen	1/8				1.3	1.3	0.7	55
Acifluorfen	1/4				0.0	0.3		
Acifluorfen	1/2				0.0	0.3		
Acifluorfen		1/16			7.3	7.0	11.3	603
Acifluorfen		1/8			8.0	6.7	9.7	328
Acifluorfen		1/4			7.3	7.7	13.0	950
Acifluorfen			1/32	1/16	5.7	5.0	7.3	520
Acifluorfen			1/16	1/16	7.7	6.8	11.0	616
Acifluorfen			1/8	1/16	7.0	5.7	9.7	775
Check					6.7	3.0	6.3	220

[1] Average of 3 replications where 0 = no growth and 10 = best possible growth. Treatment dates noted at top of table. Sprayed first when tomatoes were in the cotyledon stage on 3/15/83. By 5/20 much of the loss of control was due to continuous germination. The vigor expresses phyto and lack of black nightshade control.

Black nightshade control studies in processing tomatoes on the Oxnard plains. Lange, A. H. and R. A. Brendler. Five small randomized replicated tests were conducted in 5 separate fields. The soils were clay loams, typical of the Oxnard plains. The initial applications were made to very young tomatoes in the 1-2 true leaf stage including the following 3 varieties: 6302 (Exp. 1 & 2), 317 (Exp. 3 & 4), and Peto 95 (Exp. 5). The initial applications (low rates) were made on May 11, 1983 and the retreatment (higher rates) were made on May 18. The plots were hand weeded by the grower in most trials so that we have primarily the effect of the acifluorfen on the tomato growth at rates of 1/64 to 1/8 Lb/A initially followed by 1/16 to 1/4 Lb/A one week after the initial application. The results show the excellent safety of this program on the 3 varieties in these tests. All the sequential rates studied here were found to give good to excellent black nightshade control in other tests in 1982 and 1983 as well as in these tests. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of applying acifluorfen to young tomatoes in the 1-2 true leaf stage (Exp. 3, 4 & 5).

		Average Tomato Vigor[1/]		
Herbicide	Lb/A	Exp. 3	Exp. 4	Exp. 5
Acifluorfen	1/32+(1/8)	9.2	7.5	9.2
Acifluorfen	1/16+(1/8)	8.5	9.5	9.0
Acifluorfen	1/8+(1/8)	7.8	8.5	9.2
Check		7.2	7.8	9.2

[1/] Average of 4 replications where 0 = no tomatoes and 10 = best growth. The rate in () was applied 5/18/83. The initial rate was applied 5/11/83. Evaluated 6/7/83.

The effect of chlorsulfuron on UC 82 processing tomatoes and black nightshade. Lange, A. H. and W. D. Edson. Young tomatoes in their first true leaf and black nightshade in the second true leaf stage were drenched with chlorsulfuron on March 28, 1983 in a water-band over the seed row in 1/8 or 1/4 acre inch of water at 2 rates.

When rated on April 29, there was significant black nightshade control at all rates. The amount of water for incorporation was not significant but did influence weed control probably due to the crusing as seen with the 1/4 acre inch water check. This chemical should be studied in combination with acifluorfen preemergence and postemergence. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of water-banded chlorsulfuron on the control of black nightshade and the growth of young tomato seedlings (425-10-513-186-9-83).

			Average[1/]		
		Acre Inch Water to	Black Nightshade Control	Tomato Stand & Vigor	
Herbicide	Oz/A	Incorp.	4/29	4/29	5/5
Chlorsulfuron	1/16	1/8	6.2	4.0	8.3
Chlorsulfuron	1/16	1/4	6.0	4.0	7.8
Chlorsulfuron	1/8	1/8	8.8	4.0	6.8
Chlorsulfuron	1/8	1/4	8.2	2.2	5.5
Check		1/4	7.0	4.2	5.0
Check			2.5	5.5	8.2

1/ Average of 4 replications where 0 = no control or no tomato vigor and 10 = weeds dead or healthy tomato plants. Treated 3/28/83. Evaluation dates at top of table.

Comparative response of black nightshade and tomatoes to acifluorfen. Lange, A. H. and W. D. Edson. Acifluorfen has proven to be more toxic to black nightshade than tomatoes. The object of this study was to measure more precisely the margin of safety of both pre- and postemergence herbicides in 2 soil types. The tomatoes were seeded in the greenhouse on November 9, 1982. The black nightshade seed was planted in 2 soil types, a Panoche clay loam and a Hanford sandy loam. The plants were sprayed December 8 when they were 2 inches high. The results clearly showed greater injury to black nightshade than to tomatoes in both soil types. In a Delhi loamy sand 1/16 Lb/A was safe. A difference in response was noted with Panoche clay loam where 1/8 Lb/A was not very toxic to the tomatoes. The margin of safety appeared to be near 4X even with the preemergence applications. One should, however, note the terrific difference in growth of the tomatoes and black nightshade in the Panoche clay loam vs. the Delhi loamy sand.

In the postemergence test acifluorfen produced the same results on tomatoes, i.e., 1/16 Lb/A was safe with the Delhi loamy sand and the 1/8 Lb/A was apparently safe enough in the Panoche clay loam. Black nightshade was controlled at 1/32 Lb/A and above in Delhi loamy sand and in the Panoche clay loam. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of pre- and postemergence acifluorfen applications on tomato and black nightshade planted in 2 different soil series (425-73-513-186-4-83).

		Average Weight[1]							
		Tomatoes				Black Nightshade			
		DLS[2]		PCL[2]		DLS		PCL	
Herbicide	Lb/A	Pre-	Post-[3]	Pre-	Post-	Pre-	Post-	Pre-	Post-
Acifluorfen	1/64	7.3	2.0	24.8	8.1	4.6	0.4	11.6	2.0
Acifluorfen	1/32	8.6	1.7	19.2	9.3	2.6	0.0	7.3	1.1
Acifluorfen	1/16	10.6	2.3	27.8	9.1	0.3	0.1	3.1	0.5
Acifluorfen	1/8	3.8	1.6	31.2	8.3	0.3	0.0	0.8	0.1
Acifluorfen	1/4	3.4	0.0	20.6	1.5	0.0	0.0	0.0	0.0
Acifluorfen	1/2	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0
Acifluorfen	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Check	-	4.6	1.7	24.6	11.3	4.5	1.3	10.0	2.8

[1] Average weight of 4 replications where all weights were taken to the nearest 1/10 gram.

[2] DLS = Delhi loamy sand; PCL = Panoche clay loam.

[3] Preemergence treatments applied 12/8/82. Postemergence treatments applied 1/3/83. Evaluated 1/27/83.

<u>The effect of acifluorfen on the control of perennial bindweed in processing tomatoes</u>. Lange, A. H., W. D. Edson and J. May. Ten to twelve inch tomato plants heavily infested with perennial bindweed were sprayed on July 23, July 29, August 5 and August 14, 1983. The bindweed, black nightshade and tomatoes were rated on August 14.

The weed control was significant with the repeated application of 1/4 and 1/2 pound per acre, but the tomato vigor was decreased somewhat at the 1/2 pound per acre rate in the early rating. A single 1 pound per acre rate gave very poor control of bindweed when rated August 14 and August 30 and considerable tomato damage.

The later reading (August 30) suggested the 1/2 pound per acre rate was closer to optimum for weed control and tomato vigor. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of repeated acifluorfen on the control of perennial bindweed and black nightshade in processing tomatoes (425-24-513-186-1-83).

		Average[1/]		
Herbicide	Lb/A	Tomato Vigor	Bindweed Control	Black Nightshade Control
Acifluorfen	¼+¼+¼	9.5	8.5	9.5
Acifluorfen	½+½+½	7.2	9.8	10.0
Acifluorfen	1	9.2	8.8	7.8
Check	-	9.7	0.0	2.2

[1/] Average of 4 replications where 0 = no vigor or no control and 10 = healthy growth or best control. Treated 7/23, 7/29 and 8/5/83. Evaluated 8/14/83.

A preliminary report of perennial bindweed control in processing tomatoes (UC 82) with metham injected through drip irrigation. Lange, A. H., R. Keim, W. D. Edson and J. Beyl. A bindweed infested field at the South Coast Field Station, Santa Ana, CA, was prepared and layed out in a split - split plot design comparing 2 rates of metham, 2 types of planting and 3 dates of planting. Metham was injected over a 4 hour period commencing August 25 and finishing August 26, 1983.

UC 82 tomatoes were seeded over the drip line (buried at a 3 inch depth down the middle of every other 30 inch bed) on August 29, September 9, and Spetember 19, 1983. On the same days transplants were also planted.

The preliminary results showed excellent bindweed control at both rates as well as volunteer barley. Not only was there no phytotoxicity to seeding 3 days after injection, but there was a stimulation in tomato growth at 50 Gal/A. Even at 150 Gal/A there appeared to be more fresh weight than in the untreated check suggesting stimulation probably due to disease or nematode control and some masking of phytotoxicity.

Transplants planted at 3 days were killed at 150 Gal/A, but were unaffected by 11 days. More details will be reported at the completion of this experiment. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

Table 1.
Injected metham for weed control
(425-76-506-186-1-83)

Herbicide	Gal/A	Average[1/] Bindweed Control	Grass Control
Metham	50	9.8	10.0
Metham	150	10.0	10.0
Check	0	1.5	3.4

1/ Average of 24 replications where 0 = no control and 10 - no weeds. Evaluated 10/7/83.

Table 2.
The effect of thinning weights of tomatoes seeded 3 days after metham injection (425-76-506-186-1-83)

Herbicide	Gal/A	Average Fresh Wt. Pound/Plot[1/]
Metham	50	70.9
Metham	150	52.9
Check	0	28.3

1/ Average of 4 replications.

The effect of thiobencarb on the control of dodder in tomatoes. Lange, A. H. and W. D. Edson. In earlier studies dodder has been controlled selectively with thiobencarb. In this greenhouse work thiobencarb was applied at 1 to 8 Lb/A to the surface of 3 inch pots of dodder (seed mixed in the top 3/8 to 1/2 inch of soil) and tomatoes planted at 3/8 inch depth. The soil was a Panoche clay loam. Thiobencarb was applied February 1, 1983 in 1/4 acre inch of water. Each treatment was replicated 10 times except that dodder was placed in only 5 of the 10 pots.

The most striking response was the lack of the tomato germination in the pots which had received dodder seed. The control of dodder was excellent from all rates of thiobencarb. No phytotoxicity to the tomatoes was observed from the thiobencarb at rates up to 8 Lb/A. (University of California, Cooperative Extension, 9240 S. Riverbend Ave., Parlier, CA 93648.)

The effect of thiobencarb applied preemergence and the effect of dodder on the germination and stand of tomatoes (425-73-513-186-13-83).

		Average[1/] Tomato Stand		Tomato	Average[1/]
Herbicide	Lb/A	With Dodder	Without Dodder	Fresh Weight[2/]	Dodder Control
Thiobencarb	1	0.5	6.0	9.5	10.0
Thiobencarb	2	0.8	10.0	8.8	9.5
Thiobencarb	4	1.8	9.5	8.7	9.8
Thiobencarb	8	0.3	10.0	13.8	10.0
Check	-	1.3	8.0	11.4	3.2

1/ Average of 6 replications where 0 = total kill of plants and 10 = lush, green growth. Evaluated 2/25/83.
2/ Weight taken in grams in the pots without dodder.

Acifluorfen for postemergence control of black nightshade in direct seeded tomatoes. McMullin, W. G. and A. G. Ogg, Jr. On June 23, 1983, a field study was established to evaluate postemergence applications of acifluorfen for control of black nightshade in direct seeded tomatoes. To control weeds other than black nightshade, napropamide was uniformly applied at 2 lb/A to the pre-irrigated seedbed and incorporated two inches deep. A single row of Columbia tomato was planted in each plot on June 1 and rill irrigated on June 3 and 13 to promote germination. Tomatoes were thinned to one plant per four inches of row on June 22. Tomatoes with two well-developed true leaves were treated with acifluorfen on June 23 and retreated seven days later. Plots 64 inches wide by 40 feet long were arranged in a randomized block with four replications. At the first treatment, black nightshade ranged in size from 0.5 to 2.5 inches tall with two to five leaves and a population density varying from five to ten plants per square foot. All treatments were applied as a broadcast spray in 59 gallons per acre at 30 psi. The experiment was conducted in Warden fine sandy loam with 0.9% organic matter and a pH of 6.5. Black nightshade was controlled 93 to 97% with acifluorfen at the low rate of 1/16 + 1/8 and almost perfectly at 1/8 + 1/4 lb/A (Table 1). Both treatments of acifluorfen stunted the tomatoes but only the high rate at 1/8 + 1/4 lb reduced the tomato stand, injured tomatoes excessively, and reduced fruit yield. (USDA-ARS and Washington State University, Irr. Agric. Res. and Ext. Center, Prosser, WA 99350)

Table 1. Response of tomatoes and black nightshade to acifluorfen applied postemergence.[1]

Herbicide	Rate (lb/A)	Tomato injury(%)			Black nightshade control (%)			Harvest summary (9-29-83)[2]			
		6-30	7-7	9-13	6-30	7-7	9-13	Plants (no/2m)	Total biomass (lb/2m)	Vine wt. (lb/2m)	Fruit wt. (lb/2m)
Acifluorfen	1/16+1/8	31 b	35 b	0	81 b	97 b	93 b	18 a	104 a	21	83 a
Acifluorfen	1/8 +1/4	55 a	63 a	0	95 a	100 a	99 a	14 b	70 b	17	53 b
Nontreated	- -	0 c	0 c	0	0 c	0 c	0 c	21 a	81 ab	19	63 ab
				NS						NS	

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[1] Means within a column followed by the same letter are not significantly different at the 5% level.

[2] Forced harvest due to frost, most fruit was still green and was not sorted into different ripeness classes.

An evaluation of one postemergence herbicide for control of black nightshade in processing tomatoes. Mullen, R.J., J.P. Orr, and A.H. Lange. A postemergence weed control trial, evaluating acifluorfen applied as single or multiple sprays for control of black nightshade in processing tomatoes was established at Augusta Bixler Farms (Bill & Rick Salmon) on June 3, 1983 on Roberts Island, north of Tracy, California. The soil was a Sacramento clay loam and all treatments were applied with a handheld CO_2 backpack sprayer at 50 gallons per acre spray volume. Weeds present at time of initial applications were black nightshade (seedling to first or second true leaf) and 3 to 4 inches tall yellow nutsedge. The tomatoes were about 1½ inches tall (1st and 2nd true leaf) with some a little larger. The trial was first evaluated on June 9, 1983 and all treatments gave good to excellent control of black nightshade but only acifluorfen at 1/16 lb/ac. or 1/10 lb/ac. or 1/8 lb/ac. showed good crop safety (including a 1/8 lb/ac. of an older formulation of acifluorfen. Acifluorfen at 1/5 lb/ac. also gave relatively good crop safety. A second rating was done on June 14, 1983 following the series of second applications applied earlier on June 9, 1983. Weed control of black nightshade was again excellent, although none of the treatments gave control of yellow nutsedge. Acifluorfen as a single treatment of 1/5 lb/ac. or 1/8 lb/ac. (old formulation) gave good crop safety, as did the combination of acifluorfen at 1/16 lb/ac. and acifluorfen at 1/10 lb/ac. plus 1/8 lb/ac. The combination of acifluorfen at 1/8 lb/ac. plus 1/8 lb/ac. caused a moderate reduction in crop vigor.

An evaluation of one postemergence herbicide for control of black nightshade in processing tomatoes[1/]

Treatment	Rate lb/Ac	Black Nightshade 6/9	 6/14	Yellow Nutsedge 6/9	 6/14	Crop Vigor 6/9	 6/14
acifluorfen	1/16 + 1/8	8.8	9.4[2/]	1.0	1.4[2/]	8.6	8.7[2/]
acifluorfen	1/10 + 1/8	9.0	9.5[2/]	1.0	2.0[2/]	8.8	8.4[2/]
acifluorfen	1/8 + 1/8	9.4	9.8[2/]	1.5	2.5[2/]	7.9	7.7[2/]
acifluorfen	1/5	9.4	9.5	2.0	2.0	7.5	8.9
acifluorfen	1/4	9.5	9.8	2.5	2.8	6.6	7.5
acifluorfen	2/5	10.0	10.0	3.7	3.5	3.9	4.3
acifluorfen	1/2	10.0	10.0	4.5	4.1	2.7	2.5
acifluorfen (old formulation)	1/8	8.9	9.4	1.6	1.9	8.2	8.7
control	----	0.0	0.0	0.0	0.0	9.3	9.1

[1/] Average of four replications: 0 = no weed control; crop dead

[2/] Early treatment only: 10 = complete weed control; crop growing vigorously

An evaluation of three preplant incorporated herbicides and combination treatments and one postemergence herbicide in processing tomatoes. Mullen, R.J., J.P. Orr, A.H. Lange, F. Clayton, and R. Chavarria. A weed control trial in processing tomatoes, comparing three preplant incorporated herbicides and one postemergence herbicide for the control of black nightshade, was established at Bacchetti Farms (Bert and Mark Bacchetti) on April 14, 1983 on Fabian Tract northwest of Tracy, California. The treatments were applied with a handheld CO_2 backpack sprayer at 50 gallons per acre spray volume. The soil type was a Sacramento clay loam and the three preplant herbicides were incorporated mechanically 2-3 inches deep with the grower's power Rotary tiller. The trial was first evaluated on April 28, 1983 just after crop emergence. Best weed control was achieved with the combination treatment of acifluorfen plus pebulate and napropamide but crop vigor was somewhat reduced. Acifluorfen, at the high rate, also gave excellent control of black nightshade but crop vigor and stand were considerably reduced. Acifluorfen, at the lowest rate, gave moderate to good black nightshade control and demonstrated very good crop safety. On May 5, 1983 acifluorfen, at three rates, was applied postemergence to both crop and emerged nightshade over three earlier applied rates of acifluorfen as preplant incorporated treatments. At time of postemergence treatments, the crop was first to second true leaf (1-1½ inches tall) and the nightshade was seedling to first and second true leaf.

The entire trial, both pre and postemergence, was evaluated again on May 12, 1983. Best nightshade control was achieved with the combination of acifluorfen at ½ lb/ac. preplant incorporated plus acifluorfen at ¼ lb/ac. postemergence, followed by the preplant incorporated combination of pebulate plus napropamide plus acifluorfen, then acifluorfen, preplant incorporated at ¼ lb/ac. or ½ lb/ac., alone, and the combination of acifluorfen at ¼ lb/ac. preplant incorporated plus acifluorfen at 1/8 lb/ac. postemergence. Unfortunately, all of these treatments resulted in a considerable reduction in crop vigor and/or stand. Acifluorfen at 1/8 lb/ac. preplant incorporated alone or in combination with acifluorfen at 1/16 lb/ac. postemergence gave marginally acceptable black nightshade control with good crop safety as did the preplant incorporated combination of metolachlor and napropamide. The combination of pebulate plus napropamide gave poor control of black nightshade but were quite safe on the tomatoes. Yields of selected treatments were taken on September 2, 1983. None of the treatments outyielded the control treatment but most were at or near the control indicating no significant yield reduction due to the treatments but there may have been some delay in maturity as evidenced by the percent green fruit in crop maturity figures. Acifluorfen at ¼ lb/ac. preplant incorporated had the lowest yield of the treatments selected for harvest.

An evaluation of three preplant incorporated herbicides and combination treatments and one postemergence herbicide in processing tomatoes

		Black Nightshade		Crop[1] Vigor			Crop Maturity (%)		
Treatment	Rate Lb/Ac	4/28 Pre only	5/12 Pre+Post	4/28 Pre only	5/12 Pre+Post	Yield Tons/Ac	Red	Green	Culls
pebulate + napropamide	6 + 2	4.5	0.8	9.0	10.0	28.5	87.9	9.9	2.2
pebulate + napropamide	9 + 2	4.9	0.0	9.1	10.0				
metolachlor	2	6.6	5.8	8.8	8.0	28.0	90.3	2.1	7.6
metolachlor + napropamide	2 + 2	7.1	6.5	8.7	7.5				
acifluorfen	1/8	7.5	6.2	8.9	8.0	27.6	81.8	14.3	3.9
acifluorfen	1/4	8.4	8.8	7.7	6.3	24.8	86.8	9.5	3.7
acifluorfen	1/2	9.0	8.5	6.8	6.7				
	Post 5/5								
acifluorfen	1/8 + 1/16	8.1	7.0	8.9	8.5	26.8	88.4	10.2	1.4
acifluorfen	1/4 + 1/8	8.4	8.3	7.8	4.5				
acifluorfen	1/2 + 1/4	9.0	9.5	7.1	5.0				
acifluorfen + pebulate + napropamide	1/4 + 6 + 2	9.5	9.4	7.5	6.0	26.4	91.8	2.1	6.1
control	-----------	0.0	0.0	9.3	10.0	28.6	91.2	6.1	2.7

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[1] Average of four replications: 0 = no weed control; crop dead

10 = complete weed control; crop growing vigorously

An evaluation of one postemergence herbicide for control of black nightshade in tomatoes. Mullen, R.J., J.P. Orr, A.H. Lange, F. Clayton, and R. Chavarria. A trial in processing tomatoes evaluating acifluorfen for postemergence control of black nightshade was established on May 10, 1983 at Bacchetti Farms (Bert and Mark Bacchetti) on Fabian Tract northwest of Tracy, California. The soil type was a Sacramento clay loam and all treatments were applied at 50 gallons per acre spray volume with a handheld CO_2 backpack sprayer. Four treatments had acifluorfen applied as a single postemergence application on May 10, 1983; six treatments were first treated with different rates of acifluorfen on May 10, 1983, followed by six different rates applied again on May 17, 1983. Six additional treatments had rates of acifluorfen applied on May 10 and again on May 17, followed by a third series of treatments on May 23, 1983. The object here was to evaluate acifluorfen as single and multiple applications at different rates on both the crop and nightshade at different growth stages to determine the best rate or combination of rates at the proper time for best weed control and crop safety. On May 10, the crop was at the first and second true leaf stage of growth (1½-2 inches tall) and the nightshade was slightly behind (1-1½ inches tall); on May 17, the crop had advanced to 2-3 inches tall and the nightshade was at 2-3 inches tall. The trial was first evaluated on May 23, 1983. The only treatment that gave good control of black nightshade and relatively good crop safety was acifluorfen at ¼ lb/ac. as a single treatment. The second trial rating was made on May 27, 1983 and only those acifluorfen treatments that had had three treatments were evaluated (the third application had been put applied on May 23, 1983) as well as one single rate of acifluorfen at ½ lb/ac. applied late - May 23, 1983. Acceptable weed control was achieved with the combination overtime of acifluorfen at 1/16 lb/ac. plus ¼ lb/ac. plus ½ lb/ac., followed by the combination of 1/16 lb/ac. plus ¼ lb/ac. plus ¼ lb/ac.; both treatments showed good to excellent crop safety. Yields of selected treatments were taken on September 2, 1983. All of the treatments outyielded the control, except the combination of acifluorfen treatment of 1/16 lb/ac. + ¼ lb/ac. + ½ lb/ac. and that was not a significant decrease. The single early application of acifluorfen at 1/8 lb/ac. was the highest yielder followed closely by the single early application of acifluorfen at ¼ lb/ac.

An evaluation of one postemergence herbicide for control of black nightshade in tomatoes

Treatment	Rate Lb/Ac A.I.	Black Nightshade		Crop Vigor 1/		Yield	Crop Maturity (%)		
		5/23	5/27	5/23	5/27	Tons/Ac	Red	Green	Culls
acifluorfen	1/32	3.5	NT	8.8	NT				
acifluorfen	1/16	4.4	NT	8.9	NT				
acifluorfen	1/8	4.9	NT	8.4	NT	32.8	87.9	8.0	4.1
acifluorfen	1/4	7.9	NT	8.4	NT	31.0	92.6	1.2	6.2
acifluorfen	1/32 + 1/16	5.1	NT	8.9	NT				
acifluorfen	1/32 + 1/8	4.3	NT	9.0	NT				
acifluorfen	1/32 + 1/4	4.5	NT	8.7	NT				
acifluorfen	1/16 + 1/16	4.6	NT	9.1	NT				
acifluorfen	1/16 + 1/8	5.6	NT	8.6	NT	30.3	85.8	8.4	5.8
acifluorfen	1/16 + 1/4	6.1	NT	8.4	NT	29.3	88.4	3.1	8.5
acifluorfen	1/32+1/16+1/8	4.5	3.6	8.4	9.5				
acifluorfen	1/32+1/16+1/4	3.5	3.8	9.1	9.4				
acifluorfen	1/32+1/8+1/4	5.3	4.6	8.6	9.4				
acifluorfen	1/16+1/8+1/4	6.5	5.4	8.6	9.3				
acifluorfen	1/16+1/4+1/4	6.0	6.5	8.5	9.2				
acifluorfen	1/16+1/4+1/2	6.5	7.5	8.6	8.8	24.6	79.9	2.2	17.9
control	----	2.5	0.0	9.6	9.5				
control	----	0.5	0.0	9.6	9.4	25.8	88.0	6.5	5.5
acifluorfen	1/2 (late)	NT	5.4	NT	9.0				

1/ Average of four replications: 0 = no weed control; crop dead

10 = complete weed control; crop growing vigorously

NT = not taken

An evaluation of two postemergence herbicides for control of hairy nightshade in processing tomatoes. Mullen, R.J., J.P. Orr, and A.H. Lange. A trial in processing tomatoes evaluating acifluorfen & metribuzin for postemergence control of hairy nightshade in processing tomatoes was established on May 27, 1983 at Yagi Brothers Farms (Pete, Frank, & Charles Yagi) on Roberts Island, Southwest of Stockton, California. The soil type was a Sacramento silty clay loam and all treatments were applied at 50 gallons per acre spray volume with a handheld CO_2 backpack sprayer. Three treatments had acifluorfen applied as a single postemergence application on May 27, 1983 and the balance of the trial treatments were first treated on May 27, 1983 followed by a second series of treatments on June 1, 1983. Acifluorfen, at 1/4 lb/ac., as a single treatment, followed by acifluorfen, at 1/8 lb/ac., as a single treatment gave excellent control of nightshade but only the lower rate of acifluorfen showed relatively good crop safety; the combination of acifluorfen and metribuzin did not. It should be noted that when the treatments were started on May 27, the crop was at 2nd true leaf stage of growth with some plants larger and the hairy nightshade ranged from seedling stage to one inch tall (early 1st true leaf). The trial was again evaluated on June 9, 1983. Excellent nightshade control was achieved with all the nultiple application treatments but only the combination of acifluorfen @1/16 lb/ac. plus acifluorfen @ 1/8 lb/ac. showed relatively good crop safety. The earlier single acifluorfen applications still had excellent nightshade control with acifluorfen @ 1/16 lb/ac. showing the best crop safety, followed by acifluorfen @ 1/8 lb/ac. None of the treatments (early or early +late) gave any measure of yellow nutsedge control. A second smaller trial on larger tomatoes and nightshade was established adjacent to the main trial on June 1, 1983 followed by a second series of applications on June 9, 1983. The nightshade at treatment was 2 to 4 inches tall and the tomatoes were 3 to 5 inches tall. The trial was evaluated on June 14, 1983. Acifluorfen @ 1/4 lb/ac. + 1/2 lb/ac. gave the best nightshade control but caused considerable crop stunting and burning. The combination of acifluorfen @ 1/4 lb/ac. + 1/4 lb/ac. gave acceptable nightshade control and showed good crop safety.

An evaluation of two postemergence herbicides for control of hairy nightshade in processing tomatoes[1/]

Treatment	Rate Lb/Ac	Hairy Nightshade 6/1	Hairy Nightshade 6/9	Yellow Nutsedge 6/1	Yellow Nutsedge 6/9	Crop[1/] Vigor 6/1	Crop[1/] Vigor 6/9
acifluorfen	1/16	8.9	8.9	2.0	1.0	8.8	8.8
acifluorfen	1/8	9.3	9.8	3.3	2.3	8.2	8.1
acifluorfen	1/4	9.9	9.9	4.0	3.0	6.2	4.2
acifluorfen	1/16 + 1/8	8.9	10.0[2/]	2.0	1.0[2/]	8.7	7.8[2/]
acifluorfen	1/8 + 1/4	9.5	10.0[2/]	3.0	2.0[2/]	8.1	6.3[2/]
acifluorfen	1/4 + 1/4	9.8	10.0[2/]	4.0	3.0[2/]	6.4	4.4[2/]
acifluorfen	1/4 + 1/2	9.9	10.0[2/]	5.0	4.0[2/]	6.1	2.4[2/]
acifluorfen + metribuzin	1/4 + 1/4	10.0	9.9	4.1	3.0	5.6	3.7
control	---	0.0	0.0	0.0	0.0	9.3	9.5
acifluorfen	1/4 + 1/4	7.5				8.7	
acifluorfen	1/4 + 1/2	9.0				6.8	
control	---	0.0				9.3	

[1/] Average of four replications: 0 = no weed control; crop dead
10 = complete weed control; crop growing vigorously

[2/] Early treatment only

Effect of acifluorfen postemergence on canning tomato varieties. Mullen, R.J. and J.P. Orr. On June 3, 1983 17 canning tomato varieties in the first to second true leaf stage were treated with 0.2 lb/A a.i. acifluorfen. This trial was located on the Augusta-Bixler farm Southeast of Stockton. The treatment was made with a CO_2 backpack sprayer at 50 gallon per acre spray volume. The soil was a Sacramento clay loam. There was a great deal of difference in varietal tolerance to acifluorfen at 0.2 lb/A a.i. The table below shows the differences.

Canning tomato variety tolerance to acifluorfen at 0.2 lb/A a/i.

Phytotoxicity 2/ 0 - 1	Phytotoxicity 3/ 1.5 - 3.0	Phytotoxicity 3.5 - 5.0
Castlerock	9889 hybrid	UC 82 B1/
Castlejay	49er hybrid	UC 82 L
Peelmech	Peto 98	E - 62031/
HJ916	GSX - 1	Joaquin
VF 7879 hybrid1/	CX 8203	GS33
	CX 8101	
	AV 57151/	

1/ Variety widely grown or will be widely grown

2/ phytotoxicity = burn or malformation 0 = none 10 = very severe

3/ 2 replications

Effect of acifluorfen postemergence on hairy nightshade. Orr, J.P. On June 16, 1983 acifluorfen 2E was applied postemergence at rates 1/16 through 1/3 lb/A a.i. was applied to sprinkler irrigated canning tomatoes in the 1st to 2nd true leaf stage and hairy nightshade in the cotyledon 1st true leaf stage. Rates from 1/16 to 1/4 lb/A a.i. resulted in poor control of hairy nightshade and slight to moderate burn on the tomatoes. Acifluorfen at 1/3 lb/A a.i. gave 70% control of hairy nightshade with severe burn to the tomatoes.

The application was made with a CO_2 backpack sprayer in 50 gallon per acre on a clay loam soil on the Sicata Ranch in Solano County, California

Effect of acifluorfen postemergence on hairy nightshade

Herbicide	Control Rate lb/A a.i.	Hairy nightshade 1/	Tomato Burn 2/ 3/
acifluorfen 2E	1/16	1.0	0
acifluorfen	1/10	4.0	1.0
acifluorfen	1/8	5.0	2.0
acifluorfen	1/6	5.5	2.0
acifluorfen	1/4	6.0	3.0
acifluorfen	1/3	7.0	4.0
control	---	0.0	0.0

1/ 10 = 100% Control

2/ 0 = no injury

3/ 3 replications

Effect of postemergence layby soil treatments on Ferrymorse 6203 canning tomatoes.

Orr, J.P. and D. Colbert: Various preemergence herbicides were applied post-directed to Ferrymorse 6203 canning tomatoes on June 8, 1983 and incorporated 2-3 inches with a power tiller in a clay loam soil in Walnut Grove, California. Application was made with a CO_2 backpack sprayer directed to the base of tomatoes in the 7 leaf stage 8 inches high. Metolachlor at 3 and 4 lb/A a.i. ethafluralin at 1.12 to 1.7 lb/A a.i., dinitramine at 0.3 to 0.75 lb/A a.i. and acifluorfen at 0.25 to 0.75 lb/A a.i. gave good control of hairy nightshade. The tomatoes had excellent tolerance to all treatments.

Effect of postemergence layby soil treatments on Ferrymorse 6203 canning tomatoes

Herbicides	rate lb/A a.i.	tomato1/ 4/ stand/vigor reduction	% ripe @ harvest	control 2/ 3/ hairy nightshade
pendimethalin	0.75	0/0	95	0
pendimethalin	1.5	0/0	92	0
pendimethalin + metolachlor	0.75 + 3.0	0/0	93	10
pendimethalin + metolachlor	1.5 + 3.0	0/0	92	10
trifluralin	0.75	0/1	96	0
ethafluralin	1.12	0/0	95	10
ethafluralin	1.30	0/0	95	10
ethafluralin	1.70	0/0	95	10
metolachlor	3.0	0/0	95	10
dinitramine	0.30	0/0	95	0
dinitramine	0.60	0/0	97	10
dinitramine	0.75	0/0	80	10
acifluorfen	0.25	0/0	97	10
acifluorfen	0.50	0/0	94	10
acifluorfen	0.75	0/0	91	10
pendimethalin	1.00	0/0	95	0
metolachlor	4.00	0/0	95	10
control	--	0/0	95	0

1/ are 3 replications

2/ low population

3/ weed control 0 = none

4/ stand/vigor reduction 0 = none

Effect of postemergence layby soil treatments on yellow nutsedge and hairy nightshade in canning tomatoes. Orr, J.P. and D. Colbert. Various preemergence herbicides were applied post-directed to Ferrymorse 6203 canning tomatoes on June 7, 1983 and incorporated 2 to 3 inches with a power tiller in a sandy loam soil in Elk Grove, California. Application was made with a CO_2 backpack sprayer directed to the base of the tomatoes in the 7 true leaf stage, 8 to 10 inches high.

Metolachlor at 3.0 lb/A a.i. gave excellent control of yellow nutsedge.

All treatments gave poor control of hairy nightshade. Tomato tolerance was excellent to all herbicide treatments.

Effect of postemergence layby soil treatments on yellow nutsedge and hairy nightshade in canning tomatoes

	Rate	Control		Ferrymorse 6203
Herbicides	lb/A a.i.	Y. Nutsedge	H. Nightshade 1/ 2/	Stand/Vigor reduction 3/ 4/
pendimethalin	0.75	0	0	0/0.6
pendimethalin	1.5	0	0	0/0
pendimethalin + metolachlor	0.75+3.0	9.3	0	0.6/0.6
pendimethalin + metolachlor	1.5 +3.0	10	0	0.3/0
trifluralin	0.75	0	0	0/0.6
ethafluralin	1.12	0	3.3	0/0
ethafluralin	1.30	0	3.3	0.3/0.3
ethafluralin	1.70	6.3	0	0/0
metolachlor	3.0	9.3	5.6	0/0
metolachlor	3.0	9.3	0	0/0
dinitramine	0.3	0	0	0/0
dinitramine	0.6	0	3.3	0/0
dinitramine	0.75	0	3.3	0/0
acifluorfen	0.25	0	3.3	0/0
acifluorfen	0.50	0	3.3	0/0.6
acifluorfen	0.75	0	3.3	0/0
pendimethalin	1.0	0	0	0/0.3
metolachlor	4.0	9.3	0	0.3/0.3
control		0	0	0/0.3

1/ weed control 0 = none 10 = 100%

2/ very high population

3/ tomato stand/vigor reduction 0 = none

4/ 3 replications

Effect of acifluorfen and thiobencarb applied preplant incorporated to Ferrymorse 6203 processing tomatoes. Orr, J.P. Acifluorfen and thiobencarb was applied June 7, 1983 preplant incorporated under sprinkler irrigation on a clay soil in Sacramento, California.

Application was made with a CO_2 backpack sprayer and replicated 4 times.

Rates of acifluorfen was from 0.1 to 0.3 lb/A and thiobencarb was 2.0 and 4.0 lb/A.

The acifluorfen at 0.3 lb/A resulted in a 17% stand reduction and a 27% vigor reduction to the tomatoes. Thiobencarb gave no dodder control on tomato stand or vigor reduction at 2 and 4 lb/A.

Effect of acifluorfen and thiobencarb applied preplant incorporated to Ferrymorse 6203 processing tomatoes

Treatment	Rate lb/A a.i.	Reduction 8/27/83 Tomato Stand	Vigor 1/	Dodder Control	Barnyard grass 2/ Control
acifluorfen	0.10	0	0	---	10
aciflurofen	0.13	0	0	---	10
acifluorfen	0.18	0	0	---	10
acifluorfen	0.25	0	0	---	10
acifluorfen	0.30	1.7	2.7	---	10
thiobencarb	2.0	0	0	0	10
thiobencarb	4.0	0	0	0	10
check	---	0	0	0	0

1/ 0 = no vigor reduction

2/ 10 = 100% control

Effect of acifluorfen and acifluorfen plus metribuzin for control of Jimsonweed in canning tomatoes. Orr, J.P. and R. Mullen. On May 24, 1983 acifluorfen at 1/8, 1/4 and 1/2 lb/A a.i. was applied to Ferrymorse 6203 tomatoes (furrow irrigated) in the 2 true leaf stage and Jimsonweed in the cotyledon to 2 true leaf stage. On May 31 a second application of acifluorfen at 1/2 lb/A a.i. was made in combination to the above treatments. Tomatoes were in the 4 true leaf stage and Jimsonweed in the 2 true leaf stage. Metribuzin was applied 1 week after to initial acifluorfen treatments at rates of 1/4 and 1/2 lb/A a.i. on May 31. All treatments were made in 50 gallon per acre water. Rates of acifluorfen from 1/8 to 1/2 lb/A a.i. resulted in fair to excellent control of Jimsonweed with slight to moderate vigor reduction and yields of 21.5 to 20.1 Tons/Ac. The combination treatment of acifluorfen at 1/2 plus 1/2 lb/A resulted in increased vigor reduction to 32% and a yield reduction down to 17.2 Tons/Ac. The highest yielding herbicide treatment of 24.2 Tons/Ac was acifluorfen at 1/4 lb/A a.i. followed 1 week later by 1/4 lb/A a.i. metribuzin. The weedy control yielded 12.6 Tons/Ac followed by the hoed control of 28.0 Tons/Acre.

Effect of acifluorfen and acifluorfen plus metribuzin for control of Jimsonweed in canning tomatoes

Herbicides	Rate lb/A	Jimsonweed Control 2/ Coty-2 true lvs	2 true lvs	Reduction Stand/Vigor 3/ tomato	Yield 4/ T/A
acifluorfen 2E	1/8	7.0	0.0	0/1.6	21.5
acifluorfen	1/4	9.5	3.0	0/2.5	21.0
acifluorfen	1/2	10.0	5.0	0/2.2	20.1
acifluorfen	1/8 + 1/2	8.0	6.0	0/1.7	16.6
acifluorfen	1/4 + 1/2	10.0	6.0	0/2.0	18.7
acifluorfen	1/2 + 1/2	10.0	6.0	0/3.2	17.2
acifluorfen + metribuzin	1/4 + 1/4	10.0	3.0	0/1.2	24.2
acifluorfen + metribuzin	1/2 + 1/2	10.0	3.0	0/5	20.7
control (weedy)	----	0.0	0.0	0/0	12.6
control (hoed) 1/	----	10.0	10.0	0/0	28.0

1/ $ 100.00/A hoe cost

2/ weed control 10 = 100%

3/ tomato injury 0 = none

4/ ave 4 reps

Effect of acifluorfen postemergence on Ferrymorse 6203 tomatoes. Orr, J.P.
On May 19, 1983 acifluorfen 2E at rates from 1/32 to 1/3 lb/A a.i. was applied to sprinkler irrigated tomatoes in the 2 to 4 leaf stage. Tomato vigor reduction was very slight at the highest rate. There was slight thickening and twisting at the 1/8 to 1/3 lb/A rate.

Treatments were made with a CO_2 backpack sprayer in 50 gallon per acre water on the Ferreria Ranch, a clay loam soil, located in Walnut Grove, California.

Effect of acifluorfen postemergence on Ferrymorse 6203 tomatoes

Herbicide	rate lb/A a.i.	tomato stand reduction	tomato [1/] vigor reduction	tomato [2/] phytotoxicity
acifluorfen	1/32	0	0	0
acifluorfen	1/16	0	0	0
acifluorfen	1/8	0	0	thickening/twisting
acifluorfen	1/4	0	0	thickening/twisting
acifluorfen	1/3	0	0.6	thickening/twisting
control	---	0	0	0

1/ stand & vigor reduction 0 = none

2/ 4 replications

Turfgrass suppression using postemergence herbicides. Brenner, L.K. and R.D. William. Perennial sods or living mulches are managed in orchards to control soil erosion and improve traffic conditions. Reducing grass competition by using dwarf turfgrasses, postemergence grass herbicides, and small equipment may allow adoption of living mulches in other horticultural cropping systems such as Christmas trees, grapes, and small fruits.

A perennial ryegrass (*Lolium perenne* L.) was suppressed using sublethal rates of fluazifop, sethoxydim, and glyphosate. Three cultivars of perennial ryegrass, 'Derby', 'Elka', and 'Manhattan II', were treated in summer at rates of 0.02 to 1.2 kg/ha using a logarithmic sprayer. A second experiment was established in the fall to compare specific rates and timings.

Preliminary results of both trials indicate that a single application of herbicide can suppress growth for six to eight weeks without limiting regrowth. Sethoxydim is more phototoxic to established ryegrass than fluazifop at similar rates. Three weeks after treatment in the fall, fluazifop suppressed the grass at rates of 0.13, 0.32, and 0.51 kg/ha; sethoxydim at 0.02, 0.04, and 0.1 kg/ha; and glyphosate at 0.13, 0.32, and 0.57 kg/ha. After six weeks, fluazifop and low rates of glyphosate continued to suppress grass growth, but excessive injury occurred in the sethoxydim treatments.

Subsequent studies will determine the effectiveness of the treatments under spring moisture and temperature regimes, refine timing and application techniques, evaluate crop/sod interactions, and determine the impact of the living mulch on weed populations. (Oregon State University, OR 97331)

Competitiveness and control of false dandelion in young filbert orchards. Riggert, Craig. Over the last 15 years, orchard floor management in filberts has shifted from clean cultivation to vegetation management with herbicide strips and flailing. While shading in older orchards restricts competitive vegetation, young orchards are plagued with excess weed growth. Frequent flailing of young orchards does limit some weed infestations, but encourages others. False dandelion thrives under flailed conditions. Filberts are not irrigated in the Willamette Valley and must rely on stored soil moisture. Competition for soil moisture can result in reduced tree vigor.

In 1983, soil moisture blocks were placed in two young filbert orchards to observe the degree to which false dandelion reduced soil moisture. The blocks revealed significant soil moisture losses from 12, 24, and 36-inch depths near false dandelion when compared with areas where the weed was controlled.

The phenoxy herbicide 2,4-D is now cleared for use in filberts. Demonstration plots were established in 1983 to evaluate and compare various application dates, herbicide and surfactant rates, and 2,4-D products.

Application rates of 1 and 2 pounds ai/acre were applied on May 11 and July 5. Some plots received herbicides on both dates. Surfactant rates of 8 and 16 ounces per 100 gallons were also compared.

The plots were evaluated in July and August. The most effective treatment was repeated applications of 2,4-D. There were no observable differences between the herbicide rates in the study, nor was there any measurable difference between rates of surfactant. All 2,4-D products performed with equal effectiveness. (Oregon State University Extension Service, OR 97331)

Evaluation of glufosinate in plums. Torell, J.M. and S.A. Dewey. This experiment was initiated at the Southwest Idaho Research and Extension Center in 1982 to evaluate the efficacy of glufosinate alone and in a tank-mix with norflurazon. The herbicide treatments were initially applied on May 13, 1982 and were reapplied on April 6, 1983. The glufosinate treatments were applied again on August 4, 1983 to evaluate their efficacy for the control of summer annual weeds. The plots were 8.8m by 15m and were arranged in a completely randomized design with four replications. The herbicides were applied with a hand-held sprayer calibrated to deliver 468 l/ha at 2.5 kg/cm^2 pressure.

Visual ratings for weed control efficacy were taken on April 15, 1983 and August 19, 1983. The trees were observed throughout the season for evidence of phytotoxicity from glufosinate that may have contacted low-lying leaves. The early evaluation indicated that glufosinate provided excellent control of downy brome, tumble mustard and blue mustard. Herbicidal activity on the other species was generally good but evaluation was more difficult because the stand of these weeds was not uniform. The activity of glufosinate was particularly high on blue mustard. Nearly all weeds with a vigor reduction rating greater than 90 died within a week of the evaluation date. Two days after application good broad-spectrum activity from paraquat was evident on the weeds whereas, glufosinate phytotoxicity to blue mustard was severe but symptoms were just beginning to be visible on downy brome. Six days after application severe glufosinate phytotoxicity was observed on all vegetation under the trees.

