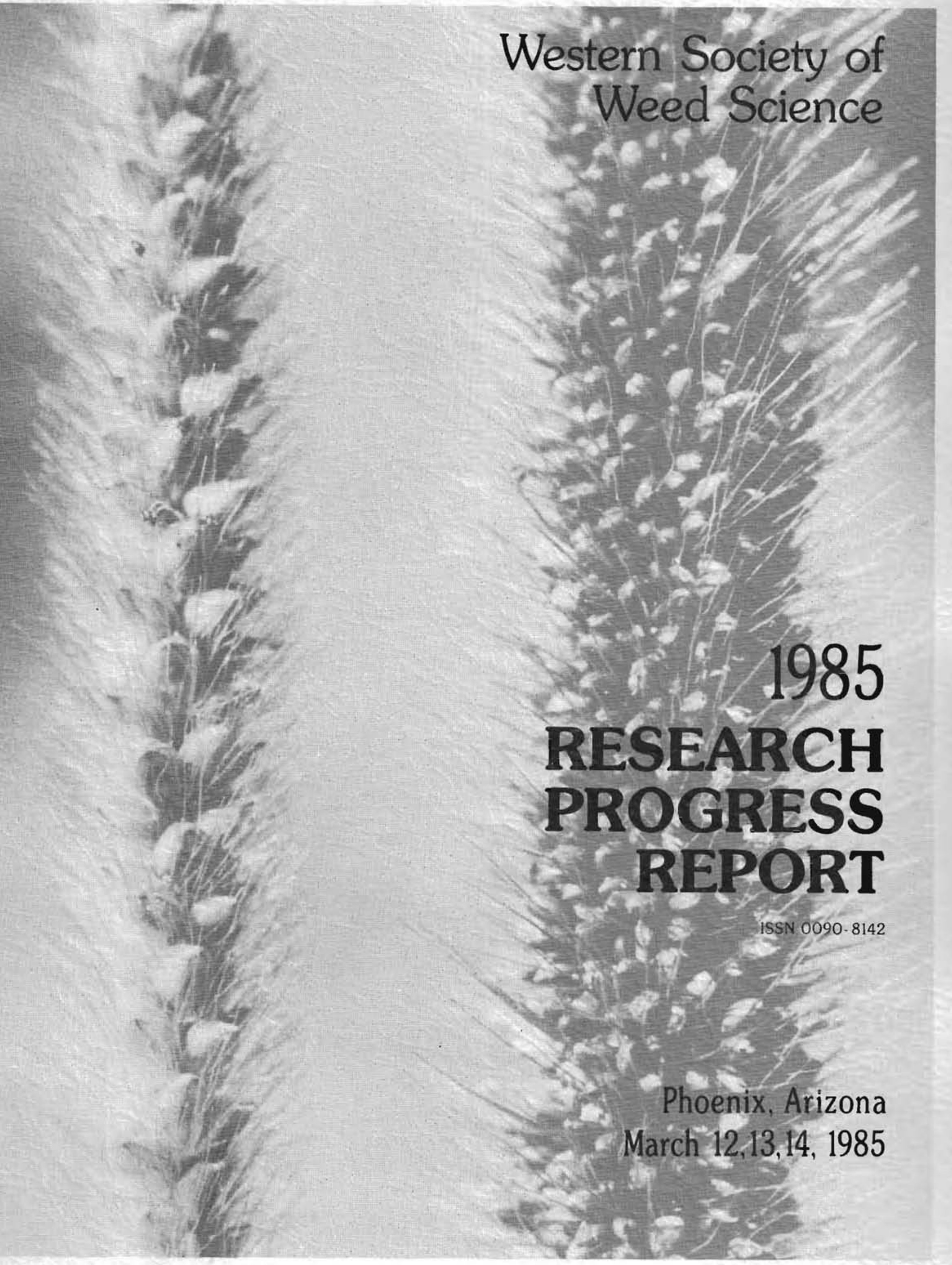

Western Society of Weed Science

1985 RESEARCH PROGRESS REPORT

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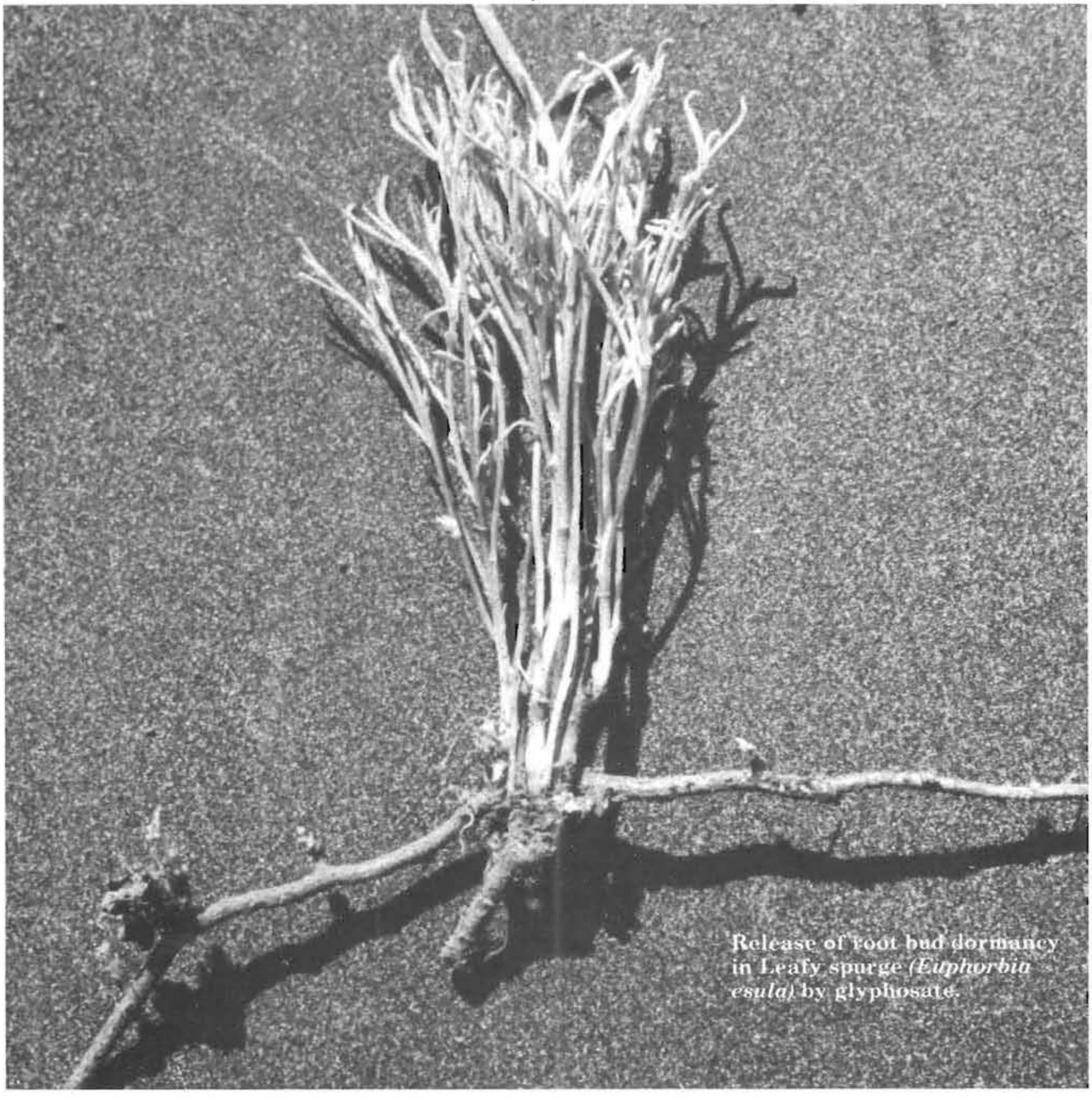

Phoenix, Arizona March 12, 13, 14, 1985

FOREWORD

The Western Society of Weed Science 1985 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 In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION.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 1985 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 (7) project chairmen. Final responsibility of putting the indices and reports together belongs to the research section chairman, who appeals for indulgence to 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.

Charles E. Stanger
Chairman, Research Section
Western Society of Weed Science
1985

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PROJECT 1.

PERENNIAL HERBACEOUS WEEDS

Lloyd C. Haderlie - Project Chairman

A preliminary comparison of field bindweed and wild oat response to varying formulations of glyphosate and sulphosate. Evans, J.O. and R.W. Gunnell. The intent of this study was to compare levels of response of wild oat and field bindweed treated with both formulated and technical grade glyphosate, and formulated and technical grade sulphosate. The plot site was a field which had been prepared for spring planting, but was later abandoned due to excessive springtime precipitation. Plot size was 2.7m by 6.1m with 3 replications in a randomized block design. Treatments were applied August 1, 1984 with a backpack sprayer set to deliver 94 l/ha at 30 psi. At application wild oats were in the early milk stage with an average height of 60 cm and a population of 26 per square meter. Field bindweed was in the early flower stage and varied from 60% to 90% ground cover throughout the plot area. Treatments were evaluated for weed injury August 9, 1984 and August 30, 1984. Evaluations were made on a visual percent injury basis. Results showed that equivalent rates of both formulated and technical glyphosate and formulated and technical sulphosate caused similar degrees of injury to field bindweed and wild oat. By August 30, wild oats were controlled 100% in all treatments, and field bindweed injury was greatest in the 2.24 kg/ha technical sulphosate and technical glyphosate treatments. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

Field bindweed and wild oat response to formulated and technical glyphosate and sulphosate.

		Percent control			
	Rate	field bindweed		wild oat	
Treatment	(kg/ha)	8-9-84	8-30-84	8-9-84	8-30-84
sulphosate (form)	.56	60	57	92	100
sulphosate (form)	1.12	80	70	98	100
sulphosate (form)	2.24	78	73	97	100
sulphosate (tech)	1.12	72	70	93	100
sulphosate (tech)	2.24	77	87	95	100
glyphosate (form)	.56	63	55	93	100
glyphosate (form)	1.12	78	67	97	100
glyphosate (form)	2.24	80	73	98	100
glyphosate (tech)	1.12	60	65	90	100
glyphosate (tech)	2.24	70	82	93	100
check	-	0	0	0	0

Field bindweed, Canada thistle and common mallow control in non-crop areas. Dewey, S.A. and P.W. Foote. A study conducted near Twin Falls on waste ground infested with field bindweed, Canada thistle and common mallow. Five herbicides were tested for their initial and long-term weed control. All treatments were applied July 11, 1983 in a randomized complete block design replicated 3 times. Application was made with a CO_2 backpack sprayer calibrated to deliver 20 gal/A.

On August 4, 1983 all treatments except DPX 6376 resulted in 95 to 100% control of top-growth. DPX 6376 plots were still green. On September 16 plants treated with DPX 6376 were chlorotic and growth appeared arrested. Thistle and bindweed regrowth was beginning to appear by September 16 in plots treated with 2,4-D or 2,4-D + tryclopyr. Evaluation on June 6, 1984 showed glyphosate to provide the highest level of Canada thistle and bindweed control. Dicamba and DPX 6376 provided the most effective control of mallow. Glyphosate did not control common mallow. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Field Bindweed, Canada Thistle and Common Mallow Control in Non-Crop Areas

Treatment	Rate (ai/A)	% Weed Control[1] (9/16/83)		% Weed Control[1] (6/6/84)		
		Cath	Fibw	Cath	Fibw	Coma
triclopyr + + 2,4-D	0.63 lb+ 1.25 lb	87	83	13	12	8
2,4-D	2.5 lb	85	70	7	8	5
dicamba	1.5 lb	94	99	10	58	93
glyphosate	2.5 lb	99	97	75	86	0
DPX 6376	0.5 oz	93	87	40	17	90
Check	-	-	-	-	-	-
LSD (0.05)		9.4	6.4	13.2	17.1	13.1

1/ Cath = Canada thistle, Fibw = field bindweed, Coma = common mallow

Yellow toadflax control and grass injury on rangeland. Dewey, S.A. and P.W. Foote. A study conducted on rangeland near Soda Springs, to evaluate efficiacy of five herbicides on yellow toadflax, and phytotoxicity to range grasses. All treatments were applied on June 15, 1983 with a CO_2 backpack sprayer calibrated to deliver 20 gal/A. A randomized complete block design replicated three times was used with individual plots dimensions of 10 x 30 ft. At the time of application toadflax and mountain bromegrass (*Bromus marginatus*) plants were 2 to 8 inches tall. The trial was grazed in 1983 and 1984.