Excellent activity on pigweed and green foxtail in roto-tilled areas between the trees was observed after the late application of glufosinate. When glufosinate was applied to all weeds growing near the trees, phytotoxicity was observed downward from the height of the sprayer boom. Severe phytotoxicity was observed on low-lying plum leaves that were sprayed but symptoms did not appear above the point of application. Thus, the amount of glufosinate translocation appears to be minimal. (Southwest Idaho Research and Extension Center, University of Idaho, Parma, ID 83660)

Table 1. Evaluation of glufosinate in plums.

Treatment	Rate kg ai/ha	Vigor Reduction[1/][2/]						
		Dobr	Voba	Tumu	Yepw	Blmu	Wesa	Refi
glufosinate + norflurazon	1.1 + 2.2	84	50	95	33	99	20	90
glufosinate + norflurazon	1.7 + 2.2	90	70	85	60	97	33	85
glufosinate + norflurazon	2.3 + 2.2	88	60	88	48	97	47	90
glufosinate	1.7	94	85	95	68	99	20	90
paraquat + X-77	0.8 + 0.63 ml/l	90	73	68	95	90	--[3/]	--[3/]
Check		0	0	0	0	0	0	0

[1/] Visual evaluation on a 0-100 scale 9 days after treatment. The treatments were applied on April 6, 1983.

[2/] Weed abbreviations: Dobr = downy brome, Voba = volunteer barley, Tumu = tumble mustard, Yepw = yellowflower pepperweed, Blmu = blue mustard, Wesa = western salisfy, Refi = redstem filaree

[3/] Western salsify and redstem filaree were not evaluated in any of the plots treated with paraquat.

Table 2. Weed control from late glufosinate treatments

Treatment[1/]	Rate kg ai/ha	Stand Reduction[2/][3/]		
		Piwe	Ruth	Grass
norflurazon/glufosinate	2.2/1.1	69	33	86
norflurazon/glufosinate	2.2/1.7	75	80	95
norflurazon/glufosinate	2.2/2.3	98	97	98
glufosinate	1.7	72	68	90
Check		0	0	0

[1/] Glufosinate was applied on August 4, 1983. The combination treatments were applied as tank-mixes on April 6, 1983.

[2/] Stand reduction values are the means of visual evaluations on a 0-100 scale. 0 = mortality not different from the check; 100 = complete kill.

[3/] Abbreviations: Pìwe = pigweed (redroot pigweed, Powell amaranth and prostrate pigweed); Ruth = Russian thistle; Grass = green foxtail and downy brome. Green foxtail was the predominant grass when the late treatments were applied.

Evaluation of preemergence herbicides in grapes. Torell, J. M., S. A. Dewey and C. R. Salhoff. An experiment was conducted at the Southwest Idaho Research and Extension Center to evaluate the performance of preemergence herbicides for the control of annual weeds in grapes. Herbicides were applied on May 12, 1982 with a handheld sprayer calibrated to deliver 280.5 ℓ/ha of spray solution. The experimental design was a randomized complete block with 5 replications.

Dichlobenil was the outstanding treatment in terms of weed control efficacy but resulted in considerable phytotoxicity as evidenced by a chlorotic ring around the leaf margins. The other treatments did not provide a high degree of weed control. In 1983, all of the treatments exhibited residual activity on downy brome. The visual evaluations for tumble mustard and redstem filaree were highly variable.

(Southwest Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Weeds Counts in 1982

Treatment	Rate kgai/ha	Mean # of plants per quadrant (1'x6')[1/],[2/] WG	OG	PL	RT	KO	OB	TW
Check	-	10.4a	8.0a	2.6a	2.2b	11.8a	2.0ab	37.0a
Oryzalin	4.5	0.8b	0.8b	3.0a	1.2b	0.6b	4.2a	10.6b
Dichlobenil	6.7	0.0b	0.2b	0.0b	0.0b	0.0b	0.2b	0.4b
Oryzalin + Napropamide	2.25 + 2.25	0.0b	0.0b	2.6a	1.2b	0.4b	2.0ab	6.2b
Napropamide	4.5	0.0b	0.6b	1.8ab	8.5a	0.0b	3.8a	14.6b
Oryzalin	2.25	0.2b	0.2b	2.6a	1.0b	0.6b	4.6a	9.2b

[1/] Weed abbreviations: WG = witchgrass, OG = other grass (mostly barnyardgrass and green foxtail), PL = prickly lettuce, RT = Russian thistle, KO = Kochia, OB = other broadleaves, TW = total weed count.

[2/] Means followed by the same letter in the same column are not significantly different at the 0.05 level by Duncans Multiple Range Test.

Weed Control in Grapes

Treatment	Rate kgai/ha	Stand Reduction[1/],[2/] Dobr	Tumu	Refi
Check	-	0	0	0
Oryzalin	4.5	87	26	32
Dichlobenil	6.7	89	64	34
Oryzalin + Napropamide	2.25 + 2.25	92	0	40
Napropamide	4.5	81	16	32
Oryzalin	2.25	74	8	36

[1/] Visual evaluation of stand reduction, 0-100 scale. Evaluation on May 11, 1983.

[2/] Weed abbreviations: Dobr = downy brome, Tumu = tumble mustard, Refi = redstem filaree.

PROJECT 5.

WEEDS IN AGRONOMIC CROPS

Russel P. Schneider - Project Chairman

Postemergence herbicide evaluations for mixed annual grass control in seedling alfalfa. R.F. Norris, C.A. Frate, R.A. Lardelli. A field study designed to compare the efficacy of several new postemergence grass herbicides in seedling alfalfa was established at Rocky Hill Ranch in Woodlake, Tulare County, California. Herbicide treatments were applied on June 9, 1983, when the alfalfa was 6 to 8 inches tall. Size of weeds (barnyardgrass, yellow foxtail, feather finger grass, and crabgrass) varied from 4 to 12 inches. The experimental design was a randomized complete block with three replications; the plots were 8 by 10 ft. All applications were made with a CO_2 backpack handsprayer, equipped with tee jet 8004 flat fan nozzles and calibrated to deliver 40 gal/A. Field conditions on June 9 were: low air temperature was 69F, the high was 88F, and the sky was clear but hazy.

Visual evaluations on grass control were made on June 28, July 28, and September 13. Herbicide injury to alfalfa was not significant in any treatment when compared with the untreated check. Treatments of DPX-Y6202 at 0.25 and 0.50 lb/A, and DOWCO 453 at 0.25 and 0.50 lb/A resulted in the highest weed control through September 13. Sethoxydim and HOE-33171 appeared initially to be effective herbicides for grass control; however, their performance had weakened by the September 13 evaluation. Addition of diethatyl to sethoxydim increased the longevity of control. SC-1084 and fluazifop-butyl appeared weak in this trial. (Botany Department, University of California, Davis and Cooperative Extension, Visalia.)

Mixed annual grass control in seedling alfalfa

Herbicides	Rate lb ai/A	Overall grass control[1,2]		
		6/28/83[3]	7/28/83	9/13/83
Sethoxydim + Pace	0.25 + 1 qt	7.2 fgh	8.7 ef	6.0 cdef
Sethoxydim + Pace	0.50 + 1 qt	8.7 ij	9.7 f	6.0 cdef
Fluazifop-butyl + Pace	0.25 + 1%	4.7 bc	2.7 b	3.7 bc
Fluazifop-butyl + Pace	0.50 + 1%	5.2 bcd	3.3 bc	4.7 bcd
DPX-Y 6202 + Pace	0.25 + 1 qt	9.0 j	9.7 f	8.1 efg
DPX-Y 6202 + Pace	0.50 + 1 qt	9.9 j	9.5 f	8.1 efg
HOE 33171	0.25	8.2 hij	8.0 ef	5.7 bcd
HOE 33171	0.50	9.5 j	8.3 ef	6.8 defg
CGA-82725 + Atplus 411F	0.25 + 1 qt	6.8 efg	9.5 f	6.3 cdefg
CGA-82725 + Atplus 411F	0.50 + 1 qt	7.2 fgh	8.3 ef	5.0 bcd
RE-36290 + Pace	0.25 + 1 qt	6.3 def	7.0 de	5.0 bcd
RE-36290 + Pace	0.50 + 1 qt	7.5 fghi	9.7 f	6.8 defg
DOWCO 453 + Pace	0.25 + 1 qt	8.5 ij	9.7 f	8.8 fg
DOWCO 453 + Pace	0.50 + 1 qt	9.4 j	9.7 f	8.3 efg
Sethoxydim + Pace + Diethatyl	0.50 + 1 qt + 2.0	7.8 ghij	9.5 f	9.0 fg
Sethoxydim + Pace + Diethatyl	0.50 + 1 qt + 4.0	7.2 fgh	7.7 ef	7.0 defg
SC-1084 + RICO oil	0.25 + 1 qt	4.3 b	3.0 bc	2.3 ab
SC-1084 + RICO oil	0.50 + 1 qt	5.7 cde	5.0 cd	4.8 bcd
Untreated Check		0 a	0 a	0 a

---

[1] Species present: barnyardgrass, yellow bristle, feather finger grass, and crabgrass.

[2] Control rating: 0 = none; 10 = complete.

[3] Means with the same letters are not significantly different at 5% according to the Duncan's multiple range test.

Postemergence grass herbicides compared with early mowing for winter annual grass control in seedling alfalfa. R. F. Norris, and R. A. Lardelli. Winter annual weeds and volunteer wheat can be a serious problem in seedling alfalfa.

An alfalfa field, planted on September 20, 1982, near Davis, Yolo County, California was chosen for the experiment. The native weed population included wild oats and annual ryegrass in addition to a heavy stand of volunteer wheat. Three herbicide treatments and a mowing treatment were evaluated and compared.

At application, alfalfa height was 2 to 6 inches, while the grass species measured 1 to 2 ft. Treatments were applied on February 3, 1983 with a CO_2 backpack handsprayer with 8004 flat fan nozzles operated at 30 psi and delivering 40 gal/A of spray solution. Plot size was 8 ft by 20 ft, and each treatment was replicated four times in a randomized complete block design. On February 11, 1983 alfalfa and weeds were mowed and removed as one treatment.

Visual evaluations were made on March 4, 1983 and April 12, 1983. Yield data were obtained on May 24, 1983. The harvest operation was accomplished by mowing 3 ft by 20 ft strips from each plot. The alfalfa and grasses were separated from a subsample, the biomass dried, and percent weeds per plot calculated based on dry weight of each sample. Because of partial flooding during the late winter, evaluations of two treatments were based on only three replications. The flooding did not interact with the herbicides.

There was no phytotoxicity to the alfalfa from any of the herbicides. Excellent control of the grasses was achieved by the plots receiving sethoxydim. Control with fluazifop-butyl was equally good. Propham at 4 lb/A provided only partial control of the weeds; this may be the result of the late application date. The mowing treatment showed a slight increase in alfalfa stand and reduction in weeds present. (Botany Department, University of California, Davis.)

Control of winter annual weeds in seedling alfalfa[1]

		Alfalfa[2]			Grass control[3]		Harvest data 5/24	
		Stand	Vigor				Fresh wt. total	
Treatment	Rate lb ai/A	4/12	3/4	4/12	8/4	4/12	lb/plot	% weeds
Sethoxydim + Pace	1.0 + 1 qt	8.3 b	7.9 a	8.8 a	7.5 b	10.0 c	15.9 a	14.2 a
Fluazifop-butyl + Pace	1.0 + 1 qt	7.8 b	9.1 a	8.3 a	7.6 b	9.5 c	13.2 a	21.6 a
Propham	4.0	7.0 ab	7.8 a	8.3 a	5.3 b	6.8 b	17.8 ab	64.6 ab
Mowing		5.0 ab	7.0 a	8.0 a	7.1 b	5.5 b	23.3 b	89.5 b
Untreated Check		3.8 a	7.1 a	7.5 a	2.1 a	1.0 a	32.7 c	92.6 b

[1] Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

[2] 10 = complete stand, full vigor; 0 = no stand or vigor.

[3] 10 = complete control; 0 = no control.

Foxtail barley control in established alfalfa. Alley, H. P. and M. A. Ferrell. Foxtail barley is a common and serious problem in many of the alfalfa production areas. There is a need for an effective dormant or post-emergence herbicide for foxtail barley control in established alfalfa other than the chemicals now available. Four new grass herbicides were applied to an almost solid stand of foxtail barley in a weak stand of alfalfa on May 25, 1983 to evaluate their efficacy and crop phototoxicity. At time of treatment the foxtail barley had 3 inches of vegetative growth and the alfalfa 4 to 6 inches new growth.

Foxtail barley control and crop phytotoxicity readings were visually evaluated approximately five weeks following application. None of the herbicides included in the experiment caused any apparent damage to the alfalfa. The only treatment significantly reducing the foxtail barley infestation was Dowco 453. Fluazifop-butyl reduced the height of foxtail barley to a uniform 3 to 4 inches with the plants remaining green and succulent. Sethoxydim and CGA-82725 showed little or no activity toward the foxtail barley at the rates applied. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1252.)

Foxtail barley control-established alfalfa

Treatment[1]	Rate lb ai/A	Foxtail Control[2] %	Alfalfa[2] Damage
sethoxydim + Atplus 411F	0.2 + 1 qt	0	0
sethoxydim + Atplus 411F	0.3 + 1 qt	25	0
sethoxydim + Atplus 411F	0.4 + 1 qt	0	0
sethoxydim + Atplus 411F	0.6 + 1 qt	30	0
fluazifop-butyl + Atplus 411F	0.25 + 1% v/v	10	0
fluazifop-butyl + Atplus 411F	0.375 + 1% v/v	20	0
fluazifop-butyl + Atplus 411F	0.5 + 1% v/v	35	0
Dowco 453 + X-77	0.25 + 0.25% v/v	90	0
Dowco 453 + X-77	0.375 + 0.25% v/v	94	0
Dowco 453 + X-77	0.5 + 0.25% v/v	100	0
CGA-82725 + Atplus 411F	0.25 + 1 pt	0	0
CGA-82725 + Atplus 411F	0.375 + 1 pt	0	0
CGA-82725 + Atplus 411F	0.5 + 1 pt	0	0

[1] Herbicide applied May 25, 1983.
[2] Visual evaluations July 6, 1982.

Downy brome control in alfalfa using foliar applied herbicides. Evans, J.O. and R.W. Gunnell. Downy brome (*Bromus tectorum* *L*.) continues to gain importance as a serious weed in several agronomic crops in the intermountain region. It is reported to exist in sufficient stands to significantly reduce yield and quality in about half of the alfalfa hay and seed fields in Utah. The foliar applied herbicides are proposed to allow growers a choice between spring spraying versus mechanical removal of annual grasses, or as alternatives to presently registered soil applied herbicides which have previously demonstrated fall or dormant crop selectivity against downy brome. Since foxtail barley (*Hordeum* *jubatum* *L*.) was also present, evaluations were recorded for this weed.

This experiment was conducted in Logan, Utah in an alfalfa field where the crop had attained a height of approximately 7 inches when the experiment was initiated. Downy brome was 7 to 10 inches tall and foxtail barley was 18 inches high. Treatments were made with a bicycle sprayer delivering 20 gpa water as carrier and 30 psi pressure through 8002 nozzles. Plot size was 11 X 30 feet and replicated four times. Evaluations were made July 29, 1983 at which time downy brome was represented in the control plots at 217 plants/M^2 and foxtail barley counts averaged 7/M^2. Dowco 453ME, DPX-Y6202 and fluazifop were very active against the two weeds, however, the latter compound failed to control the species satisfactorily at the lowest suggested dosage. Sethoxydim was noteably weak against the two species under test, but similar to all other herbicides used in this study, sethoxydim was safe on alfalfa. Adding a broadleaved weed herbicide such as bromoxynil did not detract from the grass removing activity of Dowco 453ME, but did slightly decrease the action of DPX-Y6202, and completely removed the grass control component of fluazifop. The grass control ability of fluazifop was reduced about 90 percent when it was tank mixed with bromoxynil. Previous studies have demonstrated the requirement of a wetting agent (Atplus 411F as an example) in order for the foliar applied herbicides to express their grass herbicidal action. This principle was shown to be true for DPX-Y6202 also since its grass control characteristics were improved 100 fold at the lowest dosage when Atplus 411F was mixed with the formulated product. These four herbicides when applied alone or in combination with bromoxynil at the dosages tested here were shown to be very safe for alfalfa even when an additive such as Atplus 411F was added to the spray solution. Interactions between broadleaf and grass specific compounds are indicated in the results of this trial which resemble the antagonisms reported by other scientists working with small grain herbicides. (Plant Science Department, Utah State University, Logan, Utah 84322)

Downy brome (*Bromus tectorum L.*) and foxtail barley (*Hordeum jubatum L.*) control in alfalfa using foliar applied herbicides together with surface additives or bromoxynil. Evaluation 7-29-83.

Treatment	Rate	Crop response	Weed Response (% Control)	
	oz/A	Injury index	Downy brome	Foxtail barley
Dowco 453ME	2 +	0	98	86
Atplus 411F	1%			
Dowco 453ME	4 +	0	100	100
Atplus 411F	1%			
Dowco 453ME	8 +	0	100	100
Atplus 411F	1%			
Dowco 453ME	4 +	0	98	95
Bromoxynil	4			
DPX-Y6202	1	0	0	0
DPX-Y6202	2	0	89	92
DPX-Y6202	4	0	98	100
DPX-Y6202	1 +	0	100	98
Atplus 411F	1%			
DPX-Y6202	2 +	0	100	100
Atplus 411F				
DPX-Y6202	4 +	0	100	100
Atplus 411F	1%			
DPX-Y6202	2 +	0	85	86
Bromoxynil	4			
Fluazifop	4 +	0	30	38
Atplus 411F	1%			
Fluazifop	8 +	0	90	84
Atplus 411F	1%			
Fluazifop	16 +	0	100	99
Atplus 411F	1%			
Fluazifop	8 +	0	0	0
Bromoxynil	4			
Sethoxydim	4 +	0	0	0
Atplus 411F	1%			
Sethoxydim	8 +	0	10	18
Atplus 411F	1%			
Sethoxydim	16 +	0	0	0
Atplus 411F	1%			
Sethoxydim	8 +	0	0	0
Bromoxynil	4			

Annual grass and broadleaf weed control in dormant alfalfa, year of treatment and one year following treatment. Alley, H. P. Treatments were applied to semi-dormant alfalfa on April 16, 1982. Alfalfa was breaking dormancy with green leaf growth at the base of the plant. The downy brome was in the 1 to 3 leaf stage with a very dense stand due to good fall moisture. The only broadleaf weed of any density was field pepperweed which was in the 8 to 12 leaf/1.27 to 2.54 cm leaf height. Air temperature was 45F with a relative humidity of 44% at time of treatment. The soil on the experimental site was classified as a loam (50.8% sand, 26.0% silt, 23.2% clay with 2.6% organic matter and a 6.6 pH). All treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 374 L/ha solution at 2.8 kg/cm^2 pressure. Plots were 2.7 x 4.57 m arranged in a randomized complete block, with three replications.

Visual weed control and crop phytotoxicity evaluations were made May 28, 1982, approximately five weeks following treatment and May 21, 1983 one year following treatment. There was no serious crop damage or stunting from any of the treatments. Terbacil, metribuzin and the combination of hexazinone/terbacil at the higher rates of application gave 93 to 100% control of the annual broadleaf and grass weeds, as evaluated five weeks following treatment. At this early evaluation date, fluazifop-butyl + WA exhibited excellent downy brome control at a rate of 0.56 kg/ha and above with no activity on the annual broadleaf weed. When evaluated one year following treatment, none of the herbicides showed residual control. Terbacil and fluazifop-butyl gave only 50 to 60% reduction in downy brome. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1251.)

Downy brome and field pepperweed control

Herbicides[1]	Rate lb ai/A	Crop Phytotoxicity[2]		Percent Control[3]		
		Chlorosis	Stunting	FP 1982	DB 1982	DB 1983
terbacil 80W	0.56	0.3	0.3	83	60	40
terbacil 80W	1.12	0.3	0.3	98	93	60
hexazinone 90SP	0.56	0.0	0.0	100	98	20
hexazinone/terbacil	0.56 + 0.56	0.0	0.0	100	93	20
hexazinone/terbacil	0.56 + 0.84	0.0	0.0	100	97	0
metribuzin 70DF	0.84	0.0	0.0	100	93	0
metribuzin 70DF	1.12	0.3	0.0	100	96	0
sethoxydim 1.53 EC + WA*	0.22	1.0	0.3	0	27	0
sethoxydim 1.53 EC + WA*	0.44	1.0	1.3	0	33	0
CGA 82725 2EC + WA*	0.28	1.0	1.3	0	3	0
CGA 82725 2EC + WA*	0.43	0.6	0.6	0	3	0
CGA 82725 2EC + WA*	0.56	1.0	1.0	0	17	0
fluazifop-butyl 4E + WA**	0.28	1.0	1.0	0	77	20
fluazifop-butyl 4E + WA**	0.56	0.6	0.6	0	98	10
fluazifop-butyl 4E	0.84	1.0	1.0	0	17	40
+ WA**		1.3	1.3	0	100	40
fluazifop-butyl 4E + WA**	1.12	0.0	0.0	0	100	50

[1] Herbicides applied April 16, 1982.

[2] Crop phytotoxicity rating 0 to 10. 0 = no chlorosis or stunting; 10 = no green color and complete stunting of alfalfa.

[3] Visually evaluated May 28, 1982 and May 21, 1983. Abbreviations: FP = field pennycress; DB = downy brome.

*Atplus 411F at 0.25% v/v.

**Atplus 411F at 2.33 L/ha.

Downy brome and annual broadleaf weed control in established alfalfa. Alley, H.P. The treatments were applied to dormant established alfalfa on March 23, 1983. At time of treatment the downy brome had 1/2 to 3/4 inch leaf growth. A minor infestation of field pepperweed (*Lepidium campestre* (L.) R. Br.) and smallseed falseflax (*Camelina microcarpa* (Andrz.)) was present in the plots. Air temperature was 42F with a relative humibity of 83% at time of treatment. The soil was classified as a silt loam (25% sand, 61% silt, 14% clay with 1.4% organic matter and 7.6 pH.) All treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa at 40 psi. Plots were 9 x 30 ft. arranged in a randomized complete block.

Weed control evaluations made on May 31, 1983, approximately five weeks following treatment, showed that fluazifop-butyl and Dowco 453 were the only herbicides showing activity on downy brome. Fluazifop-butyl applied at 0.375 and 0.5 lb ai/A gave 90 and 92% reduction in downy brome and Dowco 453 applied at 0.125 and 0.25 lb ai/A gave 100% downy brome control. None of the treatments exhibited a potential for broadleaf weed control. Fluazifop-butyl and CGA-82725 reduced the height of alfalfa by 25%. (Wyoming Agric. Exp. Sta., Laramie, 82071, SR 1249.)

Downy Brome and Broadleaf Weed Control

Treatment[1]	Rate lb ai/A	Percent Control[2]		
		DB	FP	FF
fluazifop-butyl + Atplus 411F	0.125 + 1% v/v	27	13	0
fluazifop-butyl + Atplus 411F	0.25 + 1% v/v	70	13	0
fluazifop-butyl + Atplus 411F	0.375 + 1% v/v	90	0	0
fluazifop-butyl + Atplus 411F	0.5 + 1% v/v	92	0	0
sethoxydim + Atplus 411F	0.2 + 1 qt	7	0	0
sethoxydim + Atplus 411F	0.3 + 1 qt	0	0	0
sethoxydim + Atplus 411F	0.4 + 1 qt	13	0	0
Dowco 453	0.125	100	33	0
Dowco 453	0.25	100	47	0
CGA-82725 + Atplus 411F	0.375 + 1 qt	0	7	0
CGA-82725 + Atplus 411F	0.5 + 1 qt	20	7	0

[1] Herbicides applied April 23, 1983.

[2] Visual evaluations May 31, 1983. Abreviations: DB = downy brome grass; FP = field pepperweed; FF = smallseed falseflax.

Postemergence quackgrass control in established alfalfa. Evans, J.O. and R.W. Gunnell. A quackgrass (Agropyron repens L.) trial was initiated on April 26, 1983, in an eleven year old alfalfa field near Hyde Park, Utah. Quackgrass occupied about 70 percent of the ground area. Alfalfa and quackgrass were between 3 and 6 inches tall at treatment time. None of the postemergence grass herbicides evaluated in this trial controlled quackgrass throughout the season when employed as a single early postemergence application. Approximately one month after spraying, several treatments appeared to be controlling quackgrass satisfactorily. Dowco 453ME, DPX-Y6202,and fluazifop were the most active, and sethoxydim was less active against this species. Higher dosages of Dowco 453ME and DPX-Y6202 caused stunting, necrosis and senescence of above ground quackgrass vegetation while fluazifop injury consisted of stunting and less severe necrosis than the two previously mentioned candidate herbicides.

When bromoxynil was tank mixed with the four grass herbicides a significant decrease in grass activity was noted in all except the Dowco 453ME plus bromoxynil treatment. The plot area was harvested on June 15, 1983, and postharvest rainfall and irrigation created ideal conditions for both crop and weed regrowth. Prior to second cutting on August 1, 1983, plots were reevaluated, and surprisingly there was no detectable difference between the check and any of the treatments. Quackgrass, 8 to 12 inches tall, was green and actively growing throughout the entire plot. None of the treatments in the study caused measureable injury to alfalfa or dandelion. (Plant Science Department, Utah State University, Logan, Utah 84322)

Postemergence quackgrass control in established alfalfa. Hyde Park, Utah

Treatment	Rate oz/A	Percent control of quackgrass	
		May 31, 1983	August 1, 1983
Dowco 453ME + 411F	2 + 1%	65	0
Dowco 453ME + 411F	4 + 1%	84	0
Dowco 453ME + 411F	8 + 1%	88	0
Dowco 453ME + bromoxynil	4 + 4	83	0
DPX-Y6202	1	0	0
DPX-Y6202	2	10	0
DPX-Y6202	4	51	0
DPX-Y6202 + 411F	1 + 1%	65	0
DPX-Y6202 + 411F	2 + 1%	79	0
DPX-Y6202 + 411F	4 + 1%	85	0
DPX-Y6202 + bromoxynil	2 + 4	20	0
Fluazifop + 411F	4 + 1%	54	0
Fluazifop + 411F	8 + 1%	75	0
Fluazifop + 411F	16 + 1%	79	0
Fluazifop + bromoxynil	8 + 4	40	0
Sethoxydim + 411F	4 + 1%	10	0
Sethoxydim + 411F	8 + 1%	23	0
Sethoxydim + 411F	16 + 1%	64	0
Sethoxydim + bromoxynil	8 + 4	10	0

Quackgrass control in alfalfa. Chase, R. L. Trials were established in six counties in Utah in the fall of 1982 to evaluate the effectiveness of several herbicides on quackgrass in alfalfa. Pronamide and hexazinone were applied in the fall. Hexazinone was also applied at two different times in the spring. Fluazifop, sethoxydim, and glyphosate were applied in early spring. Several growers had reported success in using low rates of glyphosate on quackgrass before the alfalfa greened up in the spring. The plots were 11 by 30 feet and replicated four times in a randomized block design. Herbicides were applied with a bicycle sprayer at 20 gpa. Glyphosate was applied at 10 and 20 gpa.

Visual evaluations were made in June, 1983. Hexazinone gave very little control when applied in the fall with the exception of Piute County. Spring application results with hexazinone were variable, ranging from no control in two counties with the early spring application to 86% control in Morgan County with the late spring application. Fluazifop and sethoxydim gave good control (79 and 84%), but rates were exceedingly high from an economic standpoint. Glyphosate control was not consistent. Some injury to the alfalfa was also noted within a month after application, but was not permanent. There were no significant differences between control with 10 gpa as compared to 20 gpa.

A yield study done on June 14 in Wasatch County showed that the quackgrass in the check plots resulted in a 76% loss of alfalfa produced as compared to the herbicide treated plots.

Studies will be continued in 1983-84. (Utah State University Extension, Logan, Utah 84322)

Summary of quackgrass trials 1982-83

County Average % Control *

Treatments	Rate	Fall or Spring	Cache	Utah	Wasatch	Summit	Piute	Morgan	Average
pronamide	1.00	F	55c	26bcd	85a	63ab	66ab	90a	64
pronamide	2.00	F	84ab	65a	97a	70ab	84ab	94a	82
hexazinone	1.00	F	0	0d	10d	0	61abc	15cd	14
hexazinone	1.00	S_1	0	0d	85a	63ab	40c	35bc	37
fluazifop	.75	S	94a	43abc	97a	73ab	75ab	91a	79
fluazifop	1.00	S	96a	49ab	97a	81a	88a	95a	84
sexthoxydim	.75	S	74b	10d	-	-	-	-	42
sexthoxydim	1.00	S	93a	18cd	93a	70ab	70ab	88a	72
hexazinone	1.00	S_2	-	-	64b	70ab	-	86a	73
glyphosate	.19 (10 gpa)	S	-	-	10d	53bc	15d	-	26
glyphosate	.38 (10 gpa)	S	-	-	38c	73abc	58bc	-	56
glyphosate	.19 (20 gpa)	S	-	-	25c	25cd	10d	41bc	25
glyphosate	.38 (20 gpa)	S	-	-	56b	58abc	64abc	70ab	62

*Numbers are averages of four replications. Values followed by the same letter do not differ significantly at the 5% level according to Duncan's multiple range test.

Evaluation of graminicides in established alfalfa. Dewey, S.A. and J.M. Torell. This trial was conducted on a cooperator's field adjacent to the Kimberly Research and Extension Center to evaluate the efficacy of two graminicides for downy brome control and the effect of graminicides on the phytotoxicity of 2,4-DB to alfalfa. The soil at this study site is a silt loam.

The treatments were applied on April 22, 1983 to 2.4 x 9.1 meter plots with a hand-held sprayer calibrated to deliver 280.5 l/ha. The experimental design was a randomized complete block with three replications. At the time of herbicide application, downy brome was 5.1 to 17.8 centimeters tall and had not headed. Shepherdspurse and tansy mustard were present in the study area but were not evaluated.

Fluazifop-butyl provided good to outstanding control of downy brome as indicated by visual stand reduction ratings and grass dry weight. Sethoxydim treatments resulted in less satisfactory control of downy brome. However, alfalfa dry weight values for sethoxydim and fluazifop-butyl treatments were not significantly different.

Crop vigor was not affected by either of the graminicides or 2,4-DB applied alone. The use of 2,4-DB plus sethoxydim tank mixes resulted in severe phytotoxicity to the alfalfa, causing both plant stunting and leaf necrosis. Evidence of stunting persisted beyond the time of second cutting. Sethoxydim plus 2,4-DB tank mixes also appeared to slightly reduce grass control. Fluazifop-butyl plus 2,4-DB tank mix resulted in some leaf necrosis and alfalfa stunting, but symptoms were not as severe. Grass control did not appear to be reduced by the fluazifop-butyl plus 2,4-DB tank mix, and alfalfa dry weight measurements at harvest did not indicate any yield reduction. (District III Extension Office, University of Idaho, 1330 Filer Avenue East, Twin Falls, ID 83301)

Effect of postemergence graminicides on weed control and yield

Treatment	Rate	Crop VR[2]			Dobr SR[2],[3]			Alfalfa dry wt.[4]	Dobr dry wt.[4]
	kgai/ha	4-29	5-19	5-27	4-29	5-19	5-27	g/m²	g/m²
fluazifop-butyl	0.14	0	0	0	0	88	89	541.6 ab	52.3 bc
fluazifop-butyl	0.19	0	0	0	0	91	92	583.9 ab	9.2 c
fluazifop-butyl	0.28	0	0	0	0	92	93	517.7 ab	12.1 c
fluazifop-butyl	0.42	0	0	0	0	94	96	600.0 a	2.9 c
fluazifop-butyl	0.56	0	0	0	0	94	97	601.8 a	1.0 c
sethoxydim	0.22	0	0	0	0	53	62	551.3 ab	105.3 abc
sethoxydim	0.34	0	0	0	0	73	73	552.6 ab	48.7 bc
sethoxydim	0.45	0	0	0	0	83	79	537.4 ab	92.1 abc
sethoxydim + 2,4-DB amine	0.22 + 1.12	13	30	40	0	42	37	368.7 c	194.8 a
sethoxydim + 2,4-DB amine	0.45 + 1.12	16	50	50	0	85	58	306.2 c	147.8 ab
fluazifop-butyl + 2,4-DB amine	0.42 + 1.12	13	24	25	0	94	95	533.5 ab	2.5 c
2,4-DB amine	1.12	1	0	0	0	0	0	435.0 bc	155.4 ab
Check		0	0	0	0	0	0	520.3 ab	101.7 abc

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[1] Crop oil concentrate at 1.0% v/v was used with all herbicide treatments.

[2] VR = Vigor Reduction, SR = Stand Reduction. Visual evaluation on a 0-100 scale. The treatments were applied on April 22, 1983. The dates above columns designate dates of evaluation.

[3] Dobr = downy brome

[4] Means within a column followed by the same letter are not significantly different at the 5% level of probability as determined by Duncan's Multiple Range Test.

Post-emergence grass herbicides for use in alfalfa. Bell, C.E. and K. Little. Six post-emergence grass herbicides were compared for control of prairie cupgrass (Eriochloa contracta Hitchc.) in established alfalfa, var. CUF 101.

Application was made on June 30, 1983 to emerged prairie cupgrass, 4 to 6 inches tall in alfalfa 10 to 12 inches tall. Plot size was 4 feet by 25 feet in flat planted alfalfa with 4 replications. The crop was in the 5th year of the stand and had been irrigated 1 week prior to treatment. Herbicides were applied with a CO_2 pressured sprayer with 8003 nozzles at a spray volume of 30 gal./A. Six herbicides (sethoxydim, fluazifop-butyl, HOE 00581, CGA 82725, DPX-Y6202 and SC-1084) were applied at three rates each (.25, .5 and 1.0 lb. ai/A) along with an untreated control. A crop oil adjuvant was added to each treatment at the rate of 1 qt./A.

The trial was evaluated on August 2, 1983 for herbicidal activity. At the rate of .25 lb. ai/A, sethoxydim, HOE-00581, and DPX-Y6202 resulted in moderately successful control of the grass present (60-70%). At .5 lb. ai/A, these same herbicides resulted in 95% control and at 1.0 lb. ai/A, 100% control. The other three herbicides (fluazifop-butyl, CGA82725 and SC-1084) were not able to completely control this grass and only achieved moderately successful control at the highest rate (1.0 lb. ai/A). No phytotoxicity was observed from any treatment. (University of California Cooperative Extension, Court House, El Centro, Cal. 92243).

Treatment	lb. ai/A	Prairie Cupgrass Control (%)
Sethoxydim	.25	67.5
Sethoxydim	.5	95
Sethoxydim	1.0	100
Fluazifop-butyl	.25	25
Fluazifop-butyl	.5	40
Fluazifop-butyl	1.0	72.5
HOE 00581	.25	70
HOE 00581	.5	95
HOE 00581	1.0	100
CGA 82725	.25	25
CGA 82725	.5	65
CGA 82725	1.0	80
DPX-Y6202	.25	60
DPX-Y6202	.5	95
DPX-Y6202	1.0	100
SC-1084	.25	12.5
SC-1084	.5	27.5
SC-1084	1.0	82.5
Untreated Control		0

Preplant incorporated herbicides in field corn. Mitich, L.W. and N.L. Smith. This experiment was established on the UC Davis Experimental Farm to evaluate several preplant incorporated herbicides for weed control in field corn. Herbicides were applied to 30-inch preformed beds June 7, 1983, using a CO_2 backpack sprayer calibrated to deliver 40 GPA spray volume. A power driven bed shaper was utilized to incorporate an 8-inch band 2 to 3 inches deep down the bed centers. Four replications were used; the individual plot size was 10 by 20 ft. Corn (cultivar 'DeKalb XL-25A') was planted June 9 followed 4 days later by furrow irrigation. In addition to a natural weed population, barnyardgrass and black nightshade were seeded in the plot area.

No corn phytotoxicity was observed July 12 when weed control evaluations were made. Alachlor and metolachlor alone and in combination with cyanazine gave excellent weed control. Alachlor ME and alachlor were equal in performance. Good broadleaf control was observed from HP 783, an experimental formulation containing atrazine. Corn yield was reduced markedly in the plots where poor weed control occurred. (University of California Cooperative Extension, Davis, CA 95616)

Preplant incorporated herbicides in field corn

		Average weed control[1]					
Herbicide	Rate lb/A	Corn phyto[2]	Barnyard-grass	Redroot pigweed	Black nightshade	Common purslane	Yield lb/A
Cycloate	6.0	0.8	6.5	7.0	8.5	6.8	6319
Alachlor	3.0	0	10.0	10.0	9.8	10.0	6954
Alachlor	4.0	0	10.0	10.0	9.8	10.0	7499
Metolachlor	2.0	0	9.9	9.3	5.8	9.3	6758
Metolachlor	3.0	0	10.0	9.8	8.3	9.5	6754
Alachlor ME	3.0	0	10.0	10.0	9.5	9.8	6863
Alachlor ME	4.0	0	10.0	10.0	9.8	10.0	7090
Alachlor + Cyanazine	3.0 + 1.5	0	10.0	10.0	10.0	10.0	7043
Metolachlor + Cyanazine	2.5 1.5	0	10.0	10.0	10.0	10.0	7032
Vernolate + Safener	4.0	0	7.5	5.8	3.3	10.0	6403
Vernolate + Safener	6.0	0	9.5	7.8	3.0	10.0	6490
HP 783-B	1.78	0	0	0	0	0	4101
HP 783-B	2.23	0	0	0	0	0	4955
HP 783-B	4.45	0	0	0	0	0	4437
HP 783	2.23	0	5.5	10.0	10.0	10.0	5947
Control	-	0	0	0	0	0	4170

[1] Average of 4 replications where 0 = no weed control and 10 = total weed control

[2] Phyto 0 = no injury 10 = all dead

A comparison of mechanical incorporation, mechanical incorporation plus sprinklers and sprinkler irrigation alone for incorporating thiocarbamate herbicides. Evans, J.O. and R.W. Gunnell. Two thiocarbamate herbicides were used to determine whether presently available sprinkler irrigation equipment can adequately move thiocarbamate herbicides into soil sufficiently well to allow weed control comparable to the presently recommended mechanical procedures. EPTC and vernolate formulated with the currently registered crop safner R25788 were evaluated as to their ability to control redroot pigweed, prostrate pigweed, and lambsquarters. The experiment was conducted in Logan, Utah on a silt loam field containing 2.4 precent organic matter and a pH of 8.3. Due to excessive spring rains and wet fields the trial was established in early July, 1983. Utah Hybrid 44A silage corn was planted July 12, 1983 at 27,000 seeds/A. Plot size was 11 X 25 feet with three replications. Three methods of incorporating herbicides were blocked to allow appropriate operations without disturbing other treatments. Mechanical incorporation preceeded planting, whereas sprinkler irrigation and sprinkler plus harrowing to incorporate the herbicides was accomplished after the crop was planted.

Sprinkler irrigation did not incorporate these herbicides adequately to provide comparable weed control to incorporation techniques involving mechanical mixing of the soil. Control of the three test weeds ranged from 10 to 15 percent lower when irrigation was the only means of distributing the soil applied herbicides. On the other hand irrigation did not reduce the weed control obtained by mechanically placing the herbicides in the weed seed zone. (Plant Science Department, Utah State University, Logan, Utah)

Influence of mechanical soil mixing, sprinkler irrigation and their combination on the control of three annual weeds with EPTC and vernolate.

Logan, Utah

Treatment	Rate lb/A	Crop Injury	Percent Weed Control		
			Redroot pigweed	Prostrate pigweed	Lambsquarters
S-tine and spike-tooth harrow					
EPTC/R25788	4	0	92	90	98
EPTC/R25788	6	0	91	90	97
vernolate/R25788	4	0	90	87	95
vernolate/R25788	6	0	96	96	98
control	-	0	0	0	0
Spiketooth harrow and sprinkler					
EPTC/R25788	4	0	92	88	94
EPTC/R25788	6	0	92	90	96
vernolate/R25788	4	0	92	88	96
vernolate/R25788	6	0	94	90	95
control	-	0	0	0	0
Sprinkler only					
EPTC/R25788	4	0	85	80	83
EPTC/R25788	6	0	78	78	88
vernolate/R25788	4	0	80	77	88
vernolate/R25788	6	0	82	85	87
control	-	0	0	0	0

obtained by mechanically placing the herbicides in the weed seed zone

Herbicide evaluation in field corn. Dewey, S.A. and J.M. Torell. A field experiment was conducted at the Kimberly Research and Extension Center to evaluate the efficacy of herbicides for annual weed control and phytotoxicity to the crop. The treatments were applied to 3.7 x 9.1 meter plots arranged in a randomized complete block design with three replications. The soil at the study area is a silt loam.

Herbicides were applied with a hand-held sprayer calibrated to deliver 187 l/ha at 2.8 kg/cm^2. Preplant incorporated, preemergence surface, postemergence and directed postemergence treatments were applied on May 19, May 27, June 4 and July 7, 1983, respectively. The preplant incorporated treatments were incorporated with a roto-tiller set for a depth of 7.62cm. Field corn was planted on May 20 to a row spacing of 76.2cm.

The outstanding treatments with respect to weed control were ametryn, alachlor, metolachlor, cyanazine and EPTC+/tridiphane + cyanazine. The ametryn treatment resulted in phytotoxicity to the crop. The various EPTC+ treatments provided excellent broad-spectrum weed control in early season but later in the season their effectiveness decreased. The directed postemergence application of sethoxydim provided excellent control of green foxtail but also caused moderate phytotoxicity to the crop. (District III Extension Office, University of Idaho, Twin Falls, ID 83301)

Effect of herbicides on weed stand and crop vigor

					Stand Reduction[4],[5]					
	Rate	Type of[3]	Crop VR[4]		Repw		Colq		Grft	
Treatment[1]	kgai/ha	Application	7-6	8-4	7-6	8-4	7-6	8-4	7-6	8-4
alachlor	3.92	PPI	0	0	100	97	100	98	100	99
metolachlor	2.80	PPI	0	0	98	89	99	90	98	94
cyanazine	2.24	PPI	0	0	96	87	100	93	93	81
vernolate+	6.72	PPI	0	0	99	85	100	89	100	93
2,4-D	0.56	Post	0	0	53	58	73	69	5	15
dicamba	0.28	EP	0	0	96	87	98	89	5	7
bentazon	1.12	Post	0	0	96	82	98	83	3	15
tridiphane	0.84	Post	0	0	38	77	52	73	20	80
ametryn	2.24	DP	-	11	-	98	-	98	-	99
EPTC+ R25788/tridiphane + cyanazine	6.72/0.56 + 1.68	PPI/Post	0	0	100	99	100	99	100	100
EPTC+ R25788	2.24	PPI	0	0	95	79	94	84	99	86
EPTC+ R25788	4.48	PPI	0	0	98	78	98	85	98	85
EPTC+ R25788	6.72	PPI	0	0	99	84	99	85	100	87
EPTC+ R25788 + extender	2.24	PPI	0	0	90	81	95	82	96	86
EPTC+ R25788 + extender	4.48	PPI	0	0	96	82	96	84	99	86
EPTC+ R25788 + extender	6.72	PPI	0	0	97	82	98	83	99	83
EPTC+ R29148 + extender	2.24	PPI	0	0	92	77	90	81	95	82
EPTC+ R29148 + extender	4.48	PPI	0	0	93	82	95	83	100	87
EPTC+ R29148 + extender	6.72	PPI	0	0	99	83	99	83	100	84
sethoxydim + COC[2]	1.68	DP	-	-	-	79	-	82	-	100
Check			0	0	0	0	0	0	0	0

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[1] A sequential application is designated by a slash and a tank-mix is designated by a + between herbicide names.

[2] COC = Crop oil concentrate at 0.5% v/v

[3] PES = preemergence surface, PPI = preplant incorporated, Post = postemergence, EP = early postemergence, DP = directed postemergence.

[4] Visual evaluation on a 0-100 scale, VR = vigor reduction and SR = stand reduction. The DP applications had not been applied when the early evaluation was conducted.

[5] Weed abbreviations: Repw = redroot pigweed, Colq = common lambsquarters, Grft = green foxtail.

Wild proso millet control in corn. Zimdahl, R.L., and W.A. Fithian. The objective of this experiment was to evaluate the efficacy of three preplant herbicides in combination with two preemergence, one early postemergence, and six postemergence herbicide treatments for control of wild proso millet (*Panicum miliaceum* L.) in corn (*Zea mays* L.). Each treatment also was applied alone. The study was conducted in a furrow-irrigated corn field north of Severance, Colorado. The Nelson fine sandy loam soil (0-3% slope) had 57% sand, 22% silt, 21% clay, 1.2% organic matter, and a pH of 7.6. Pioneer silage corn (var. 3536) was planted on May 6, 1983 in 30-inch rows; emerged corn population on June 9, 1983 was 28,900 plants per acre.

Plot design was a split plot, with three replications. Main plots consisted of the three preplant treatments plus a check, each randomized on 30 by 100 blocks. The subplots were the two preemergence, one early postemergence, and six postemergence treatments plus a check. Each subplot was 10 by 30 feet. The treatments are shown in Table 1.