Evaluation of weed control 2 months after treatment indicated excellent toadflax control from chlorsulfuron and DPX-6376. Other materials tested did not provide satisfactory control at this earliest evaluation date. Two months after application all materials but 2,4-D had caused noticeable grass injury, primarily in the form of stand thinning. Metasulfuron-methyl caused the most severe injury. Fourteen months after application (8-9-84) grass injury was insignificant for all treatments except metasulfuron-methyl. Weed control from all treatments had diminished after 14 months, but the sulfonated-urea compounds still provided much higher levels of toadflax control than were obtained with 2,4-D or tryclopyr. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Yellow Toadflax Control and Grass Injury on Rangeland

Treatments[1]	Rate ai/A	% Toadflax Control 8-16-83	% Toadflax Control 8-9-84	% Grass Injury[2] 8-16-83	% Grass Injury[2] 8-9-84
metasulfuron-methyl	2 oz	67	73	85	96
chlorsulfuron	2 oz	100	69	22	4
DPX-6376	1.87 oz	100	73	47	9
2,4-D	2.0 lb	22	7	0	1
triclopyr	3.0 lb	65	15	22	7
Check	-	-	-	-	-
LSD (0.05)		10.61	34.30	7.89	9.28

1/ All treatments include .5% v/v of X77 surfactant

2/ *Bromus marginatus*

Two-year yellow toadflax control study on rangeland. Dewey, S.A. and P.W. Foote. An experiment was conducted near Soda Springs to evaluate the long-term efficacy of several herbicides on yellow toadflax, and phytotoxicity to range grasses. Treatments were applied August 9, 1982 in a randomized complete block design replicated twice. Treatments were applied at 30 psi to 10 x 60 ft plots with a CO_2 backpack sprayer calibrated to deliver 20 gal/A. Toadflax plants were in full bloom and grass was 18 to 24 inches tall at time of treatment. The area was grazed in 1983 and 1984.

All treatments except amitrole and amitrole + 2,4-D ester appeared to provide very good control when evaluated early the following year (6-14-83). However, 12 months after treatment toadflax control had diminished considerably. By the third evaluation date (twenty-four months after treatment) only picloram and glyphosate demonstrated any degree of control. Glyphosate was the most effective treatment tested for single-application long-term control of yellow toadflax, but injury to desirable grasses (primarily mountain brome, Bromus marginatus) was unacceptable. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Yellow Toadflax Control and Bromegrass Injury on Rangeland

Treatments[1]	Rate lb ai/A	% Toadflax Control			% Grass Stand Reduction[2]		
		6-14-83	8-16-83	8-9-84	6-14-83	8-16-83	8-9-84
2,4-D ester	2.0	97	68	0	0	0	0
dicamba	2.0	91	68	0	0	0	0
2,4,5-T	2.0	91	63	0	0	0	0
triclopyr	4.0	95	70	5	0	5	0
picloram	2.0	96	82	23	62	33	5
glyphosate	2.0	99	85	78	100	100	99
amitrole	1.0	68	65	0	11	5	0
amitrole + 2,4-D ester	.25+1.5	84	63	0	0	5	5
Check	-	-	-	-	-	-	-
LSD (0.05)		15.91	NS	6.33	1.79	11.36	8.96

1/ All treatments include .5% v/v of X77 surfactant

2/ Mountain brome (*Bromus marginatus*)

Canada thistle control in spring wheat. Morishita, D.W., D.C. Thill, and R.H. Callihan. The control of Canada thistle (CIRAR) in irrigated spring wheat (var. 721) was investigated. Three experimental herbicides and three standard herbicides were applied alone and in combination. The experiment was designed as a randomized complete block with four replications. Plots were 10 by 25 ft. Soil type was a silt loam containing 1.9% organic matter and a soil pH and CEC of 7.8 and 11.3 meq/100 g soil, respectively. All herbicide treatments were applied June 11, 1984, when the Canada thistle was in the 1 to 3 in diameter rosette stage. Environmental conditions at the time of application were as follows; air temperature 50 F, soil teperature at the 2 in depth 56 F, relative humidity 86%, and 50% cloud cover. All herbicides were applied with a CO_2 pressurized bicycle sprayer at 20 gpa. Visual evaluations were taken July 19, 1984, and the crop was harvested September 7, 1984, with a small plot combine.

XRM-3785 applied at 0.31 and XRM-3972 at 0.13 lb/A and the tank mixture of XRM-3972 + MCPA at 0.06 + 0.25 lb/A resulted in 91, 89, and 91% control of Canada thistle, respectively. All herbicide treatments except DPX-M6316 applied alone yielded higher than the checks. Although several herbicide treatments, such as 2,4-D and MCPA, only suppressed Canada thistle growth, winter wheat yields were still greater than the checks. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Formulations of herbicides used

Herbicide	Formulation
bromoxynil	4 EC
DPX-M6316	75 DF
MCPA	2 WS
XRM-3785	2.5 EC
XRM-3972	3 EC
2,4-D	4 WS

Canada thistle control and yield of spring wheat.

Treatment	Rate	Crop injury	CIRAR control	Yield
	(lb ai/A)	----(%)-----		(bu/A)
check	-	-	-	64
XRM-3785	0.31	0	91	89
XRM-3785	0.47	0	71	98
XRM-3972	0.06	0	81	86
XRM-3972	0.13	0	89	92
MCPA	0.5	0	55	85
MCPA	1.0	0	39	92
2,4-D	0.5	0	38	81
2,4-D	1.0	0	54	94
DPX-M6316[1]	0.75 oz	0	30	70
DPX-M6316[1]	1.5 oz	0	19	60
DPX-M6316[1]	3.0 oz	0	26	63
XRM-3972 + DPX-M6316[1]	0.06+0.75 oz	0	64	81
XRM-3972 + DPX-M6316[1]	0.06+1.50 oz	0	54	83
XRM-3972 + DPX-M6316[1]	0.13+0.75 oz	0	70	86
XRM-3792 + DPX-M6316[1]	0.13+1.50 oz	0	81	84
XRM-3972 + MCPA	0.06+0.25	0	91	91
XRM-3972 + MCPA	0.06+0.04	0	66	94
XRM-3785 + bromoxynil	0.31+0.38	0	58	88
check	-	-	-	60
LSD (0.05)		NS	30	21

[1]0.5% v/v nonionic surfactant

Effects of herbicide treatments on field bindweed control. Flom, D. G., D. C. Thill, and R. H. Callihan. A field study was initiated near Moscow, Idaho to evaluate the effectiveness of post harvest applied herbicides on field bindweed control. Herbicide treatments were applied to field bindweed growing in 18 to 20 inch-tall, current year, winter wheat stubble on September 29, 1983. All herbicides were applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 35 psi and 3 mph. Environmental conditions when the treatments were applied were: air temperature 54 F, soil temperature 50 F at three inches, and relative humidity 45%. The experiment was a randomized complete block design with four replications and individual plots of 10 by 30 feet. Field bindweed was evaluated for vegetative top growth control on July 20, 1984. Treatments resulting in better than 80% control were dicamba at 0.5 lb ae/A + glyphosate or SC-0224 (sulfosate) at 1.5 lb ae/A, and triclopyr + SC-0224 at 1.0 + 1.5 lb ae/A. All plots were chopped and disced twice after the initial evaluation. A second evaluation and a field bindweed stand count were conducted on Septemper 19, 1984, to evaluate regrowth. Control was still better than 50% in all treatments except dicamba at 2.0 lb ae/A, triclopyr with or without X-77 at 1.0 lb ae/A, XRM-4660 at 1.5 lb ae/A, and 2,4-D-LVE at 3.0 lb ae/A. Field bindweed seedling number was reduced by all treatments except triclopyr at 1.0 lb ae/A, XRM-4660 at 1.5 lb ae/A, and 2,4-D-LVE at 3.0 lb ae/A. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Field bindweed control at Moscow, Idaho