All applications were made using a bicycle sprayer that applied a total of 13.8 gal/A. The preplant herbicides were applied and incorporated 3 to 4 inches deep into moist soil on May 5, 1083. Air and soil temperatures were 48 and 50 F, respectively. The two preemergence treatments were applied on May 21, 1983. No wild proso millet had emerged and the soil surface was moist. Air and soil temperatures (2 inch depth) were 65 and 58 F, respectively. One treatment was applied early postemergence on June 9, 1983 to corn in the 3 to 4 leaf stage (5 inches extended leaf height) and wild proso millet in the cotyledon to 2 leaf stage. The soil surface was dry and plant foliage was damp at application. Air and soil temperatures (2 inch depth) were 59 and 57 F, respectively. The final postemergence treatments were made on July 1, 1983 to corn in the 11 to 12 leaf stage (29 inches extended leaf height) and wild proso millet in the cotyledon to tiller stage. Drop nozzles were used to direct the spray below the corn leaves. The soil surface was dry and plant foliage was moist, air and soil temperatures (2 inch depth) at time of application were 71 and 68 F, respectively.

Visual weed control ratings were made using a scale of 0 to 10 on June 22, June 30, July 17, and September 8, 1983. Zero represented no control and 10 complete control of wild proso millet. There were no other weeds present in the plot area. On September 13, 1983 ten corn stalks were removed from the second row in the middle of each plot and weighed. Yield comparisons were made based on the fresh weight of corn plants harvested from each plot.

Visual ratings. All visual ratings were averaged and converted directly to percent control. Visual ratings on main plot (preplant) treatments were based on ratings made June 22 and June 30 on plots which had not yet received a subplot treatment and on the subplot controls. The highest control rating for the preplant treatments alone was 79% for EPTC$^+$ + cyanazine. Alachlor alone gave 73% control and EPTC$^+$ alone was 66%.

Subplot visual rating percentages were based on all ratings made after the application date. Combination and averaging of all subplots resulted in 84% control on both EPTC$^+$ + cyanazine and alachlor main plot treatments, 81% on EPTC$^+$, and 58% when no preplant was applied. Visual performance comparisons of each subplot treatment on the main plot treatments indicated that, with one exception, control was 15 to 40% better with a preplant application than when no preplant was used. Pendimethalin + cyanazine applied preemergence was less than 5% better in combination with a preplant than it was applied over a main plot check.

Visual ratings of each subplot averaged over all main plot treatments resulted in three performance groups: 1) pendimethalin and pendimethalin + cyanazine applied preemergence, pendimethalin + cyanazine applied early postemergence, and linuron + metolachlor applied postemergence all resulted in better than 80% control; 2) pendimethalin + cyanazine and chloramben + bromoxynil applied postemergence resulted in 75 to 80% control; 3) pendimethalin, pendimethalin + alachlor, and chloramben applied postemergence gave less than 70% control.

Yield. A split plot analysis of variance was performed on fresh weight yields from each plot and no statistical difference was detected between main plot or subplot treatments. However, the interaction of main plot with subplot treatments was highly significant ($P \geq 0.01\%$). Based on this significance, main plot comparisons were made using Tukey's Highest Significant Difference test ($P = 0.05$). Four homologous subgroups were detected in main plot and subplot treatments. Yields are shown in Table 1 with homologous subgroups designated by letters (main and subplot yields are independent).

Because neither the main plot or subplot treatments were statistically different alone but a statistical difference did exist in the interaction, these results strongly indicate a yield basis difference in control of wild proso millet. EPTC^{+} and EPTC^{+} + cyanazine preplant incorporated treatments and pendimethalin and chloramben + bromoxynil postemergence treatments used in any combination of preplant with postemergence give the best wild proso millet control of the herbicides tested.

Superior control by these treatments did not show in the visual ratings, but the ratings were made only on the presence of wild proso millet and not on the vigor of the plants present. It is possible that these treatments adequately reduced wild proso millet vigor to reduce competition during crucial periods. Visual ratings and yield data strongly suggest that one herbicide treatment is not adequate to provide acceptable wild proso millet control in corn. (Weed Research Laboratory, Colorado State University, Fort Collins, CO 80523)

Table 1. Control of Wild Proso Millet in Corn - 1983.

Herbicide	Rate	Yield*
	(lb ai/A)	(% of control)
Main Plots		
Preplant incorporated		
EPTC[+]	6.0	118 a
EPTC[+] + cyanazine	6.0 + 2.0	117 ab
Alachlor	4.0	107 c
Check	0.0	100 d
Subplots		
Preemergence		
Pendimethalin	1.0	100 cd
Pendimethalin + cyanazine	1.0 + 1.0	100 cd
Early postemergence (3 to 4 leaf corn)		
Pendimethalin + cyanazine	1.0 + 1.0	101 c
Postemergence (11 to 12 leaf corn)		
Pendimethalin + cyanazine	1.0 + 1.5	98 d
Pendimethalin	1.0	107 a
Linuron + Metolachlor	0.5 + 1.5	100 cd
Pendimethalin + alachlor	1.0 + 2.0	100 cd
Chloramben + bromoxynil	1.8 + 0.25	105 ab
Chloramben	1.8	102 c
Check	0.0	100 cd

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*Yields followed by the same letter in main plot or subplot treatments are not statistically different (P = 0.05) according to the HSD.

Preplant incorporated and postemergence weed control in silage corn. Evans, J.O. and R.W. Gunnell. A new promising postemergence herbicide (Dowco 356) was compared with standard preplant treatments for annual broadleaved and grassy weed control in silage corn. The experimental compound was tank mixed with cyanazine and complimented with 1 percent Atplus 411F v/v total carrier solution.

Preplant herbicides were applied June 8, 1983 to four replications of plots that were 11 X 30 feet. Herbicides were applied with a bicycle sprayer delivering 20 gpa at 30 psi and 8002 nozzles. Corn was planted the following day. Approximately one month after planting, the postemergence applications were made when corn was about 30 cm tall, and redroot and lambsquarters were in the 5 to 8 leaf stage. Green foxtail was 8 to 10 cm tall when the postemergence treatments were made.

Both preplant incorporated and postemergence herbicides were capable of controlling the three species encountered in this experiment. Cycloate at 4 lbs/A plus EPTC/R29148 at 2 lbs/A, EPTC/R29148 at 4 and 6 lbs/A, EPTC/R29148/R33865 at 6 lbs/A, and metolachlor at 2 lbs/A plus cyanazine at 1.50 lbs/A appeared to be the most effective preplant incorporated treatments. None of these treatments caused corn injury. Dowco 356 tank mixed with 1 lb/A cyanazine in a water carrier containing 1 percent crop oil concentrate controlled redroot and lambsquarters satisfactorily in early and late evaluations during the season. Mid July readings revealed some minor crop stunting and burning. A second evaluation on August 24, 1983 indicated that the postemergence mixture was controlling all three weed species to an acceptable degree and also demonstrated complete recovery of the crop. A similar study using this tank mix in another location corroborated these findings. Atrazine appears to be less damaging than cyanazine when tank mixed with Dowco 356 and a surfactant. (Plant Science Department, Utah State University, Logan, Utah 84322)

Response of three annual weeds in silage corn to preplant incorporated and postemergence herbicides. Logan, Utah.

			Percent Weed Control[1]		
Treatment	Rate lb/A	Crop Injury	Redroot Pigweed	Lambsquarters	Green Foxtail
cycloate	4.00	0	65	62	20
cycloate	6.00	0	70	81	65
cycloate EPTC/R29148	4.00+ 2.00	0	88	90	90
cycloate/R29148	6.00	0	62	73	25
EPTC/R29148	4.00	0	84	89	85
EPTC/R29148	6.00	0	90	95	95
EPTC/R29148/R33865	6.00	0	92	90	93
alachlor	2.00	0	70	62	85
alachlor cyanazine	2.00+ 1.50	0	82	89	75
metolachlor	2.00	0	60	71	65
metolachlor cyanazine	2.00+ 1.50	0	80	92	88
Dowco 356 cyanazine Atplus	0.38+ 1.00+ 1%	0	99	100	95
Dowco 356 cyanazine Atplus 411F	0.75+ 1.00 1%	0	100	100	98
check	--	0	0	0	0

Effects of postemergence sprays and sprinkler applications of bromoxynil on field and sweet corn. Graf, G. T. and A. G. Ogg, Jr. On April 26, 1983 a field study was initiated at Prosser, WA to compare the tolerance of field and sweet corn to postemergence sprays and sprinkler applications of bromoxynil. Plots were 17 ft wide by 20 ft long and replicated 3 times in a 2 by 2 by 7 factorial experimental design. Two rows each of DeKalb XL-25A field corn and Golden Jubilee sweet corn were planted on April 26 and May 5, 1983, for a total of 8 rows per plot. The soil in the plot area was a silt loam with 0.9% organic matter and a pH of 7.3. The herbicide treatments were applied on May 25 at which time the growth stage of the corn was:

Corn type	Planting date	Stage of growth
Field corn	April 26	5 in. tall, 5 to 6 leaves
	May 5	3 in. tall, 4 leaves
Sweet corn	April 26	3 to 4 in. tall, 5 to 6 leaves
	May 5	2 to 3 in. tall, 3 to 4 leaves

Treatment Nos. 3 and 6 (Table 1) were applied as conventional sprays in 25 gpa. Treatments 1, 2, 4 and 5 were applied with a sprinkler irrigation simulator developed especially for research applications of pesticides in irrigation water. Crop injury was evaluated visually on June 1. On June 17, ten plants from each subtreatment were harvested and dry weights determined.

Field corn was more tolerant than sweet corn to bromoxynil. When bromoxynil was applied as a conventional spray both the 0.25 and 0.5 lb/A rates injured the corn visibly. However when bromoxynil was applied in 0.25 and 0.5 inches of water neither corn type was injured significantly. There was no significant difference between the two growth stages in the response of field corn or sweet corn to bromoxynil. Dry weights taken 23 days after treatment were similar, indicating that the corn had recovered from the early injury and was growing normally. (USDA-ARS, Irr. Agric. Res. and Ext. Center, Prosser, WA 99350).

Effect of Postemergence Sprays and Sprinkler Applications of Bromoxynil on Corn

Trmt. No.	Treatment	Rate Lbs/A	Amount of water	Crop injury(%)[1/],[2/]		Dry wt. (g/10 plants)[1/]	
				Field corn	Sweetcorn	Field corn	Sweetcorn
1	Bromoxynil	0.25	1/4 inch	1.7 b A	0.0 c A	47.5	55.7
2	Bromoxynil	0.25	1/2 inch	0.0 b A	0.0 c A	52.7	58.7
3	Bromoxynil	0.25	Spray-25 gpa	2.5 b B	8.3 b A	41.7	47.5
4	Bromoxynil	0.50	1/4 inch	0.0 b A	1.7 c A	50.5	57.8
5	Bromoxynil	0.50	1/2 inch	0.0 b A	0.0 c A	54.0	51.7
6	Bromoxynil	0.50	Spray-25 gpa	12.5 a B	24.2 a A	47.0	43.2
7	Nontreated	-	-	0.0 b	0.0 c	42.0	48.2
						NS	NS

[1/] Means within a column followed by the same letter are not significantly different at the 5% level. NS = Not significantly different.

[2/] Means within a row with the same letter below are not significantly different at the 5% level.

Postemergence weed control in field corn. Mitich, L.W. and N.L. Smith. Several herbicides were evaluated for their weed control performance in this experiment established on the UC Davis Experimental Farm. Corn (cultivar 'DeKalb XL 25A') was planted June 6, 1983, on 30 inch beds followed by a furrow irrigation 6 days later. Herbicides were applied in 40 GPA water carrier July 5 on 6 to 8 inch barnyardgrass, 2 to 3 inch redroot pigweed and 1 to 2 inch black nightshade. Nonphytotoxic oil (Surfel @ 1% v.v) was included in all treatments except bromoxynil, dicamba and 2,4-D. Four replications were used with 10 by 20 ft individual plots.

Control of barnyardgrass was poor with all herbicides and it was a serious competitor for the duration of the experiment. Pigweed and nightshade control was excellent with the Dowco 356 + atrazine + cyanazine combination and dicamba or formulations containing dicamba (HP 783/1-A, HP 783/1). Slight corn phytotoxicity was observed July 29 from the Dowco 356 + atrazine + cyanazine combination and with HP 783/1 (which contains atrazine). (University of California Cooperative Extension, Davis, CA 95616)

Postemergence weed control in field corn

Herbicide	Acre rate	Corn phyto[1]	Average weed control[2] Barnyard-grass	Redroot pigweed	Black nightshade	Yield lb/A
Bromoxynil	0.5 lb	0	0	6.3	7.5	4173
Dicamba	0.5 lb	0	0.3	9.9	9.9	4933
2,4-D amine	0.5 lb	0	0	6.8	5.5	4330
Dowco 356 + Atrazine + Cyanazine	0.5 lb 0.5 lb 0.5 lb	1.0	0.7	9.9	9.9	4320
HP 783/1-A	4.3 pt	0	0.3	9.7	9.7	4639
HP 783/1-B	4.3 pt	0.3	0	0.3	0.3	3151
HP 783/1	2.8 pt	0.7	0	9.8	9.8	4335
HP 783/1	3.6 pt	0.7	0	9.8	9.8	3722
HP 783/1	4.3 pt	0.7	0.5	9.9	9.9	4653
Control		0	0	0	0	3750

Data is average of 4 replications.

[1] 0 = no phytotoxicity, 10 = all dead

[2] 0 = no weed control, 10 = complete control

Wild oat control in malting barley. Alley, H. P. Research plots were established on May 17, 1983 to evaluate individual and/or herbicide combinations for wild oat control in malting barley (var. Klages). Plots were 9 x 30 feet in size with three replications in the randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit calibrated to deliver 10 gpa solution. The soil was classified as a sandy clay loam (58% sand, 20% silt, 22% clay) with 1.1% organic matter and a 8.0 pH. The barley was in excellent condition, 2 tiller with 4 to 5 leaves and the wild oat in the 2 to 4 leaf stage-of-growth at time of treatment.

Visual evaluations for wild oat control and crop damage was made on July 6, 1983, approximately 2 months following application of the herbicides. AC-222293 + diclofop applied at 0.78 + 1.0 lb ai/A and above gave 100% wild oat control. AC-222293, as an individual treatment, was comparable to the combination. The combination of AC-222293 + diclofop appeared to be more damaging to the barley crop than either herbicide applied individually. CGA-82725 applied as an individual treatment gave effective wild oat control but killed the barley. When CGA-82725 was mixed with 2,4-D or MCPA the barley was normal without the phytotoxicity of the CGA-82725 applied alone. Chlorsulfuron did not appear to have the same effect of reducing the barley kill as 2,4-D or MCPA. (Wyoming Agric. Exp. Sta., Laramie, 82071, SR 1250.)

Treatment[1]	Rate lb ai/A	Percent[2] Control	Observations
*AC-222293 + diclofop	0.625 + 1.0	96	
*AC-222293 + diclofop	0.78 + 1.0	100	Barley shortened 4 to 6 inches
*AC-222293 + diclofop	0.94 + 1.0	100	Barley shortened 4 to 6 inches
*AC-222293 + diclofop	1.25 + 1.0	100	Barley shortened 4 to 6 inches
*difenzoquat	1.0	95	
diclofop	1.0	78	
barban	0.38	80	
*barban + chlorsulfuron	0.25 + 0.33 Product	83	
*AC-222293 + chlorsulfuron	0.5 + 0.33 Product	98	
barban + metribuzin	0.38 + 0.25	47	
*AC-222293	0.625	99	
*AC-222293	0.78	99	
*AC-222293	0.94	100	
*AC-222293	1.25	100	
CGA-82725 + Atplus 411F	0.12 + 0.5 pt	90	Killed barley
CGA-82725 + Atplus 411F	0.25 + 0.5 pt	97	Killed barley
CGA-82725 + Atplus 411F	0.5 + 0.5 pt	98	Killed barley
CGA-82725 + Atplus 411F	0.12 + 1.0 pt	90	Killed barley
CGA-82725 + Atplus 411F	0.25 + 1.0 pt	100	Killed barley
CGA-82725 + Atplus 411F	0.5 + 1.0 pt	97	Killed barley
CGA-82725 + 2,4-DA + Atplus 411F	0.25 + 0.25 + 1 pt	98	Barley normal
CGA-82725 + 2,4-DE + Atplus 411F	0.25 + 0.25 + 1 pt	98	Barley normal
CGA-82725 + MCPA + Atplus 411F	0.25 + 0.25 + 1 pt	98	Barley normal
CGA-82725 + MCPA + Atplus 411F	0.25 + 0.5 + 1 pt	98	Barley normal
CGA-82725 + chlorsulfurou + Atplus 411F	0.25 + 0.33 + 1 pt	99	Reduced barley stand 50%
Check			

[1] Herbicides applied May 17, 1983.
[2] Visual evaluations July 6, 1983.
*X-77 added at 0.25% v/v.

Wild oat control in barley. Mitich, L.W. and N.L. Smith. A site on the Tulelake Field Station heavily infested with wild oat was selected to evaluate the efficacy of CGA 82725 herbicide for its control of wild oat in barley (cultivar 'Klages'). Barley and wild oat were in the 3- to 4-leaf stage May 23, 1983, when CGA 82725 alone and in combination with 2,4-D amine was applied using a CO_2 sprayer calibrated to broadcast 20 gpa. A surfactant (Atplus 411F) was included at 0.612% v/v. Four replications were used, individual plot size was 10 by 25 ft. An evaluation on June 13 indicated severe crop injury from CGA 82725 when applied alone. This resulted in considerable loss of stand. When tank mixed with 2,4-D amine, barley was not injured and wild oat control was increased which was very evident at harvest. (University of California Cooperative Extension, Davis, CA 95616)

Wild oat control in barley

Herbicide	Rate lb/A	Phyto[1]	Stand reduction[2]		Wild oat control[3]		Yield
		6/13	7/26	9/23	7/26	9/23	
CGA 82725	0.25	8.4	6.3	5.5	9.0	4.8	2345
CGA 82725	0.50	9.7	7.3	9.4	9.0	1.3	505
CGA 82725 + 2,4-D	0.25 + 0.25	0	0.5	0	9.0	9.4	4659
Control	-	0	0	3.7	0	0	2875

[1] Phytotoxicity 0 = no injury; 10 = all dead.

[2] Stand reduction 0 = none; 10 = 100%.

[3] Control 0 = none; 10 = complete.

Diclofop and diclofop tank mixes for wild oat control in spring barley. Morishita, D.W., D.C. Thill, and R.H. Callihan. An experiment was initiated to determine the influence of bromoxynil (Brominal ME 4), MCPA Na-salt (Chiptox), and bromoxynil + MCPA (Brominal 3+3) when tank mixed with diclofop on the control of wild oat. The experiment was established in a spring barley (var. Vangaurd) field near Deary, Idaho. Herbicides were applied June 6, 1983, at the 1 to 3 leaf stage of wild oat development with a CO_2 pressurized backpack sprayer. Environmental conditions at the time of application were clear skies, no wind, 76% relative humidity, and an air and 2 inch soil temperature of 63 and 60 F, respectively. Soil type was a silt loam consisting of 3.1% o.m., and soil pH of 5.1 with a CEC of 16 meq/100 g soil. The experimental design was a randomized complete block with four replications, with individual plots 10 by 30 ft in size. Evaluation for crop injury and weed control was made July 26, 1983. The barley was harvested August 30, 1983, with a small plot combine.

Control of common lambsquarter was 99% or better with all rates of bromoxynil, MCPA Na-salt, and bromoxynil + MCPA alone and in combination with diclofop. Where comparable rates of diclofop were used alone or in combination with broadleaf herbicides, wild oat control was not affected except in one case. The diclofop + MCPA Na-salt treatment at 1.0 + 0.5 lb/A resulted in a 20% reduction in wild oat control when compared to 1.0 lb/A of diclofop alone. When rate of diclofop was increased to 1.25 lb/A the apparent antagonism with MCPA Na-salt was overcome. Crop phytotoxicity was observed only with diclofop + bromoxynil + MCPA at 1.0 + 0.375 lb/A. Variability within treatments due to random lodging of the crop throughout the study site, resulted in no yield differences among treatments. However, best yields are indicated in the diclofop + bromoxynil at 1.0 + 0.375 and diclofop + bromoxynil + MCPA NA salt at 1.0 + 0.35 + 0.15 lb/A treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Diclofop and tank mix effects on weed control and barley yield

Treatment	Rate	Crop injury	Weed Control Wioa	Weed Control Colq	Yield
	(lb ai/A)	%	%	%	(lb/A)
check	-	-	-	-	1591
(bromoxynil + MCPA)[1]	0.50	0	5	100	1284
diclofop	0.75	0	86	0	1907
diclofop	1.0	0	93	1	1823
diclofop + bromoxynil[2]	0.75 + 0.375	0	91	99	1776
diclofop + bromoxynil	1.0 + 0.375	0	93	100	2115
diclofop + (bromoxynil + MCPA)	0.75 + 0.25	1	81	100	1711
diclofop + (bromoxynil + MCPA)	0.75 + 0.375	1	79	100	1776
diclofop + (bromoxynil + MCPA)	1.0 + 0.25	1	89	100	1757
diclofop + (bromoxynil + MCPA)	1.0 + 0.375	6	84	100	1953
diclofop + bromoxynil + MCPA[3]	0.75 + 0.30 + 0.20	0	91	100	1992
diclofop + bromoxynil + MCPA	0.75 + 0.35 + 0.15	0	88	100	1716
diclofop + bromoxynil + MCPA	1.0 + 0.30 + 0.20	3	95	99	1570
diclofop + bromoxynil + MCPA	1.0 + 0.35 + 0.15	0	96	100	2103
diclofop + MCPA[4]	1.0 + 0.50	0	73	99	1781
diclofop + MCPA	1.25 + 0.50	0	88	100	1916
$LSD_{(0.05)}$		4	9	2	NS

[1] Brominal 3 + 3
[2] Brominal ME4
[3] Brominal ME4 + Chiptox sodium salt
[4] Chiptox sodium salt

Wild oat and broadleaf weed control in spring barley. Schaat, B.G., D.C. Thill, and R.H. Callihan. An experiment was initiated April 30, 1983 at Potlach, Idaho to study the effects of various herbicide treatments on the control of wild oat and broadleaf weeds in spring barley (var. Advance). Plots were 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 6.6% organic matter, pH 5.3, and CEC of 31.3 meq/100 g soil. Postplant incorporated treatments were applied April 30 with an air temperature of 55 F, soil surface temperature 56 F, soil temperature at 2 inches 58 F, and relative humidity 70%. These treatments were incorporated at 5 mph to a depth of 2 inches with a rod weeder and a spike-toothed harrow. Postemergence treatments were applied at the two to three leaf and four to five leaf stage of wild oat growth on May 25 and June 6, respectively. Climatological data on May 25 and June 6 were; air temperature 77 and 68 F, soil surface temperature 86 and 88 F, soil temperature at 2 inches 88 and 71 F, and relative humidity 40 and 65%, respectively. The plots were harvested September 9, 1983 with a small plot combine.

Wild oat were best controlled (86%+) with applications of barban, both rates of AC222,293, and R-40244 in tank mixture with difenzoquat or barban. In general, all broadleaf herbicides effectively controlled shepherdspurse, field pennycress, and common lambsquarter. Applications of bromoxynil alone and in tank mixtures with either MCPA or chlorsulfuron, and chlorsulfuron effectively controlled mayweed. Smooth dock was best controlled when treated with bromoxynil + chlorsulfuron, bromoxynil + MCPA, higher rates of chlorsulfuron, and 2,4-D. Control of smooth dock was variable when treated with R-40244. Tank mixtures of diclofop + various rates of chlorsulfuron ranging from 0.008 to 0.064 lb ai/A were included to observe any antagonistic effect on wild oat control. None was observed.

Because of the exceptionally high population of mayweed, many treatments such as barban, AC222,293, and R-40244 in combination with wild oat herbicides had grain yields that were not different than the check even though wild oat and other broadleaf weeds were adequately controlled. Tank mixtures of diclofop + chlorsulfuron (1.0 + 0.016 and 1.0 + 0.064 lb ai/A) resulted in grain yields greater than the check. (Idaho AgriculturalExperimental Station, Moscow, Idaho 83843)

Wild oat and broadleaf weed control in spring barley at Potlatch, Idaho

Treatment	Rate	Date applied	Crop injury	Weed control							Yield
				Wioa	Mawe	Shpu	Hebi	Smdo	Fipc	Colq	
	(lb ai/A)		------------------	------------------	------------------	------------------	%	------------------	------------------	------------------	(lb/A)
check	-	-									1508
triallate	1.25	4/30	0[2/]	73	0	33	33	0	33	33	798
triallate	1.25	4/30	0	32	5	35	2	30	2	55	1321
barban	0.38	5/25	0	100	3	67	67	67	67	67	1325
diclofop	1.00	5/25	0	54	8	52	40	69	75	58	1474
difenzoquat	1.00	6/6	2	71	15	50	32	29	25	52	1248
AC222,293[1/]	0.375	5/25	0	99	5	75	55	52	55	32	1594
AC222,293	0.625	5/25	0	100	2	72	45	50	58	42	1973
triallate/	1.25	4/30	2	61	90	96	100	81	98	100	1357
bromoxynil + MCPA	0.375	5/25									
bromoxynil + MCPA	0.375	5/25	0	0	91	100	99	100	100	100	1703
R-40244	0.50	5/25	0	2	30	100	100	41	100	100	1013
R-40244	1.00	5/25	2	0	78	100	100	70	100	100	1022
R-40244 +	0.50	5/25	11	86	49	100	100	68	100	100	1246
barban	0.38										
R-40244 +	1.00	5/25	15	71	75	100	100	60	100	100	1174
barban	0.375										
R-40244 +	0.50	5/25	4	80	40	100	82	70	100	82	1364
diclofop	1.00										
R-40244	0.25	6/6	9	0	15	100	100	41	100	100	1305
R-40244	0.50	6/6	15	0	15	100	100	89	100	100	918
R-40244 +	0.25	6/6	21	82	25	100	100	72	100	100	873
difenzoquat	1.00										
R-40244 +	0.50	6/6	22	86	40	100	100	99	100	100	1969
difenzoquat	1.00										
triallate/	1.25	4/30	4	44	40	100	100	94	100	100	1591
R-40244	0.50	5/25									
chlorsulfuron	0.016	5/25	0	0	68	75	75	80	100	100	1472
diclofop +	1.00	5/25	0	49	94	99	100	100	100	100	1959
bromoxynil	0.50										
bromoxynil	0.50	5/25	0	0	99	100	100	100	100	100	1385
diclofop +	1.00	5/25	3	73	92	98	97	98	97	100	2140
chlorsulfuron	0.008										
diclofop +	1.00	5/25	0	79	97	100	100	100	100	100	2351
chlorsulfuron	0.016										
diclofop +	1.00	5/25	0	82	98	100	100	100	100	100	2194
chlorsulfuron	0.032										
diclofop +	1.00	5/25	2	80	99	100	100	100	100	100	2278
chlorsulfuron	0.064										
diclofop +	1.00	5/25	4	28	82	100	79	100	100	100	1778
2,4-DLVE	1.00										
diclofop +	1.00	5/25	2	66	96	100	100	100	100	100	2116
bromoxynil +	0.05										
chlorsulfuron	0.008										
$LSD_{(0.05)}$			3	33	25	37	37	42	32	33	695

[1/] all AC222,293 and chlorsulfuron treatments included 0.5% v/v nonionic surfactant.

[2/] all evaluations were taken 7/11/83.

Broadleaf weed control in spring barley. Schaat, B.G., D.C. Thill, and R.H. Callihan. On May 22, 1983 an experiment was initiated at Potlatch, Idaho to study the effects of various herbicide treatments on broadleaf weed control in spring barley (var. Advance). Plots measured 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 6.7% organic matter, pH 5.7, and a CEC of 19.1 meq/100 g soil. Postemergence treatments were applied at the three to four leaf stage of crop growth. Climatological data at the time of application on May 22 and 25 was; air temperatures 75 and 68 F, soil surface temperature 88 and 74 F, soil temperature at 2 inches 77 and 72 F, and relative humidity 100 and 52%, respectively. The plots were harvested August 30, 1983 with a small plot combine.

Control of henbit, common lambsquarter, and smooth dock was not different among treatments. Coast fiddleneck was not effectively controlled when treated with EH 541 (0.46 lb ai/A), MCPA, or 2,4-D amine. All herbicide treatments controlled field pennycress except 2,4-D amine. Mayweed was best controlled when treated with bentazon, bentazon M, and bentazon tank mixtures. No differences in grain yield were observed. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in spring barley at Potlatch, Idaho

Treatment	Rate	Date applied	Weed control						Yield
			Hebi	Fipc	Cofn	Colq	Smdo	Mawe	
	(lb ai/A)		%						(lb/A)
check	-	-							2784
EH540	0.375	5/22	69[1]	94	71	100	98	30	3138
EH541	0.46	5/22	85	96	64	100	98	45	2677
EH736 +	0.36	5/22	50	99	75	100	95	40	3433
Triton X-100	0.1%v/v								
EH736 +	0.72	5/22	72	98	70	95	80	52	2814
Triton X-100	0.1%v/v								
bentazon +	0.5	5/25	66	100	99	99	100	76	3468
2,4-Damine +	0.40								
Moract oil	5.0%v/v								
bentazon +	0.5	5/25	68	96	99	94	99	89	3474
2,4-DLVE +	0.03								
Moract oil	5.0%v/v								
bentazon +	0.75	5/25	76	95	99	100	100	98	3474
2,4-DP +	1.00								
Moract oil	5.0%v/v								
bentazon M +	0.75	5/25	58	99	100	92	100	76	3356
Moract oil	5.0%v/v								
bentazon M +	1.25	5/25	90	99	100	99	100	91	3390
Moract oil	5.0%v/v								
bentazon +	0.5	5/25	75	90	94	78	95	91	3256
dicamba +	0.06								
Moract oil	5.0%v/v								
bentazon +	0.75	5/25	75	88	98	69	98	86	3109
Moract oil	5.0%v/v								
MCPA	0.05	5/25	42	99	62	99	72	40	3231
bromoxynil +	0.25	5/25	72	98	98	96	94	68	3608
MCPA									
2,4-Damine	0.75	5/25	35	62	52	75	70	42	3059
2,4-DLVE	0.75	5/25	55	100	92	98	96	48	2992
$LSD_{(0.05)}$			NS	19	33	NS	NS	33	NS

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[1] all evaluations were taken 6/20/83.

Broadleaf weed control in spring barley. Schaat, B.G., D.C. Thill, and R.H. Callihan. On April 28 and May 3, 1983, experiments were initiated at Potlatch and Culdesac, Idaho to study broadleaf weed control in spring barley (var. Sevin-22 and Advance), respectively. The barley crop at Culdesac was underseeded with alfalfa. Plots were 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The herbicide treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil data, climatological data, and stage of crop growth at the time of application are shown in Table 1. The plots were harvested at location 1 on August 30 and at location 2 on August 18, 1983 with a small plot combine.

Mayweed, the most difficult to control annual weed species in these experiments, was most effectively controlled at both locations by applications of PPG-1013 (preemergence surface); bromoxynil alone and tank mixed with chlorsulfuron, DPX-T6376, or dicamba; bromxynil + MCPA (formulated package mix, 2lb/gal) alone and tank mixed with chlorsulfuron or DPX-T6376; DPX-T6376; and chlorsulfuron alone and tank mixed with dicamba. Treatments that did not control the following weeds were: field pennycress - dicamba (Table 3), post applications of PPG-1013 and the low rate of triclopyr (Table 2); tumble mustard - PPG-1013 (0.003 lb ai/A); shepherdspurse - dicamba and metribuzin; coast fiddleneck - PPG-1013 (0.005 lb ai/A), 2,4-D, MCPA, and metribuzin; henbit - PPG-1013 (post), dicamba, dicamba + bromoxynil, triclopyr, XRM-4660, and MCPA; and common lambsquarter - PPG-1013 (0.003 lb ai/A) and dicamba. Canada thistle was most effectively controlled (82%+) with PPG-1013 (0.01 lb ai/A), dicamba + chlorsulfuron (0.094 + 0.016 lb ai/A), triclopyr, and XRM-4660 (0.563 lb ai/A). Seedling alfalfa was most severly injured when treated with chlorsulfuron or DPX-T6376 alone or in tank mixture with other herbicides; dicamba and dicamba tank mixtures; 2,4-D; XRM-4660; MCPA; and metribuzin. Applications of PPG-1013 applied postemergence, bromoxynil (o.50 lb ai/A), and triclopyr (0.25 lb ai/A) did not severely injure seedling alfalfa. Crop injury at both locations was most severe with applications of PPG-1013 (preemergence surface) and XRM-4660. No differences in grain yield occurred at either location. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data for broadleaf weed control in spring barley

	Location 1		
Application dates	4/28/83	5/11/83	6/23/83
Air temperature, F	57	61	54
Soil surface temperature, F	69	66	58
Soil temperature (2 in), F	60	65	58
Relative humidity, %	50	45	100
Stage of crop growth	1lf	2-3lf	3-4lf

	Location 2		
Application dates	5/3/83	5/17/83	5/31/83
Air temperature, F	54	63	78
Soil surface temperature, F	58	68	85
Soil temperature (2 in), F	60	68	82
Relative humidity, %	80	75	62
Stage of crop growth	-	1-2lf	2-3til

	Location 1	Location 2
Soil type	silt loam	silt loam
Organic matter, %	3.5	10.2
Soil pH	5.2	6.6
CEC, meq/100g soil	16.6	31.3

Table 2. Broadleaf weed control and yield in spring barley (location 1)

Treatment	Rate	Date applied	Crop injury	Weed control				Yield
				Mawe	Fipc	Cofn	Tumu	
	(lb ai/A)		%					(lb/A)
check	-	-						3341
PPG-1013	0.10	4/28	12[2]	100	100	78	100	4107
PPG-1013	0.20	4/28	15	100	100	100	100	4320
PPG-1013	0.003	5/11	0	51	56	78	65	4320
PPG-1013	0.005	5/11	1	78	44	55	75	4223
PPG-1013	0.01	5/11	1	24	30	70	98	4325
bromoxynil (2 EC)	0.50	5/11	8	100	99	100	100	4543
bromoxynil + MCPA (2+2 EC)	0.375	5/11	8	95	78	74	100	4602
chlorsulfuron[1]	0.008	5/11	5	100	100	75	100	4086
chlorsulfuron	0.016	5/11	8	95	100	100	100	4202
DPX-T6376	0.005	5/11	14	99	99	100	99	3964
DPX-T6376	0.008	5/11	8	100	97	100	100	4341
dicamba	0.094	5/11	0	71	75	100	88	4156
dicamba + chlorsulfuron	0.094 0.008	5/11	6	100	99	75	100	3686
dicamba + chlorsulfuron	0.094 0.016	5/11	0	96	100	100	100	4417
dicamba + bromoxynil	0.094 0.25	5/11	2	89	78	100	99	4080
triclopyr	0.25	6/2	2	18	54	15	100	3961
triclopyr	0.50	6/2	2	36	75	30	200	4249
2,4-DLVE	1.00	6/2	6	65	90	42	100	4343
XRM-4660	0.188	6/2	8	75	92	58	100	4007
XRM-4660	0.375	6/2	12	78	92	59	100	2908
XRM-4660	0.563	6/2	20	90	98	88	100	3714
bromoxynil + chlorsulfuron	0.25 0.008	5/11	6	99	100	72	98	4391
bromoxynil + MCPA + chlorsulfuron	0.25 0.008	5/11	6	98	100	100	100	3861
bromoxynil + DPX-T6376	0.25 0.005	5/11	11	94	100	75	100	4212
bromoxynil + MCPA + DPX-T6376	0.25 0.005	5/11	11	82	85	75	82	4087
MCPA	1.00	6/2	1	22	99	29	100	4500
metribuzin	0.375	6/2	2	90	94	55	100	4311
bromoxynil (4EC)	0.50	5/11	4	72	100	100	75	4135
$LSD_{(0.05)}$			8	33	31	42	28	NS

[1] all chlorsulfuron and DPX-T6376 treatments included 0.5% v/v nonionic surfactant.

[2] all evaluations were taken 6/23/83.

Table 3. Broadleaf weed control and yield in spring barley (location 2)

Treatment	Rate	Date applied	Crop injury	Weed control								Yield
				Mawe	Fipc	Hebi	Cath	Alal	Shpu	Colq	Wibu	
	(lb ai/A)		%									(lb/A)
check	-	-										2570
PPG-1013	0.10	5/3	4[2]	92	100	87	48	59	100	100	100	2608
PPG-1013	0.20	5/3	19	98	100	100	52	67	100	100	100	2549
PPG-1013	0.003	5/17	6	42	79	65	18	30	79	49	80	3646
PPG-1013	0.005	5/17	1	32	76	50	32	38	72	88	43	3220
PPG-1013	0.01	5/17	1	62	84	70	95	47	82	88	67	3333
bromoxynil (2EC)	0.50	5/17	8	91	100	95	10	38	100	96	93	2981
bromoxynil + MCPA (2+2EC)	0.375	5/17	10	95	100	75	35	52	100	100	57	2839
chlorsulfuron[1]	0.008	5/17	4	94	100	99	12	81	100	100	68	2848
chlorsulfuron	0.016	5/17	3	95	100	92	47	88	100	100	90	3384
DPX-T6376	0.005	5/17	2	94	99	85	52	98	95	100	83	3434
DPX-T6376	0.008	5/17	16	92	100	94	40	98	100	91	85	2977
dicamba	0.094	5/17	10	62	33	36	53	97	20	75	65	3081
dicamba + chlorsulfuron	0.094 0.008	5/17	2	92	100	91	32	91	100	95	100	2565
dicamba + chlorsulfuron	0.094 0.016	5/17	17	97	98	93	90	97	100	100	92	2994
dicamba + bromoxynil	0.094 0.25	5/17	9	90	80	64	70	89	80	94	87	3583
triclopyr	0.25	5/31	14	48	59	52	94	22	30	100	50	2657
triclopyr	0.50	5/31	15	55	82	60	82	66	44	100	93	2326
2,4-DLVE	1.00	5/31	18	61	79	84	74	82	98	100	100	3103
XRM-4660	0.188	5/31	12	56	94	49	70	80	94	100	77	3163
XRM-4660	0.375	5/31	22	66	94	50	66	90	98	100	100	3042
XRM-4660	0.563	5/31	26	55	100	64	94	100	100	100	67	2902
bromoxynil + chlorsulfuron	0.25 0.008	5/17	5	100	100	94	35	80	100	100	70	3150
bromoxynil + MCPA + chlorsulfuron	0.25 0.008	5/17	0	91	100	96	50	92	100	100	100	2971
bromoxynil + DPX-T6376	0.25 0.005	5/17	4	94	100	91	38	91	99	98	80	3084
bromoxynil + MCPA + DPX-T6376	0.25 0.005	5/17	9	90	95	91	70	89	96	96	98	3048
MCPA	1.00	5/31	4	51	92	61	65	79	70	100	72	2930
metribuzin	0.375	5/31	10	78	75	75	65	75	48	92	100	3145
bromoxynil (4EC)	0.50	5/17	0	95	100	94	80	30	100	98	73	3361
LSD$_{(0.05)}$			12	24	25	29	51	28	27	18	NS	NS

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[1] all chlorsulfuron and DPX-T6376 treatments included 0.5% v/v nonionic surfactant.

[2] all evaluations were taken 6/22/83.

Broadleaf weed control in spring barley

Herbicide[1]	Rate	Percent Control[2]			Barley Yield[3]
	lb ai/A	LQ	NS	KO	Bu/A
PPG-1013 1E	0.01	25	60	100	41.1
PPG-1013 1E	0.02	36	10	100	39.6
PPG-1013 1E	0.04	75	51	100	38.8
PPG-1013 1E	0.06	66	85	95	36.3
PPG-1013 1E + X-77	0.01 + 0.25% v/v	30	30	100	39.2
PPG-1013 1E/X-77	0.02 + 0.25% v/v	85	40	100	40.6
EH-541 (MCPA-MCPP-dicamba)	15 oz Product	60	96	95	42.2
EH-541 (MCPA-MCPP-dicamba)	20 oz Product	90	100	95	52.0
EH-540 (2,4-DA-MCPP-dicamba)	12 oz Product	66	75	100	47.7
EH-540 (2,4-DA-MCPP-dicamba)	16 oz Product	70	85	100	46.7
bromoxynil ME4	0.38	96	96	100	41.0
bromoxynil ME4	0.5	85	100	100	41.5
bromoxynil + MCPA 3+3	0.38	100	100	100	44.8
bromoxynil + MCPA 3+3	0.5	100	96	100	48.1
chlorsulfuron	0.00469	96	40	88	43.7
chlorsulfuron	0.00938	81	0	100	42.9
chlorsulfuron	0.01406	81	66	72	42.5
bromoxynil ME4 + chlorsulfuron	0.25 + 0.00469	100	100	100	46.3
bromoxynil ME4 + chlorsulfuron	0.38 + 0.00469	100	96	100	45.4
2,4-D (alkanolamine)	0.5	85	90	100	43.2
2,4-D (alkanolamine)	0.25	21	36	88	49.4
2,4-D (dimethyl & diethanolamine)	1 pt	75	90	100	41.6
2,4-D (dimethyl & diethanolamine)	½ pt	45	90	95	43.4
dicamba + 2,4-D (alkanolamine)	0.125 + 0.25	90	100	100	43.3
dicamba + bromoxynil ME4	0.125 + 0.25	100	90	100	44.3
dicamba + MCPA	0.09 + 0.25	81	100	100	47.5
dicamba + chlorsulfuron	0.09 + 0.0078	45	70	100	46.3
dicamba + metribuzin	0.09 + 0.125	100	75	100	48.1
bromoxynil ME4 + diclofop methyl	0.38 + 1.0	55	96	100	37.6
Check	---				50.0

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[1] Herbicides applied April 25, 1983.

[2] Weed control evaluations June 15, 1983, by counts from two 6 in. by 5 ft quadrats per plot. Abbreviations: LQ = common lambsquarters; NS = hairy nightshade; KO = kochia.

[3] Harvested August 18, 1983.

Broadleaf weed control in spring barley. Alley, H. P. and M. A. Ferrell. Research plots were estalbished May 25, 1983 to evaluate individual and/or herbicide combinations for annual broadleaf weed control in spring barley (var. Steptoe) at the Torrington Research and Extension Center. Plots were 9 by 30 ft in size with three replications in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit calibrated to deliver 20 gpa solution. The soil was classified as a sandy loam (68% sand, 20% silt, 11% clay) with 1.3% organic matter and a pH of 6.9. The barley was in the 1 to 3 tiller with 4 to 9 in. leafy height. Common lambsquarters, hairy nightshade and kochia were the predominant annual broadleaf weed species present and in a vigorous and succulent stage-of-growth. Percentage weed control was determined by counts from two 6 in. by 5 ft quadrats per replication.

Eight of the postemergence treatments gave 90% or better control of the weed spectrum. Five treatments resulted in 96% or greater control. The outstanding treatments were: bromoxynil ME4, bromoxynil + MCPA 3+3 and bromoxynil ME4 + chlorsulfuron.

No treated plot yielded higher than the non-treated check. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1247.)

Postemergence herbicides for wild oat control in spring wheat. Mitich, L.W. and N.L. Smith. Six wheat varieties were planted April 8, 1983, on the Tulelake Field Station to evaluate wild oat control and variety tolerance to barban, difenzoquat, diclofop methyl and AC 222,293 alone and in combination using reduced rates. Herbicides were applied May 24 using a CO_2 sprayer (80067 nozzle tips) calibrated to deliver 8 gpa. Wheat was in the 4-leaf stage, 5 to 7 inches tall with 2 to 3 tillers. Wild oat was in the 3- to 4-leaf stage 2 to 5 inches tall with 1 to 3 tillers. Temperature at application was 55 F with a maximum of 85 F for the day. A split plot design was used with herbicides as main plots (25 by 30 ft) and varieties as subplots (5 by 25 ft). The site was sprinkler irrigated.