Treatment[1] [4]	Rate	Control Early[2]	Control Late[3]	Bindweed stand count[3]
	(lb ae/A)	------%-------		(#/ft^2)
check	---	--	--	7
dicamba (4DMA)	2.0	58	20	4
dicamba +	0.5			
glyphosate (3WS)	1.5	87	53	3
glyphosate	3.0	71	59	3
dicamba +	0.5			
SC-0224 (2.8WS)	1.5	81	53	2
SC-0224	3.0	76	68	6
triclopyr (4EC)	1.0	28	6	5
triclopyr (3A)	1.0	4	5	4
triclopyr (4EC) +	1.0			
glyphosate	1.5	65	50	3
triclopyr (4EC) +	1.0			
SC-0224	1.5	84	61	2
XRM-4660 (1.5EC)	1.5	19	3	6
2,4-D-LVE (4EC)	3.0	3	5	6
LSD (0.05)	---	30	25	2.2

[1]herbicide treatments applied September 29, 1983
[2]early control evaluations were made on July 20, 1984
[3]late control and stand counts were made on September 19, 1984
[4]a nonionic surfactant (X-77) added at 0.5% v/v except for dicamba at 2.0 lb ae/A, triclopyr (3A), XRM-4660, and 2,4-D-LVE

Leafy spurge control with picloram using several pipe-wick applicator designs. Lym, R. G. and C. G. Messersmith. Leafy spurge control with picloram was evaluated using three designs of a pipe-wick applicator. The pipe-wick consisted of 0.75-inch PVC pipe with 0.12-inch holes drilled every 2 inches and covered by 0.5-inch poly-foam overlayed with canvas. The wicking material was wrapped around 75% of the pipe circumference and attached to the PVC pipe with contact cement. Liquid in the storage tank flowed into the wick with flow rate dependent on weed density. The design consisted of 1) two 6-ft bars, 1 ft apart, rectangular shaped (2-bar applicator); 2) three 6-ft bars 1 ft apart, rectangular shaped (3-bar applicator); and 3) two 6-ft bars 1 ft apart with three interconnecting diagonal bars so each leafy spurge stem was treated by the front, diagonal and rear bar (diagonal applicator). The picloram concentration in the wick was 0.5 lb/gal. Herbicide was applied using the wicks either with one pass or two passes; the second pass was in the opposite direction to the first pass. The experiment was established on 10 August 1981 in a pasture near Sheldon, ND when the leafy spurge was 16 to 32 inches tall and most seed was mature. The weather was 82 F, 70% relative humidity and the soil was dry and 89 F at 1 inch. The plots were 10 by 30 ft in a randomized complete block design. Evaluations were based on percent stand reduction as compared to the control.

Application	No. passes	Picloram concentration	1982		1983		1984	
			June	August	June	August	June	August
		(lb/gal)	(% control)					
2-Bar	1	0.5	77	36	48	17	14	11
2-Bar	2	0.5	88	77	76	55	36	35
3-Bar	1	0.5	75	15	30	11	8	6
3-Bar	2	0.5	92	80	86	57	46	36
Diagonal	1	0.5	71	56	52	45	14	13
Diagonal	2	0.5	100	99	97	84	73	72
LSD (0.05)			21	25	25	30	33	27

Picloram applied using two passes resulted in better leafy spurge control than a single pass regardless of applicator type. Picloram application with the diagonal wick resulted in better leafy spurge control than with either the 2-bar or 3-bar rectangular design, while the 2-bar and 3-bar designs provided similar leafy spurge control. Picloram applied with two passes of the diagonal wick provided 99, 84 and 72% leafy spurge control after 1, 2 and 3 years, respectively, which is similar to picloram broadcast at 2.0 lb/A despite using less chemical. Wick application of picloram is an inexpensive alternative to obtain leafy spurge control comparable to picloram at 2 lb/A spray applied even when two passes with the wick are required to maintain long term control. (Cooperative investigation Dep. of Agronomy and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