Moderate phytotoxicity was observed June 16 on Modoc and TL 75-409 varieties from difenzoquat (1 lb/A); however, yields were not reduced. Evaluations for wild oat control were made July 26 and September 13. Excellent control was obtained from AC 222,293 at 0.75 lb/A and when tank mixed with barban, each at 0.25 lb/A. Difenzoquat and diclofop methyl at 1 lb/A provided good control of wild oat. Difenzoquat a 0.5/A gave good control when mixed with barban at 0.25 or 0.38 lb/A. Good control was achieved with diclofop methyl at 0.5 lb/A plus barban at 0.38 lb/A but control was reduced when diclofop methyl was mixed with 0.25 lb/A of barban. Yields reflected the reduction in wild oat from the herbicide applications. (University of California Cooperative Extension, Davis, CA 95616)

Wild oat control in six varieties of wheat

Herbicide	Rate lb/A	Wild oat[1] control		Anza Yield	Yecora Rojo Yield	Modoc Yield	Yolo Yield	TL 75-409 Yield	Fielder Yield
		7/26	9/13						
Barban	0.38	4.0	3.3	6910	6294	4980	6630	5672	7622
Difenzoquat	1.0	8.8	8.0	8214	8250	5827	8395	6027	8335
Barban + difenzoquat	0.25 + 0.25	5.0	4.8	7495	7409	5381	7314	7510	7574
Barban + difenzoquat	0.25 + 0.5	8.5	7.8	8202	8019	6703	8639	7970	8060
Barban + difenzoquat	0.38 + 0.25	5.5	7.0	7700	7197	5831	7164	7772	6694
Barban + difenzoquat	0.38 + 0.5	7.9	8.0	8138	8248	6902	7998	8005	7535
Barban + diclofop methyl	0.25 + 0.25	4.3	3.8	7314	6746	4837	6800	6811	7628
Barban + diclofop methyl	0.25 + 0.25	4.3	5.0	7377	7155	5488	7554	7433	7289
Barban + diclofop methyl	0.38 + 0.5	7.9	7.8	7849	7747	6080	8124	7961	8038
Diclofop methyl	1.0	8.4	8.8	7743	7833	6505	7926	8068	7903
AC 222,293	0.75	10.0	9.9	7884	3021	6726	8029	7917	7930
Barban + AC 222,293	0.25 + 0.25	9.9	9.1	8147	7431	6684	7901	7765	7789
Control		1.5	1.3	5944	6196	4854	6631	5554	6105
LSD (0.5%)		2.5	1.8	1070	1206	1626	1282	1491	1628

[1] Control 0 = none; 10 = complete.
Data is

Wild oat control in irrigated winter wheat. Morishita, D.W., D. C. Thill, and R.H. Callihan. Wild oat infestations in southern Idaho are increasing each year. A study was initiated near Declo, Idaho, to determine the effectiveness of several herbicides for wild oat control in irrigated winter wheat (var. Stephens). Herbicide treatments were arranged in a randomized complete block design with four replications in 10 by 30 foot plots. Herbicide applications were made at the 1 to 3 leaf and 3 to 5 leaf stages of growth on April 23, and May 22, 1983, respectively. Soil type in the study was a loam soil consisting of 1.4% o.m., CEC of 16.6 meq/100 g soil, and soil pH 7.1. On the April 23 application date, air temperature was 53 F, soil temperature at the 2 inch depth 48 F, relative humidity 81%, and light dew present. May 23 treatments were applied at an air and 2 inch soil temperature of 37 and 40 F, respectively. Relative humidity was 90% and dew was present. All herbicides were applied in a water carrier at 10 gpa with a CO_2 pressurized backpack sprayer. Evaluations for weed control and crop injury were made July 20. The crop was harvested August 30, with a small plot combine.

Severe crop injury resulted in the bromoxynil + metribuzin and metribuzin + dicamba treatments. This was due to improper timing of application (too early). All broadleaf herbicide treatments and AC222,293 provided 95% or greater control of the mustard spp. Control of both wild oat and mustard spp. was best (95% or greater) with AC222,293 alone and in combination with bromoxynil. Difenzoquat at 1.0 lb/A also provided 93% wild oat control. Highest yields were obtained in the AC222,293 treatment applied at 0.625 lb/A as well as diclofop alone and diclofop + bromoxynil. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Weed control in irrigated winter wheat

Treatment	Rate	Date of application	Crop injury	Weed control		Yield
				Must	Wioa	
	(lb ai/A)		----------	-------%-------	---------	(bu/A)
check	-	-	-	-	-	91
AC222,293[1]	0.375	4/23	0	99	96	103
AC222,293	0.625	4/23	4	100	98	121
AC222,293 + bromoxynil	0.625 + 0.375	4/23	4	100	95	111
AC222,293 + bromoxynil	0.625 + 0.50	4/23	4	100	95	93
barban	0.375	4.23	0	25	65	107
barban + bromoxynil	0.375 + 0.50	4/23	0	95	39	106
barban + diclofop	0.375 + 0.25	4/23	0	25	69	112
barban + diclofop	0.375 + 0.50	5/22	0	61	31	91
barban + difenzoquat	0.375 + 0.25	4/23	0	23	65	111
barban + difenzoquat	0.375 + 0.50	5/22	0	45	70	109
bromoxynil	0.50	4/23	0	100	8	82
bromoxynil + MCPA	0.375	4/23	0	100	8	96
bromoxynil + metribuzin	0.25 + 0.25	4/23	60	100	50	68
diclofop	1.0	4/23	0	59	58	120
diclofop + bromoxynil	1.0 + 0.50	4/23	0	95	79	120
difenzoquat	1.0	5/22	0	49	93	115
metribuzin + dicamba	0.25 + 0.125	4/23	63	100	58	46
terbutryn + MCPA	0.75 + 0.25	4/23	0	100	29	86
LSD (0.05)			17	38	18	30

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[1] AC222,293 applied with 0.5% v/v DM710 surfactant.

Wild oat control in irrigated spring-planted cereals in southern Idaho. Morishita, D.W., D.C. Thill, and R.H. Callihan. Studies were initiated near Idaho Falls and Rupert, Idaho, to evaluate herbicide efficacy for wild oat control in spring wheat (var. Borah) and spring barley (var. Guss). Both experiments were designed as randomized complete blocks with four replications. Plots were 10 by 30 ft in size. Application data and environmental conditions for both locations are shown on Table 1. All herbicide treatments except triallate 10 G were applied with a CO_2 pressurized backpack sprayer. Triallate 4EC treatments were applied at 20 gpa and all other broadcast applications were applied at 10 gpa. Visual evaluations for weed control and crop injury in the wheat and barley were made July 20 and 21, 1983, respectively. The barley and wheat were harvested on August 30 and September 3, respectively with a small plot combine.

All rates of AC222,293 and barban + difenzoquat at 0.375 + 0.50 lb/A resulted in 91% or greater wild oat control in the spring wheat (Table 2). Early season crop injury was observed with difenzoquat at 1.0 lb/A. This was be expected because Borah, a hard red spring wheat variety, is susceptible to difenzoquat caused injury. In the spring barley, application of barban + difenzoquat at 0.375 + 0.50, difenzoquat at 1.0, and AC222,293 + bromoxynil at 0.625 + [illegible].50 lb/A resulted in 91% or greater control of wild oat (Table 3). No herbicide induced crop injury was observed in the barley. No differences in grain yield were measured in the barley crop due to a nonuniform wild oat population. Several herbicide treatments yielded better than the check in the spring wheat. The best yielding treatments were AC222,293 at 0.375, AC222,293 + bromoxynil at 0.625 + 0.50 and the sequential application of triallate/barban at 1.0 and 0.375 lb/A. Although difenzoquat at 1.0 lb/A caused substantial early season crop injury, the grain yield was still greater than the check. (Idaho Agricultural Experiment Station, Moscow, ID ID 83843)

Table 1. Application data for southern Idaho

	Idaho Falls			Rupert	
Application dates	4/22,	5/24,	6/9	4/23,	5/12
Air temperature, F	58	54	61	69	61
Soil temp (2 in), F	51	54	65	61	60
relative humidity, %	71	62	90	45	60
Soil type	loam			silt loam	
Organic matter, %	1.8			1.6	
Soil pH	7.5			6.7	
CEC/100 g soil	14.7			17.9	

Table 2. Wild oat control in irrigated spring wheat

Treatment	Rate	Date of application	Crop injury	Wioa control	Yield
	(lb ai/A)		---------%--------		(bu/A)
check	-	-	-	-	81
AC222,293[1]	0.375	5/29	0	99	114
AC222,293	0.625	5/29	0	99	106
AC222,293 + bromoxynil	0.625 + 0.50	5/29	0	100	113
barban	0.375	5/29	0	73	96
barban + bromoxynil	0.375 + 0.50	5/29	0	33	100
barban + diclofop	0.375 + 0.25	5/29	5	78	108
barban + diclofop	0.375 + 0.50	6/9	0	81	104
barban + difenzoquat	0.375 + 0.25	5/29	0	78	103
barban + difenzoquat	0.375 + 0.50	6/9	4	91	101
bromoxynil	0.50	5/29	1	13	91
diclofop	1.0	5/29	0	80	108
diclofop + bromoxynil	1.0 + 0.50	5/29	4	35	104
difenzoquat	1.0	6/9	26	84	107
triallate(4EC)	1.0	4/22	5	48	86
triallate (10G)	1.0	4/22	1	49	103
triallate/barban	1.0/0.25	4/22 5/29	3	85	106
triallate/barban	1.0/0.375	4/22 5/29	0	79	114
triallate/bromoxynil	1.0/0.50	4/22 5/29	3	61	105
LSD$_{(0.05)}$			6	21	19

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[1] AC222,293 applied with 0.5% v/v DM710 surfactant.

Table 3. Wild oat control in irrigated spring barley

Treatment	Rate	Date of application	Crop injury	Wioa control	Yield
	(lb ai/A)		---------%--------		(lb/A)
check	-	-	-	-	6177
AC222,293[1]	0.375	5/12	0	50	6729
AC222,293	0.625	5/12	0	84	6280
AC222,293 + bromoxynil	0.625 + 0.50	5/12	0	91	7080
barban	0.375	5/12	0	66	7380
barban + bromoxynil	0.375 + 0.50	5/12	0	51	6785
barban + diclofop	0.375 + 0.25	5/12	0	39	6677
barban + diclofop	0.375 + 0.50	5/12	0	26	6397
barban + difenzoquat	0.375 + 0.25	5/12	0	66	6509
barban + difenzoquat	0.375 + 0.50	5/12	0	100	6429
bromoxynil	0.50	5/12	0	59	7057
diclofop	1.0	5/12	0	85	6028
diclofop + bromoxynil	1.0 + 0.50	5/12	0	40	6492
difenzoquat	1.0	5/12	0	100	6784
triallate (4EC)	1.25	4/23	0	75	6706
triallate (10G)	1.25	4/23	0	75	6471
triallate/barban	1.25/0.25	4/23 5/12	0	78	7098
triallate/barban	1.25/0.375	4/23 5/12	0	84	7108
triallate/bromoxynil	1.25/0.50	4/23 5/12	0	79	6422
LSD$_{(0.05)}$			NS	37	NS

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[1] AC222,293 applied with 0.5% v/v DM710 surfactant.

Wild oat and broadleaf weed control in winter wheat. Schaat, B.G., D.C. Thill, and R.H. Callihan. Experiments were initiated during October 1982 to study wild oat and broadleaf weed control in winter wheat at Grangeville and Reubens, Idaho. The varieties Dawes and Dawes/Stephens mix were planted at Grangeville and Reubens, respectively. Plots were 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The herbicide treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil data, climatological conditions at dates of application, and stage of wild oat growth are recorded in Table 1. The plots were harvested at location 1 and 2 on August 18 and September 6, 1983, respectively with a small plot combine.

Applications of triallate + chlorsulfuron applied postplant incorporate with diclofop applied sequentially the following spring, diclofop + bromoxynil + chlorsulfuron, AC222,293 + chlorsulfuron, R-40244 + diclofop, and R-40244 + barban resulted in excellent (91%+) control of all weed species at both locations. At location 2, applications of diclofop + bromoxynil and AC222,293 + 2,4-D also controlled (91%+) all weed species (Table 3). In addition, applications of diclofop + chlorsulfuron, barban + chlorsulfuron, AC222,293, and R40244 + difenzoquat resulted in excellent weed control at location 1 (Table 2). Several other herbicide treatments provided excellent weed control of one or more species at each location.

Grain yields at location 2 were generally best where wild oat and broadleaf weeds were controlled. Wild oat, however, was the predominate weed species in this study. At location 1, grain yields were usually greatest where both wild oat and catchweed bedstraw were effectively controlled. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data for wild oat control in winter wheat

	Location 1				
Application dates	10/14/82	11/11/82	3/21/83	4/14/82	4/29/83
Air temperature, F	59	35	55	57	67
Soil surface temperature, F	62	38	57	59	62
Soil temperature (2 in), F	60	36	59	54	68
Relative humidity, %	72	90	48	35	62
Stage of wild oat growth	-	-	-	2-3lf	3-4lf

	Location 2			
Application dates	10/19/82	11/11/82	3/21/83	4/28/83
Air temperature, F	51	35	49	59
Soil surface temperature, F	50	36	50	64
Soil temperature (2 in), F	52	35	55	64
Relative humidity, %	65	90	70	34
Stage of wild oat growth	-	-	1-2lf	3lf

	Location 1	Location 2
Soil type	clay loam	silt loam
Organic matter, %	5.6	7.5
Soil pH	5.1	5.7
CEC, meq/100 g soil	28.2	19.3

Table 2. Wild [illegible]t and broadleaf weed control in winter wheat (location 1)

Treatment	Ra[illegible]	Date of application	Crop injury	Weed control		Yield
				Wioa	Cwbs	
	(lb ai/A)		----------------	-%-	------------	(bu/A)
check	-	-				66
triallate (4EC)	1.25	10/14/82	0[2]	49	38	72
triallate (10G)	1.25	10/14/82	5	70	22	63
triallate + diclofop	1.25 1.00	10/14/82	0	96	81	80
triallate + chlorsulfuron[1]	1.25 0.016	10/14/82	0	50	60	79
triallate + chlorsulfuron/ diclofop	1.25 1.00 0.016	10/14/82 4/14/83	2	100	100	81
diclofop	1.00	4/14/83	2	100	8	73
chlorsulfuron	0.016	3/21/83	2	12	100	76
difenzoquat	1.00	4/14/83	2	100	5	63
difenzoquat + chlorsulfuron	1.00 0.016	4/14/83	4	99	76	62
diclofop + chlorsulfuron	1.00 0.016	4/14/83	9	98	99	79
barban	0.375	4/14/83	2	100	19	79
barban + chlorsulfuron	0.375 0.016	4/14/83	5	100	100	73
AC222,293	0.375	4/14/83	2	100	94	74
AC222,293	0.63	4/14/83	6	100	89	72
AC222,293 + chlorsulfuron	0.63 0.016	4/14/83	4	100	100	78
chlorsulfuron + bromoxynil + MCPA	0.008 0.25 0.25	11/11/82	2	19	100	79
diclofop + bromoxynil + chlorsulfuron	1.00 0.25 0.016	4/14/83	2	100	100	73
R-40244	0.50	3/21/83	2	85	72	64
R-40244 + diclofop	0.50 1.00	3/21/83	4	100	95	70
R-40244 + difenzoquat	0.50 1.00	4/14/83	9	100	96	46
R-40244 + barban	0.50 0.375	4/14/83	2	100	94	78
diclofop + bromoxynil	1.00 0.375	4/14/83	5	100	28	72
AC222,293 + 2,4-DLVE	0.63 0.75	4/14/83	4	83	64	60
bromoxynil + MCPA	0.375 0.375	3/21/83	0	8	49	73
2,4-DLVE	0.75	4/14/83	4	32	20	68
$LSD_{(0.05)}$			NS	27	33	12

[1] all chlorsulfuron, difenzoquat, and AC222,293 treatments included 0.5% v/v nonionic surfactant.

[2] all evaluations were taken 6/28/83.

Table 3. Wild oat and broadleaf weed control in winter wheat (location 2)

Treatment	Rate	Date of application	Crop injury	Weed control Wioa	Weed control Fipc	Weed control Cofn	Weed control Mawe	Yield
	(lb ai/A)		-----------	---------	----%	----------	----------	(bu/A)
check	-	-						63
triallate (4EC)	1.25	10/19/82	5[2/]	38	70	70	52	79
triallate (10G)	1.25	10/19/82	0	35	30	35	32	85
triallate/	1.25	10/19/82	2	64	25	25	20	97
diclofop	1.00	4/28/83						
triallate +	1.25	10/19/82	2	28	82	95	72	84
chlorsulfuron[1/]	0.016							
triallate +	1.25	10/19/82	2	91	100	100	100	115
chlorsulfuron/	0.016							
diclofop	1.00	4/28/83						
diclofop	1.00	4/28/83	0	100	25	25	25	104
chlorsulfuron	0.016	3/21/83	0	2	100	100	100	64
difenzoquat	1.00	4/28/83	2	96	2	10	0	86
difenzoquat +	1.00	4/28/83	5	75	100	100	100	89
chlorsulfuron	0.016							
diclofop +	1.00	4/28/83	0	85	100	100	100	112
chlorsulfuron	0.016							
barban	0.375	4/28/83	0	99	0	25	0	100
barban +	0.375	4/28/83	2	49	100	100	100	92
chlorsulfuron	0.016							
AC222,293	0.375	4/28/83	0	98	74	26	10	96
AC222,293	0.63	4/28/83	0	90	100	100	39	101
AC222,293 +	0.63	4/28/83	4	95	100	100	99	104
chlorsulfuron	0.016							
chlorsulfuron +	0.008	3/21/83	0	35	100	100	99	86
bromoxynil +	0.25							
MCPA	0.25							
diclofop +	1.00	3/21/83	2	92	100	100	100	111
bromoxynil +	0.25							
chlorsulfuron	0.016							
R-40244	0.50	3/21/83	0	18	100	100	98	87
R-40244 +	0.50	4/28/83	5	100	100	100	100	105
diclofop	1.00							
R-40244 +	0.50	4/28/83	0	28	100	75	100	88
difenzoquat	1.00							
R-40244 +	0.50	4/28/83	0	98	100	100	99	98
barban	0.375							
diclofop +	1.00	4/28/83	0	100	92	95	91	106
bromoxynil	0.375							
AC222,293 +	0.63	4/28/83	8	95	100	100	90	92
2,4-DLVE	0.75							
bromoxynil +	0.375	3/21/83	2	18	100	100	92	75
MCPA	0.375							
2,4-DLVE	0.75	4/28/83	2	49	100	100	100	80
$LSD_{(0.05)}$			NS	23	33	35	31	20

[1/] all chlorsulfuron, difenzoquat, and AC222,293 treatments included 0.5% v/v nonionic surfactant.

[2/] all evaluations were taken 6/28/83.

Downy brome and broadleaf weed control in winter wheat. Mo[illegible]ishita, D. W., D.C. Thill, and R.H. Callihan. A field experiment was established to evaluate the effects of several herbicides applied alone and in combination on weed control in winter wheat (var. Stephens) near Lewiston, Idaho. Herbicide treatments were applied preplant incorporated (PPI) and preemergence surface (PES) October 1 and 25, 1982, respectively. Postemergence (Post) treatments were applied March 17, 1983. PPI treatments were double incorporated with a disk and spike-tooth harrow. Environmental conditions at the time of PPI, PES, and Post applications were as follows: Air temperature 57, 56, and 59 F, soil temperature at 2 inch depth 46, 54, and 54 F, relative humidity 42, 89, and 49%, cloud cover 20, 100, and 20%, and wind speed at 0 to 3, 3 to 6, and 0 to 4 mph. Soil type at the study site was a silt loam with 2.2% o.m., pH of 5.9, and CEC of 15.8 meq/100 g soil. All treatments were applied at 20 gpa with a CO_2 pressurized backpack sprayer. Four replications in a randomized complete block design were used in this experiment. Plot size was 10 by 30 feet. Visual evaluations for crop injury and weed control were made May 12, and June 21, 1983. The crop was harvested July 22, 1983, with a small plot combine.

No significant crop injury was observed on the early evaluation date, however diclofop + DPX-T6376 and R-40244 showed 5% crop injury on the second evaluation date. Diclofop at 1.0 and 1.25 lb/A applied PPI, SSH-0860 at 1.5 and 2.0 lb/A applied PES, and metribuzin + terbutryn applied Post provided good to excellent control (79%+) of downy brome. Although not significant, it appeared that downy brome control was slightly reduced when diclofop (PPI) was tank-mixed with chlorsulfuron or DPX-T6376. Control of clasping pepperweed and pineappleweed was excellent with PES applications of chlorsulfuron alone at 0.0156 and 0.0313 lb/A, diclofop + chlorsulfuron at 1.25 + 0.0313 lb/A, napropamide + R-40244, R-40244, and SSH-0860 at 1.5 and 2.0 lb/A. Post applications of metribuzin alone and metribuzin + terbutryn also resulted in excellent broadleaf weed control. Highest yields were obtained with diclofop + chlorsulfuron at 1.0 + 0.0156 and 1.25 + 0.0313 lb/A applied PES and SSH-0860 applied PPI at 1.0 lb/A. Ten other herbicide treatments also yielded better than the check (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Downy brome and broadleaf weed control in winter wheat

Treatment	Rate	Date of application	Crop injury		Weed control					Yield
					Dobr		Clpw		Pawe	
	(lb ai/A)		E[1]	L[2]	E	L	E	L	E	(bu/A)
			%							
check	-	-								77
chlorsulfuron	0.0156	10/1	1	0	40	49	70	56	71	85
chlorsulfuron	0.0313	10/1	0	1	23	18	96	64	96	94
chlorsulfuron	0.0156	10/25	4	0	28	14	100	100	100	82
chlorsulfuron	0.0313	10/25	3	0	69	75	100	75	100	92
diclofop	1.0	10/1	3	0	86	80	0	3	18	75
diclofop	1.25	10/1	0	1	89	84	23	4	3	77
diclofop	1.0	10/25	4	1	18	35	3	0	24	73
diclofop	1.25	10/25	0	0	68	90	6	3	8	88
diclofop + chlorsulfuron	1.0 + 0.0156	10/1	1	0	70	76	71	18	89	92
diclofop + chlorsulfuron	1.25 + 0.0313	10/1	5	1	58	73	90	73	98	91
diclofop + chlorsulfuron	1.0 + 0.0156	10/25	1	0	38	61	75	75	75	99
diclofop + chlorsulfuron	1.25 + 0.0313	10/25	0	3	58	83	100	100	100	98
diclofop + DPX-T6376	1.25 + 0.0313	10/1	3	5	66	56	60	48	81	82
DPX-T6376	0.0313	10/1	4	3	64	28	81	38	91	91
metribuzin	0.375	3/17	0	3	76	74	99	100	100	85
metribuzin + terbutryn	0.375 + 0.75	3/17	0	3	89	79	100	100	100	91
napropamide	0.50	10/25	0	0	6	3	0	0	5	82
napropamide	1.0	10/25	0	0	29	25	18	0	91	88
napropamide + R-40244	1.0 + 0.50	10/25	0	0	45	46	100	99	96	93
R-40244	0.50	10/25	1	5	48	25	100	99	80	83
SSH-0860	1.0	10/1	0	0	72	41	93	58	88	98
SSH-0860	1.50	10/1	0	1	59	50	94	68	69	83
SSH-0860	2.0	10/1	0	0	78	66	90	79	94	95
SSH-0860	1.0	10/25	0	0	54	50	98	95	99	87
SSH-0860	1.5	10/25	3	0	89	86	99	100	99	93
SSH-0860	2.0	10/25	4	1	98	94	100	100	100	94
SSH-0860	1.50	3/17	0	0	23	18	98	64	100	82
SSH-0860	2.0	3/17	1	0	18	6	93	60	98	85
LSD$_{(0.05)}$			NS	3	36	36	27	34	28	14

[1]early evaluation (5/12); [2]late evaluation (6/21).

Blackgrass control in winter wheat. Brewster, Bill D. and Arnold P. Appleby. Blackgrass is a relatively new weed in western Oregon and has the potential of infesting most fall- and winter-grown crops. A field trial was conducted near Sheridan to evaluate four herbicides for blackgrass control in [illegible] seeded wheat. Alachlor, pendimethalin, and diuron were applied on October 19, 1983, prior to emergence of the wheat and blackgrass. Diclofop-methyl was applied on November 2, when the wheat and blackgrass were in the one-leaf stage of growth. The experiment was a randomized complete block with five replications and 2.4 by 7.6 m plots. Herbicides were applied with a unicycle compressed-air plot sprayer. The spray volume was 234 L/ha with water as the carrier. Visual evaluations were made on December 3, 1982 and May 31, 1983.

No visible symptoms of herbicide injury on the wheat were seen. Only those treatments that contained diclofop-methyl provided satisfactory blackgrass control. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Percent blackgrass control and wheat injury and yield following pre- and postemergence herbicide applications

		Blackgrass			Wheat		
Herbicide	Rate	Growth stage	Dec. 3	May 31	Dec. 3	May 31	Yield (kg/ha)
	(kg/ha)		(% control)		(% injury)		
alachlor	0.84	pre	83	14	0	0	2040
diuron	1.68	pre	0	4	0	0	1610
alachlor + diuron	0.84 + 1.68	pre	84	34	0	0	2490
alachlor + pendimethalin	0.84 + 1.12	pre	84	60	0	0	3430
diuron + pendimethalin	1.68 + 1.12	pre	71	30	0	0	2630
alachlor/ diclofop-methyl	0.84/ 1.12	pre/ 1 leaf	98	100	0	0	5530
diuron/ diclofop-methyl	1.68/ 1.12	pre/ 1 leaf	95	100	0	0	5330
Untreated control	-		0	0	0	0	1550

$LSD_{.05} = 540$

$LSD_{.01} = 850$

Herbicides for control of black mustard and Italian ryegrass in winter wheat. Mitich, L.W. and N.L. Smith. A UC Davis Experimental Farm site was selected to evaluate several pre- and postemergence herbicides for control of Italian ryegrass and black mustard in winter wheat. Cultivar 'Shasta' was drill seeded December 13, 1982. The area was then seeded to ryegrass and mustard. Napropamide, R-40244 and diethatyl were surface applied the following day using a CO_2 sprayer calibrated to deliver 30 GPA. Individual plot size was 10 by 20 ft with four replications used. Postemergence herbicides (diclofop methyl and molinate) were applied February 3, 1983, to 2- to 3-leaf wheat, 1- to 2-leaf ryegrass and 3- to 4- leaf mustard. Wheat stand was poor because of the extremely heavy rainfall during the season which resulted in water logged soil.

Good control of ryegrass was observed from napropamide and diclofop methyl, however napropamide reduced the wheat stand. R-40244 gave excellent control of mustard and when followed by a postemergence application of diclofop methyl to control ryegrass, maximum yields were obtained with little crop injury. (University of California Cooperative Extension, Davis, CA 95616)

Weed control in winter wheat

Herbicides	Rate lb/A	Italian ryegrass control[1] 2/3/83	5/4/83	Black mustard control[1] 2/3/83	5/4/83	Wheat stand 2/3/83	Yield lb/A 7/9/83
Napropamide	1	8.0	9.0	2.0	0	2.5	163
Napropamide	2	9.8	9.5	3.8	0	2.5	54
Napropamide + R-40244	1 + 0.5	10.0	10.0	10.0	10.0	4.0	739
Napropamide + R-40244	1 + 1	9.8	10.0	10.0	10.0	2.3	943
R-40244 + Diclofop methyl	0.5 + 1	8.8	10.0	9.8	10.0	9.0	1384
R-40244 + Diclofop methyl	1 + 1	9.8	10.0	10.0	10.0	8.7	1812
Diethatyl	1	8.5	7.5	2.8	0	5.0	194
Molinate	2	0	0	1.0	1.3	4.3	513
Molinate	3	0	0.5	0.8	0.3	4.3	366
Control	-	0.8	0.7	0.3	0	2.5	257

[1] 0 = no control or stand; 10 = 100% control or stand

All figures are average of 4 replications.

Annual weed control in spring wheat with diclofop and bromoxynil applied in irrigation water. Graf, G.T. and A.G. Ogg, Jr. A field study was initiated to evaluate the effectiveness of diclofop and bromoxynil applied in irrigation water for weed control in spring wheat. On April 11, 1983, wild oat seed and 50 lb N/A as ammonium nitrate were broadcast on the plot area and incorporated 3 inches deep with a power-driven rotary tiller. Spring wheat variety WS-1 was planted at 100 lb/A with a conventional grain drill. The soil in the plot area was a sandy loam with a pH of 6.8 and organic matter of 0.7%. Treatments were replicated three times in a randomized block design. on plots 20 ft square. On May 6, diclofop was applied alone or as a tank mix with bromoxynil. For some treatments, the bromoxynil was applied on May 15. At the time of treatment, plant growth stages in the nontreated controls were as follows:

May 6	Wheat--3 to 4 leaves; 3 to 5 inches tall Wild oat--2 to 4 leaves; 2 to 4 inches tall Lambsquarters--1/4 to 3/4 inches tall Barnyardgrass--less than 1 inch tall
May 15	Wheat--4 to 5 leaves Wild oat--7 leaves Lambsquarters--2 to 8 leaves; 1/2 to 1-1/2 inches tall. Barnyardgrass--4 leaves; 1 to 1-1/2 inches tall.

The diclofop in Treatments Nos. 3, 4, and 5 and bromoxynil in Treatment No. 3 (Tables 1 and 2) were applied with a sprinkler irrigation simulator developed especially for research applications of pesticides in irrigation water. All other herbicide treatments were applied as conventional sprays in 35 gpa.

Weeds were harvested from 1-square-meter in each plot on June 16 to determine the density and fresh weight of each species (Table 1). On July 8, control of wild oat was determined by visual comparison to nontreated controls (Table 2). Wheat was harvested from 1-square-meter in each plot on June 16 and fresh weight was measured. On August 3 the wheat was harvested for grain from 1.6 square meter in each plot.

The activity of diclofop against wild oat was not affected by bromoxynil (Tables 1 and 2). When applied as conventional sprays, diclofop controlled 95% or more of the wild oat; however, when applied in irrigation water, it controlled only 68 to 81% of the wild oat. Barnyardgrass was controlled equally well with both application techniques. The method of application (conventional spray vs. sprinkler) did not affect the control of lambsquarters when bromoxynil was applied as a tank mix with diclofop. However, lambsquarters were controlled best when bromoxynil was applied as a sequential spray on May 15, probably because more lambsquarters had emerged by that time.

In mid-June, the fresh weight of wheat foliage was similar for all treatments containing both diclofop and bromoxynil (Table 2). Thereafter, "take-all disease" weakened the wheat plants and reduced plant populations so that grain yields in August were low, especially in Treatment Nos. 3, 4, and 5 where wild oat was not controlled effectively.

In this study diclofop in irrigation water did not control wild oat as well as conventional sprays of diclofop; however, additional research should be conducted with vigorously growing wheat before a final decision is made. (USDA-ARS, Irr. Agri. Res. and Ext. Center, Prosser, WA 99350).

Table 1. Annual weed control in spring wheat with diclofop and bromoxynil.

Trt. No.	Herbicide	Rate (lbs/A)	Volume of water	Date applied	Weed control (June 16, 1983)[1]/[2]/					
					Wild oat		Barnyardgrass		Lambsquarters	
					No/m^2	g/m^2	No/m^2	g/m^2	No/m^2	g/m^2
1	Diclofop + bromoxynil (tank mix)	1.0 + 0.5	35 GPA	May 6	2 c	15 c	1 b	2 b	25 b	32 b
2	Diclofop + bromoxynil (sequential)	1.0 + 0.5	34 GPA 35 GPA	May 6 May 15	6 c	8 c	0 b	0 b	11 bcd	13 b
3	Diclofop + bromoxynil (tank mix)	1.0 + 0.5	0.2 inch	May 6	36 ab	393 b	1 b	2 b	23 bc	32 b
4	Diclofop + bromoxynil (sequential)	1.0 + 0.5	0.2 inch 35 GPA	May 6 May 15	32 b	290 b	1 b	2 b	9 cd	7 b
5	Diclofop + bromoxynil (sequential)	1.0 + 0.5	0.6 inch 35 GPA	May 6 May 15	39 ab	297 b	0 b	0 b	4 d	7 b
6	Bromoxynil	0.5	35 GPA	May 15	69 a	917 a	48 a	67 a	9 d	5 b
7	Nontreated	-	-	-	62 ab	883 a	53 a	88 a	49 a	367 a

[1]/ Analysis of variance conducted on transformed data (square root (A + 0.5)).

[2]/ Values within a column followed by the same letter are not significantly different at the 5% level.

Table 2. Wild oat control and yield of spring wheat treated with diclofop and bromoxynil.

Trt. No.	Herbicide	Rate (lbs/A)	Volume of water	Date applied	Wild oat control July 8 [1/3/]	Wheat yield[2/3/] Fresh wt. June 16	Wheat yield[2/3/] Grain wt. Aug. 3
					%	g/1m^2	g/1.6m^2
1	Diclofop + bromoxynil (tank mix)	1.0 + 0.5	35 GPA	May 6	95 a	693 a	210 ab
2	Diclofop + bromoxynil (sequential)	1.0 + 0.5	34 GPA 35 GPA	May 6 May 15	96 a	710 a	287 a
3	Diclofop + bromoxynil (tank mix)	1.0 + 0.5	0.2 inch	May 6	68 b	613 ab	186 abc
4	Diclofop + bromoxynil (sequential)	1.0 + 0.5	0.2 inch 35 GPA	May 6 May 15	72 b	647 ab	82 c
5	Diclofop + bromoxynil (sequential)	1.0 + 0.5	0.6 inch 35 GPA	May 6 May 15	81 b	623 ab	172 bc
6	Bromoxynil	0.5	35 GPA	May 15	0 c	330 bc	87 c
7	Nontreated	-	-	-	0 c	255 c	96 c

[1/] Analysis of variance conducted on transformed data (square root (A + 0.5)).

[2/] Analysis of variance conducted on transformed data (Log (A + 1.0)).

[3/] Values within a column followed by the same letter are not significantly different at the 5% level.

Wild buckwheat control in winter wheat. Alley, H. P. and M. A. Ferrell. A series of herbicide treatments were applied on May 26, 1983 to evaluate their efficacy for wild buckwheat control in winter wheat. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit calibrated to deliver 20 gpa solution. The soil was classified as a loam (33% sand, 39% silt, 27% clay) with 3.0% organic matter and a 6.7 pH. The winter wheat was in the two-tiller/10 to 12 in. leafy height and the wild buckwheat, 2 to 3 leaf/1 to 2 in. growth at time of treatment. Quadrat counts showed a wild buckwheat density of 50.6 plants per ft^2.

Weed control and crop damage evaluations were made on June 6 and August 8, 1983. The June 6 wild buckwheat control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. The August 8 evaluations were visual estimates. Nine of the treatments using bromoxynil ME4, bromoxynil + MCPA 3+3, bromoxynil + chlorsulfuron, dicamba + MCPA, R-40244 + bromoxynil ME4, R-40244 + metribuzin and dicamba + bromoxynil gave 99% or greater wild buckwheat control. As individual treatments--chlorsulfuron and R-40244 were not effective. The winter wheat and wild buckwheat treated with R-40244 was stunted and chlorotic. (Wyoming Agric. Ext. Sta., Laramie, WY 82071, SR 1246.)

Wild buckwheat control in winter wheat

Treatment[1]	Rate lb ai/A	Percent Control[2]	
		June	August
EH-541	15 oz product	58	43
EH-541	20 oz product	86	90
EH-540	12 oz product	86	90
EH-540	16 oz product	94	99+
bromoxynil ME4	0.38	99+	99
bromoxynil ME4	0.5	99+	99+
bromoxynil ME4 + MCPA 3+3	0.38	99+	95
bromoxynil ME4 + MCPA 3+3	0.5	99+	99
chlorsulfuron	0.00469	8	0
chlorsulfuron	0.00938	34	17
chlorsulfuron	0.001406	40	40
bromoxynil ME4 + chlorsulfuron	0.25 + 0.00469	99	100
bromoxynil ME4 + chlorsulfuron	0.38 + 0.00469		
dicamba + MCPA	0.125 + 0.25	99	98
dicamba + chlorsulfuron	0.125 + 0.008	96	96
dicamba + metribuzin	0.125 + 0.125	96	67
R-42044	0.5	0	0
R-40244 + bromoxynil	0.25 + 0.25	99+	99
R-40244 + metribuzin	0.25 + 0.25	99+	91
dicamba	0.125	98	90
dicamba + bromoxynil ME4	0.125 + 0.25	99+	99
picloram + 2,4-D	0.15 oz + 0.38	95	100
2,4-D (dimethyl & diethanolamine)	1 pt	0	0
2,4-D (alkanolamine)	1 pt	4	0

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[1] Herbicides applied May 26, 1983.

[2] Weed control evaluations June 6, 1983 by counts from two 6 in. by 5 ft quadrats per replication and visual evaluations August 8, 1983.

Testiculate buttercup control in winter wheat. Chase, R. L.

Trials were established in November 1982 in three counties in Utah to evaluate fall versus spring applications of several herbicides for their effectiveness in controlling testiculate buttercup. Applications were made with a bicycle sprayer applying 20 gpa. Plots were 11 by 30 feet and replicated 4 times in randomized block design. The wheat had 3 to 5 tillers at the time of application in the fall. Of the spring applications, terbutryn was applied the middle of March, the rest the first part of April.

Chlorsulfuron averaged between 98 and 100% control at .167 oz ai/A both in the fall and spring. Other treatments were nearly as effective, but more costly. Metribuzin at .5 lb ai/A gave better control (98%) when applied in the fall than in the spring (88%).

Testiculate buttercup control in winter wheat 1982-83
County Average % Control*

Treatment	Rate	Fall/ Spring	Box Elder	Utah	Juab	Overall Average
chlorsulfuron	.17 oz	F	100a	100a	100a	100
chlorsulfuron	.33 oz	F	100a	100a	100a	100
chlorsulfuron	.50 oz	F	100a	100a	100a	100
terbutryn	1.00	F	74b	92a	90abc	85
terbutryn	1.25	F	76b	98a	75c	83
terbutryn	1.50	F	75b	95a	93ab	88
chlorsulfuron + terbutryn	.10 1.00	F	100a	100a	93ab	98
metribuzin	.25	F	75b	98a	93ab	89
metribuzin	.50	F	94a	100a	100a	98
chlorsulfuron	.17 oz	S	100a	100a	98a	99
chlorsulfuron	.33 oz	S	100a	100a	100a	100
chlorsulfuron	.50 oz	S	100a	100a	100a	100
chlorsulfuron + bromoxynil	.10 oz .25	S	99a	97a	100a	98
chlorsulfuron + metribuzin	.10 oz .125	S	86a	100a	88abc	91
bromoxynil + MCPA	.375	S	89a	95a	86abc	90
metribuzin	.25	S	76b	67b	80bc	74
metribuzin	.50	S	99a	63b	100a	88
metribuzin + bromoxynil	.125 .25	S	85b	60b	87abc	77
terbutryn	1.00	S	97a	92a	100a	96

* Numbers are averages of four replications. Values followed by the same letter do not differ significantly at the 5% level according to Duncan's multiple range test.

Broadleaf weed control in winter wheat. Schaat, B.G., D.C. Thill, and R.H. Callihan. An experiment was initiated on March 24, 1983 to study the effects of various herbicide treatments on the control of broadleaf weeds, particularly catchweed bedstraw, in winter wheat (var. Stephens) at Culdesac, Idaho. Plots were 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The treatments were broadcast with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 7.4% organic matter, pH 5.6, and CEC of 26.2 meq/100 g soil. All treatments were applied at the three to four tiller stage of crop growth on March 24, 1983. Climatologicial conditions at time of application were; air temperature 52 F, soil surface temperature 52 F, soil temperature at 2 inches 53 F, and relative humidity 48%. The plots were harvested August 3, 1983 with a small plot combine.

All herbicide treatments effectively (98%+) controlled field pennycress and henbit. Catchweed bedstraw was best controlled (85%+) when treated with RH0265, terbutryn + MCPA + dicamba, and chlorsulfuron + bromoxynil. Chlorsulfüron + bromoxynil completely controlled coast fiddleneck and applications of terbutryn + bromoxynil (0.75 + 0.375 lb ai/A) and terbutryn + MCPA (1.25 + 0.25 lb ai/A) resulted in 85 to 88% control. Downy brome was not effectively controlled by any herbicide treatment. Overall, the chlorsulfuron + bromoxynil treatment resulted in the best broadspectrum broadleaf weed control and the greatest grain yield. All but two treatments, terbutryn (1.50 lb ai/A) and terbutryn + MCPA (0.60 + 0.25 lb ai/A), increased grain yield when compared to the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in winter wheat at Culdesac, Idaho

		Date of	Weed control					
Treatment	Rate	application	Cwbs	Cofn	Fipc	Hebi	Dobr	Yield
	(lb ai/A)		--------	--------	%	--------	--------	(bu/A)
check	-	-						68
terbutryn	1.25	3/24/83	5[1]	42	100	100	42	97
terbutryn	1.50	3/24/83	12	58	100	100	5	90
terbutryn + MCPA	0.60 0.25	3/24/83	25	69	100	100	10	93
terbutryn + MCPA	1.00 0.25	3/24/83	15	78	100	100	15	94
terbutryn + MCPA	1.25 0.25	3/24/83	38	88	100	100	5	112
metribuzin + bromoxynil	0.25 0.375	3/24/83	28	45	100	100	10	98
metribuzin + bromoxynil	0.375 0.375	3/24/83	52	39	99	100	18	115
terbutryn + bromoxynil	0.75 0.375	3/24/83	62	85	98	100	5	103
terbutryn + bromoxynil + MCPA	0.60 0.375	3/24/83	44	76	100	100	15	106
terbutryn + MCPA + dicamba	0.60 0.25 0.125	3/24/83	85	72	100	100	32	110
terbutryn + MCPA + dicamba	1.00 0.25 0.125	3/24/83	90	74	100	100	20	106
chlorsulfuron + bromoxynil	0.016 0.25	3/24/83	88	100	100	99	18	130
metribuzin + dicamba	0.25 0.125	3/24/83	50	22	100	100	5	111
RH0265	0.25	3/24/83	91	2	100	100	10	117
$\text{LSD}_{(0.05)}$			19	38	NS	NS	20	25

[1] all evaluations were taken 5/19/83.

Broadleaf weed control in winter wheat. Schaat, B.G., D.C. Thill, and R.H. Callihan. On October 8, 1982 at Moscow, Idaho, and on October 19, 1982 at Waha, Idaho, two experiments were initiated to study broadleaf weed control in winter wheat (var. Stephens and Walladay, respectively). Plots measured 10 by 30 feet in size with treatments replicated four times in a randomized complete block design. The herbicide treatments were broadcast applied with a CO2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil data, date of applications, stages of crop growth, and climatological data are given in Table 1. The plots were harvested at location 1 on August 2 and at location 2 on August 3, 1983 with a small plot combine.

Fall application of chlorsulfuron (0.016 lb ai/A), spring applications of dicamba + chlorsulfuron (0.063 + 0.016 lb ai/A), and chlorsulfuron + bromoxynil (0.008 + 0.25 lb ai/A) resulted in the best overall control of all weed species at both locations (Tables 2 and 3). Catchweed bedstraw, a difficult to control broadleaf annual weed, was best controlled with spring applications of dicamba + chlorsulfuron, chlorsulfuron + bromoxynil, diuron + bromoxynil, and metribuzin + bromoxynil (Table 3). Hedge parsley was most effectively controlled by applications of chlorsulfuron, DPX-T6376, and tank mixtures of chlorsulfuron with either dicamba or bromoxynil (Table 3). In general, coast fiddleneck, prickly lettuce, and flixweed were best controlled with applications of chlorsulfuron alone or in tank mix combinations with dicamba (fall or spring) and bromoxynil (Table 3).

At location 1, mayweed, field pennycress, miners lettuce, shepherdspurse, and henbit were effectively controlled (84% or greater) by preemergence applications of PPG-1013; fall postemergence applications of PPG-1013 (0.06 lb ai/A); fall and spring applications of chlorsulfuron (0.016 lb ai/A); DPX-T6376; DPX-T6376 + bromoxynil; and spring applications of dicamba + chlorsulfuron (0.063 + 0.016 lb ai/A).

No visual crop injury was observed at either location. Grain yields at location 2 were greatest when both catchweed bedstraw and hedge parsley were effectively controlled except for the spring application of dicamba + chlorsulfuron (0.063 + 0.016 lb ai/A). Grain yields were not different at location 1. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data for broadleaf weed control in winter wheat

	Location 1			
Application dates	10/8/82	11/4/82	3/15/83	4/4/83
Air temperature, F	50	48	45	48
Soil surface temperature, F	48	48	46	48
Soil temperature (2 in), F	38	48	46	52
Relative humidity, %	92	75	62	76
Stage of crop growth	-	2-3lf	2-3til	3-4til

	Location 2				
Application dates	10/19/18	11/9/82	12/22/82	3/16/83	4/7/83
Air temperature, F	47	38	44	49	52
Soil surface temperature, F	50	35	42	60	52
Soil temperature (2 in), F	50	32	36	58	54
Relative humidity, %	60	100	72	58	58
Stage of crop growth	-	1-2lf	3-4lf	2-3til	3-4til

	Location 1	Location 2
Soil type	loam	silt loam
Organic matter, %	3.7	7.7
Soil pH	5.4	5.2
CEC meq/100 g soil	19.2	26.5

Table 2. Broadleaf weed control and yield in winter wheat (location 1)

Treatment	Rate	Date applied	Crop injury[2]	Weed control[2]					Yield
				Mawe	Fipc	Mile	Shpu	Hebi	
	(lb ai/A)		---	---	---	%	---	---	(bu/A)
check	-	-							59
PPG-1013	0.10	10/8/82	12	94	95	100	100	100	76
PPG-1013	0.20	10/8/82	14	88	100	95	100	100	76
PPG-1013	0.02	11/4/82	5	74	99	100	72	99	90
PPG-1013	0.04	11/4/82	10	62	100	100	80	100	77
PPG-1013	0.06	11/4/82	5	90	100	100	100	99	78
PPG-1013	0.02	3/15/83	12	48	22	28	25	62	56
PPG-1013	0.04	3/15/83	4	55	17	75	52	78	79
PPG-1013	0.06	3/15/83	5	45	5	70	50	100	76
chlorsulfuron[1]	0.016	11/4/82	1	89	100	100	100	100	80
chlorsulfuron	0.008	11/4/82	0	71	100	99	100	100	93
chlorsulfuron	0.016	3/15/83	5	90	100	100	94	89	88
metribuzin	0.25	3/15/83	0	88	52	100	100	92	90
dicamba + chlorsulfuron	0.063 0.008	11/4/82	0	81	95	100	100	100	101
dicamba + chlorsulfuron	0.125 0.016	11/4/82	9	75	100	100	100	100	71
dicamba + chlorsulfuron	0.063 0.016	3/15/83	2	92	100	100	100	85	92
dicamba + chlorsufuron	0.125 0.016	3/15/83	10	69	100	100	95	86	75
dicamba + metribuzin	0.125 0.125	11/4/82	9	61	90	100	100	100	66
dicamba + metribuzin	0.125 0.125	3/15/83	0	90	46	100	68	89	86
dicamba + bromoxynil	0.125 0.25	11/4/82	0	66	5	99	100	99	86
dicamba + bromoxynil	0.125 0.25	3/15/83	5	86	30	81	52	32	77
DPX-T6376	0.016	11/4/82	8	84	99	100	100	100	72
DPX-T6376	0.008	11/4/82	4	88	100	100	100	100	74
DPX-T6376	0.016	3/15/83	10	100	100	100	100	99	81
DPX-T6376 + bromoxynil	0.008 0.25	3/15/83	6	100	100	100	100	99	85
chlorsulfuron + bromoxynil	0.008 0.25	3/15/83	2	100	100	100	91	82	94
diuron + bromoxynil	0.60 0.25	3/15/83	1	98	89	100	100	72	88
terbutryn + MCPA	1.00 0.375	4/7/83	1	70	100	32	81	15	89
metribuzin + bromoxynil	0.375 0.375	4/7/83	6	78	49	50	50	49	71
$LSD_{(0.05)}$			NS	30	28	32	42	28	NS

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[1] All chlorsulfuron and DPX-T6376 treatments included 0.5% v/v nonionic surfactant.

[2] Crop injury, mayweed, and prickly lettuce control were evaluated on 7/13/83; all other evaluations were made on 5/19/83.

Table 3. Broadleaf weed control in winter wheat (location 2)

Treatment	Rate	Date applied	Crop injury[2]	Weed control[2]					Yield
				Prle	Cwbs	Hepa	Cofn	Flwe	
	(lb ai/A)		----------------------	----------------------	----------------------	%	----------------------	----------------------	(bu/A)
check	-	-						0	30
PPG-1013	0.10	10/19/82	5	82	58	68	100	100	60
PPG-1013	0.20	10/19/82	5	91	66	72	74	100	52
PPG-1013	0.02	11/9/82	4	6	44	59	51	100	55
PPG-1013	0.04	11/9/82	9	22	28	65	82	100	51
PPG-1013	0.06	11/9/82	2	35	46	61	80	100	50
PPG-1013	0.02	3/16/83	0	36	12	12	15	12	26
PPG-1013	0.04	3/16/83	2	56	40	8	75	30	29
PPG-1013	0.06	3/16/83	6	75	70	45	75	45	44
chlorsulfuron[1]	0.016	11/9/82	0	100	25	100	100	100	61
chlorsulfuron	0.008	11/9/82	1	100	29	100	100	100	52
chlorsulfuron	0.016	3/16/83	4	100	82	100	100	100	61
metribuzin	0.25	3/16/83	2	75	28	32	75	71	50
dicamba +	0.063	11/9/92	0	100	54	98	100	100	61
chlorsulfuron	0.008								
dicamba +	0.125	11/9/82	0	100	32	100	100	100	62
chlorsulfuron	0.016								
dicamba +	0.063	3/16/83	9	100	90	100	100	100	55
chlorsulfuron	0.016								
dicamba +	0.125	3/16/83	6	98	94	100	100	100	75
chlorsulfuron	0.016								
dicamba +	0.125	12/22/82	0	36	20	70	80	84	54
metribuzin	0.125								
dicamba +	0.125	3/16/83	0	100	48	18	2	32	60
metribuzin	0.125								
dicamba +	0.125	12/22/82	0	50	34	22	72	62	40
bromoxynil	0.25								
dicamba +	0.125	3/16/83	0	100	60	10	82	35	19
bromoxynil	0.25								
DPX-T6376	0.016	11/9/82	0	100	28	100	88	100	45
DPX-T6376	0.008	11/9/82	6	100	5	95	75	95	38
DPX-T6376	0.016	3/16/83	2	100	20	100	100	100	52
DPX-T6376 +	0.008	3/16/83	4	100	60	82	100	80	58
bromoxynil	0.25								
chlorsulfuron +	0.008	3/16/83	1	100	100	92	100	100	69
bromoxynil	0.25								
diuron +	0.60	3/16/83	4	78	89	56	100	98	56
bromoxynil	0.25								
terbutryn +	1.00	4/7/83	0	100	42	70	80	100	55
MCPA	0.375								
metribuzin +	0.375	4/7/83	2	75	86	50	95	89	34
bromoxynil	0.375								
$LSD_{(0.05)}$			NS	38	37	27	36	27	20

[1] All chlorsulfuron and DPX-T6376 treatments included 0.5% v/v surfactant.

[2] Crop injury and prickly lettuce control were evaluated on 7/13/83; all other weed species were evaluated on 5/22/82.

The effect of bromoxynil-chlorsulfuron tank mixtures on broadleaf weed control in winter wheat. Gaiser, D.R., D.C. Thill and R.H. Callihan. Experiments were initiated in the spring of 1983 to examine the effects of various mixtures of bromoxynil, chlorsulfuron, dicamba, diuron, DPX-T6376, MCPA, and metribuzin on broadleaf weed control in winter wheat. The experiments were established at three locations in northern Idaho and three in eastern Washington, (i.e., location 1, Lapwai, Id.; location 2, Genesee, Id.; location 3, Tilma, Id.; location 4, Uniontown, Wa.; location 5, Waverly, Wa.; location 6, Johnson, Wa.). At all locations, treatments were replicated four times on 10 by 30 foot plots in a randomized complete block design. Also, Stephens winter wheat was planted at all locations. The treatments were broadcast-applied postemergence with a CO2-pressurized backpack sprayer calibrated to deliver 20 GPA at 40 PSI and 3 MPH with 8002 flat fan nozzles. Environmental conditions at application, as well as visual evaluation and harvest dates for the six locations are summarized in Table 1. All plots were harvested with a Hege small plot combine. The weeds evaluated were henbit, mayweed, shepherdspurse, field pennycress, annual polemonium, common lambsquarter, common chickweed, jagged chickweed, ivyleaf speedwell, coast fiddleneck, and prostrate knotweed.

Visual evaluations of weed control for weeds occurring at more than one location were averaged and are shown in Table 2. Evaluation data for weeds occurring at only one location are shown in Table 3. Yield (Table 2) in bu/A was calculated from weight per plot and average test weight on a per location basis, then averaged over all plots by treatment. Statistical analysis indicated that treatment by location interactions were not significant for yield.

All treatments gave good (79%) to excellent (99%) control of field pennycress, coast fiddleneck and prostrate knotweed. Control of common chickweed was good with all treatments except bromoxynil + metribuzin. Shepherdspurse, jagged chickweed, and ivyleaf speedwell control was fair (65%) to good (93%) with all treatments. Control of annual polemonium was fair (70%) to good (94%) with all treatments except bromoxynil. Applications of bromoxynil and bromoxynil + MCPA (formulated tank mixture, 3 lb/gal) resulted in less control than the other treatments on henbit, mayweed, and common lambsquarter; in general, the remaining treatments all produced fair to excellent control.

Applications of bromoxynil + MCPA, chlorsulfuron, DPX-T6376 at 0.008 lb ai/A, bromoxynil + MCPA + chlorsulfuron, bromoxynil + dicamba + chlorsulfuron, bromoxynil + MCPA + DPX-T6376 at 0.25 + 0.005 lb ai/A, and bromoxynil + metribuzin all produced yields greater than the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Environmental conditions at application; and application, evaluation, and harvest dates for six experimental locations.

	Location					
	1	2	3	4	5	6
Air temp. F	57	58	62	55	52	55
Soil temp. (at 4 in) F	50	45	55	51	52	45
Relative humidity, %	60	55	58	66	58	41
Crop stage[1]	2-3	3	3-4	2-3	2-3	3
Soil type	silt loam					
Organic matter, %	3.65	3.57	4.09	4.82	3.16	3.35
Soil pH	6.06	5.31	5.85	5.63	5.54	5.84
CEC (meq/100 g soil)	22.6	25.2	21.0	26.3	21.4	21.4
Application date	3/24	4/5	4/27	3/19	3/20	4/12
Evaluation date	4/26	4/28	6/22	4/28	4/20	5/20
Harvest date	7/28	8/18	9/6	8/18	9/6	8/18

[1] Feekes - Large scale.

Table 2. Broadleaf weed control and grain yield averaged over several locations.[1]

Treatment	Rate	Weed Control					Yield
		Hebi	Mawe	Shpu	Fipe	Anpo	
	(lb a.i./A)	----------------------%----------------------					(bu/A)[3]
bromoxynil	0.50	53	62	67	93	48	94
bromoxynil + MCPA	0.38	55	70	78	93	70	101
chlorsulfuron[2]	0.016	83	87	82	86	87	101
chlorsulfuron	0.008	84	80	78	85	87	101
DPX-T6376	0.008	88	93	91	94	90	98
DPX-T6376	0.005	86	93	84	92	88	95
bromoxynil + chlorsulfuron	0.25 + 0.016	83	91	90	99	86	97
bromoxynil + chlorsulfuron	0.25 + 0.008	83	91	90	98	90	97
bromoxynil + chlorsulfuron	0.25 + 0.005	78	89	86	98	80	94
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.016	85	93	90	98	90	98
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.008	85	91	91	98	92	100
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.005	82	89	87	98	91	99
bromoxynil + dicamba + chlorsulfuron	0.25 + 0.06 + 0.005	77	85	83	92	86	99
bromoxynil + diuron	0.25 + 0.40	83	69	82	93	70	93
bromoxynil + metribuzin	0.25 + 0.13	81	75	75	95	62	98
bromoxynil + DPX-T6376	0.25 + 0.008	89	94	92	98	94	95
bromoxynil + DPX-T63786	0.25 + 0.005	87	93	92	98	93	95
bromoxynil + MCPA + DPX-T6376	0.25 + 0.008	88	94	92	98	94	97
bromoxynil + MCPA + DPX-T6376	0.25 + 0.005	88	92	92	99	93	99
check	-	-	-	-	-	-	91
LSD$_{(0.05)}$		11	12	14	13	36	6

[1] Henb and Yield averaged over all locations; Mawe over locations 1, 2, 3, 5 and 6; Shpu over locations 1, 3, 5 and 6; Fipe over locations 1 and 4; Anpo over locations 2 and 5.

[2] all treatments with chlorsulfuron or DPX-T6376 included 0.5% v/v nonionic surfactant.

[3] test weight = 56 lb/bu.

Table 3. Broadleaf weed control at various locations[1].

Treatment	Rate	Weed Control					
		Colq	Chwe	Jacw	Ilsw	Cofn	Prkw
	(lb a.i./A)	%					
bromoxynil	0.50	15	91	86	71	88	79
bromoxynil + MCPA	0.38	29	91	79	84	80	89
chlorsulfuron[2]	0.016	85	91	79	82	88	84
chlorsulfuron	0.008	88	91	75	82	79	86
DPX-T6376	0.008	91	94	88	81	96	95
DPX-T6376	0.005	84	90	86	80	92	89
bromoxynil + chlorsulfuron	0.25 + 0.016	91	92	85	54	97	94
bromoxynil + chlorsulfuron	0.25 + 0.008	91	94	70	62	97	92
bromoxynil + chlorsulfuron	0.25 + 0.005	92	90	68	62	96	96
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.016	94	90	78	74	94	96
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.008	92	97	84	86	96	94
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.005	90	94	84	85	94	92
bromoxynil + dicamba + chlorsulfuron	0.25 + 0.06 + 0.005	84	95	84	85	94	96
bromoxynil + diuron	0.25 + 0.40	59	97	86	75	81	92
bromoxynil + metribuzin	0.25 + 0.13	52	77	90	93	86	96
bromoxynil + DPX-T6376	0.25 + 0.008	79	98	89	85	96	96
bromoxynil + DPX-T63786	0.25 + 0.005	69	94	89	80	95	94
bromoxynil + MCPA + DPX-T6376	0.25 + 0.008	86	97	65	88	94	95
bromoxynil + MCPA + DPX-T6376	0.25 + 0.005	92	94	88	74	97	95
check	-	-	-	-	-	-	-
$LSD_{(0.05)}$		20	14	23	23	13	8

[1] Colq at location 4; Chwe, Jacw, and Ilsw at Location 2; Cofn and Prkw at location 3.

[2] all treatments with chlorsulfuron or DPX-T6376 included 0.5% v/v nonionic surfactant.

The influence of fall and spring-applied bromoxynil-chlorsulfuron tank mixtures on broadleaf weed control in winter wheat. Gaiser, D.G., D.C. Thill and R.H. Callihan. A field experiment was established in the fall of 1982 at the University of Idaho Plant Science Farm at Moscow, Id. to study the influence of time of herbicide application on broadleaf weed control in winter wheat (var. Stephens). All treatments were replicated four times on 10 by 30 foot plots in a randomized complete block design. The treatments were broadcast with a CO_2-pressurized backpack sprayer calibrated to deliver 20 GPA at 40 PSI and 3 MPH with 8002 flat fan nozzles. The soil was a clay loam with 5.4% organic mattter, a CEC of 40.5 meq/100 g soil, and pH 4.4. Fall postemergence treatments were applied at the 2-3 leaf stage of crop growth on November 10, 1982, with an air temperature, soil temperature (2 in. depth), and relative humidity of 40 F, 38 F, and 78%, respectively. Spring postemergence treatments were applied at tillering stage of the crop on April 19, 1983. The air temperature was 75 F, soil temperature (4 in. depth) was 58 F, and relative humidity 44%. Visual evaluations of fall treatments for mayweed and narrowleaved montia control were recorded on April 19, 1983. Visual evaluations of mayweed control for all treatments were recorded June 28, 1983. The late evaluation of narrowleaved montia control was omitted because the plants had produced seed and senesced by that time. All plots were harvested with a Hege small plot combine on August 4, 1983.

The early evaluation of fall-applied treatments indicated poor mayweed control with all treatments, except bromoxynil + chlorsulfuron at 0.25 + 0.016 lb ai/A, bromoxynil + MCPA (formulated tank mixture, 2 lb/gal) + chlorsulfuron at 0.25 + 0.016 lb ai/A, and chlorsulfuron alone at 0.016 lb ai/A. All of the fall-applied treatments except bromoxynil and bromoxynil + MCPA gave good (80%) to excellent (97%) control of narrowleaved montia. Overall, the late evaluation of the fall treatments indicated that mayweed control had decreased considerably since the early evaluation; with the previously mentioned treatments maintaining the best long-term control. All spring-applied treatments gave good to excellent mayweed control except bromoxynil and bromoxynil + MCPA.

Fall applications of bromoxynil + chlorsulfuron at 0.25 + 0.005 and 0.13 + 0.005 lb ai/A, bromoxynil + MCPA + chlorsulfuron at 0.25 + 0.016 lb ai/A and chlorsulfuron alone all produced greater grain yields than the comparable spring-applied treatments. No bromoxynil-chlorsulfuron tank mixtures produced greater yields than chlorsulfuron alone when averaged over all treatments. Fall applications resulted in an average of 14 bu/A more yield than spring-applied treatments. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Broadleaf weed control in winter wheat at Moscow, Idaho.

Treatment	Rate	Time of application	Weed Control			Yield
			Mawe		Nlmo	
			E[1]	L[2]	E	
	(lb a.i./A)		-----------%----------			(bu/A)[3]
check	-	-	-	-	-	62
bromoxynil	0.25	fall	1	0	6	63
bromoxynil + chlorsulfuron	0.25 + 0.016	fall	86	62	97	80
bromoxynil + chlorsulfuron	0.25 + 0.008	fall	49	14	90	74
bromoxynil + chlorsulfuron	0.25 + 0.005	fall	51	6	85	77
bromoxynil + chlorsulfuron	0.25 + 0.004	fall	26	11	80	68
bromoxynil + chlorsulfuron	0.13 + 0.008	fall	56	0	88	73
bromoxynil + chlorsulfuron	0.13 + 0.005	fall	35	11	85	76
bromoxynil + chlorsulfuron	0.13 + 0.004	fall	26	0	81	62
bromoxynil + MCPA	0.25	fall	14	0	69	63
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.016	fall	76	62	96	76
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.004	fall	26	2	94	69
chlorsulfuron[4]	0.016	fall	86	68	97	85
chlorsulfuron	0.008	fall	56	10	91	78
chlorsulfuron	0.005	fall	49	4	89	89
bromoxynil	0.25	spring		24		64
bromoxynil + chlorsulfuron	0.25 + 0.016	spring		99		68
bromoxynil + chlorsulfuron	0.25 + 0.008	spring		99		60
bromoxynil + chlorsulfuron	0.25 + 0.005	spring		97		54
bromoxynil + chlorsulfuron	0.25 + 0.004	spring		94		55
bromoxynil + chlorsulfuron	0.13 + 0.008	spring		94		66
bromoxynil + chlorsufluron	0.13 + 0.005	spring		94		60
bromoxynil + chlorsulfuron	0.13 + 0.004	spring		92		58
bromoxynil + MCPA	0.25	spring		38		59
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.016	spring		98		60
bromoxynil + MCPA + chlorsulfuron	0.25 + 0.004	spring		81		64
chlorsulfuron	0.016	spring		97		52
chlorsulfuron	0.008	spring		91		58
chlorsulfuron	0.005	spring		84		63
LSD$_{(0.05)}$			32	24	20	14

[1] E = early evaluation (4/19);

[2] L = late evaluation (6/28);

[3] test weight = 58 lb/bu;

[4] chlorsulfuron alone treatments included 0.1% v/v nonionic surfactant.

Nonherbicidal effects of dinoseb application date in early- and late-planted winter wheat. Geddens, R.M., A.P. Appleby, and B.D. Brewster. Increases in grain yield of winter wheat treated with dinoseb have been observed when no significant weed competition was present. This experiment was established to determine factors responsible for nonherbicidal stimulation of yield from postemergence dinoseb applications.

A split-plot experiment with planting date as main plot factor and dinoseb application date as subplot factor was installed at Hyslop Research Farm, Corvallis, Oregon. Treatments were incorporated into a randomized complete block design in four replications, one replication of which was discarded prior to final analysis due to rodent damage. Stephens winter wheat was planted at 100 kg/ha in 18-cm rows on Sep. 30 and Oct. 18. Single postemergence applications of dinoseb amine at 1.7 kg/ha were begun in November and continued through March at approximately monthly intervals. Identical timing sequences were applied to each main plot. Postemergence applications of diuron at 1.8 kg ai/ha were applied for weed control over the entire trial area. All herbicide applications except Mar. 24 treatment were made with a unicycle sprayer equipped with compressed air and 3-m boom. Herbicides were applied in 234 L/ha water at 124 kPa. The final dinoseb application was made with a CO_2-equipped backpack sprayer.

Suppression of foliar diseases by dinoseb was considered the more likely explanation for increased yield. For this reason, development of several diseases was monitored periodically through the winter. Symptoms of infection by barley yellow dwarf virus (BYDV) were observed in early spring in the early-seeded plots. Leaf blotch caused by Septoria spp, primarily S. tritici, also was noted in plots of both seeding dates. Disease assessment was complicated by mixed infection of BYDV and leaf blotch. Injury from leaf blotch was generally confined to lower foliage and uniformly dispersed over all plots. Severity of BYDV was determined on May 5. Ratings for disease severity were based on the percentage of total foliage exhibiting chlorosis typical of BYDV infection. Disease ratings indicated a reduction in the amount of diseased foliage in early-seeded plots receiving dinoseb. In the early-seeded treatments, grain yields for all dinoseb treatments except the January application date were greater than the control. Though not statistically significant, higher yields were generally associated with earlier application dates. No significant variation occurred among test weights for either the early- or late-seeded treatments. Disease ratings and grain yield for the late-seeded treatments also were not significantly different.

Stimulation of yield by dinoseb in this trial was confined to early-seeded plots and tended to be greater with earlier application dates. Symptoms of BYDV infection also appeared almost exclusively in the earlier seeding. Because of these factors and suppression of BYDV symptoms, it seems reasonable to assume that an interaction between dinoseb and either BYDV or its aphid vectors may be occurring. Additional pesticidal effects, however, cannot be excluded at this time. Research is in progress to further explain this phenomenon. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Dinoseb application date affecting BYDV infection and grain yield
on early- and late-planted winter wheat

Treatment	Application date	Disease rating (%)[1]	Grain yield (kg/ha)	Test weight (kg/L)
Sep. 30 planting				
dinoseb amine	Nov. 10	2.3 a[2]	6830 a	0.72 ns
dinoseb amine	Dec. 8	0.5 a	7070 a	0.72
dinoseb amine	Jan. 11	4.0 a	6170 ab	0.68
dinoseb amine	Feb. 24	1.0 a	6450 a	0.71
dinoseb amine	Mar. 24	2.2 a	6510 a	0.71
Control	--	7.5 b	5200 b	0.71
Oct. 18 planting				
dinoseb amine	Nov. 10	0.8 ns	7010 ns	0.72 ns
dinoseb amine	Dec. 8	1.0	6920	0.73
dinoseb amine	Jan. 11	1.0	7270	0.73
dinoseb amine	Feb. 24	0.7	7090	0.72
dinoseb amine	Mar. 24	0.8	6900	0.73
Control	--	0.7	6980	0.73

[1] Chlorotic tissue as percent of total visible foliage.

[2] Means within main plot (seeding date) level followed by a common letter are not significantly different (P = 0.05) as determined by Duncan's multiple range test; no significant differences within a main plot level denoted by "ns".

Tolerance of five durum and one red wheat varieties to three herbicides. Heathman, E.S., and B.R. Tickes. A study was conducted at the Yuma Valley Experiment Station to evaluate the tolerance of Mexicali, Aldura, Jori, Yavaros, and Gem durum wheats and Zorogosa (a red wheat) to postemergence application of barban, difenzoquat, and diclofop. The herbicides were applied February 9, 1983 alone or as a tank mix using a compressed air sprayer in eight gpa. Plots were ten by thirty ft in a randomized complete block with four replications. The crop was beginning to tiller. Littleseed canarygrass was in the two to three leaf stage. The weed infestation varied from zero to twenty per sq ft and averaged less than one per sq ft. At this level of infestation, yields of wheat were not effected by littleseed canarygrass.

Evaluations for stunting to varieties and littleseed canarygrass control by treatments were made February 28 and April 22 and at harvest June 22. A five ft four in swath was harvested the length of each plot. Stunting was severe in the February 28 ratings from difenzoquat applied alone to Mexicali, Aldura, Jori, and Yavaros. Barban at 0.38 lb/A applied in combination with difenzoquat was more phytotoxic to Mexicali, Aldura, Jori, and Yavaros than at 0.25 lb/A. The phytotoxicity of barban plus diclofop increased as the rate of each was increased on Mexicali, Aldura, Zorogoza, and Jem. At harvest time visual symptoms of phytoxocity were much more difficult to evaluate and were modified by soil, water, and irrigation patterns in the field. There was some correlation between visual estimates of injury and yield, but it was not consistent. Estimations of early season crop injury are subject to error because of the ability of wheat to compensate for early season stunting through tillering and assumption of normal growth.

Difenzoquat and diclofop applied alone have given excellent control of wild oat. Diclofop will give only partial control of littleseed canarygrass and difenzoquat has no effect on this species. Barban will give excellent control of littleseed canarygrass, but is less effective for wild oat control. Many durum varieties have not been tolerant to difenzoquat at labeled rates. No wheat variety tested in Arizona has shown a lack of tolerance to diclofop. A combination of barban for littleseed canarygrass control and dipenzoquat or diclofop for wild oat control might be advantageous where both weeds are encountered in the wheat field.

The objective of this study was to evaluate the pytotoxicity of these herbicides to wheat as tank mixes and at the less than label rates. Any combination of barban and diclofop significantly reduced yield in one or more varieties. The response of wheat to barban plus difenzoquat was more varied. Barban at 0.38 lb/A and difenzoquat at 0.25 lb/A reduced yield in all treatments. The other combinations did not significantly reduce yield.

University of Arizona, Tucson, Arizona, 85721.

Yield in lb/acre and estimated wheat injury at the June 22, 1983 harvest in Yuma, Arizona.

		Varieties											
		Mexicali		Aldura		Jori		Yavaros		Zoragosa		Gem	
Treatment	lb/A	Yield	% Injury	Yield	% Injury	Yield	% Injury	Yield	% Injury	Yield	% Injury	Yield	% Injury
Difenzoquat	1.0	3365	20	4215	5	3915	5	4425	2	4335	2	4225	10
Barban	0.38	4635	13	4635	0	4720	0	4635	10	4500	7	4335	7
Barban and Difenzoquat	0.25 0.25	4785	0	4710	0	4335	0	4935	0	4335	0	4650	0
Barban and Difenzoquat	0.25 0.50	4485	3	5370	0	4770	0	4695	0	4935	0	4845	0
Barban and Difenzoquat	0.38 0.25	3780	3	4275	0	3915	0	4050	12	3840	2	4050	5
Barban and Difenzoquat	0.38 0.50	3915	0	4545	6	3990	0	4395	10	4845	5	4545	3
Barban and Diclofop	0.25 0.25	3780	17	4920	3	4635	5	4485	5	4425	2	4050	7
Barban and Diclofop	0.25 0.50	4080	17	5010	0	4710	0	4785	5	4200	5	4575	5
Barban and Diclofop	0.38 0.50	3330	17	3990	3	4065	7	3915	15	3990	12	3975	20
Untreated		3840	0	4845	0	4260	0	4260	0	4110	0	4335	0
LSD 0.05		949	7	997	5	836	5	999	11	889	7	764	8

Wheat variety tolerance to AC 222,293. Mitich, L.W. and N.L. Smith. Thirteen wheat varieties were planted on the Tulelake Field Station, Modoc County, Calif., April 8, 1983, to evaluate their tolerance to the experimental wild oat herbicide AC 222,293. The site was sprinkler irrigated. A split plot design with four replications was used with treatments as main plots (20 by 65 ft) and varieties as subplots (5 by 20 ft). Herbicide applications were made May 23, 1983, using a CO_2 sprayer calibrated to deliver 20 GPA to wheat in the 3- to 5-leaf stage of growth. A light infestation of wild oats existed in the plot area.

Slight phytotoxicity was observed June 13 on Modoc and TL 409 varieties. However, the plants had outgrown these early symptoms of stunting by the time the second observation was made on July 26. Wheat yields were not reduced from herbicide treatments. (University of California Cooperative Extension, Davis, CA 95616)

Wheat Variety Tolerance

Variety	Control Phytotoxicity [1] 6/13	Control Phytotoxicity [1] 7/26	Control Yield lb/A	AC 222,293 0.75 lb/A Phytotoxicity 6/13	AC 222,293 0.75 lb/A Phytotoxicity 7/26	AC 222,293 0.75 lb/A Yield lb/A	AC 222,293 1.5 lb/A Phytotoxicity 6/13	AC 222,293 1.5 lb/A Phytotoxicity 7/26	AC 222,293 1.5 lb/A Yield lb/A
Anza	0	0	6956	0	0	7399	0	0	8447
Yecora Rojo	0	0	5787	0	0	7468	0	0	7554
Modoc	0	0	6273	0.8	0	6644	3.1	0	6769
Yolo	0	0	7652	0	0	8498	0	0	8977
TL 409	0	0	6456	0.8	0	6949	2.4	0	7707
Fielder	0	0	6319	0	0	7111	0	0	8591
Fieldwin	0	0	7271	0	0	7641	0	0	8903
Shasta	0	0	7493	0	0	7787	0	0	7605
Oslo	0	0	6898	0.3	0	6975	0	0	8227
Twin	0	0	7737	0	0	7842	0	0	8624
906 R	0	0	7146	0	0	7763	0	0	8184
WB 803	0	0	7647	0	0	9005	0	0	8542
Dirkwin	0	0	6572	0	0	7124	0	0	5914

[1] Crop phytotoxicity where 0 = no injury, 10 = All dead
Data is average of four replications.

Effects of cereal herbicides on the incidence and severity of take-all disease of winter wheat. Geddens, R.M., A.P. Appleby, and R.L. Powelson. Research in Europe has shown that injury from take-all (*Gaeumannomyces graminis* var. *tritici*), a common and highly destructive soil-borne disease of winter wheat grown in the Pacific Northwest, can be influenced by herbicides routinely used for weed control in small grains. Our research was undertaken to determine the effects of several herbicides used for weed control in winter wheat in Oregon on the incidence of take-all symptoms and the severity of the disease as reflected in grain yield and quality.

A split-plot experiment with levels of disease inoculum as main plots and herbicide treatments as subplots was established at Hyslop Research Farm, Corvallis, Oregon, in 1982-83. Ground oats, either sterile or infested with the take-all fungus, were incorporated to a depth of 8-12 cm into the main plots with a Rototerra power tiller on Oct. 19. Stephens winter wheat was planted the same day at 100 kg/ha on 17.8 cm rows. Diuron at 1.8 kg ai/ha on Nov. 3 and bromoxynil at 0.6 kg ai/ha on Dec. 10 were applied to the entire experimental area for weed control. These additional herbicides were necessary so that only effects of the treatments on take-all and crop growth could be evaluated. Herbicide treatments were applied on Jan. 11 to 2.4 m by 7.6 m plots with a unicycle sprayer equipped with compressed air and 2.4 m boom. Herbicides were applied in 234 L/ha water at 124 kPa. Disease assessments taken on June 27 were based on the percentage of total grain heads per plot exhibiting the desiccated "whitehead" symptom characteristic of take-all injury. Plots were harvested on Aug. 1 with a Hege small-plot combine. Grain was cleaned of debris and weighed. Yields and test weights were then calculated. Data were analyzed in a split-plot analysis of variance. Separation of treatment means within each disease category was performed using Fisher's protected LSD.

With the exception of diclofop-methyl, all herbicides significantly reduced the incidence of whiteheads. Mecoprop reduced whiteheads more than the other herbicides except difenzoquat. Mecoprop, terbutryn, difenzoquat, and dinoseb increased yields of take-all plots. Grain yield for mecoprop was higher than for other herbicides except terbutryn. Wheat treated with dicamba was stunted and heads were malformed. Phytotoxicity from dicamba accounted for the lower yield and test weights as compared to the control. In plots without take-all, only dicamba reduced yields. It should be noted that these results occurred in the absence of weed competition. Test weights from take-all-infested plots treated with mecoprop were greater than the control and all other herbicides except difenzoquat. In the absence of disease, only dicamba reduced test weights. Both mecoprop and dicamba have previously been reported to intensify take-all injury to small grains in Europe. Of the herbicides included in this research, only mecoprop has not been registered for use in wheat in Oregon. Results from this experiment suggest that the severity of take-all disease may be reduced with subsequent increases in grain yield and quality through the use of mecoprop and difenzoquat for weed control. Dinoseb reduced disease symptoms and increased yield without affecting test weight. Terbutryn stimulated yield and test weight with only marginal reduction in disease severity. Choice of specific herbicides will obviously depend upon their herbicidal efficacy. The results reported here may be a consideration when take-all disease is present and several equally effective herbicides are available. (Crop Science and Bot.-Pl. Pathol. Depts., Oregon State Univ., Corvallis, OR 97331)

Effects of cereal herbicides on the incidence and severity of take-all disease of winter wheat

Herbicides	Rate (kg ai/ha)	Percent whiteheads (%)[1]		Grain yield (kg/ha)[1]		Test weight (kg/L)[1]	
		No take-all	Take-all	No take-all	Take-all	No take-all	Take-all
mecoprop	2.45	0	5 a[2]	7700 bc	6300 a	58.5 ab	58.5 a
difenzoquat	1.11	0	18 ab	8300 a	5700 bc	58.1 ab	57.8 ab
dinoseb	1.67	0	27 bc	8200 ab	5600 bc	57.4 b	55.8 cd
metribuzin	0.28	0	31 bcd	8200 ab	5200 cd	58.5 ab	56.2 bc
dicamba	0.28	0	33 cd	5800 d	4400 e	54.3 c	54.7 d
barban	0.42	0	33 cd	7500 c	5300 bcd	58.5 ab	56.2 bc
terbutryn	1.78	0	36 cd	8400 a	5800 ab	58.9 a	56.6 bc
diclofop-methyl	1.39	0	40 de	7700 bc	4800 de	58.9 a	56.2 bc
Control	--	0	52 e	7900 abc	4900 d	58.1 ab	55.4 cd

[1] Differences between levels of inoculum, herbicide, and inoculum x herbicide significant at 0.01 level of probability.

[2] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability.

Effect of diclofop-methyl on the incidence and severity of take-all disease of winter wheat. Geddens, R.M., A.P. Appleby, and R.L. Powelson. Annual grasses pose a serious problem to Oregon wheat growers. Of the major grass species infesting wheat fields in western Oregon, Italian ryegrass and wild oats are particularly troublesome but can be controlled with postemergence applications of diclofop-methyl. Unverified reports have been received that postemergence application of diclofop-methyl may increase injury from take-all disease (Gaeumannomyces graminis var. tritici) in winter wheat. This research was undertaken to determine the effects of diclofop-methyl application and rate on the severity of take-all symptoms and productivity of wheat under different levels of disease stress.

An experiment established at Hyslop Research Farm, Corvallis, Oregon in 1982-83, included a factorial combination of diclofop-methyl at 0, 1.12, and 2.24 kg ai/ha with soil-incorporated, ground oat inoculum of take-all disease at 0, 10.0, and 100.0 kg/ha. The nine herbicide-inoculum rate combinations were incorporated into a randomized complete block design in six replications. Coarsely ground oats, either sterile or infested with the take-all fungus, were spread by hand over plots 3.0 m by 7.6 m. A constant total mass of oats with differing proportions of infested material was applied to each plot. Hand-raking mixed the inoculum uniformly into the top 5 to 8 cm of soil. Stephens winter wheat was planted on October 19 at 100.0 kg/ha on 17.8 cm rows. Diuron at 1.8 kg ai/ha was applied on November 3 to the entire trial area for weed control. Diclofop-methyl applications were made on December 8 at the one- to two-tiller stage of wheat development. Both diuron and diclofop-methyl were applied with a unicycle sprayer equipped with compressed air and 3.0 m boom. Herbicides were applied in 234 L/ha of water at 124 kPa. Take-all infection of the roots can induce premature desiccation of the head. Percentage of total grain heads per plot exhibiting the bleached "whitehead" symptom was determined on June 27. Plots were harvested with a small plot combine on August 1. Grain was cleaned of debris, weighed, and both yield and test weights were calculated. Data were subjected to a factorial analysis of variance. In the absence of significant interaction, means for significant main effects were evaluated using Fisher's protected LSD.

The higher inoculum rate significantly increased disease symptoms (Table 1), and decreased grain yield (Table 2) and test weight (Table 3). The effect of lower rate was not significantly different from the check. Levels of take-all produced in this experiment approximated conditions that could be encountered either early in continuous wheat culture (lower inoculum) or later as natural inoculum accumulates (higher inoculum). Levels of diclofop-methyl represent a standard rate, 2 X standard, and a herbicide check. Applications of the herbicide at any rate produced no significant change in either disease incidence, as reflected in whitehead percentage (Table 1) or grain yield (Table 2). Test weights for the 1.12 and 2.24 kg/ha rates were not significantly different from the check. Evidence at present suggests that postemergence applications of diclofop-methyl at recommended rates to winter wheat will not aggravate injury from take-all disease at low to moderate levels. Experiments in progress should further define the relationships of disease severity to inoculum density under a wider range of diclofop-methyl rates and timings. (Crop Sci. and Bot.-Pl. Pathol. Depts., Oregon State Univ., Corvallis, OR 97331)

Table 1. Effect of diclofop-methyl rate on percent 'whiteheads' in winter wheat with take-all disease

Ground oat inoculum (kg/ha)	'Whiteheads' as percent of total heads per plot Diclofop-methyl (kg ai/A) 0.00	 1.12	 2.24	Mean of inoculum rate
0.0	0	1	0	0 b[1]
10.0	1	3	2	2 b
100.0	46	42	50	46 a
Mean of herbicide rate	16 a	15 a	18 a	

[1] Means of rates within a factor followed by the same letter are not significantly different at the 0.05 level of probability as determined by the F-LSD

Table 2. Effect of diclofop-methyl rate on grain yield of winter wheat with take-all disease

Ground oat inoculum (kg/ha)	Grain yield (kg/ha) diclofop-methyl (kg ai/ha) 0.0	 1.12	 2.24	Mean of inoculum rate
0.0	8160	7530	7530	7740 a
10.0	7740	7680	7830	7750 a
100.0	5970	6020	5580	5860 b
Mean of herbicide rate	7290 a	7080 a	6980 a	

Table 3. Effect of diclofop-methyl rate on test weight of winter wheat with take-all disease

Ground oat inoculum (kg/ha)	Test weight (g/L) diclofop-methyl (kg ai/ha) 0.0	 1.12	 2.24	Mean of inoculum rate
0.0	758	758	750	756 a
10.0	750	754	750	752 a
100.0	725	742	721	729 b
Mean of herbicide rate	745 ab	752 a	740 b	

The influence of tillage and postemergence herbicide treatments on winter wheat production and weed control. Morishita, D. W., D. C, Thill, and R. H. Callihan. Reduced and no tillage farming practices are becoming important erosion control methods in the Palouse region of northern Idaho and eastern Washington. Weed control efficacy of several broadleaf herbicides applied postemergence were compared in winter wheat (var. Stephens) grown under conventional, minimum, and no tillage systems. The experiment was designed as a split plot randomized complete block with four replications. The main plots were tillage systems with herbicide treatments as subplots. In the conventional tillage system, the wheat was sown with a John Deere double disk conventional drill. The wheat in the minimum tillage treatment was planted with a chisel planter designed by University of Idaho agricultural engineers. A Pioneer no-till drill was used for planting the no tillage treatment. Fertilizer, planting date, and seeding rate were identical in all tillage systems. Herbicides were applied to the conventional tillage system on March 24, 1983. Environmental conditions at this time were: Air temperature 52 F soil temperature at 2 inch depth 48 F, relative humidity 70%, and cloudy skies. Herbicide applications on the minimum and no tillage systems were made April 5, 1983, under clear skies, 50% relative humidity, and air and soil temperatures of 53 and 62 F, respectively. Soil type at the study site was a silt loam. All herbicides were applied at 20 gpa with a CO_2 pressurized backpack sprayer. Evaluation for weed control and crop injury was made June 13, 1983. The crop was harvested August 15, 1983, with a small plot combine.

There was no difference in crop injury, control for each individual weed species, and grain yield within a herbicide treatment and among tillage systems. In addition, there was no tillage by herbicide treatment interaction. Thus data were summed across tillages. None of the herbicide treatments adequately controlled downy brome. Chlorsulfuron + metribuzin at 0.016 + 0.375 lb/A provided the best overall control of volunteer pea, mayweed, and prickly lettuce. Excellent control of volunteer pea and prickly lettuce was observed with applications of dicamba + bromoxynil + MCPA, chlorsulfuron + bromoxynil, and metribuzin + dicamba. In addition, prickly lettuce was effectively controlled when treated with bromoxynil + MCPA, terbutryn + MCPA, and 2,4-D. Mayweed was best controlled with applications of chlorsulfuron herbicide tank mixtures, metribuzin + bromoxynil and SSH-0860. Grain yields were greatest with applications of metribuzin + bromoxynil, chlorsulfuron + metribuzin, and chlorsulfuron + terbutryn. Several other herbicides treatments also yielded better than the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effect of herbicides and tillage system on weed control and yield in winter wheat

Herbicide	Rate	Tillage system	Date of application	Crop injury		Weed Control[1] Vope		Mawe		Dobr		Prle		Yield[1]	
	(lb a.i./A)			-------	-------	-------	-------	-------	%	-------	-------	-------	-------	(bu/A)	
check		CT[3]			$\bar{X}$[2]		$\bar{X}$		$\bar{X}$		$\bar{X}$		$\bar{X}$	61	$\bar{X}$
		MT												70	65
		NT												64	
bromoxynil	0.50	CT	3/24	1		56		80		6		94		75	
+ MCPA		MT	4/5	9	4	48	56	61	75	5	5	71	86	83	77
		NT	4/5	3		65		83		5		94		76	
chlorsulfuron	0.008 +	CT	3/24	0		78		93		43		95		66	
+ bromoxynil	0.25	MT	4/5	1	2	91	86	98	95	15	23	99	95	72	70
		NT	4/5	5		90		95		10		91		72	
chlorsulfuron	0.016 +	CT	3/24	0		91		100		75		98		72	
+ metribuzin	0.375	MT	4/5	3	3	98	94	100	100	61	53	99	99	94	79
		NT	4/5	0		93		100		24		100		72	
chlorsulfuron	0.008 +	CT	3/24	1		61		64		39		59		72	
+ terbutryn	0.60	MT	4/5	1	1	91	81	99	86	9	20	85	77	86	78
		NT	4/5	0		91		96		13		88		74	
dicamba +	0.125 +	CT	3/24	1		95		75		4		99		71	
bromoxynil	0.25	MT	4/5	0	1	100	98	64	73	5	11	89	95	81	77
+ MCPA		NT	4/5	1		100		80		24		98		80	
diuron +	0.60 +	CT	3/24	6		49		85		31		51		69	
bromoxynil	0.25	MT	4/5	0	2	26	45	63	79	18	35	58	62	80	76
		NT	4/5	0		59		90		56		76		77	
metribuzin +	0.375 +	CT	3/24	3		50		99		70		100		73	
bromoxynil	0.375	MT	4/5	3	2	29	42	94	97	63	58	65	82	85	80
		NT	4/5	1		48		99		43		81		81	
metribuzin +	0.25 +	CT	3/24	6		94		86		45		93		61	
dicamba	0.125	MT	4/5	4	4	95	96	74	77	40	37	80	88	81	73
		NT	4/5	3		99		71		25		93		77	
SSH-0860	1.50	CT	3/24	0		5		76		68		83		61	
		MT	4/5	3	1	24	10	90	87	20	41	53	71	75	70
		NT	4/5	0		0		94		35		79		74	
terbutryn	0.75 +	CT	3/24	0		5		61		19		66		65	
+ MPCA	0.25	MT	4/5	0	0	8	5	83	77	8	9	85	83	78	73
		NT	4/5	1		3		88		0		98		75	
2,4-D	1.0	CT	3/24	3		48		36		0		93		72	
		MT	4/5	1	3	81	71	34	32	5	4	93	90	76	74
		NT	4/5	4		85		25		6		86		74	
LSD (0.05)							16		17		20		17		9

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[1] Crop injury, weed control for each species, and grain yield within a herbicide treatment were not different between tillage systems.

[2] $\bar{X}$ = effect of herbicide across tillage system

[3] CT = conventional tillage, MT = minimum tillage, NT = no tillage

The use of chlorsulfruon and DPX-T6376 in small grain-pulse crop production systems in Idaho. Beck, K.G., D.C. Thill, and R.H. Callihan. A five-year experiment was established in the fall of 1981 to evaluate the effects of various rates of chlorsulfuron and DPX-T6376 on weed control, crop injury, and yield in winter wheat and spring barley (non-rotational crops); and to determine the subsequent residual effects of the test herbicides on lentil, pea, and spring barley (rotational crops) production. Chlorsulfuron and DPX-T6376 are being applied for one, two, or three consecutive years to non-rotational crops prior to revolving to rotational species. During any one given year, only non-rotational crops receive the test herbicides, while rotational crops are treated with conventional, registered herbicides for weed control. Also, soil samples are being collected just prior to and at various time intervals after application of test herbicides to determine the rate of dissipation. Rotational crops were sampled at harvest time for the analysis of residual test herbicides. At harvest, samples of non-rotational grains were collected to determine germination percentages.

Rotational Crops. Lentils and peas were treated with dinoseb while rotational spring barley received bromoxynil for weed control (application data in Table 3). In addition, peas and lentils were treated with sethoxydim at 0.3 lb a.i./A for wild oat and quackgrass control. No differences in biomass yield were observed among herbicide treatments for rotational spring barley, lentils, or peas (Table 1). Also, no differences in seed or grain yield were noted for peas or rotational spring barley, respectively. Seed yield was not determined for lentils.

No crop injury was observed in peas, lentils, or rotational spring barley 13 months after herbicide application.

Non-rotational Crops. Application data for the test herbicides and checks applied to winter wheat and spring barley are presented in Table 3. In addition, wild oat was controlled in both crops with diclofop-methyl at 1.0 lb a.i./A. Differences in grain yield were observed in spring barley with chlorsulfuron at 0.25 oz a.i./A providing the greatest yield while DPX-T6376 at 0.25 oz a.i./A yielded the least (Table 1). No differences in barley test weights were noted. No differences in grain yield or test weights of winter wheat were observed.

A slight injury to spring barley was noted, but no differences due to herbicidal treatment were found (Table 2). There was no injury to winter wheat at any of the rates of the test herbicides applied.

All herbicide treatments provided good control of redroot pigweed in spring barley and no differences due to herbicides were observed (Table 2). Control of common lambsquarter in spring barley was always poor with the test herbicides whereas, the sprayed check, bromoxynil at 0.5 lb a.i./A, provided excellent control. In winter wheat, good control of mayweed was acheived with all rates of the test herbicides and the sprayed checks except for the lowest rate of DPX-T63 76. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Influence of chlorsulfuron and DPX-T6376 on rotational crop biomass and yield of rotational peas and spring barley and on yield of winter wheat and spring barley.

		Rotational Crop Biomass			Rotational Crop Yield[2,3]		Grain Yield	
Treatment[4]	Rate	Lentils	Peas	Spring Barley	Peas	Spring Barley	Winter Wheat	Spring Barley
	(oz a.i./A)	-----------------	-----------------	(lb/A)	-----------------	-----------------	(bu/A)	(lb/A)
chlorsulfuron	0.0625	2091	3835	4709	1048	1611	66	1681
chlorsulfuron	0.125	2042	4414	5725	1518	2029	67	1792
chlorsulfuron	0.25	1800	4216	5524	1333	1567	70	2165
chlorsulfuron	0.5	2104	5106	5733	1664	1701	69	1857
DPX-T6376	0.0625	1968	3797	5259	1222	1676	70	1733
DPX-T6376	0.125	2013	4034	4516	1265	1339	67	1697
DPX-T6376	0.25	2414	3817	4619	1211	1392	64	1650
check		2135	4148	4771	1190	1173	66	1986
LSD (0.05)		NS	NS	NS	NS	NS	NS	326

[1] Oven dry weight.

[2] Lentil seed yield not determined.

[3] Rotational crops treated with test herbicides 13 months before planting; Winter wheat and spring barley (non-rotational) treated in both 1982 and 1983 with test herbicides.

[4] Spring barley (non-rotational) and winter wheat treated with chlorsulfuron and DPX-6376 at noted rates and check treatments with 0.5 lb (a.i.)/A of bromoxynil in 1983. Peas and lentils treated with dinsoeb at 6 lb (a.i.)/A in 1983. Rotational spring barley treated with 0.5 lb(a.i)/A bromoxynil in 1983.

Table 2. Influence of chlorsulfuron and DPX-T6376 on crop injury in rotational crops, in winter wheat and spring barley and on weed control in winter wheat and spring barley (non-rotational).

							Weed Control			
		Rotational Crop Injury[1]			Crop Injury		Winter Wheat	Spring Barley		
Treatment[5]	Rate	Lentils	Peas	Spring Barley	Winter Wheat[2]	Spring Barley[3]	Mawe[3]	Rrpw[3]	Colq[3]	Colq[4]
	(oz a.i./A)	(%)								
chlorsulfuron	0.0625	13	0	0	0	9	100	88	10	8
chlorsulfuron	0.125	11	0	0	0	5	95	90	9	0
chlorsulfuron	0.25	15	3	0	0	5	85	94	24	11
chlorsulfuron	0.5	16	0	0	0	5	93	95	30	13
DPX-T6376	0.0625	18	0	0	0	5	69	95	0	0
DPX-T6376	0.125	11	0	0	0	5	89	95	5	4
DPX-T6376	0.25	14	0	0	0	5	93	95	10	3
check [5]		8	0	0	0	10	99	98	99	94
LSD (0.05)		NS	NS	NS	NS	NS	12	NS	13	9

[1] Treatments applied 4-26-82; Evaluations taken 6-20-83.

[2] Treatments reapplied 4-26-83; Evaluations taken 6-9-83.

[3] Treatments reapplied 6-4-83; Evaluations taken 6-17-83.

[4] Evaluations taken 7-2-83.

[5] Spring barley (non-rotational) and winter wheat treated with chlorsulfuron and DPX-T6376 at noted rates and check treatments with 0.5 lb (a.i.)/A of bromoxynil in 1983. Peas and lentils treated with dinoseb at 6 lb (a.i.)/A in 1983. Rotational spring barley treated with 0.5 lb (a.i.)/A of bromoxynil in 1983.

Table 3. Application Data 1983.

	Rotational Crops		Non-Rotational Crops	
	Sp. Barley	Lentils and Peas	Winter Wheat	Spring Barley
Date of application	6-20-83	5-20-83	4-26-83	6-4-83
Treatments applied	bromoxynil	dinoseb	chlorsulfuron DPX-T6376 bromoxynil	chlorsulfuron DPX-T6376 bromoxynil
Method of application	broadcast	broadcast	broadcast	broadcast
Type of application	post	pre-emergence	post	post
Temp (F) air/soil surface	72/80	61/57	45/48	62/54
Soil temp (F)/depth (in)	63/6	54/4	48/6	60/6
% relative humidity	52	62	86	65
% cloud cover	50	0	0	15
Wind (mph)/direction	0-3/east	2-4/east	0-2.5/s. west	0-4/east
Dew present	none	yes	none	yes
Carrier/volume (gpa)	water/18.2	water/26	water/20	water/20
Nozzle size (flat fan)	8002	8004	8002	8002
Boom press (psi)/ht(in.)	40/20	40/20	40/20	40/20
Sprayer type/speed (mph)	CO_2 backpack/3	tricycle/2.3	CO_2 backpack/3	CO_2 backpack/3

Herbicide screening in chemical fallow at Lewiston, Idaho. Lish, J. M., D. C. Thill, and R. H. Callihan. Fall and spring herbicide treatments were applied in barley stubble near Lewiston, Idaho. Fall treatments were applied December 2, 1982 (dalapon + metribuzin and R40244 treatments were applied on December 22, 1982) and spring treatments were applied on April 6, 1983. Herbicides were applied in 10 gpa water carrier with a CO_2 pressurized backpack sprayer at 45 psi. The experimental design was a randomized complete block with four replications. Soil type was a silt loam with 2.4% organic matter, 14.1 meq/100 g CEC, and soil pH was 5.4. Application weather data is reported in Table 1. Wheat yield will be reported in 1985.

Table 1. Application weather data.

	Date of application		
	12/2/82	12/22/82	4/6/83
Air temp. (F)	42	40	50
Soil temp. @ 2" (F)	38	34	51
Relative humidity (%)	91	79	55
Cloud cover (%)	100	0	0
Dew	heavy	heavy	none

Downy brome and volunteer barley control was excellent with fall applied propham + paraquat, atrazine + cyanazine + paraquat, and pronamide + dicamba (90% + at third evaluation date). Control was good with spring treatments containing glyphosate or SC0224. Volunteer barley control was excellent with fall applied glyphosate and SC0224 in combination with R40244, and spring applied dalapon combinations. Clasping pepperweed control was generally good to excellent with spring applications. Prickly lettuce control was generally better with spring than fall applications although several treatments resulted in excellent control. Atrazine + cyanazine + paraquat applied in the fall resulted in the best weed control across all species. Kochia, Russian thistle, and common lambsquarters were prevalent in plots treated with triazine-type herbicides. (University of Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Weed control in chemical fallow at Lewiston, Idaho

Treatment	Rate[2]	Time of application	Weed control										
			Dobr			Voba			Clpw			Prle	
			Eval 1	Eval 2	Eval 3	Eval 1	Eval 2	Eval 3	Eval 1	Eval 2	Eval 3	Eval 1	Eval 3[1]
	(lb a.i./A)		(% of control)										
propham + paraquat[3]	3 + 0.25	Fall	97	83	94	98	92	95	89	55	19	95	0
atrazine + cyanazine + paraquat	2 + 3 + 0.25	Fall	99	98	98	100	99	93	100	96	94	100	75
dalapon + chlorsulfuron	3 + 0.25	Fall	93	56	31	98	81	88	97	56	26	100	25
dalapon + dicamba	3 + 0.5	Fall	84	55	13	94	95	76	70	22	36	100	100
dalapon + metribuzin	3 + 0.67	Fall	96	83	83	98	89	84	97	82	50	95	0
pronamide + dicamba	0.38 + 0.5	Fall	98	96	95	98	99	98	89	18	12	99	35
propham + dicamba	3 + 0.5	Fall	62	46	45	63	44	58	42	0	0	63	0
chlorsulfuron + glyphosate	0.25 + 0.28	Fall	90	56	49	93	81	62	99	99	84	100	50
DPX6376 + glyphosate	0.25 + 0.28	Fall	86	21	22	88	90	76	100	100	90	100	100
glyphosate	0.28	Fall	82	21	8	85	82	89	91	38	26	58	0
SC0224	0.28	Fall	92	42	24	70	76	81	90	71	32	31	0
R40244	0.5	Fall	43	0	0	40	0	6	67	62	54	100	98
SC0224 + R40244	0.28 + 0.5	Fall	100	94	85	100	95	91	98	92	61	100	50
glyphosate + R40244	0.28 + 0.5	Fall	99	90	80	100	92	94	97	92	85	100	0
glyphosate	0.28	Spring	-	97	89	-	100	95	-	100	94	0	50
SC0224	0.28	Spring	-	97	91	-	100	98	-	100	89	-	28
glyphosate + chlorsulfuron	0.28 + 0.25	Spring	-	95	88	-	98	94	-	100	100	-	48
glyphosate + chlorsulfuron	0.28 + 0.5	Spring	-	99	89	-	100	96	-	100	100	-	95
glyphosate + DPX6376	0.28 + 0.25	Spring	-	99	90	-	100	96	-	100	100	-	100
glyphosate + DPX6376	0.28 + 0.5	Spring	-	97	89	-	100	93	-	100	100	-	100
glyphosate + dicamba	0.28 + 0.5	Spring	-	98	90	-	100	95	-	100	94	-	100
glyphosate + dicamba + chlorsulfuron	0.28 + 0.25 + 0.13	Spring	-	95	86	-	98	92	-	100	98	-	80
glyphosate + metribuzin	0.28 + 0.67	Spring	-	94	83	-	90	86	-	100	95	-	93
paraquat	0.25	Spring	-	74	50	0	55	45	-	100	58	-	38
dalapon + chlorsulfuron	3 + 0.25	Spring	-	86	79	-	80	95	-	100	100	0	88
dalapon + dicamba	3 + 0.5	Spring	-	82	69	-	81	95	-	100	95	-	100
DOWCO 453	0.06	Fall	28	12	0	40	18	25	44	32	19	70	0
DOWCO 453[3]	0.12	Fall	66	58	41	68	66	66	49	29	0	10	0
$LSD_{(0.05)}$			25	27	27	30	23	22	19	33	30	33	20
$Plants/ft^2$			20	11		7	3		5	3		1	4

[1] Eval 1 - 3/21/83; Eval 2 - 5/20/83; Eval 3 - 6/9/83.

[2] Chlorsulfuron and DPX6376 are reported in oz a.i./A.

[3] Paraquat, glyphosate, SC0224, and DOWCO 453 treatments and tank mixtures applied with 0.5% v/v X-77 surfactant.

Chemical fallow weed control in southeastern Idaho. Lish, J. M., D. C. Thill, and R. H. Callihan. Fall and spring herbicide treatments were applied in grain stubble at three southeastern Idaho locations. Treatments were applied in 10 gpa water carrier at 49 psi with a CO_2 backpack sprayer. All treatments included 0.5% nonionic surfactant. The experiments were randomized complete block designs with four replications. Plot size was 10 by 30 ft. Application data is in Table 1. Weed species visually evaluated were downy brome, prickly lettuce, Russian thistle, tumble mustard, and tansy mustard at Arbon; volunteer barley, prickly lettuce, field pennycress, and tumble mustard at Soda Springs; and volunteer wheat, mustards (tansy, tumble, and smallseeded falseflax), Russian thistle, and prickly lettuce at Idaho Falls. Wheat injury and yield will be reported in 1985.

Tansy mustard, tumble mustard, and field pennycress were controlled with all spring treatments at Arbon and Soda Springs (Tables 2 and 3). Other species were controlled 92% or better with spring treatments except prickly lettuce and Russian thistle treated with glyphosate or SC0224 at 0.28 lb a.i./A at Arbon. Control at Idaho Falls was variable (Table 4). Spring treatments resulted in better control than fall treatments overall. Growth of Russian thistle was enhanced with atrazine + cyanazine + glyphosate. Grass control was generally good on all species (downy brome, volunteer wheat, and volunteer barley) with pronamide treatments. All spring treatments resulted in good control of grasses at Arbon and Soda Springs. (University of Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Weather and soil data.

	Idaho Falls		Arbon		Soda Springs	
Application date	10/20/82	5/23/83	10/19/82	5/22/83	10/20/82	6/14/83
Air temp. (F)	29	59	48	75	49	78
Soil temp. (F)	38	50	60	74	40	80
Relative humidity (%)	0	46	71	38	53	38
Organic matter (%)	1.56		1.86		1.57	
Silt (%)	48.0		54.4		50.4	
Sand (%)	36.8		27.6		35.6	
Clay (%)	15.2		18.0		14.0	
Soil pH	7.67		7.53		7.61	
CEC/100 g soil	15.3		17.3		15.6	

Table 2. Weed control in chemical fallow at Arbon, Idaho

Treatment	Rate[2]	Time of application	Weed Control[1] Dobr	Prle	Ruth	Tumu	Tamu
	(lb a.i./A)		---------------	---------------	(% of check)	---------------	---------------
propham + glyphosate	3 + 0.28	Fall	100	10	19	21	33
metribuzin + glyphosate	0.67 + 0.28	Fall	94	72	0	100	67
glyphosate	0.28	Fall	92	30	0	75	57
atrazine + cyanazine + glyphosate	0.2 + 3 + 0.28	Fall	98	69	0	100	100
propham + dicamba	3 + 0.5	Fall	95	42	0	95	58
pronamide + glyphosate	0.25 + 0.28	Fall	100	6	0	25	87
pronamide + glyphosate	0.38 + 0.28	Fall	100	22	12	78	73
pronamide + dicamba	0.25 + 0.5	Fall	100	24	0	75	33
pronamide + chlorsulfuron	0.38 + 0.25	Fall	100	66	25	100	100
pronamide + chlorsulfuron	0.38 + 0.5	Fall	90	51	18	50	67
glyphosate + dicamba	0.28 + 0.5	Fall	79	38	0	60	33
dalapon + dicamba	3 + 0.5	Fall	52	29	10	100	20
glyphosate + chlorsulfuron	0.28 + 0.25	Fall	84	94	12	100	100
glyphosate + chlorsulfuron	0.28 + 0.5	Fall	96	95	44	100	100
glyphosate + DPX6376	0.28 + 0.25	Fall	86	91	0	85	63
glyphosate + DPX6376	0.28 + 0.5	Fall	66	100	0	100	83
atrazine + chlorsulfuron + glyphosate	0.28 + 0.25 + 0.28	Fall	96	89	5	100	100
propham + chlorsulfuron + glyphosate	3 + 0.25 + 0.28	Fall	100	84	5	88	100
glyphosate + metribuzin	0.28 + 0.67	Spring	100	92	95	100	100
glyphosate	0.28	Spring	100	76	85	100	100
SC0224	0.28	Spring	100	75	61	100	100
glyphosate + dicamba	0.19 + 0.25	Spring	99	95	100	100	100
glyphosate + dicamba	0.28 + 0.25	Spring	100	97	100	100	100
glyphosate + dicamba	0.28 + 0.5	Spring	100	96	100	100	100
glyphosate + chlorsulfuron	0.28 + 0.25	Spring	99	96	96	100	100
glyphosate + chlorsulfuron	0.28 + 0.5	Spring	100	98	99	100	100
glyphosate + DPX6376	0.28 + 0.25	Spring	99	100	99	100	100
glyphosate + DPX6376	0.28 + 0.25	Spring	100	100	100	100	100
$LSD_{(0.05)}$			16	29	26	32	54
Plants/ft^2			5	23	11	0.2	0.4

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[1] Evaluated 6/23/83.

[2] Chlorsulfuron and DPX6376 are reported in (oz a.i./A).

Table 3. Weed control in chemical fallow at Soda Springs, Idaho.

			Weed Control[2]			
Treatment	Rate[1]	Time of application	Voba	Prle	Fipc	Tumu
	(lb a.i./A)		------------(% of check)---------			
propham + glyphosate	3 + 0.28	Fall	65	42	44	75
metribuzin + glyphosate	0.67 + 0.28	Fall	42	75	95	55
glyphosate	0.28	Fall	15	50	68	85
atrazine + cyanazine + glyphosate	0.2 + 3 + 0.28	Fall	56	84	75	85
propham + dicamba	3 + 0.5	Fall	58	30	50	50
pronamide + glyphosate	0.25 +0.28	Fall	99	22	66	75
pronamide + glyphosate	0.38 + 0.28	Fall	100	24	25	50
pronamide + dicamba	0.25 + 0.5	Fall	100	29	60	25
pronamide + chlorsulfuron	0.38 + 0.25	Fall	99	94	49	88
pronamide + chlorsulfuron	0.38 + 0.5	Fall	100	99	99	100
glyphosate + dicamba	0.28 + 0.5	Fall	34	25	95	100
dalapon + dicamba	3 + 0.5	Fall	36	50	41	75
glyphosate + chlorsulfuron	0.28 + 0.25	Fall	32	99	75	56
glyphosate + chlorsulfuron	0.28 + 0.5	Fall	65	100	98	100
glyphosate + DPX6376	0.28 + 0.25	Fall	60	100	70	100
glyphosate + DPX6376	0.28 + 0.5	Fall	54	100	100	75
atrazine + chlorsulfuron + glyphosate	0.28 + 0.25 + 0.28	Fall	81	98	100	100
propham + chlorsulfuron + glyphosate	3 + 0.25 + 0.28	Fall	69	96	100	100
glyphosate + metribuzin	0.28 + 0.67	Spring	96	99	100	100
glyphosate	0.28	Spring	99	100	100	100
SC0224	0.28	Spring	100	99	100	100
glyphosate + dicamba	0.19 + 0.25	Spring	99	100	100	100
glyphosate + dicamba	0.28 + 0.25	Spring	100	100	100	100
glyphosate + dicamba	0.28 + 0.5	Spring	99	100	100	100
glyphosate + chlorsulfuron	0.28 + 0.25	Spring	98	100	100	100
glyphosate + chlorsulfuron	0.28 + 0.5	Spring	100	100	100	100
glyphosate + DPX6376	0.28 + 0.25	Spring	100	100	100	100
glyphosate + DPX6376	0.28 + 0.5	Spring	100	100	100	100
$LSD_{(0.05)}$			32	26	43	43
$Plants/ft^2$			1.3	1.5	0.5	0.3

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[1] Chlorsulfuron and DPX6376 reported as (oz a.i./A).

[2] Evaluated 7/13/83.

Table 4. Weed control in chemical fallow at Idaho Falls, Idaho.

			Weed control[2]					
			Vowh eval.		Must eval.		Ruth eval.	Prle eval.
Treatment	Rate[1]	Time of application	1	2	1	2	2	2
	(lb a.i./A)		(% of check)					
propham + glyphosate	3 + 0.28	Fall	95	88	84	32	0	12
metribuzin + glyphosate	0.67 + 0.28	Fall	100	71	100	50	25	75
glyphosate	0.28	Fall	100	91	98	56	0	44
atrazine + cyanazine + glyphosate	0.2 + 3 + 0.28	Fall	100	99	100	98	12	100
propham + dicamba	3 + 0.5	Fall	100	91	100	66	0	55
pronamide + glyphosate	0.25 + 0.28	Fall	99	100	98	86	6	65
pronamide + glyphosate	0.38 + 0.28	Fall	100	100	99	19	0	22
pronamide + dicamba	0.25 + 0.5	Fall	55	74	70	48	15	65
pronamide + chlorsulfuron	0.38 + 0.25	Fall	100	94	100	92	59	91
pronamide + chlorsulfuron	0.38 + 0.5	Fall	100	91	100	100	41	94
glyphosate + dicamba	0.28 + 0.5	Fall	100	91	100	50	21	78
dalapon + dicamba	3 + 0.5	Fall	100	90	100	38	38	69
glyphosate + chlorsulfuron	0.28 + 0.25	Fall	50	49	74	41	22	48
glyphosate + chlorsulfuron	0.28 + 0.5	Fall	75	65	98	72	32	75
glyphosate + DPX6376	0.28 + 0.25	Fall	60	65	98	75	25	73
glyphosate + DPX6376	0.28 + 0.5	Fall	93	40	100	60	33	67
atrazine + chlorsulfuron + glyphosate	0.28 + 0.25 + 0.28	Fall	73	32	83	33	8	32
propham + chlorsulfuron + glyphosate	3 + 0.25 + 0.28	Fall	45	25	59	25	17	21
glyphosate + metribuzin	0.28 + 0.67	Spring	-	62	-	79	92	100
glyphosate	0.28	Spring	-	84	-	94	64	84
SC0224	0.28	Spring	-	92	-	95	59	65
glyphosate + dicamba	0.19 + 0.25	Spring	-	76	-	100	80	100
glyphosate + dicamba	0.28 + 0.25	Spring	-	89	-	100	74	99
glyphosate + dicamba	0.28 + 0.5	Spring	-	84	-	100	96	95
glyphosate + chlorsulfuron	0.28 + 0.25	Spring		60	-	72	75	75
glyphosate + chlorsulfuron	0.28 + 0.5	Spring	-	86	-	100	98	100
glyphosate + DPX6376	0.28 + 0.25	Spring	-	79	-	100	100	100
glyphosate + DPX6376	0.28 + 0.5	Spring	-	90	-	100	100	100
LSD (0.05)			37	38	NS	50	43	48
Plants/ft^2			5.4	5.8	20.8	5	5	1.6

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[1] Chlorsulfuron and DPX6376 are reported in (oz a.i./A).

[2] Evaluation dates: 1 = 5/11/83; 2 = 6/23/83.

Canada thistle control after 1 or 2 years of chlorsulfuron application. Dyer, W. E. and P. K. Fay. Canada thistle (*Cirsium arvense*) is the most troublesome perennial weed in small grain production in Montana. Chlorsulfuron was applied for 1 or 2 successive years to Canada thistle to determine the residual control of regrowth.

Chlorsulfuron was applied at 0, 17, 35, and 70 g/ha (with 0.25% v/v surfactant) to Canada thistle in the bud stage in the summer of 1981. The herbicides were applied with a CO_2-pressurized backpack sprayer in 138 l/ha of water to 3.4 by 39.0 m plots. There were four replications. Retreatments of the same rates were applied at right angles to the original treatments in June 1982. Canada thistle stand counts were taken in July of 1982 and 1983. Oats (*Avena sativa*) were planted in the experimental area in 1981, 1982, and 1983.

There was no reduction of Canada thistle stems/m^2 by any rate, 2 years after application. Successive yearly applications were more effective than single treatments in reducing Canada thistle stand densities. Applications of 18 g/ha (the highest rate presently labeled for use in Montana) in 2 successive years reduced Canada thistle regrowth in the third year by 46%. Yearly applications of chlorsulfuron may provide sustained control of Canada thistle regrowth, if applied for 2 or more successive years. (Montana Agricultural Experiment Station, Bozeman, MT 59717.)

Table 1. Canada thistle stems/m^2 on June 9, 1983 after 1 or 2 years of chlorsulfuron application at the bud stage.

g/ha		
Chlorsulfuron 1981	Chlorsulfuron 1982	Canada thistle stems/m^2 1/
18	--	40.9
--	18	24.7
18	18	18.9
35	18	18.4
70	18	6.3
35	--	45.9
--	35	8.5
18	35	5.4
35	35	5.2
70	35	0.9
70	--	34.7
--	70	1.6
18	70	0.5
35	70	0.5
70	70	0.3
--	--	35.1
	LSD .05	7.3

1/ Values are the means of four replications.

The effect of chlorsulfuron soil residues on 11 crops, 36 months after herbicide application . Dyer, W. E. and P. K. Fay. Chlorsulfuron continues to show promise for broad-spectrum weed control in small grain production in Montana. The length of persistence of chlorsulfuron soil residues, however, remains questionable in high pH soils. Eleven rotational crops grown in Montana were seeded into 32-month-old chlorsulfuron residues to determine the length of the residual period.

Chlorsulfuron was applied at 0, 35, 70, and 140 g/ha in 135 l/ha of water to 3.3 by 18.3 m plots using a CO_2-pressurized backpack sprayer, on September 20, 1980. There were four replications. On May 23, 1983, the following crops were planted into the chlorsulfuron soil residues: potato, sugar beet, safflower, sunflower, corn, pinto bean, garbanzo bean, alfalfa, faba bean, lentil, and flax. The crops were harvested by hand on August 25, 1983, and dry weight of five plants/plot was measure.

Dry weight of all crops except potato tubers was reduced by all rates of application of chlorsulfuron. Chlorsulfuron appears to be highly persistent in this pH 8.1 soil. (Montana Agricultural Experiment Station, Bozeman, Montana 59717.)

Table 1. Dry weight (g/5 plants/plot) of 11 crops grown in soil residues of chlorsulfuron, applied 36 months previously.

Rate g/ha	Potato	Sugar beet	Safflower	Sunflower	Corn	Pinto bean	Garbanzo bean	Alfalfa	Faba bean	Lentil	Flax
	------------------plant dry weight (g/5 plants)----------------										
35	572	116	248	1340	648	79	61	3	116	2	51
70	335	46	209	1262	367	69	28	2	72	2	26
140	257	16	167	367	235	59	23	2	40	1	11
Control	748	538	465	3378	1896	159	252	18	307	34	104
LSD.05	274	118	146	946	294	42	62	5	180	11	23

Trifluralin persistence study. Stovicek, R. F., D. C. Thill, and R. H. Callihan. A study was conducted at the Idaho Agricultural Experiment Station in Moscow, Idaho, to evaluate the residual effect of trifluralin on winter wheat. All herbicides were tested across three tillage systems. Herbicides used were dinoseb, trifluralin and triallate; tillage systems included no tillage, minimum tillage and conventional tillage. All herbicide applications were applied broadcast with a CO2 pressurized knapsack sprayer calibrated to deliver 187 L/ha at 2.8 kg/cm2 and 5 km/h. Preplant incorporated treatments were applied on April 25, 1982, and preemergence surface treatments on April 29, 1982. Spring peas were planted on April 27, 1982, and harvested on August 13, 1983. Winter wheat (var. Stephen) was planted on September 29, 1982. Forage samples were randomly selected from a 1.5 by 0.3 m area in each plot on May 16, 1983, and oven dry weight determined. The crop was harvested August 3, 1983, with a Hege small plot combine. Plot size of each treatment was 4 by 10 m with four replications arranged in a split block design, with herbicide treatments as main plots and tillage systems as subplots. Soil type at the study area was a silty clay, with a pH of 5.6.

No tillage by herbicide interactions occured for any of the measured paramenters. Forage dry weights and grain test weights were not different among herbicide treatments. All herbicide treatments, except trifluralin at 1.68 kg.ha, resulted in grain yields greater than the check. This demonstrates the importance of good weed control in the rotational crop (peas in this case) grown immediately prior to the planting of winter wheat. Although not significantly different, grain yields were less where higher rates of trifluralin were applied to the rotational pea crop when compared to the other herbicide treatments. Grain yield and forage dry weights were not different between tillage systems. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Treatment effects on yield and forage of winter wheat in a trifluralin presistence study.

Treatment	Rate (kg/ha)	Forage dry[1] Weight (kg/ha)	Grain Weight (kg/ha)	Grain Test Weight (kg/L)
triallate + dinoseb	0.84 10.0	2266	4490	0.767
triallate + dinoseb	1.68 10.0	2036	4719	0.773
trifluralin	1.68	1624	4019	0.772
triallate + trifluralin	1.40 0.56	2303	4484	0.769
triallate + trifluralin	1.40 1.12	1982	4167	0.763
check		1580	3628	0.770
LSD (0.05)		NS	435	NS

[1] Oven dry weight.

Table 2. Tillage effects on yield and forage of winter wheat in a trifluralin persistence study.

Tillage Treatment	Forage dry[1] Weight (kg/ha)	Grain Yield (kg/ha)	Grain Test Weight (kg/L)
conventional	1932	4138	0.7698
no tillage	2190	4153	0.7607
minimum tillage	1775	4464	0.7675
LSD (0.05)	NS	NS	NS

Interactions of DPX-T6376 with postemergence wild oat herbicides under greenhouse conditions. Evans, J. O. and R. W. Gunnell. Previous field experiments have revealed significant antagonism among postemergent herbicides when those possessing broadleaved activity are combined with grass active ones. This experiment was designed to measure the magnitude of antagonism when a candidate herbicide for broadleaved weeds, DPX-T6376, was mixed with commonly used wild oat compounds. Cayuse variety oats were used as a substitute for wild oats in this study since they respond similarly to the weed and express excellent uniformity under greenhouse conditions. Steptoe barley was used as a tolerant crop. Each treatment consisted of one 950 ml pot containing 4 oat seeds and one 950 ml pot containing 4 barley seeds. Each replication contained 10 treatments and 5 replications were used in the study. A silt loam soil of neutral pH and 2.76 percent organic matter provided the growth medium. A precision trac-type greenhouse sprayer operated at 40 psi and delivering 10 gpa through 8001E nozzles was used to spray the oats and barley in the three leaf stage. Evaluations were made three weeks after spraying.

The most severe injury to oats was noted with diclofop-methyl which essentially eliminated the oat plants. It did not injure the barley. Diclofop-methyl applied in combination with DPX-T6376 was considerably less toxic to oats since the combination expressed about half the injury to oats and reduced their fresh weight only half that caused by diclofop-methyl alone. AC222,293 was slightly less active on Cayuse oats as compared to diclofop-methyl and it was safe on barley. DPX-T6376 did not interfere with the AC222,293 on oats, nor did it cause this herbicide to be more damaging to barley. Difenzoquat was about half as active on Cayuse oats as compared to diclofop-methyl and when combined with DPX-T6376 did not measureably loose its oat action. DPX-T6376 can be damaging to oats and barley by itself, especially when applied at the highest recommended dosages. (Plant Science Department, Utah State University, Logan, Utah)

Interaction of DPX-T6376 and grass specific herbicides on Cayuse oats and Steptoe barley grown in the greenhouse.

		Crop response (barley)		Weed response (oat)	
Treatment	Rate gm/ha	*Injury Index	Fresh wt. (gm/4 plants)	*Injury Index	Fresh wt. (gm/4 plants)
DPX-T6376	8.75	0	5.1	0	5.0
DPX-T6376	17.50	1.0	5.0	0	4.1
DPX-T6376	26.25	1.0	5.7	1.2	3.1
Diclofop	1120.90	0	7.8	9.0	1.1
Diclofop DPX-T6376	1120.90 + 17.5	1.0	5.0	5.6	2.0
Difenzoquat	1120.90	0.6	7.3	5.2	2.8
Difenzoquat DPX-T6376	1120.90 + 17.5	0.4	4.8	6.6	1.8
AC222,293	1120.90	0.9	7.4	8.0	1.1
AC222,293 DPX-T6376	1120.90 + 17.5	1.4	4.6	8.0	1.3
check	--	0	6.8	0	4.8

*0 = no control, 10 = complete kill.

Interactions of foliar applied grass specific herbicides with selected herbicides more specific for dicot weeds. Evans, J. O. and R. W. Gunnell. This study was conducted to assess potential antagonism and or synergism of tank mixes containing postemergence grass active herbicides with those having activity against broadleaved weeds. The experiment was completed under greenhouse conditions where Cayuse oats was grown as the sensitive species. The potting soil was a silt loam with a pH of 7.8 and containing 2.76 percent organic matter. Four wild oat plants were grown in each pot and one pot was used per treatment. Treatments were replicated four times in the test. Plants were sprayed approximately three weeks after planting when they were about 12 cm tall. Treatments were made with a trac-type greenhouse spray chamber delivering 10 gpa carrier and herbicide and 40 psi through 8001E nozzles.

The three postemergence grass herbicides tested were CGA82725, fluazifop, and sethoxydim, and they behaved quite differently when tank mixed with broadleaf herbicides. Each grass herbicide was also applied alone and in combination with a crop oil concentrate in order to establish their anticipated activity on oats. CGA82725 and fluazifop injury to oats increased with the addition of the oil concentrate. Sethoxydim injury to oats, however, resulted in total kill of oat plants with or without adding crop oil. When sethoxydim was tank mixed with broadleaf herbicides it maintained a high injury rating for oats regardless of the broadleaf compound in the mix. Fluazifop activity, however, decreased when tank mixed with chlorsulfuron. Oat injury decreased when CGA82725 was tank mixed with either DPX-T6376 or chlorsulfuron. Tank mixes containing CGA82725 plus bromoxynil or 2,4-D were highly phytotoxic to oats. (Plant Science Department, Utah State University, Logan, Utah 84322)

Response of Cayuse oats to foliar applications of grass specific herbicides in the presence of surfactants or herbicides not possessing high grass activity.

Treatment	Rate oz/A	Cayuse oat response	
		Injury Index*	Fresh Wt. (gm./4 plants)
CGA82725	4.00	2.0	4.2
CGA82725 Atplus 411F	4.00+ 1%	10.0	0.5
CGA82725 DPX-T6376	4.00+ 0.25	3.0	4.6
CGA82725 chlorsulfuron	4.00+ 0.25	0.25	5.3
CGA82725 bromoxynil	4.00+ 6.00	9.0	0.8
CGA82725 2,4-DB	4.00+ 6.00	8.8	0.9
fluazifop	4.00	6.8	2.5
fluazifop Atplus 411F	4.00+ 1%	8.5	0.9
fluazifop DPX-T6376	4.00+ 0.25	7.3	1.8
fluazifop chlorsulfuron	4.00+ 0.25	3.5	3.1
fluazifop bromoxynil	4.00+ 6.00	8.0	1.8
fluazifop 2,4-DB	4.00+ 6.00	8.3	1.3
sethoxydim	4.00	10.0	0.7
sethoxydim Atplus 411F	1%	10.0	0.4
sethoxydim DPX-T6376	4.00+ 0.25	10.0	0.6
sethoxydim chlorsulfuron	4.00+ 0.25	10.0	0.5
sethoxydim bromoxynil	4.00+ 6.00	9.8	0.6
sethoxydim 2,4-DB	4.00+	10.0	0.5
check		0	4.8

* 0 = no affect: 10 = complete kill

Grass control with postemergence applications of herbicides. Brewster, Bill D. and Arnold P. Appleby. Eight herbicides were applied to 31 grass species at Corvallis, Oregon to evaluate efficacy. A single row of each species was seeded across each plot. Plots were 1.8 by 15.2 m, and each treatment was replicated three times. The herbicides were applied with a compressed-air unicycle plot sprayer on June 2, 1983. The spray volume was 154 L/ha with water as the carrier. Oil concentrate was added to each treatment at a rate of 2.3 L/ha. Visual estimates of percent injury or control were made on June 20.

Large differences in susceptibility among certain species were found across all herbicides. Some species such as reed canarygrass, witchgrass, and bermudagrass were controlled by all herbicides. In contrast, rattail fescue seemed to be unaffected by all treatments. Many differences in grass control were found among herbicides. For instance, fenoxaprop-ethyl and fenthiaprop-ethyl are structurally similar, but differed greatly in activity. Fenoxaprop-ethyl controlled large crabgrass but was ineffective on cheatgrass, while fenthiaprop-ethyl produced the exact opposite results. Large differences within the fescue and bluegrass genera were also observed. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Control of 31 grass species with postemergence applications of herbicides

		Herbicides									
		fenoxaprop-ethyl		fenthioprop-ethyl	fenoxaprop-ethyl + fenthioprop-ethyl	sethoxydim	fluazifop-butyl	haloxyfop-methyl	CGA 82725	diclofop-methyl	DPX Y6202
		(kg/ha)									
Grass species	Growth stage[1]	0.11	0.22	0.22	0.11+ 0.22	0.28	0.28	0.14	0.18	1.1	0.28
		(% control)									
wheat	2 T	43	73	99	99	85	93	99	23	0	97
barley	2-3 T	88	99	100	100	93	96	100	88	20	100
rye	2-3 T	83	70	99	100	98	96	100	13	30	99
oats	1-2 T	95	100	99	100	99	98	100	99	98	99
wild oats	1-2 T	85	96	93	100	98	95	100	92	92	98
corn	1 T	100	98	92	100	02	00	100	100	100	100
sorghum	4 L	100	99	95	100	98	100	99	100	7	100
sudangrass	4 L	65	92	58	98	95	99	100	98	0	97
johnsongrass	4 L	98	97	88	95	93	95	100	100	7	100
barnyardgrass	3 L	20	47	70	68	97	87	67	85	57	62
yellow foxtail	4 L	65	78	50	80	99	99	96	96	92	99
tall fescue	1-2 L	37	30	99	92	98	91	97	93	99	98
rattail fescue	1 L	0	0	0	0	0	0	0	0	0	0
orchardgrass	2-3 L	89	99	100	100	100	100	100	100	100	100
Kentucky bluegrass	1-2 L	95	99	96	98	99	100	100	99	95	100
annual bluegrass	1-2 L	0	0	0	0	0	0	80	53	7	87
roughstalk bluegrass	2-3 L	83	95	96	97	99	100	98	96	52	100
weeping lovegrass	2-3 L	99	99	73	98	92	100	99	100	27	87
downy brome	3-4 L	0	0	85	99	83	100	100	0	0	100
field brome	3 L	13	23	100	100	99	100	100	0	0	100
soft chess	3 L	0	7	100	100	99	100	95	43	13	100
smooth brome	2 L	10	10	100	100	99	100	100	77	17	100
cheat	2-3 L	0	0	100	100	98	100	100	0	13	100
Italian ryegrass	3-4 L	43	60	98	99	100	96	99	91	99	100
perennial ryegrass	2-3 L	40	53	100	100	100	99	100	95	100	100
Colonial bentgrass	1-2 L	53	77	100	100	100	100	100	100	100	100
meadowfoxtail	2-3 L	73	82	99	99	99	100	100	99	98	100
large crabgrass	1-2 L	99	100	0	99	100	100	100	100	99	100
bermudagrass	2 L	99	100	99	100	100	100	100	100	97	100
witchgrass	2 L	99	100	99	100	100	100	100	100	100	100
reed canarygrass	1-2 L	100	100	100	100	100	100	100	100	100	100

[1] T = tillers, L = leaves

German velvetgrass control in fine-leaved fescue. Brewster, Bill D. and Arnold P. Appleby. A trial was conducted in a fine-leaved fescue field near Sublimity, Oregon, to compare seven herbicides for control of established German velvetgrass. The experimental design was a randomized complete block with 2.4 by 6.1 m plots and three replications. The herbicides were applied with a compressed-air unicycle sprayer on November 24, 1982. The spray volume was 234 L/ha with water as the carrier. An oil concentrate was applied with each treatment at a rate of 2.3 L/ha. Only light frost had occurred in the days prior to treatment, and the German velvetgrass was in good condition.

Visual evaluations of crop injury and German velvetgrass control were made on March 21, 1983. No effect from any herbicide was seen on the fescue. None of the herbicide treatments eliminated the velvetgrass topgrowth, but three treatments provided at least 90% control. Haloxyfop-methyl was the most effective treatment. Fenthiaprop-ethyl was the only completely ineffective treatment. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

German velvetgrass control and fine-leaved fescue injury from seven herbicide treatments

Herbicide [1]	Rate	Fescue injury	Velvetgrass control
	(kg/ha)	%	%
sethoxydim	0.56	0	90
fluazifop-butyl	0.56	0	75
SC 1058	1.12	0	70
CGA 82725	1.12	0	92
DPX Y6202	0.56	0	70
fenthiaprop-ethyl	1.12	0	10
haloxyfop-methyl	0.56	0	98
untreated control	0	0	0

[1] Applied November 24, 1982

Fababean weed control. Chase, R. L., Evans, J. O., and Gunnell, R. W. A trial to determine the selectivity of several herbicides to fababeans (var. Diana) was established on June 3, 1983. Soil type was a silt loam with 2.8% O.M. and a pH or 8. Treatments were applied with a bicycle sprayer at 20 gpa. There were 3 replications in a randomized block design. The fababeans were planted immediately after incorporation of the herbicides. Postemergence treatments were applied on July 5, 1983. A visual evaluation was made August 3, 1983.

Trifluralin alone or in combination with metribuzin was consistent in giving good control with no injury to the fababeans. Bromoxynil was consistent in producing injury to the fababeans. (Utah State University Extension, Logan, Utah 84322)

Fababean weed control

		Percent reduction in competitive ability*		
Treatment	lb/A	Redroot	lambsquarter	green foxtail
Preplant Incorporated				
Trifluralin	.75	72 ab	58 ab	94 a
Trifluralin	1.00	83 ab	78 a	95 a
Trifluralin	1.25	60 abc	48 abcd	96 a
Trifluralin + Metribuzin	1.00 .38	83 ab	83 a	97 a
Trifluralin + Metribuzin	1.25 .38	85 a	80 a	96 a
EPTC	2.00	7 d	0 e	63 bc
EPTC +	2.00	7 d	0 e	43 c
Alachlor	2.00	60 abc	25 cde	52 bc
Alachlor	3.00	37 bcd	30 bcde	73 abc
Metolachlor	2.00	33 bcd	7 e	62 bc
Metolachlor	3.00	7 d	0 e	81 ab
Pendimethalin	1.00	50 abc	13 e	95 a
Pendimethalin	2.00	68 ab	47 abcd	97 a
Triallate	1.25	3 d	0	0 d
Postemergence				
Bentazon	.75	10 d	0 e	0 d
Bentazon	1.00	10 d	0 e	0 d
Sethoxydim	.25	25 cd	0 e	0 d
Sethoxydim + Bromoxynil	.25 .38	0 d	0 e	95 a
diclofop	1.00	0 d	0	74 abc
diclofop + Bromoxynil	1.00 .38	37 bcd	77 a	55 bc
Bromoxynil	.38	27 cd	72 a	0 d

*Values followed by the same letter do not differ significatly at the 5% level according to Duncan's multiple range test.

Evaluation of preplant incorporated herbicides on selected weeds in 'Dark Red' kidney beans. Mitich, L.W. and J.A. Roncoroni. Ten herbicides were evaluated at varying rates and combinations (16 preplant incorporated treatments) to determine their effectiveness in controlling four weeds common in bean production--barnyardgrass, black nightshade, hairy nightshade and redroot pigweed on UC Davis Experimental Farm. The herbicides were applied on June 8, 1983, with a CO_2 backpack sprayer and incorporated 2 inches deep with a Lilliston incorporator. 'Dark Red' kidney beans were planted to moisture the same day. Black and hairy nighthsade and barnyardgrass seeds were broadcast on the soil surface to augment the natural population. Treatments were applied to plots 10 ft wide (four 30-inch rows) and 20 ft long. A randomized complete block design was used with each plot replicated four times. Weed control evaluations were made August 12, and yields were taken on September 28, 1983.

Three herbicides--prodiamine, ethalfluralin and pronamide--were compared to several registered compounds, with two of the three showing promise in weed control. Ethalfluralin + metolachlor produced the highest degree of control (89% or better) of the nightshade species and pigweed, and was second only to ethalfluralin alone in the control of barnyardgrass. This combination also provided the greatest increase in yield of the herbicides tested.

Prodiamine (1.5 lb ai/A) gave at least 70% weed control and increased the yield.

Besides the metolachlor + ethalfluralin combination, only metolachlor + trifluralin produced better than 75% control of the nightshades.

Prodamine and the combinations of alachlor + ethalfluralin, and metolachlor + trifluralin produced better than 75% control of redroot pigweed. Ethalfluralin provided the best control (90%) of barnyardgrass. (University of California Cooperative Extension, Davis, CA 95616)

Preplant incorporated herbicides in 'Dark Red' kidney beans

Herbicide	Rate lb ai/A	Percent control[1,2]			Bean yield[1,4] (g/plot)
		Barnyardgrass	Nightshade[3]	Pigweed	
Trifluralin	0.75	83	23	68	1486
EPTC + trifluralin	1.5 + 0.5	79	41	54	1569
Dinitramine	0.05	68	25	43	1288
Prodiamine	1.5	84	70	81	2016
Alachlor	3.0	73	67	73	1658
Alachlor ME	3.0	84	55	61	1250
Metolachlor	3.0	84	73	71	2026
Ethalfluralin	1.5	90	70	75	1931
Alachlor + trifluralin	3.0 + 0.5	71	69	70	1706
Alachlor + ethalfluralin	3.0 + 1.125	79	73	76	1740
Metolachlor + trifluralin	3.0 + 0.75	81	79	80	1843
Metolachlor + ethalfluralin	2.0 + 1.125	85	89	95	2129
Chlorpropham	4.0	53	33	33	1368
Pronamide	1.0	59	49	51	1304
Pronamide	2.0	50	35	41	1406
Control		38	10	23	1311
LSD $_{.05}$					NS

[1] All numbers are average of four replications.

[2] 100% = total weed control; 0 = no control.

[3] No distinction made between black and hairy nightshade.

[4] Harvest date September 28, 1983.

Preplant weed control in 'California Light Red' kidney beans. Canevari, W.M. and L.W. Mitich. Eight herbicides were evaluated for their effectiveness in controlling sowthistle, hairy nightshade, and pigweed species in a trial established in San Joaquin County, Calif. The preplant application of the materials was made on June 21, 1983, to plots 5 ft by 20 ft and the herbicides were power incorporated into the soil (Wyman clay loam). Plots were replicated four times. On June 24, 'California Light Red' kidney beans were planted into moisture in two rows on each of the 60 in. beds. Weed control evaluations were made on July 15.

All materials provided at least 80% control of pigweed, with many providing better than 95% control. Eighty percent or greater control of hairy nightshade was achieved with all herbicides, excluding pendimethalin. Prodiamine, alachlor, metolachlor + trifluralin, alachlor + ethafluralin, and metolachlor + esthalfluralin produced better than 80% control of sowthistle.

Metolachlor + ethalfluralin and chlorpropham caused slight phytotoxic injury to the plants; other materials produced very slight initial injury. (University of California Cooperative Extension, Stockton, CA 95205 and Davis, CA 95616)

Preplant herbicides in 'California Light Red' kidney beans

		Percent weed control[1]			
Herbicide	Rate lb ai/A	Sowthistle	Hairy nightshade	pigweed	Crop phytotoxicity (%)[2]
EPTC + trifluralin	1.5 + 0.5	73	81	91	5
Dinitramine	0.33	45	80	96	5
Prodiamine	1.5	83	95	99	5
Alachlor	3.0	85	93	98	5
Metolachlor	3.0	89	90	90	5
Ethalfluralin	1.5	58	91	95	5
Alachlor + trifluralin	3.0 + 0.5	91	87	96	5
Alachlor + ethalfluralin	3.0 + 1.125	94	95	98	5
Metolachlor + trifluralin	2.0 + 0.75	78	88	93	5
Metolachlor + ethalfluralin	2.0 + 1.125	94	93	96	10
Chlorpropham	4.0	30	80	80	19
Pendimethalin	1	35	45	98	5
Control	-	0	13	20	5

[1] 100% = total weed control; 0% = no control.

[2] 100% = death of plant; 0% = plant uneffected.

Evaluation of three postemergence herbicides in 'California Light Red' kidney beans. Canevari, W.M. and L.W. Mitich. 'California Light Red' kidney beans were planted on June 6, 1983, in a trial established in San Joaquin County, California. Bentazon, acifluorfen and AC 263,499 were evaluated for their effectiveness in controlling hairy nightshade, sowthistle species and pigweed species, weeds important in bean production, and to determine their effect on beans, if any. The herbicides were applied on July 15 with a CO_2 backpack sprayer at a constant volume of 30 gpa. The beans were in the 3- to 5-trifoliate leaf stage. Plot size was 5 ft wide by 25 ft long and four replications were used. Weed control and phytotoxicity evaluations were made on July 21, with a second phytotoxicity rating being made on August 1.

Bentazon at both rates produced better than 90% control of both sowthistle and hairy nightshade. Acifluorfen at 0.25 lb/A gave better than 80% control of all weeds but at 0.125 lb/A produced slightly less control of all weeds.

AC 263,499 provided 76% control of pigweed species at 0.25 lb/A and 65% control at 0.125 lb/A. While there was some initial crop injury, no significant phytotoxic effect on the beans was evident at the time of the second evaluation. (University of California Cooperative Extension, Stockton, CA 95205 and Davis, CA 95616)

Postemergence weed control in 'California Light Red' kidney beans

	Rate	Percent control[1,2]			Crop phytotoxicity[1,3]	
Treatment	lb/A	Pigweed	Sowthistle	Nightshade	7/21	8/1
Bentazon	1.0	43	93	90	10	7.5
Bentazon	2.0	73	95	95	21	8.3
Acifluorfen	.25	84	81	85	15	9.0
Acifluorfen	.125	81	79	74	12	7.5
AC 263,499	.25	65	33	40	14	6.3
AC 263,499	.125	76	43	40	11	8.0

[1] All numbers are averages of four replications.

[2] 100% = total weed control; 0% = no control.

[3] 100% = plant death; 0 = plants unaffected.

Evaluation of postemergence weed control in 'California Light Red' kidney beans. Canevari, W.M., R.J. Mullen and L.W. Mitich. A trial was established in San Joaquin County, California, to evaluate the effectiveness of eight herbicides in the control of major weeds in bean production. 'California Light Red' kidney beans were planted on June 28, 1983. The herbicides were applied on July 15 to beans in the 3 to 5 trifoliate leaf stage, and to weeds ranging in size from 3 to 9 in. Plots were 30 in. wide by 30 ft long and the herbicides were applied with a CO_2 backpack sprayer which delivered a constant volume of 60 gpa. Weed control and crop phytotoxicity evaluations were made on July 21 and August 1.

All herbicides gave better than 85% control of the seedling mustard species. All treatments gave better than 82% control of barnyardgrass, except bentazon + fluazifop-butyl (70%) and bentazon + CGA-82725 (65%). None of the materials produced commercial control of yellow nutsedge. Pigweed species and common lambsquarters were present but not controlled by these herbicides, as expected, so consequently are not included in the table. (University of California Cooperative Extension, Stockton, CA 95205 and Davis, CA 95616)

Postemergence weed control in 'California Light Red' kidney beans

Herbicide	Rate lb/A	Mustard		Barnyard-grass		Yellow nutsedge		Phyto-toxicity[1,3]	
		7/21	8/1	7/21	8/1	7/21	8/1	7/21	8/1
Bentazon + sethoxydim	1.0 0.5	84	90	37	91	38	41	12	11
Bentazon + fluazifop-butyl	1.0 + 0.5	67	88	23	70	45	31	20	11
Bentazon + HOE-33171	1.0 0.5	84	93	39	90	36	56	25	14
Bentazon + CGA-82725	1.0 0.5	78	86	30	65	38	45	28	13
Bentazon + DPX-Y6202-7	1.0 1 oz	80	91	28	88	30	35	20	13
AC 263,499	0.25	40	91	28	91	13	45	31	33
AC 263,499	0.125	53	96	25	83	15	43	30	26
Control		0	0	0	0	0	0	0	0

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[1] All numbers are averages of four replications.

[2] 100% = total weed control; 0% = no weed control.

[3] 100% = death of plant; 0% = plants unaffected.

Evaluation of postemergence weed control in 'Dark Red' kidney beans. Mitich, L.W. and J.A. Roncoroni. Seven herbicides were evaluated for their effectiveness in controlling barnyardgrass, hairy nightshade, black nightshade, and redroot pigweed, and to determine their phytotoxic effect on the bean plants, if any. The trial was established June 8, 1983, on the UC Davis Experimental Farm when barnyardgrass and hairy and black nightshade seed was broadcast on to the soil surface to augment the natural population. On August 11, 1983, when the beans were in the 3- to 5-leaf stage and weeds in the 2- to 5-leaf stage, postemergence treatments were applied with a CO_2 pressure backpack sprayer calibrated to deliver 30 GPA to plots 10 ft wide (4 rows, 30 in. each) by 20 ft long. A randomized complete block design was used and the trial was replicated four times. Evaluations were made on August 25, 1983, and yields were taken on September 28, 1983.

None of the herbicides gave any appreciable increase in yield over the control, or produced better control of the nightshades or pigweed than bentazon (see table 2). Sethoxydim + bentazon in a sequential treatment gave at least 80% control of all weeds. Sethoxydim, sethoxydim + bentazon, CGA-82725, and DPX-Y6202-7 at both rates all gave better than 98% control of barnyardgrass. All other treatments, excluding bentazon, produced greater than 75% control. Bentazon and sethoxydim + bentazon gave better than 75% control of hairy and black nightshade and pigweed. Fluazifop butyl produced better than 75% control of redroot pigweed.

Although sethoxydim and sethoxydim + bentzon caused initial slight injury to the bean plants, there was no effect on yields. All other herbicides caused little or no injury to the crop.

In conjunction with the postemergence trials, a growth regulator, PPG-1712 from PPG Industries, was evaluated for potential increase in yield (see table 1). However, no increase in bean yield occurred. (University of California Cooperative Extension, Davis, CA 95616)

Table 1
Evaluation of PPG-1721

Date applied		Rate g ai/A	Yield[1, 2] (g)
July 18, 1983	First Bloom	50	1440
July 18, 1983		96	1540
August 9, 1983	Full Bloom	50	1619
August 9, 1983		96	1458
Control			1944

[1] Harvest date September 28, 1983.

[2] All yields are averages of 4 replications.

Table 2
Postemergence herbicides in 'Dark Red' kidney beans

Herbicide	Rate lb ai/A	Percent control[1,2] Barnyardgrass	Nightshade[3]	Redroot Pigweed	Phytotoxicity[5] (%)	Bean yield[1,4] g/plot
Sethoxydim	0.75	100	50	0	25	1774
Bentazon	0.75	15	100	100	7.5	1971
Fluazifop butyl	0.5	93	50	48	10	2018
Sethoxydim + bentazon	0.5 +0.75	100	95	80	20	2025
Fluazifop butyl + bentazon	0.75 +0.75	75	58	80	13	1973
dicloflop methyl	1.0	86	88	61	5.0	1964
HOE-33171	0.15	86	45	20	0	2001
HOE-33171	0.15	78	25	20	5.0	1840
HOE-33171	0.2	89	66	68	2.5	1946
CGA-82725 + Atplus	0.5 + 1 qt.	99	45	43	0	1833
DPX-Y6202-7	0.75 oz ai.	99	63	68	2.5	1981
DPX-Y6202-7	1.5 oz ai.	100	25	13	0	1711
Control		23	23	43	0	1943
LSD.05						249

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[1] All numbers are average of four replications.
[2] 100% - total weed control; 0% = no control.
[3] No distinction made between black and hairy nightshade.
[4] Harvest date September 28, 1983.
[5] 100% plant death; 0% plant unaffected.

Evaluation of preplant incorporated herbicide weed control of various weeds in blackeye beans. Frate, C.A. and L.W. Mitich. Ethalfluralin was tested with many registered compounds on blackeye beans in Tulare County, California, to evaluate their effectiveness in controlling weeds and their effect on bean growth. The herbicides were applied April 21, 1983, using a small tractor sprayer. The field was then disked, and 2 days later the field was disked again, beds were shaped, and irrigation water applied. After drying, the beds were cultivated and mulched. 'California Blackeye 5' beans were planted to moisture on May 13, 1983. Plot size was 80 ft by 50 ft with 3 replications. The plots were cultivated prior to the second evaluation.

No herbicide controlled purple nutsedge. Trifluralin alone or in combination with ethalfluralin provided the best control of both seedling johnsongrass and barnyardgrass, while alachlor and metolachlor provided some control. Control with chlorpropham was relatively ineffective. Results of control on broadleaf weed species is not included in the table because of their low population. No phytotoxicity or stunting of the beans were observed. (University of California Cooperative Extension, Visalia, CA 93291 and Davis, CA 95616)

Blackeye bean weed control, Tulare County, California

		Number of seedlings per sample plot[1,2]					
	Rate	Purple nutsedge		Johnsongrass		Barnyardgrass	
Herbicide	lb ai/A	5/31/83	6/13/83	5/31/83	6/13/83	5/31/83	6/13/83
Trifluralin	0.75	65.3	16.7	0.7	0.3	0	0
Ethalfluralin	1.5	17.0	3.3	0.3	0.3	0	0
Alachlor	2.5	86.3	45.3	0.7	8.0	20	0.3
Metolachlor	2.5	7.7	2.3	4.7	10.3	20	0
Chlorpropham	4.0	32.6	5.7	0.3	22.7	60	19.3
Trifluralin + alachlor	0.5 2.5	3.7	16.0	5.0	3.0	2.0	0
Trifluralin + metolachlor	0.5 2.5	8.3	3.0	0	0	0	0
Trifluralin + chlorpropham	0.5 2.5	117.0	36.7	0	0.3	2	0
Control		52.0	17.3	0.3	21.3	60	15.3
$LSD_{.05}$		NS	NS	NS	16.9	28.9	11

[1] Sample plot - eight rows 38 in. wide by 40 ft long.

[2] Plots were cultivated after first observation.

Control of yellow nutsedge in blackeye beans. Frate, C.A. and L.W. Mitich. Seven preemergence herbicides were evaluated for their effectiveness in controlling yellow nutsedge in Tulare County, Calif. Nightshade and barnyard grass were also present but not in sufficient numbers for their control to be evaluated. The herbicides were applied on May 11, 1983, with a CO_2 backpack sprayer which delivered 30 gpa. Plots were 42 ft by 42 ft and replicated three times. The field was disked, beds were shaped, and irrigation applied the next day. 'California Blackeye 5' beans were planted to moisture on May 25. Evaluations were made on June 6 and July 5. The field was cultivated after the first observation.

Alachlor, metolachlor, and metolachlor + alachlor produced very good control of yellow nutsedge. No phytotoxicity or reduction in vigor of the beans were observed from any of the treatments. (University of California Cooperative Extension, Visalia, CA 93291 and Davis, CA 95616)

Yellow nutsedge counts

Herbicide	Rate lb ai/A	No. nutsedge plants/plot[1,2,3] June 6	July 5
Ethalfluralin	1.5	11.7	0.8
Alachlor	2.5	0.3	0
Alachlor	3.0	0	0
Metolachlor	2.5	0.3	0
Trifluralin + alachlor	0.6 2.5	0.3	0
Trifluralin + metolachlor	0.6 2.5	0	0
Trifluralin + chlorpropham	0.6 2.5	4.3	0.8
Control[4]		6.3	1.0
LSD.05		7.0	NS

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[1] Sample area was 12 ft 8 in. (four 38 in. rows) wide by 20 ft long.

[2] All counts are average of 3 replications.

[3] Field was cultivated after first observation.

[4] Control plots were treated with trifluralin at .75 lb ai/A.

Herbicide evaluation in pinto beans. Torell, J.M., C.R. Salhoff, S.A. Dewey and R.H. Callihan. This study was initiated to test the efficacy of selected herbicides in pinto beans grown in southwestern Idaho. Herbicides were applied with a knapsack sprayer calibrated to deliver 140 l/ha for preplant incorporated and preemergence surface applications and 374 l/ha for postemergence application. Pinto beans, variety UI 114, were planted on May 21, 1982 at the Southwest Idaho Research and Extension Center. Preplant incorporated, preemergence surface, postemergence and late postemergence treatments were applied on May 20, May 25, July 9 and July 20, respectively. Preplant incorporated treatments and preemergence surface treatments were evaluated on June 23. Postemergence treatments were evaluated on July 19 and late postemergence treatments were evaluated on August 3.

Ethalfluralin preplant incorporated at 1.1 kg ai/ha followed by a bentazon postemergence treatment at 1.1 kg ai/ha and EPTC/Extender plus trifluralin preplanted incorporated at 3.4 plus 0.8 kg ai/ha were the outstanding treatments. Ethalfluralin alone gave excellent weed control before the bentazon postemergence treatment was applied and probably would have performed very well throughout the season even if the postemergence treatment had been deleted. Postemergence PPG-844 treatments caused severe crop injury and exhibited excellent activity on pigweed. Postemergence treatments of fluazifop-butyl had good activity on grasses but were weak on broadleaves. (Southwest Idaho Research and Extension Center, University of Idaho, Parma, ID 83660)

Table 1. Herbicide evaluation in pinto beans at the Southwest Idaho Research and Extension Center, Parma, ID. Effect of preplant incorporated and preemergence surface application on weed control.

Treatment[1]	Rate kgai/ha	Type of[2] Application	Crop[3] VR	Weed Control[3],[4] Piwe VR	Piwe SR	Colq VR	Colq SR	Hans VR	Hans SR	Grass[5] VR	Grass SR
Trifluralin + Bentazon[6]	0.8 + 1.1	PPI + Post	7	90	99	100	100	0	33	100	100
Trifluralin	0.8	PPI	0	75	97	100	100	0	30	100	100
PPG-844	0.3	PES	0	0	70	0	17	3	47	0	58
PPG-844	0.6	PES	0	8	93	0	43	53	90	25	77
Metolachlor + PPG-844[6]	3.0 + 0.2	PES + Post	3	0	63	0	17	8	40	8	91
PPG-1013	0.1	PES	0	0	30	0	17	0	8	8	68
PPG-1013	0.2	PES	0	0	43	33	50	8	47	0	43
PPG-1013	0.3	PES	0	8	90	17	70	0	77	7	48
EPTC	2.8	PPI	0	65	97	67	90	58	96	93	98
EPTC	3.9	PPI	0	23	82	33	50	17	87	67	97
EPTC/Extender	2.8	PPI	3	0	65	0	33	37	90	80	97
EPTC/Extender	3.9	PPI	0	17	32	33	33	20	32	47	60
EPTC + Trifluralin	3.4 + 0.8	PPI	0	30	65	67	67	30	65	70	98
EPTC/Extender + Trifluralin	3.4 + 0.8	PPI	0	83	99	100	100	20	93	100	100
UBI-S734	1.1	PPI	0	0	23	0	23	0	0	100	100
UBI-S734	1.7	PPI	0	40	70	0	33	0	33	100	100
SD-95418	0.8	PPI	3	100	100	100	100	0	8	100	100
SD-95418	1.7	PPI	20	100	100	100	100	32	63	100	100
Ethalfluralin + Bentazon[6]	1.1 + 1.1	PPI + Post	7	100	100	100	100	17	91	100	100
SC-7829	2.3	PPI	0	0	47	0	0	17	57	80	98
SC-7829	4.5	PPI	0	0	42	0	25	12	63	98	99
Hercules 2234	4.5	PPI	0	87	0	0	23	73	33	100	100
Handweeded Check			0	100	100	100	100	100	100	100	100
Weedy Check			0	0	0	0	0	0	0	0	0

1/ Treatments with an extender contained R-33865.

2/ PPI = preplant incorporated, PES = preemergence surface, post = postemergence.

3/ Visual evaluation on a 0-100 scale. VR = vigor Reduction, SR = Stand Reduction. PPI and PES treatments were rated on June 23, 1982.

4/ Weed abbreviations: Piwe = pigweed (redroot pigweed and Powell amaranth), Colq = common lambsquarters, Hans = hairy nightshade.

5/ Barnyardgrass and green foxtail were present with barnyardgrass being the predominant species.

6/ See Table 2 for the results of the evaluation following the application of postemergence treatments.

Table 2

Herbicide evaluation in pinto beans at the Southwest Idaho Research and Extension Center, Parma, Idaho

Effect of postemergence application on weed control

Treatment	Rate	Type of1/	Crop2/	Piwe		Colq		Hans		Grass4/	
	kgai/ha	Application	VR	VR	SR	VR	SR	VR	SR	VR	SR
Trifluralin + Bentazon5/	0.8 + 1.1	PPI + Post	0	100	100	100	100	92	80	100	100
PPG-844	0.5	Post	30	92	91	57	0	60	7	12	7
PPG-844	0.2	Post	28	77	57	50	30	53	0	12	30
PPG-844 + X-776/	0.5	Post	32	97	99	60	33	53	17	48	33
PPG-844 + X-776/	0.2	Post	37	97	99	47	32	70	13	23	0
PPG-844 + Sethoxydim	0.2 + 0.6	Post	47	100	100	47	37	55	17	87	57
Metolachlor + PPG-8445/	3.0 + 0.2	PES + Post	23	95	99	23	0	70	58	63	93
PPG-1013	0.04	Post	22	67	67	53	60	27	10	7	17
PPG-1013	0.07	Post	33	93	83	56	30	53	7	17	13
Bentazon + Sethoxydim7/	1.1 + 0.6	Post	0	0	0	0	0	0	0	20	95
Fluazifop-butyl8/	0.1	Post	0	13	57	0	0	27	17	43	63
Fluazifop-butyl8/	0.3	Post	3	10	8	10	13	17	0	46	62
Fluazifop-butyl8/	0.6	Post	2	7	32	17	33	13	0	83	65
Fluazifop-butyl8/	0.3	LP	0	0	0	0	17	0	0	53	82
Fluazifop-butyl8/	0.6	LP	0	0	0	0	20	0	0	77	81
Ethalfluralin + Bentazon5/	1.1 + 1.1	PPI + Post	7	100	100	100	100	17	91	100	100
Bentazon	1.1	Post	0	27	0	37	23	70	65	8	30
Handweeded Check			0	100	100	100	100	100	100	100	100
Weedy Check			0	0	0	0	0	0	0	0	0

1/ PPI = preplant incorporated, PES = preemergence surface, post + postemergence, LP = late postemergence.

2/ Visual evaluation on a 0-100 scale. VR = Vigor Reduction, SR = Stand Reduction.
Post treatments were evaluated on July 19 and late post treatments were evaluated on August 3.

3/ Weed abbreviations: Piwe = pigweed (redroot pigweed and Powell amaranth), Colq = common lambsquarters, Hans = hairy nightshade.

4/ Barnyardgrass and green foxtail were present with barnyardgrass being the predominant species.

5/ See Table 1 for the results of the evaluation of PPI and PPS treatments.

6/ Ortho X-77 at 0.25% V/V.

7/ Applied with BASF Crop Oil Concentrate at 2.3 l/ha.

8/ Applied with Mor-Act Crop Oil at 2.3 l/ha.

TABLE 3

Herbicide evaluation in pinto berans at the Southwest Idaho Research and Extension Center, Parma, Idaho
Effect of herbicide treatments on crop yield and dry weight of weeds

Treatment	Rate kgai/ha	Type of[1] Appli.	Crop Yield kg/ha[2]	Piew kg/ha dry wt.[6]	Colq kg/ha dry wt.[5]	Hans kg/ ha dry wt.[6]	Grass kg/ha dry wt.[6]	TWW-kg/ha TDW[7]
Trifluralin + Bentazon	0.8+1.1	PPI+Post	2079ab	0f	25g	0c	8g	32j
Trifluralin	0.8	PPI	1082efghijk	0f	0g	1068ab	0g	1068hij
PPG-844	0.3	PES	748fghijklmn	30ef	1600abcdefg	104c	1890abcde	2933abcdefg
PPG-844	0.6	PES	1521bcde	32ef	1820abcdef	38c	784abcdefg	1675abcdefgh
PPG-844	0.5	Post	485jklmn	0f	2755abc	0c	1628ab	4384a
PPG-844	0.2	Post	377lmn	93def	987bcdefg	79c	1393abc	2552bcdefgh
PPG-844 + X-77[8]	0.5	Post	619hijklmn	0f	1719abcdef	0c	807abcdefg	2527bcdefgh
PPG-844 + X-77[8]	0.2	Post	373lmn	286bcdef	739defg	35c	1186abcdef	2246defgh
PPG-844 + Sethoxydim	0.2 + 0.6	Post	562ijklmn	0f	1573abcedfg	280bc	190defg	2043efgh
Metolachlor + PPG-844	3.0 + 0.2	PES+Post	1033efghijklm	519abcdef	1267abcdefg	35c	70efg	1891efghi
PPG-1013	0.1	PES	1049efghijklm	1093abcd	1694abcdef	328bc	755abcedfg	3870abcd
PPG-1013	0.2	PES	966fghijklmn	452abcdef	909cdefg	101c	1305abcd	2766abcdefg
PPG-1013	0.3	PES	1200efghij	209bcdef	761defg	123c	1728a	2821abcdefgh
PPG-1013	0.04	Post	302n	233bcdefg	865cdefg	708abc	638abcedfg	2445cdefgh
PPG-1013	0.07	Post	327mn	315bcdef	792defg	109c	758abcdefg	1974efgh
EPTC	2.8	PPI	1363cdefg	689abcdef	1161bcdefg	11c	158defg	2019efgh
EPTC	3.9	PPI	1966abcd	637abcdef	249efg	53c	546bcdefg	1485ghij
EPTC/Extender	2.8	PPI	1194efghij	1107abcd	2066abcde	48c	53efg	3274abcdefg
EPTC/EXtender	3.9	PPI	745fghijklmn	739abcdef	1334abcdefg	241bc	556bcdefg	2869abcdefg
EPTC + Triflu4ralin	3.4 + 0.8	PPI	1468bcdef	1078abcd	338defg	791abc	168defg	2374defg
EPTC/Extender + Trifluralin	3.4 + 0.8	PPI	2017abc	9f	0g	306bc	0g	315ij
Bentazon + Sethoxydim[9]	1.1 +0.6	Post	1516bcde	851abcdef	1286abcdefg	12c	392cdefg	2540cdefgh

TABLE 3 (continued)

Herbicide evaluation in pinto beans at the Southwest Idaho Research and Extension Center, Parma, Idaho

Effect of herbicide treatments on crop yield and dry weight of weeds

Treatment	Rate kgai/ha	Type of1/ Appli.	Crop Yield kg/ha2/	Piwe kg/ha dry wt.3/	Colq kg/ha dry wt.4/	Hans kg/ ha dry wt.5/	Grass kg/ha dry wt.6/	TWW-kg/ha DW7/
Fluazifop-butyl + crop oil10/	0.1	Post	699ghijklmn	172cdef	3164a	110c	855abcdefg	4301ab
Fluazifop-butyl + crop oil10/	0.3	Post	740ghijklmn	385abcdef	2016abcdef	281bc	586abcdefg	3267abcdefg
Fluazifop-butyl + crop oil10/	0.6	Post	1039efghijklm	1212ab	959bcdef	758abc	148defg	3076abcdefg
Fluazifop-butyl + crop oil10/	0.3	LP	703ghijklmn	925abcdef	1701abcdef	553abc	399cdefg	3577abcde
Fluazifop-butyl + crop oil10/	0.6	LP	671ghijklmn	1386a	955bcdefg	585abc	399cdefg	3364abcdef
S-734	1.1	PPI	786fghijklmn	1149abc	1205bcdefg	270bc	0g	2623abcdefgh
S-734	1.7	PPI	1238efghi	333bcdef	2227abcd	141c	0g	2702abcdefgh
SD-95418	0.8	PPI	1122efghijk	293bcdef	103fg	1309a	2g	1707fghi
SD-95418	1.7	PPI	1311defgh	131cdef	794defg	744abc	21efg	1691fghi
Ethalfluralin + Bentazon	1.1+1.1	PPI+Post	2269a	0f	0g	0c	0g	0j
SC-7829	2.3	PPI	1171efghij	697abcdef	1971abcdef	471bc	33efg	3172abcdefg
SC-7829	4.5	PPI	773fghijklmn	1055abcde	1330abcdefg	195c	16efg	2597bcdefgh
Bentazon	1.1	Post	908efghijklmn	935abcdef	646defg	0c	923abcdefg	2504cdefgh
Hercules 2234	4.5	PPI	1246efghi	350bcdef	2849ab	259bc	0g	3458abcdef
Handweeded check	...	...	2097ab	2f	0g	17c	10fg	29j
Weedy check	...	...	....klm	1004abcdef	1493abcdefg	231bc	1462abc	4190abc

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1/ PPI = preplant incorporated; PES = preemergence surface; Post = postemergence; LP = late postemergence.

2/ Means within a column followed by the same letter are not significantly different at the 0.05 level of probability by Duncan's Multiple Range Test.

3/ Piwe = pigweed (redroot pigweed and Powell amarenth).

4/ Colq = common lambsquarter.

5/ Hans = hairy nightshade.

6/ Barnyardgrass and green foxtail were present with barnyardgrass being the predominant species.

7/ TWW = total weed weight.

8/ Ortho X-77 at 0.25% v/v.

9/ Applied with BASF crop oil concentrate at 2.3 l/ha.

10/ Applied with Mor-Act crop oil at 2.3 l/ha.

Wild oat control in lentils. Huston, C.H., R.H. Callihan, and D.C. Thill. A study was conducted for wild oat (Avena fatua L.) control and wild oat herbicide tolerance in lentils (Lens culinaris Merck.) near Princeton, Idaho. Treatments were arranged in a randomized complete block design replicated four times with individual plot size 10 X 32 feet. 'Eston' lentils were planted on 7 inch rows April 26, 1983. Soil type was a Taney silt loam. All herbicides were broadcast using a backpack sprayer equipped with 5002 flatfan nozzles and calibrated to deliver 20 gpa. Preemergence surface and postplant incorporated treatments were applied on April 29, with postplant incorporated treatments being incorporated immediately after application by cross harrowing. The postplant incorporated treatments were the following: R-40244 (emulsifiable concentrate 2.0 lb/gal), triallate (emulsifiable concentrate 4.0 lb/gal), and metribuzin (dry flowable 75%). Preemergence surface treatments included: R-40244 (emulsifiable concentrate 2.0 lb/gal), pendimethalin (emulsifiable concentrate 4.0 lb/gal), and dinoseb (amine salt 3.0 lb/gal). Air temperature was 15.5 C, relative humidity 50%, soil surface temperature 8.5 C, and soil temperature at 6 inches 7.5 C. All postemergence applications (except HOE-00583) were made on June 12, 1983. Herbicides applied were: fluazifop-butyl (emulsifiable concentrate 4.0 lb/gal), sethoxydim (emulsifiable concentrate 1.5 lb/gal), diclofop-methyl (emulsifiable concentrate 3.0 lb/gal), Dowco 453 (emulsifiable concentrate 1.0 lb/gal), and HOE-00581 (emulsifiable concentrate 1.0 lb/gal). Air temperature was 18 C, with soil temperature at 6 inches was 16 C with relative humidity 75% and cloud cover 80%. The postemergence treatment of HOE-00583 (emulsifiable concentrate 2.0 lbs/gal) was made on June 13, 1983 with air temperature 21 C and soil temperature 15 C at 6 inches.

Evaluations for crop injury and weed control were made on June 27 and July 15, 1983. Plots were harvested on August 25, 1983.

Wild oat control was excellent (96%) with the combination of 1.0 lb/A R-40244 and 0.5 lb/A sethoxydim, as well as the combination of 3.0 lb/A dinoseb and 0.2 lb/A Dowco 453 (98%). Excellent control (96-98%) was also observed on later evaluations of the 0.2 and 0.4 lb/A HOE-00583 treatments. The combination of 0.25 lb/A metribuzin and 0.5 lb/A sethoxydim resulted in good control (91%), whereas combinations of 1.0 lb/A R-40244 plus 0.25 lb/A fluazifop-butyl, and 3.0 lb/A dinoseb plus 0.2 lb/A HOE-00581 provided fair control (79-81%). Wild oat control was poor in the other treatments. No significant crop injury was detected. Crop yield data were considered inconclusive due to late season depredation by elk (Cervus alces). (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Wild oat control in lentils

Treatment	Appl. Time	Rate (lb/A)	Wild oat Control % 6/27	7/15	Crop Injury (%)	Yield (lbs/A)
R-40244	PES	0.50	0	0	0.0	127
R-40244	PES	1.00	3	4	0.0	83
R-40244/	PES	1.00				
Fluazifop-butyl + X-77[1]	Post	0.25	80	79	1.3	47
R-40244/	PES	1.00				
Sethoxydim + oil[2]	Post	0.50	96	96	1.3	19
R-40244/	PES	1.00				
Diclofop-methyl	Post	1.00	46	49	0.0	62
R-40244/	POPI	1.00				
Triallate	POPI	1.20	55	58	0.0	250
R-40244/	POPI	0.50				
Triallate	POPI	1.20	61	59	0.0	273
Pendimethalin	PES	1.00	3	3	0.0	117
Pendimethalin	PES	2.00	0	0	0.0	100
Triallate/	POPI	1.20				
Pendimethalin	PES	1.00	63	58	0.0	114
Pendimethalin/	PES	1.00				
Sethoxydim + oil	Post	1.20	67	65	0.0	74
Pendimethalin/	PES	1.00				
Fluazifop-butyl + X-77	Post	0.25	74	71	0.0	75
Pendimethalin/	PES	1.00				
Diclofop-methyl	Post	1.00	53	56	0.0	96
Dinoseb/	PES	3.00				
Dowco 453 + X-77	Post	0.20	75	98	0.0	48
Dinoseb/	PES	3.00				
Hoe 00581 + oil	Post	0.20	79	81	0.0	83
Dinoseb	PES	3.00	0	0	0.0	155
Metribuzin +	POPI	0.25				
R-40244		0.50	10	13	0.0	158
Metribuzin/	POPI	0.25				
Sethoxydim + oil	Post	0.50	91	91	0.0	49
Metribuzin/	POPI	0.25				
Diclofop-methyl	Post	1.00	58	58	1.3	95
Metribuzin	POPI	0.25	5	6	0.0	120
Pendimethalin +	PES	1.00				
Dinoseb	PES	1.50	4	4	0.0	127
Hoe-00583	Post	0.20	53	96	0.0	12
Hoe-00583	Post	0.40	58	98	0.0	4
Check	-		-	-	-	154
LSD 0.05	-		27	21	1.3	65

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[1] X-77 was applied at 8.5% of spray volume.
[2] Crop oil was applied at 1.2% of spray volume.

Annual weed control in lentils. Huston, C.H., R.H. Callihan, and D.C. Thill. 'Chilean' lentils (*Lens culinaris* Merck.) were planted April 17, 1983 in a Naff-Palouse silt loam near Moscow, Idaho. Experimental treatments were arranged in a randomized complete block design replicated four times.

Postplant incorporated treatments of triallate (emulsifiable concentrate 4 lb/gal and granular 10%) were applied on April 20 and immediately incorporated by cross harrowing. Liquid treatments were applied with a backpack sprayer equipped with 5002 teejet flatfan nozzles and calibrated to deliver 20 gpa at 40 psi. Granular treatments were applied using an auger type spreader. Preemergence surface treatments of dinoseb (amine salt 3.0 lb/gal) and metribuzin (dry flowable 75%) were also applied on April 20 with the same application procedure previously described. On May 31, postemergence treatments of sethoxydim (emulsifiable concentrate 1.5 lb/gal), fluazifop-butyl (emulsifiable concentrate 4.0 lb/gal), DowCo 453 (emulsifiable concentrate 2.0 lb/gal), diclofop-methyl (emulsifiable concentrate 3.0 lb/gal), R-40244 (emulsifiable concentrate 2.0 lb/gal), and a dinoseb plus pendimethalin (emulsifiable concentrate 4.0 lb/gal) tank mix were applied using the same procedure as above.

On June 21, crop injury was visually evaluated and lentil and weed stand counts were taken using a 2.5 ft^2 quadrat. Chlorotic mottling of lentil foliage occurred in treatments consisting of or including 0.25 and 0.50 lb/A fluazifop-butyl, as well as in treatments of 6.0 lb/A dinoseb plus 1.0 lb/A diclofop-methyl. Early chlorosis was observed with the 0.5 and 1.0 lb/A R-40244 treatments, but lentil plants recovered quickly. Crop injury was negligible or absent in the other treatments. Lentil stand counts in plots treated with 1.0 lb/A R-40244 were significantly lower than the check. Some lentil mortality (not significant) was also present in plots treated with 0.25 or 0.38 lb/A metribuzin plus 1.2 lb/A triallate.

Good to excellent control of common lambsquarters (*Chenopodium album* L.), henbit (*Lamium amplexicaule* L.) and field pennycress (*Thlaspi arvense* L.) was provided by several treatments: 6.0 lb/A dinoseb plus 0.25 lb/A fluazifop-butyl, 0.5 and 1.0 lb/A R-40244, 0.25 lb/A metribuzin, combinations of metribuzin with 0.25 and 0.38 lb/A triallate, 6.0 lb/A dinoseb alone or in combination with 0.4 lb/A sethoxydim, 1.0 lb/A diclofop-methyl, 1.5 lb/A triallate, 0.25 lb/A fluazifop-butyl, and a tank mix of 1.5 lb/A dinoseb with 1.0 lb/A pendimethalin. The pigweed population, composed of *Amaranthus retroflexus* L., *A. graecizans* L. and *A. albus* L. was erratic throughout the study site, but excellent control was observed in the treatments 0.5 or 1.0 lb/A R-40244 and 0.25 or 0.3 lb/A metribuzin with 1.2 lb/A triallate combinations. Excellent wild oat (*Avena fatua* L.) control was observed in the 0.19 and 0.50 lb/A fluazifop-butyl, 0.2 lb/A DowCo 453, 0.4 lb/A sethoxydim, 1.5 lb/A triallate, the tank mix of 1.2 lb/A triallate plus 0.25 lb/A metribuzin, and sequential treatments of 6.0 lb/A dinoseb with 0.4 lb/A sethoxydim, 1.5 lb/A triallate, or 0.5 lb/A fluazifop-butyl.

Plots were harvested on August 20 and seed yields among herbicide treatments did not differ significantly from the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Annual weed control in lentils

Treatment	Appl. Time	Rate	Plants	Crop Injury	Weed Control					Yield
					Colq	Hebi	Fipc	Wioa	Piwe[1]	
		(lbs/A)	(2 ft^2)	(%)	(# plants/2 ft^2)					(lb/A)
Sethoxydim + oil[2]	post	0.20	20	0	5	14	6	2	1	489
Sethoxydim + oil	post	0.30	23	6	9	18	5	1	7	434
Sethoxydim + oil	post	0.40	27	4	9	16	9	1	2	409
Sethoxydim + oil	post	0.50	22	3	6	14	6	1	3	529
Dinoseb/ sethoxydim + oil	PES+ post	6.00 0.40	24	3	1	1	0	1	1	727
Fluazifop-butyl + X-77[3]	post+	0.12	20	2	5	16	7	1	3	546
Fluazifop-butyl + X-77	post+	0.19	22	8	6	15	2	1	1	404
Fluazifop-butyl + X-77	post	0.25	22	13	3	15	5	3	1	557
Fluazifop-butyl + X-77	post	0.50	23	30	8	16	4	0	2	599
Dinoseb/ fluazifop-butyl + X-77	PES post	6.00 0.25	22	11	0	4	0	1	2	601
DowCo 453	post	0.10	22	0	7	12	3	3	2	641
DowCo 453	post	0.20	23	1	6	17	3	0	6	531
Diclofop-methyl	post	1.00	22	8	6	16	4	2	6	480
Triallate	PoPI	1.50	25	1	5	12	7	1	7	435
Dinoseb/ diclofop-methyl	PES post	6.00 1.00	22	11	0	1	0	2	1	572
Triallate/ dinoseb	PoPI post	1.50 6.00	21	3	0	1	0	1	2	495
Dinoseb	PES	6.00	20	1	1	1	0	1	2	642
R-40244	PES	0.50	24	6	1	0	0	2	0	642
R-40244	PES	1.00	18	7	0	0	0	1	1	559
Pendimenthalin + dinoseb	PES	1.00 1.50	22	3	1	0	1	2	2	686
Metribuzin + triallate	PoPI	0.38 1.20	19	1	1	0	0	1	1	738
Metribuzin + triallate	PoPI	0.25 1.20	19	5	1	1	1	1	1	647
Metribuzin	PoPI	0.25	22	3	1	2	1	2	1	628
Control	--	--	23	0	9	18	5	6	3	561
LSD 0.05	--	--	4	6	4	8	3	12	4	211

[1] Piwe was a composite of redroot (Amaranthus retroflexus L.), prostrate (Amaranthus graecizans L.) and tumble (Amaranthus albus L.) pigweeds.

[2] Crop oil was applied at 1.2% of spray volume.

[3] X-77 was applied at 0.5% of spray volume.

Evaluation of herbicides on lentil yields and weed control when used in combination with metribuzin. Stewart, V.R. and T.K. Keener. Grass herbicides were evaluated in combination with a uniform application of metribuzin at .14 kg/ha. Two pre-plant (PPI) and seven post-emergence herbicides were applied to a uniform lentil stand with a tractor-mounted research-type sprayer. Spray volume was 251.1 l/ha. Plot size was 3.0m X 6.1m.

Broadleaf weed control was poor due to heavy weed pressure and a less than adequate rate of metribuzin being applied for the soil type. Broadleaf weed control was increased with the addition of sethoxydim, diclofop methyl and CGA 82725 with metribuzin.

Excellent foxtail control was obtained in plots treated with sethoxydim (.56 kg/ha), fluazifop butyl (.28 and .56 kg/ha), DOWCO 453 ME (.14 and .28 kg/ha) and CGA 82725 (.56 kg/ha rate). Lower rates of these treatments provided less effective control. Sequential treatment of sethoxydim provided similar grass control as did the single post application.

Good to excellent wild oat control was achieved with the use of sethoxydim, fluazifop butyl (.28 and .56 kg/ha), diclofop methyl, DOWCO 453 ME, and CGA 82725 (.56 kg/ha rate). CGA 82725 was not effective at the lower rate (.25 kg/ha) for both grass species and poor on wild oats at the higher rate. Sethoxydim, fluazifop butyl, and DOWCO 453 ME showed good activity against both grass weed species.

Yields of all but three treatments were significantly higher than the check. Highest yields were obtained from the DOWCO 453 ME treatment at .28 kg/ha, however this difference is not statistically significant from many of the other treatments as seen in the table that follows. Yields were reduced significantly when foxtail control was under 30%.

Evaluation of grass herbicides on lentil yields and weed control with a uniform pre emergence surface application of metribuzin*

Treatment	Rate AI kg/ha	Type Application	Yield kg/ha	% Weed Control[3/]		
				Lmqtr	Set	W. Oat
DPX-Y6202	.035	Post	747.2a	54.8	22.5	60.0
DPX-Y6202	.07	Post	719.6	37.5	35.0	48.8
Sethoxydim[1/]	.56	Post	931.2a	68.8	100.0	100.0
Sethoxydim seq.[1/][2/]	.56+.34	Post + seq.	914.8a	40.0	100.0	100.0
Fluazifop butyl	.28	Post	761.3a	41.3	93.8	81.3
Fluazifop butyl	.56	Post	842.1a	46.3	98.8	100.0
Diclofop methyl	.84	Post	937.7a	66.3	85.5	96.3
DOWCO 453 ME	.14	Post	919.5a	52.3	90.0	91.3
DOWCO 453 ME	.28	Post	1160.0a	56.3	100.0	98.8
CGA 82725	.28	Post	803.0a	63.5	65.0	57.5
CGA 82725	.56	Post	886.0a	45.0	100.0	81.3
Difenzoquat	.84	Post	426.8	27.5	13.8	45.0
Triallate	1.40	PPI	790.0a	57.3	46.3	75.0
Propham	4.48	PPI	633.1	52.5	16.3	80.0
Metribuzin (alone)	.14	PES	667.5	23.8	10.0	47.5
Check (no metribuzin)	0		481.7	0.0	0.0	0.0

L.S.D. (.05) = 246.3

* Metribuzin application rate .14 kg/ha.

1/ Surfactants applied with chemicals: Sethoxydim 2.3 l/ha of oil concentrate; Fluazifop butyl .25% v/v R-11.

2/ Sequential treatments of sethoxydim, 1st appln. post, 2nd appln. 30 days pre harvest.

3/ % weed control: Lmqtr = Lambsquarters (*Chenopodium album*)
Set = Foxtail (*Setaria viridis*)
W. Oat = Wild Oats (*Avena fatua*)

a/ Indicates values significantly greater than the check at the .05 level.

Dates of Application:
PPI (pre-plant incorporate) = 5/11/83
PES (Pre emergence surface) = 5/11/83
Post = 6/10/83
Sequential = 7/15/83

Annual weed control in chickpeas. Huston, C.H., R.H. Callihan, and D.C. Thill. The efficacy of several pre- and postemergence herbicides was evaluated on chickpeas (Cicer arietinum L.) at Moscow, Idaho. 'UC-5' chickpeas were planted on May 4, 1983 in a randomized complete block design replicated four times with individual plot size of 10 feet by 32 feet. Row spacing was seven inches. The soil at this location was a Palouse-Latahco silt loam with a pH of 5.6 and organic matter of 2%. Prior to application of herbicide treatments, oat seeds (Avena sativa L.) were broadcast and incorporated by harrowing.

Postplant incorporated treatments of triallate (emulsifiable concentrate 4 lb/gal), triallate (10% granular), metribuzin (75% dry flowable), and preemergence surface treatments of dinoseb (amine salt 3 lb/gal), pendimethalin (emulsifiable concentrate 4 lb/gal) and R-40244 (emulsifiable concentrate 2 lb/gal) were applied on May 13, 1983 with a backpack sprayer calibrated to deliver 20 gpa at 40 gpa using 5002 flatfan nozzles. Air temperature was 10 C, soil temperature was 8.5 C at 6 inches, and relative humidity was 39%. All postplant incorporated treatments were immediately incorporated by cross harrowing with a spike-tooth harrow. Postemergence treatments of Dowco 453 (emulsifiable concentrate 2 lb/gal), fluazifop-butyl (emulsifiable concentrate 4 lb/gal), sethoxydim (emulsifiable concentrate 1.5 lb/gal), HOE-00581 (emulsifiable concentrate 1.0 lb/gal), and PPG 844 (emulsifiable concentrate 2.0 lb/gal) were applied on June 2, 1983 using the same equipment, water volume and pressure as for the preemergence treatments. Air temperature was 12 C.

Excellent oat control was obtained with 0.2 lb/A Dowco 453 and combinations of dinoseb with either 0.2 lb/A Dowco 453 and 0.5 lb/A of fluazifop-butyl. The HOE-00581 treatments applied alone or in combination with dinoseb, and the combination of dinoseb and triallate granular at 1.5 lb/A produced good (86, 87, and 88% respectively) oat control. Fair oat control was provided with the following treatments: dinoseb plus either 0.5 lb/A sethoxydim or 1.2 lb/A triallate, metribuzin plus triallate (tank mix), and metribuzin plus 1.0 lb/A diclofop-methyl. All other treatments provided inadequate oat control.

Good to excellent control (85-100%) of both henbit (Lamium amplexicaule L.) and redroot pigweed (Amaranthus retroflexus L.) were obtained with 0.1 lb/A PPG-844, 0.5 or 1.0 lb/A R-40244, 0.38 lb/A metribuzin, 6.0 lb/A dinoseb, 2.0 lb/A pendimethalin, and the sequential treatments of 3.0 lb/A dinoseb with 0.2 lb/A Dowco-453, 1.2 lb/A triallate, or 1.5 lb/A triallate 10 G.

Good to excellent henbit control and fair (75-85%) redroot pigweed control was provided by 0.38 lb/A metribuzin plus 1.2 lb/A triallate (tank mix), 1.0 lb/A pendimethalin, and 1.5 lb/A dinoseb plus 1.0 lb/A pendimethalin.

Good to excellent control of redroot pigweed and fair control of henbit was produced by 0.38 lb/A metribuzin plus 1.0 lb/A diclofop-methyl, and with 3.0 lb/A dinoseb plus either 0.5 lb/A fluazifop-butyl or 0.5 lb/A sethoxydim.

PPG-844 produced moderate (11%) chlorosis and necrosis of chickpea leaves after spraying. By mid-July no visible injury remained. No other treatments produced significant injury.

Seed yields of all treatments did not significantly differ from the untreated check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Annual weed control in chickpeas

Treatment	Appl. Time	Rate	Weed Control			Crop Injury	Yield
			Wioa	Hebi	Rrpw		
		(lb/A)	--------	%	--------	(%)	(lb/A)
Metribuzin	PoPI	0.38	43	91	87	3	1174
Metribuzin + Triallate	PoPI	0.38 1.20	71	97	76	1	1546
Metribuzin/ Diclofop-methyl	PoPI Post	0.38 1.00	79	72	88	6	1938
Dinoseb	PES	3.0	4	73	67	1	1692
Dinoseb	PES	6.0	15	96	93	1	1143
Dinoseb + Pendimethalin	PES PES	1.5 1.0	0	92	76	0	1847
Pendimethalin	PES	1.0	8	95	80	3	1568
Pendimethalin	PES	2.0	0	93	86	0	1686
R-40244	PES	0.5	20	98	94	1	2027
R-40244	PES	1.0	5	100	96	1	1727
Dinoseb/ Fluazifop-butyl + oil[1]	PES Post	3.0 0.5	93	75	90	4	1900
Dinoseb/ Sethoxydim+oil	PES Post	3.0 0.5	71	67	95	4	2458
Dinoseb/ Diclofop-methyl	PES Post	3.0 1.0	66	82	83	3	2468
Dinoseb/ Hoe 00581 + oil	PES Post	3.0 0.2	87	69	83	5	1750
Dinoseb/ Dowco 453	PES Post	3.0 0.2	98	83	94	3	2161
Dinoseb/ Triallate	PES PoPI	3.0 1.2	70	87	87	0	2183
Dinoseb/ Triallate	PES PoPI	3.0 1.5	88	98	93	0	2089
Hoe 00581 + oil	Post	0.2	86	58	50	4	1825
Dowco 453 + oil	Post	0.2	98	45	20	0	2479
PPG 844	Post	0.1	20	100	100	11	1550
Control	-	-	-	-	-	-	1542
LSD 0.05	-	-	34	33	31	10	1043

[1] Crop oil was applied at 1.2% of spray volume.

Weed control in spring peas. Huston, C.H., R.H. Callihan, and D.C. Thill. Several herbicides were evaluated for the control of broadleaf weeds in spring peas (*Pisum sativum* L. 'Garfield') planted on May 7, 1983, near Genesee, Idaho. Plots were arranged in a randomized complete block design with four replications.

Postplant incorporated treatments of triallate (emulsifiable concentrate 4.0 lb/gal) and SD-95481 (emulsifiable concentrate 2.0 lb/gal) were applied May 12. Preemergence surface treatments, applied on the same date, were dinoseb (amine salt 3.0 lb/gal) alone and in a tank-mix with pendimethalin (emulsifiable concentrate 4.0 lb/gal), pendimethalin alone, R-40244 (emulsifiable concentrate 2.0 lb/gal), and metribuzin (dry flowable 75%). Treatments were applied with a backpack sprayer calibrated to deliver 20 gpa at 40 psi. Air temperature was 9 C and soil temperature 5 C at a depth of 6 inches, with a relative humidity of 62%. Postemergence treatments of diclofop-methyl (emulsifiable concentrate 3.0 lb/gal), fluazifop-butyl (emulsifiable concentrate 4.0 lb/gal), sethoxydim (emulsifiable concentrate 1.5 lb/gal), acifluorfen (emulsifiable concentrate 2.0 lb/gal), and PPG-844 (emulsifiable concentrate 2.0 lb/gal) were applied on May 28 using the same application methods as above. Air and soil temperatures were both 10 C, with a relative humidity of 40%. On June 13, postemergence treatments of MCPA (emulsifiable concentrate 3.7 lb/gal) and HOE-00583 (emulsifiable concentrate 2.0 lb/gal) were applied. Air temperature was 16 C with soil temperature of 12 C at 6 inches. Relative humidity was 60%. The soil type at this location was of Tilma-Thatuna silt loam.

When plots were evaluated on June 26, the 0.36 and 0.46 lb/A MCPA treatments produced 20 to 22% crop injury in the form of epinasty. The sequential application of pendimethalin and sethoxydim also exhibited some crop injury. However, by late July, little visible crop injury remained. All other treatments produced no crop injury.

Excellent control (95-100%) of common lambsquarters (*Chenopodium album* L.) was observed in treatments of 6.0 lb/A dinoseb, the tank mix of 1.5 lb/A dinoseb plus 1.0 lb/A pendimethalin, combinations of 6.0 lb/A dinoseb with 1.2 lb/A triallate, 1.0 lb/A R-40244 with 1.0 lb/A diclofop-methyl, 1.0 lb/A pendimethalin with 0.5 lb/A fluazifop-butyl, and 0.5 lb/A sethoxydim with either 1.0 lb/A pendimethalin, 1.0 lb/A R-40244, or 0.38 lb/A metribuzin. Good control (85-95%) was provided by 1.0 and 2.0 lb/A pendimethalin, 0.5 and 1.0 lb/A R-40244, 0.38 lb/A metribuzin, and the 1.0 lb/A R-40244 and 0.5 lb/A fluazifop-butyl combination. Fair to poor control (80% and below) was seen in the remaining treatments.

Good control (85-95%) of mayweed (*Anthemis cotula* L.) resulted from 1.0 and 2.0 lb/A R-40244, 0.38 lb/A metribuzin, 6.0 lb/A dinoseb, and combinations of 1.5 lb/A dinoseb with 1.0 lb/A pendimethalin, 6.0 lb/A dinoseb with 1.2 lb/A triallate, 1.0 lb/A R-40244 with 0.5 lb/A fluazifop-butyl or 0.5 lb/A sethoxydim. Fair control (75-85%) was provided by combinations of 2.0 lb/A pendimethalin with 1.0 lb/A diclofop-methyl, and 0.38 lb/A metribuzin with 0.5 lb/A sethoxydim. Other treatments resulted in poor control (17-75%). Seed yields were taken but are inconclusive due to variance induced by disease. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Weed Control in Spring Peas

Treatment	Appl. Time	Formulation	Rate	Weed Control		Crop Injury	Yield
				Colq	Mawe		
			(lb/A)	---- % -----		(%)	(lb/A)
MCPA	POST	3.7 EC	0.46	68	50	20	427
MCPA	POST	3.7 EC	0.36	75	54	23	326
Dinoseb	PES	3.0 EC	6.00	100	93	0	697
Dinoseb +	PES	3.0 EC	1.50	95	94	0	442
Pendimethalin		4.0 EC	1.00				
Pendimethalin	PES	4.0 EC	1.00	94	73	0	545
Pendimethalin	PES	4.0 EC	2.00	94	75	0	568
Pendimethalin/	PES	4.0 EC	1.00	72	84	0	320
Diclofop-methyl	POST	3.0 EC	1.00				
Pendimethalin/	PES	4.0 EC	1.00	98	67	0	476
Fluazifop-butyl + oil[1]	POST	4.0 EC	0.50				
Pendimethalin/	PES	4.0 EC	1.00	99	73	8	1233
Sethoxydim + oil	POST	1.5 EC	0.50				
R-40244	PES	2.0 EC	0.50	90	94	0	688
R-40244	PES	2.0 EC	1.00	90	93	0	504
R-40244/	PES	2.0 EC	1.00	99	65	0	748
Diclofop-methyl	POST	3.0 EC	1.00				
R-40244/	PES	2.0 EC	1.00	92	89	0	286
Fluazifop-butyl + oil	POST	4.0 EC	0.50				
R-40244/	PES	2.0 EC	1.00	98	87	0	549
Sethoxydim + oil	POST	1.5 EC	0.50				
Triallate/	POPI	4.0 EC	1.20	99	93	0	440
Dinoseb	PES	3.0 EC	6.00				
HOE-00583	POST	2.0 EC	0.05	47	17	0	497
Metribuzin	PES	75.0 DF	0.38	91	93	0	418
Metribuzin/	PES	75.0 DF	0.38	81	64	0	438
Fluazifop-butyl + oil	POST	4.0 EC	0.50				
Metribuzin/	PES	75.0 DF	0.38	97	81	0	743
Sethoxydim + oil	POST	1.5 EC	0.50				
PPG-885	POST	2.0 EC	0.10	72	70	0	381
SD-95481	POPI	2.0 EC	1.00	58	65	0	481
Control	-	-	-	-	-	-	510
LSD (0.05)	-	-	-	32	36	7	378

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[1] Crop oil was applied at 1.2% of spray volume.

Graminicides in spring peas. Huston, C.H., R.H. Callihan, and D.C. Thill. A study was established near Genesee, Idaho to evaluate several pre- and postemergence graminicides in spring peas. Peas (Pisum sativum L. 'Garfield') were planted on April 25, 1983. The soil at this location was a Palouse silt loam. The experimental design was a randomized complete block replicated four times. Postplant incorporated treatments of metribuzin (dry flowable 75%), triallate (emulsifiable concentrate 4.0 lb/gal), triallate (granular 10%), and preemergence surface treatments of 6 lb/A of dinoseb (amine salt 3.0 lb/gal) were applied on April 28, 1983. All treatments were applied with a backpack sprayer equipped with 5002 nozzles and calibrated to deliver 20 gpa at 40 psi. The air temperature was 12 C, soil temperature at 6 inches was 8 C, and relative humidity was 67%. Postemergence treatments of fluazifop-butyl (emulsifiable concentrate 4.0 lb/gal), sethoxydim (emulsifiable concentrate 1.5 lb/gal), diclofop-methyl (emulsifiable concentrate 4.0 lb/gal), HOE-00581 (emulsifiable concentrate 1.0 lb/A), and Dowco 453 (emulsifiable concentrate 2.0 lb/gal) were applied on May 20,1983.

All sequential treatments of dinoseb with 0.19, 0.25, 0.38, and 0.50 lbs/A fluazifop-butyl plus oil, dinoseb with 0.2, 0.3, 0.4, and 0.5 lb/A sethoxydim plus oil, dinoseb with 0.2 lb/A Dowco 453 plus oil and dinoseb with 0.2 lb/A HOE-00581 plus oil provided excellent wild oat (Avena fatua L.) control (96-100%). The sequential treatment of dinoseb with triallate 10G provided fair control (74%) and all other treatments resulted in poor wild oat control.

The treatments receiving 0.38 lb/A metribuzin alone or with trillate or diclofop-methyl produced good to excellent control (91-96%) of common lambsquarters (Chenopodium album L.) and henbit (Lamium amplexicaule L.). All other treatments received 6.0 lb/A dinoseb and exhibited fair to excellent control (73-96%) of common lambsquarters and henbit.

On July 15 the entire plot area was sprayed with 0.3 lb/A of fluazifop-butyl. At this time the peas were maturing in the pods and the wild oats were beginning to head. Plots were harvested on August 18, 1983. Most herbicide treatments resulted in a much greater yield than the check. However, yields from plots treated with the 0.38 lb/A metribuzin, the sequential treatment of 0.38 lb/A of metribuzin plus 1.0 lb/A diclofop-methyl, 6.0 lb/A dinoseb, and the sequential treatments of 6.0 lb/A dinoseb with 0.2 lb/A Dowco 453 or 0.2 lb/A HOE-00581 did not differ significantly from the check. (Idaho Agricultual Experiment Station, Moscow, ID 83843)

Graminicides in Spring Pea

Treatment	Appl. Time	Rate	Weed control Wioa	 Colq	 Hebi	Yield
		(lb/A)	---------%---------			(lb/A)
Dinoseb/	PES	6.00	95	90	89	2577
fluazifop-butyl + oil[1]	Post	0.19				
Dinoseb/	PES	6.00	94	74	75	2343
fluazifop-butyl + oil	Post	0.25				
Dinoseb/	PES	6.00	99	79	79	2405
fluazifop-butyl + oil	Post	0.38				
Dinoseb/	PES	6.00	99	88	88	2645
fluazifop-butyl + oil	Post	0.50				
Dinoseb/	PES	6.00	97	84	88	2441
sethoxydim + oil	Post	0.20				
Dinoseb/	PES	6.00	96	80	84	2252
sethoxydim + oil	Post	0.30				
Dinoseb/	PES	6.00	99	79	84	2256
sethoxydim + oil	Post	0.40				
Dinoseb	PES	6.00	96	73	76	2079
sethoxydim + oil	Post	0.50				
Dinoseb/	PES	6.00	25	88	89	2079
HOE 00581	Post	0.10				
Dinoseb/	PES	6.00	34	83	84	1884
HOE 00581	Post	0.20				
Dinoseb/	PES	6.00	39	90	92	2018
diclofop-methyl	Post	1.00				
Dinoseb/	PES	6.00	74	94	95	2274
triallate	POPI	1.50				
Dinoseb	PES	6.01	95	85	68	2020
Dowco 453	Post	0.20				
Dinoseb/	PES	6.00	100	89	89	1906
Dowco 453	Post	0.20				
Dinoseb/	PES	6.00	82	90	91	2862
triallate	POPI	1.20				
Dinoseb	PES	6.00	0	89	94	1781
Dinoseb/	PES	6.00	96	93	94	2606
HOE 00581 + oil	Post	0.20				
Metribuzin	POPI	0.38	18	96	95	1944
Metribuzin +	POPI	0.38	61	91	94	2040
triallate	POPI	1.20				
Metribuzin/	POPI	0.38	46	95	95	1969
diclofop-methyl	Post	1.00				
Control	-	-	-	-	-	1585
LSD (0.05)	-	-	17	11	17	407

[1] Crop oil was applied at 1.2% of spray volume.

Weed control in Austrian winter peas. Huston, C.H., R.H. Callihan, and D.C. Thill. This study was established to evaluate the efficacy of herbicide combinations on Austrian winter peas (*Pisum sativum* L.). 'Melrose' Austrian winter peas were planted on September 24, 1982 at Moscow, Idaho. Soil at this location is a Naff-Thatuna silt loam. Experimental design was a randomized complete block with four replications.

A postplant incorporated treatment of triallate (emulsifiable concentrate 4.0 lb/A) was applied immediately after seeding using a backpack sprayer equipped with 5002 flatfan nozzles and calibrated to deliver 20 gpa at 40 psi. The triallate was immediately incorporated into the soil by cross harrowing. On September 29, preemergence surface treatments of metribuzin (dry flowable 75%), dinoseb (amine salt 3.0 lb/A), pronamide (wettable powder 50%), and acifluorfen (emulsifiable concentrate 2.0 lb/gal) were applied using the spraying procedure previously described. Air temperature was 15.6 C and soil temperature at 6 inches was 13 C. Relative humidity was 80%. On April 1, 1983 postemergence treatments of dinoseb (amine salt 3.0 lb/gal), sethoxydim (emulsifiable concentrate 1.5 lb/gal), fluazifop-butyl (emulsifiable concentrate 4.0 lb/gal), tank mixes of dinoseb plus sethoxydim or fluazifop-butyl, acifluorfen (emulsifiable concentrate 2.0 lb/gal), diclofop-methyl (emulsifiable concentrate 3.0 lb/gal), terbutryn (wettable powder 80%), and a terbutryn plus diclofop-methyl tank mix were used. At this time volunteer winter wheat (*Triticum aestivum* L.) and winter barley (*Hordeum vulgare* L.) were 6 inches tall. Air temperature was 5 C and the relative humidity was 80%. Postemergence MCPA (dimethyl amine 3.7 lb/gal) was applied on May 19, 1983. The air and soil temperatures were 18 C with relative humidity of 48%.

The sequential treatments 3.0 lb/A dinoseb with 0.4 lb/A sethoxydim, 0.1 lb/A fluazifop-butyl, or 0.2 lb/A fluazifop-butyl with the sequential treatment of 0.25 lb/A metribuzin with 0.4 lb/A sethoxydim provided fair to good control (69-83%) of winter wheat and winter barley. All other treatments provided poor control (0-65%). Fair control of narrow-leaved montia (*Montia linearis* (Dougl.) Greene) was provided by treatments of 0.25 lb/A metribuzin applied alone and sequentially with 0.4 lb/A sethoxydim (76% and 68%, respectively). All other treatments provided very little control (0-35%).

Metribuzin at 0.25 lb/A caused very slight (2%) early season injury. No other treatments produced any phytotoxicity. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Weed Control in Austrian Winter Peas

			Wild Oat Control			Crop
	Appl.	Rate	%			Injury
Treatment	Time	lb/A	Wiwh[1]	Wiba[2]	Nlmo	(%)
triallate/	POPI	1.20	11	11	18	0
metribuzin	PES	0.38				
dinoseb	PES	3.00	0	0	0	0
dinoseb/	PES	3.00	0	0	12	0
dinoseb	POST	0.75				
dinoseb/	PES	3.00	74	74	69	0
sethoxydim + oil[3]	POST	0.40				
dinoseb/	Post	3.00	14	10	50	0
sethoxydim + oil	PES	0.20				
dinoseb/	PES	3.00	71	71	12	0
fluazifop-butyl + oil	Post	0.10				
dinoseb/	PES	3.00	84	84	28	0
fluazifop-butyl + oil	Post	0.20				
dinoseb/	PES	3.00	1	13	15	0
diclofop-methyl	Post	1.00				
dinoseb/	PES	3.00	10	10	32	0
diclofop-methyl	Post	0.75				
pronamide/	PES	0.50	20	20	0	0
MCPA	Post	0.46				
pronamide/	PES	0.25	5	5	0	0
MCPA	Post	0.35				
metribuzin	Post	0.25	0	0	76	0
metribuzin/	Post	0.25	82	83	68	2
sethoxydim + oil	Post	0.40				
dinoseb +	Post	0.75	28	30	15	0
sethoxydim + oil		0.40				
dinoseb +	Post	0.75	65	65	25	0
fluazifop-butyl		0.20				
acifluorfen	PES	0.50	32	32	15	0
acifluorfen	Post	0.75	0	0	35	0
terbutryn	Post	0.60	12	0	0	0
terbutryn +	Post	0.60	0	0	30	0
diclofop-methyl		1.00	-	-	-	-
control	-	-				
LSD (0.05)	-	-	15	13	30	1

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[1] Wiwh = <u>Triticum aestivum</u>

[2] Wiba = <u>Hordeum vulgare</u>

[3] Crop oil was applied at 1 quart per acre or 1.2% of spray volume.

Response of Austrian winter peas to postemergence herbicides. Huston, C.H., R.H. Callihan, D.C. Thill. This study was established at Moscow, Idaho to determine the efficacy of metribuzin (75% dry flowable) applied postemergence alone or in tank-mix combinations with sethoxydim (emulsifiable concentrate 1.5 lb/gal) or fluazifop-butyl (emulsifiable concentrate 4 lb/gal) on Austrian winter peas (Pisum sativum). Plots were 10 X 32 feet arranged in a randomized complete block design. 'Melrose' Austrian winter peas were planted in 7 inch rows on September 24, 1982. All herbicide treatments were broadcast applied on April 22, 1983 using a backpack sprayer equipped with 5002 flatfan nozzles and calibrated to deliver 20 gpa. Air temperature was 14 C, relative humidity 60%, and soil temperature at 2 inches 16 C. Soil type was a Naff-Thatuna silt loam.

When visually evaluated on May 6, the treatments of metribuzin applied alone had not caused any phytotoxicity or vigor reduction. Tank-mix combinations of metribuzin with either sethoxydim or fluazifop-butyl caused significant vigor reduction, as well as crop injury in the form of chlorosis and necrosis. However, injury was temporary and by June 14 no differences were present among treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Response of Austrian winter peas to postemergence herbicides

Treatment	Appl. Time	Rate	Vigor Reduction	Crop Injury	Vigor Reduction	Crop Injury
		(lb/A)	---------------	------(%)------	---------------	
Metribuzin	post	0.18	0.0	0.0	0	0
Metribuzin	post	0.25	0.0	0.0	0	0
Metribuzin	post	0.38	0.0	0.0	0	0
Metribuzin	post	0.50	0.0	0.0	0	0
Metribuzin + Sethoxydim + oil[1]	post	0.25 0.50	6.3	18.8	0	0
Metribuzin + Fluazifop - butyl + oil	post	0.25 0.50	10.0	21.3	0	0
Check	-	-	0.0	0.0	0	0
LSD 0.05			3.2	3.1	0	0

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[1] Crop oil applied at 1.2% of spray volume.

Evaluation of postemergence herbicides for fall-planted sugar beets. R.F. Norris, L.L. Buschmann and R.A. Lardelli. Herbicidal activity of phenmedipham plus desmedipham when applied alone, or tank-mixed with three new grass herbicides, was compared for selective control of various annual winter grasses and volunteer wheat in sugar beets. This investigation was established in Sutter County, California.

Herbicide treatments were applied on December 10, 1982, when sugar beet plants were in the 2 to 4 true-leaf stage, volunteer wheat was 4 to 6 inches tall, and annual grasses such as canarygrass, wild oat, and annual bluegrass were 1 to 3 inches tall. Broadleaf weeds present were fiddleneck, redstem filaree and corn spurry at approximately 3 to 4 inches tall. A CO_2 backpack handsprayer, operated at 30 psi with 8004 nozzles, was used for the application and delivered 40 gal/A of total spray solution. The plot size was 5 ft (2 beds on 30 inch centers) by 10 ft, and each treatment was replicated three times in a complete randomized block design.

No treatment killed the sugar beets. The greatest reduction in sugar beet vigor occurred as a result of competition where weed control was poor; hence the low vigor rating for the untreated check plots. Early grass control evaluations are based on an overall score. Sethoxydim, fluazifop-butyl and DPX-Y6202 all provided excellent grass control. Phenmedipham plus desmedipham appeared to give some control of the grasses, an effect noticeable for several months. Combinations of phenmedipham plus desmedipham with all grass herbicides tested showed good early broadleaf weed control. By the April assessment, noticeable weakness of control of corn spurry was noted. (Botany Department, University of California, Davis and Cooperative Extension, Yuba City).

Postemergence control of winter annual weeds in sugar beets[1]

Treatment[4]	Rate	Sugar beets[2]		Weed Control[3]								
		Vigor	Stand	Grasses		CY+ Wheat	WO	SY			FN	RF
	lb ai/A	4/6		1/14	2/10	4/6	4/6	1/14	2/10	4/6	1/14	2/10
Sethoxydim + Pace	0.50+1 qt	5.3bc	7.8bc	9.3c	10.0c	10.0c	10.0	0a	0a	0a	0a	0a
Fluazifop-butyl + Pace	0.50+1 qt	5.7bc	8.5bcd	9.5c	10.0c	10.0c	10.0c	0a	0a	0a	0.2a	0a
DPX-Y6202	0.50	4.5b	7.5b	9.0c	9.8c	10.0c	10.0c	0a	0a	0a	0a	0a
Phen. + des.	1.30	6.0bc	8.3bcd	3.3b	4.7b	3.3b	3.7b	5.7b	8.3c	8.0c	3.3a	5.3b
Sethoxydim + + Phen. + des. + Pace	0.50+1.30+1 qt	9.8d	9.8d	9.5c	10.0c	10.0c	10.0c	6.2b	7.5bc	3.7b	9.2b	9.0c
Fluazifop-butyl + Phen. + des. + Pace	0.50+1.30+1 qt	7.7cd	8.3bcd	9.2c	10.0c	10.0c	10.0c	8.0b	6.7b	4.0b	8.5b	4.7b
DPX-Y6202 + Phen. + des.	0.50+1.30	8.8d	9.5cd	9.3c	10.0c	10.0c	10.0c	9.2b	7.8bc	4.0b	8.7b	8.0bc
Untreated check		2.0a	3.7a	0a	0a	0a	0a	0a	0a	0a	0a	0a

[1] Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

[2] 10 = complete stand, full vigor; 0 = no stand or vigor.

[3] CY = canarygrass, WO = wild oat, SY = corn spurry, FN = fiddleneck, RF = redstem filaree.

[4] Phen. + des. = phenmedipham + desmedipham.

Quackgrass control in hops with fall-applied herbicides. Brewster, Bill D. and Arnold P. Appleby. Two field experiments were conducted to evaluate fall applications of herbicides for quackgrass control in hops in western Oregon. The experimental design was a randomized complete block with 2.4 by 6.1 m plots and three replications. Each plot contained three hop hills which were heavily infested with quackgrass that was 15 to 25 cm tall. The soil at Mt. Angel was a silt loam with 3.7% organic matter, while the soil at St. Paul was a fine sandy loam with 1.6% organic matter. The herbicides were applied with a compressed-air unicycle sprayer on November 13, 1983. The spray volume was 234 L/ha with water as the carrier. An oil concentrate was added to each treatment at a rate of 2.3 L/ha. The hops were dormant when the applications were made.

No injury was seen on the hops at either location the following spring. Two months after application all treatments, except sethoxydim at Mt. Angel, provided good top growth control of quackgrass, but by March 18 only haloxyfop-methyl at St. Paul was providing adequate control. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Visual evaluation of quackgrass control from fall applications of herbicides at two locations

		Quackgrass control			
		St. Paul		Mt. Angel	
Herbicide 1/	Rate	Feb. 1	Mar. 18	Feb. 1	Mar. 18
	(kg/ha)	%			
sethoxydim	0.56	90	57	23	40
fluazifop-butyl	0.56	87	30	90	50
haloxyfop-methyl	0.56	99	98	95	78
untreated control	0	0	0	0	0

1/ Applied November 13, 1982

Quackgrass control in peppermint with fall applications of postemergence herbicides. Brewster, Bill D. and Arnold P. Appleby. A field trial was conducted in a peppermint field near Junction City, Oregon to evaluate quackgrass control and crop tolerance of three herbicides applied in late fall. The herbicides were applied with a compressed-air unicycle plot sprayer on December 13, 1982. The experiment was a randomized complete block with two replications and 2.1 by 6.1 m plots. Oil concentrate was added to each treatment at a rate of 1.2 L/ha. The peppermint was 5-8 cm tall and the quackgrass was 10-20 cm tall when treated. Some frost injury on the quackgrass foliage was evident. Visual evaluations of quackgrass control were made on February 21 and March 17, 1983. Peppermint injury was evaluated on March 17.

No peppermint injury was observed with any treatment. DPX Y6202 was the most effective herbicide, although some quackgrass remained even in those plots treated with the higher rate. Sethoxydim and fluazifop-butyl initially provided fair control, but by spring the quackgrass had nearly recovered.

Peppermint tolerance and quackgrass control
with three postemergence herbicides

		Peppermint	Quackgrass	
Herbicide	Rate	March 17	February 1	March 17
	(kg/ha)	(% injury)	(% control)	
sethoxydim	0.56	0	50	0
sethoxydim	1.12	0	84	50
fluazifop-butyl	0.56	0	65	0
fluazifop-butyl	1.12	0	58	25
DPX Y6202	0.56	0	82	65
DPX Y6202	1.12	0	90	97
Untreated control	0	0	0	0

PROJECT 6.

AQUATIC, DITCHBANK AND NON-CROP

Randall Stocker - Project Chairman

No Papers

PROJECT 7.

CHEMICAL AND PHYSIOLOGICAL STUDIES

Lloyd C. Haderlie - Project Chairman

A lateral movement study of tebuthiuron in soil from a banding application. Schultz, T.W. and R.E. Whitesides. Tebuthiuron is considered to be slow leaching with little or no lateral movement. However, some leaching and lateral movement can occur under conditions of severe water runoff or high rainfall. The purpose of this study was to look at lateral movement in soil from a concentrated banding application.

Field studies were conducted at two locations, one in established alfalfa and the other in grass, in Whitman county, Washington on silt loam soil. Applications of tebuthiuron at a rate of 4.48 kg a.i./ha were made in late fall of 1982 and replicated again in late fall of 1983. The plots consisted of a band application, 2.5 cm by 12.2 m, and a broadcast application, 1.5 m by 12.2 m. Both types of applications were located on fairly level ground as well as on slopes of 7 to 25%. The broadcast treatment was used as a comparison for lateral movement with the bands.

Lateral movement up to 1.2 m. from the bands on the level areas was visible, but little movement from the bands could be observed on the slopes as indicated by present plant species. There was no visible lateral movement from the broadcast applications on either the level or sloped areas. Further research is being conducted to determine the pattern of movement in soil. (Department of Agronomy and Soils, Washington State University, Pullman 99164-6420)

Interaction of chlorsulfuron with other herbicides. Howard, S.W. and R.E. Whitesides. Further studies to determine the interaction between chlorsulfuron and bromoxynil, dicamba, and MCPA have been undertaken in the field and greenhouse. Mayweed (*Anthemis cotula* L.) has been used as an assay plant because it has not shown great susceptibility or tolerance to the herbicides tested.

The field study, established in early summer 1983, consisted of hand sowed, cultivated, and weed-free mayweed plots. When the plants were approximately 20 to 30 mm in heighth, with 6 to 7 fully expanded leaves, the plots were treated. Prior to treatment, specific plants were tagged to insure uniformity at the time of application. Plants were harvested and dry weights taken.

There was an apparent antagonism of chlorsulfuron by dicamba at three different rates. The same was true, but to a lesser degree with MCPA. Tank mixtures of chlorsulfuron with bromoxynil may be additive or synergistic, however, the nature of this interaction is not as clear as that of chlorsulfuron plus dicamba or MCPA.

In the greenhouse herbicide combinations are being studied by the use of the interaction models proposed by Colby, Tammes, and Campbell et al. (Department of Agronomy and Soils, Washington State University, Pullman 99164-6420)

Interaction of Chlorsulfuron with Other Herbicides

Treatment	Rate (lb/A)	Dry weight (grams)
Chlorsulfuron	0.015	0.21
Chlorsulfuron	0.007	0.20
Chlorsulfuron	0.003	0.38
Dicamba	0.5	1.38
Dicamba	0.25	1.42
Dicamba	0.13	2.24
MCPA	1.0	1.36
MCPA	0.5	1.62
MCPA	0.25	1.63
Bromoxynil	2.0	0.07
Bromoxynil	1.0	0.10
Bromoxynil	0.5	0.06
Chlorsulfuron + dicamba	0.015 + 0.5	0.50
Chlorsulfuron + dicamba	0.007 + 0.25	0.78
Chlorsulfuron + dicamba	0.003 + 0.13	1.51
Chlorsulfuron + MCPA	0.015 + 1.0	0.35
Chlorsulfuron + MCPA	0.007 + 0.5	0.67
Chlorsulfuron + MCPA	0.003 + 0.25	1.71
Chlorsulfuron + bromoxynil	0.015 + 2.0	0.09
Chlorsulfuron + bromoxynil	0.007 + 1.0	0.08
Chlorsulfuron + bromoxynil	0.003 + 0.5	0.08
Check		2.5

Tolerance of winter wheat to broadleaf weed herbicides. Whitesides, R.E. and T.L. Nagle. Soft white winter wheat (cv. Stephens) was treated with bromoxynil (0.38 lb ai/A), 2,4-D amine (1.0 lb ae/A) 2,4-D ester (1.0 lb ae/A), MCPA ester (1.0 lb ae/A), dicamba (0.25 lb ae/A), bromoxynil + MCPA ester (0.38 + 0.38 lb /A), and chlorsulfuron (0.016 lb ai/A) at five different growth stages. Initial treatments were made when the wheat had 3 to 5 tillers but before any nodes were detectable in the culm. Subsequent treatments were made when 1, 2, 3, and 4 nodes were easily identified by feel in the most advanced tiller of the plant. The experiment was conducted at two locations in Whitman County, Washington on essentially weed-free wheat. Each treatment was replicated four times in each location.

All herbicide-treated wheat did not yield as well as the untreated control. Wheat in the tillered and 1-node growth stages had more tolerance to the herbicides tested than wheat at the 3- and 4-node growth stages. The 2-node stage was variable in response. In general, these data suggest that applications of the herbicides tested should be made when the wheat is tillered or in the 1-node stage of growth. When wheat has reached the 2-node stage, care should be exercised to assess the gravity of the weed problem, recognizing the probability that herbicide treatment could reduce yields. It is highly probable that wheat in the 3- and 4-node growth stages will be injured and yield will be reduced from herbicide applications. Yield reduction from herbicide treatment in this study increased with wheat maturity after the 1-node stage of growth. (Department of Agronomy and Soils, Washington State University, Pullman 99164-6420)

Response of potatoes to chlorsulfuron and metsulfuron-methyl soil residue. Stark, J.C. and L.C. Haderlie. A field study was conducted at the University of Idaho Research and Extension Center, Aberdeen, to investigate the effects of chlorsulfuron and metsulfuron-methyl (DPX-6376) soil residue on the growth and yield of 'Russet Burbank' potatoes. Herbicides were applied June 21, 1982, to a spring wheat crop grown on a Declo loam (pH 8.1, 1.6% OM). All treatments were applied with a dual-wheel bicycle sprayer equipped with TJ8002 nozzles calibrated to deliver 187 L/ha. Individual plots (3.6 by 12.0 m) were arranged in a randomized complete block design with four replications. Weekly furrow irrigation was applied to the wheat crop throughout most of the growing season. Following harvest the field was moldboard plowed. Potatoes were planted May 5, 1983 and were sprinkler-irrigated at weekly intervals.

Stand counts and stem numbers were not affected by either herbicide (Table 1). However, chlorsulfuron greatly reduced mid-season plant height and tuber and vine dry weight. Metsulfuron-methyl at the 36 g/ha rate reduced vine dry weight but did not significantly affect tuber growth. Final yields were reduced with all herbicide treatments except the lowest rate of metsulfuron--methyl (Table 2). Metsulfuron-methyl had no effect on tuber size distribution. Conversely, chlorsulfuron reduced the percentage of U.S. #1 potatoes (>113 g) and greatly increased the proportion of malformed tubers. A typical malformation caused by chlorsulfuron was a crease or folded pattern at either end of the tuber.

(University of Idaho Research & Extension Center, Aberdeen, ID 83210)

Table 1. Influence of chlorsulfuron and metsulfuron-methyl residue on potato stand, height and dry matter production, evaluated 63 days after planting.

Treatment	Rate	Hills	Stems	Plant height	Tuber dry weight	Vine dry weight
	g/ha	no/m^2	no/m^2	cm	kg/ha	kg/ha
Control	0	3.9	13.4	35.7	374	1215
Metsulfuron-methyl	9	3.9	14.8	33.3	386	1069
	18	3.7	12.8	29.4	423	1039
	36	3.6	12.6	29.7	278	836
Chlorsulfuron	18	3.7	14.6	24.6	238	561
	36	3.7	14.1	17.9	180	425
	72	3.8	14.2	14.1	74	251
LSD $_{0.05}$		0.4	2.5	4.5	110	221

Table 2. Potato tuber yield and size distribution relative to total yield as influenced by chlorsulfuron and metsulfuron-methyl soil residue.

Treatment	Rate	Yield	<113 g	113-283 g	>283 g	Malformed
	g/ha	t/ha	%			
Control	0	34.4	24.1	60.0	6.8	9.1
Metsulfuron-methyl	9	32.3	28.3	57.1	4.0	10.6
	18	28.7	25.7	57.2	4.4	12.7
	36	27.1	18.7	54.6	10.3	16.4
Chlorsulfuron	18	17.3	32.8	43.7	2.0	21.5
	36	7.9	33.4	31.4	5.4	29.8
	72	3.0	21.2	6.4	0	72.4
LSD$_{0.05}$		4.9	12.5	14.1	5.2	12.9

Chlorsulfuron soil persistence. Zimdahl, R.L., and W.A. Fithian. This study continued and expanded work started in 1981. The objective was to determine the effect of several rates of chlorsulfuron on crops that might be grown after its use. The 1981 study was initiated June 1 at the Botany Research Farm, Ft. Collins, CO. The clay loam soil has 42% sand, 27% silt, 31% clay, 1.9% organic matter, and a pH of 7.5. Chlorsulfuron was applied at 0, 0.125, 0.25, 0.5, or 1.0 ounce ai/A [all rates are in ounces active ingredient (ai) per acre (A)] on June 1 in tillered barley that was 5 to 10 inches tall. The barley was harvested July 24, the plots were rototilled August 6, and an additional post-harvest application of 0.75 ounce ai/A was made to one-half of each plot August 20. In the spring of 1982 two rows of five crops were planted in each plot with a Planter Jr. one-row seeder (Table 1).

The plots were rototilled in May 1983 and the same crops were planted on the dates shown (Table 1). Immature dry weight yields were taken in July (Table 1).

Chlorsulfuron was applied to other plots at 0.031, 0.063, 0.125, 0.25, 0.5, or 1.0 ounce on October 5, 1982. The experiment had four replications and the crops, planting dates, and harvesting procedures described above were used in the spring of 1983 (Table 1). Two 10-foot rows of barley, and 30 plants each of sugarbeet, corn, sunflower, and bean were harvested/plot (Table 1). Dry weight yields from both experiments were analyzed using the LSD.

The crops grown in the experiment initiated in 1981 show the effect of chlorsulfuron approximately 2 years after application. These effects can be compared to the experiment initiated in 1982 wherein chlorsulfuron was resident in the soil for only 7 months prior to planting. The results of both studies will be compared to those obtained from the 1982 harvest of the study initiated in 1981 (data not included).

Barley. In 1982 one-month old barley was not affected by chlorsulfuron applied in June of 1981. When barley was replanted on the same plots in 1983, with no additional herbicide, chlorsulfuron had no effect on its growth. However, the 1.0 ounce rate decreased barley dry weight when it was applied in 1982, 7 months prior to planting barley (Table 3).

Dry Beans. No rate of chlorsulfuron affected dry beans planted 2 years after application (Table 2). Only 1.0 ounce of chlorsulfuron affected dry bean weight in the 1982 study (Table 3).

Corn. Corn is very susceptible to chlorsulfuron. Even after two years, all rates affected dry weight when the herbicide was applied in 1981 (Table 2). When applied in 1982 chlorsulfuron also reduced corn dry weight but only at 1.0 ounce.

Sunflowers. Only the highest rates affected sunflowers planted in the 1981 study and this effect was not consistent. One ounce applied alone in June 1981 did not affect dry weight whereas 0.25 ounce applied in June followed by 0.75 ounce in August did. Thus, the two warm summer months for degradation during 1981 were important. The next highest rate (0.50 + 0.75) did not decrease weight although the trend is obvious. The highest rate (total 1.75 ounce) did decrease weight (Table 2). The 1982 study showed that rates of 0.25 ounce or higher decreased weight (Table 3).

Sugarbeet. Chlorsulfuron continued to have a devastating effect on sugarbeet two years after application (Table 2). All rates except 0.125

ounce reduced weight and the highest rates eliminated all growth. In the 1982 study the highest three rates were very harmful but 0.125 ounce was not (Table 3) and this is not in agreement with the 1982 results of the 1981 study where all rates, including 0.125 ounce, eliminated all growth.

Chlorsulfuron. The low rates (0.031 and 0.063) did not affect any crop. Barley or beans can be grown successfully two years after rates as high as 1.0 ounce. There is a reduction in barley height from 0.25 and 0.5 ounce 7 months after application but only 1.0 ounce reduced dry weight yield of barley or beans. The corn results from the two studies do not agree. Only 1.0 ounce affected corn dry weight in the 1982 study. However, rates as low as 0.25 ounce reduced corn dry weight in the 1981 study where the residue had been present for 25 months as opposed to 7 for the 1982 study. The total rainfall for 25 months was 41.7 inches with 17.5 falling between June 1, 1981 and July 1, 1982 and 24.2 falling from July 1, 1982 to July 1, 1983. The difference of 6.7 inches would account for the 1982 results. However, this rain also fell on the 1981 study so the contradictory results cannot be attributed to rainfall or to irrigation which were the same for both plots.

Sunflowers should not be grown when rates as low as 0.25 ounce are applied the preceding fall. Only the highest rates of the split application affected their growth after 25 months. These rates are well above recommended use rates and therefore we conclude that a two-year period is a safe period for sunflowers after application of expected field use rates.

There is some disagreement between the two studies about a safe rate for sugarbeets. Our data are sufficient to conclude that sugarbeets should not be planted for up to two years after the expected use rates are applied.
(Weed Research Laboratory, Colorado State University, Fort Collins, CO 80523)

Table 1
Crops in chlorsulfuron soil persistence study
in 1982 and 1983 and planting and harvest in 1983.

Crop	Variety	Planting date	Harvest date
		(1983)	(1983)
Barley	Moravian 3	May 3	July 11 & 13
Sugarbeet	Mono-Hy A4	May 4	July 7
Dry Bean	Olathe	May 24	July 7
Corn	Northrup King PX-39	May 25	July 7
Sunflower	Small Black Poultry	May 26	July 7

Table 2
The effect of chlorsulfuron on the dry weight of succeeding crops - 1981 study.

Application time	Rate	Dry weight				
		Barley	Corn	Dry beans	Sun-flowers	Sugar-beet
	(ounce ai/A)	(% of check)				
June 1, 1981						
	0.125	90	75	106	89	136
	0.25	79	23	70	81	41
	0.50	80	33	71	70	27
	1.0	89	23	100	70	12
	0	100	100	100	100	100
LSD @ 0.05%		50.8	21.7	73.0	47.3	23.3
August 20, 1981						
	0.125* + 0.75	103.8	47	144	68	26
	0.25 * + 0.75	92.2	51	74	21	0
	0.50 * + 0.75	82.0	8	88	48	0
	1.0 * + 0.75	90.3	5	108	18	0
	0	100.0	100	100	100	100
LSD @ 0.05%		43.1	22.0	69.3	64.0	28.2

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[*] These amounts had been applied in June and only the additional 0.75 ounce ai/A was applied in August.

Table 3
The effect of chlorsulfuron on the
dry weight of succeeding crops - 1982 study.

Rate of Chlorsulfuron	Dry weight				
	Barley	Corn	Dry beans	Sunflower	Sugarbeet
(ounce ai/A)	- - - - - - - - -	(% of check)	- - - - - -		
0.031	93	134	59	115	100
0.063	101	120	102	94	68
0.125	109	134	113	84	58
0.25	97	114	140	6	4
0.50	78	56	80	4	42
1.0	56	13	22	2	0
Check	100	100	100	100	100
LSD @ 0.05%	24.3	59.6	49.1	26.0	53.7

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This table was compiled from approved nomenclature adopted by the Weed Science Society of America (Weed Science 26 (6):1978) and the Herbicide handbook of the WSSA (5th edition). "Page" refers to the page where a report about the herbicide begins; actual mention may be on a following page. A herbicide name occupying two or more lines and separated by an equal (=) sign is written as one word when written on one line.

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ABBREVIATIONS USED IN THIS REPORT

A(c)	acre(s)
a.e.	acid equivalent
a.i.	active ingredient
bu	bushel(s)
C	degrees Centigrade
CEC	cation exchange capacity
cm	centimeter(s)
cm^2	square centimeter(s)
CO_2	Carbon dioxide
DF	dry flowable
E(c)	emulsifiable concentrate
F	degrees Fahrenheit
F(l)	flowable
ft	foot (feet)
ft^2	square foot (feet)
g(m)	gram(s)
gal	gallon(s)
gpa	gallons per acre
h	hour(s)
ha	hectare(s)
ht	height
i.e.	that is
kg	kilogram
km	kilometer
kPa	kilo Pascal
l	liter(s)
lb(s)	pound(s)
LSD	least significant difference
m	meter(s)
m^2	aquare meter
ME	microencapsulated
Meg	milliequivalent
mm	millimeter(s)
N	nitrogen
no	number
o.m.	organic matter content
oz	ounce(s)
P	pellet
PES	preemergence surface applied
PoPI	post plant incorporated
Post	postemergence
PPl	preplant incorporated
psi	pounds per square inch
qt	quart(s)
S	south
sp	soluble powder
sq	square
t	metric ton
temp	temperature
v/v	volume by volume basis

ABBREVIATIONS USED IN THIS REPORT (Cont'd.)

W(P)	wettable powder
WA	wetting agent
X	standard level
@	at
$>$	greater than
$\geq$	greater than or equal to
%	percent
+	plus