<u>Leafy spurge control with resulting forage production from several herbicide treatments</u>. Lym, R. G. and C. G. Messersmith. An experiment to evaluate long term leafy spurge control and forage production was established at two sites in North Dakota in 1983. The predominate grasses were bluegrass (*Poa*. spp.) with occasional crested wheatgrass, smooth brome, big bluestem or other native grasses. The treatments were selected based on previous research conducted at North Dakota State University and included 2,4-D at 2.0 lb/A, picloram plus 2,4-D at 0.25 plus 1.0 lb/A, picloram at 2.0 lb/A and dicamba at 8.0 lb/A and were applied in August 1983 or June 1984 as spring or fall treatments. The 2,4-D at 2.0 lb/A and picloram plus 2,4-D treatments will be applied annually while the picloram alone and dicamba treatments will be reapplied when leafy spurge control declines to 70% or less. The plots were 15 by 50 ft with four replications in a randomized complete block design at each site. Forage yields were obtained by harvesting a 4 by 25 ft section with a rotary mower in July 1984. Sub-samples were taken by hand along each harvested strip and separated into leafy spurge and forage so the weight of each component in the mowed sample could be calculated. The samples were oven dried and are reported with 12% moisture content. Economic return was estimated by converting forage production to animal unit days (AUD) and then to pounds of beef at $0.60/lb minus the cost of the herbicide and estimated application cost, i.e. 2,4-D = $2.00/lb ai, dicamba = $11.75/lb ai, picloram = $40.00/lb ai, and application = $2.05/A.

			Valley City								Dickinson					
			Control		Yield				Control		Yield			
Treatment	Rate	Cost	June	Aug	Forage	Leafy spurge	Utilization	Net return	June	Sept	Forage	Leafy spurge	Utilization	Net return
	(lb/A)	($/A)	--(%)--		---(lb/A)---		(AUD)	($/A)	---(%)---		---(lb/A)--		(AUD)	$/A
Applied August 1983														
2,4-D	2.0	6.05	0	6	631	1282	16	3.55	5	32	434	189	11	0.55
Picloram	0.25+1.0	14.05	40	2	955	1184	23	- 0.25	20	14	343	236	9	- 8.65
Picloram	2.0	82.05	99	83	1928	0	48	-53.25	96	56	414	0	10	-76.05
Dicamba	8.0	96.05	82	21	1406	605	35	-75.05	95	15	293	28	7	-91.85
Applied June 1984														
2,4-D	2.0	6.05	...	0	820	1228	21	6.55	...	8	246	57	6	- 2.45
Picloram	0.25+1.0	14.05	...	28	1103	1015	28	2.75	...	51	385	11	10	- 8.05
Picloram	2.0	82.05	...	99	938	1228	24	-67.65	...	100	270	36	7	-77.85
Dicamba	8.0	96.05	...	91	832	1080	21	-83.45	...	67	226	24	6	-92.05
Control	...	0	...	0	745	1666	0[a]		...	0	253	321	0[a]	
LSD (0.05)			16	17	477	443			12	29	218	93		

[a] Estimated zero utilization by cattle in heavily infested areas of leafy spurge, based on data from study in progress.

Picloram at 2.0 lb/A and dicamba at 8.0 lb/A provided the highest average leafy spurge control at 98 and 89%, respectively, as fall applications and 99 and 79%, respectively, as spring applications. Picloram + 2,4-D at 0.25 + 1.0 lb/A provided low initial leafy spurge control, but previous research at North Dakota State University has shown that annual application of this treatment for 3 to 5 years will give 70 to 80% leafy spurge control and maximum forage production. 2,4-D controlled leafy spurge topgrowth only for 2 to 3 months.

Total production at Dickinson averaged 574 lb/A compared to 2411 lb/A at Valley City. The difference was probably due to below normal annual precipitation at Dickinson while precipitation was near normal at Valley City. Fall applied 2,4-D at 2.0 lb/A was the only treatment to provide a positive economic return at Dickinson, despite good leafy spurge control by all other treatments. Fall applied picloram at 2.0 and dicamba at 8.0 lb/A resulted in 1928 and 1406 lb/A forage production, respectively, at Valley City but were uneconomical treatments after one year because of the high initial cost. Much leafy spurge topgrowth remained and forage production was unaffected by spring applied treatments at Valley City. 2,4-D at 2.0 lb/A resulted in positive economic return at Valley City despite only a slight reduction in leafy spurge growth. 2,4-D will control leafy spurge topgrowth long enough to allow cattle to graze the treated area but does not reduce the infestation. Herbicides that provided good leafy spurge control generally were not cost effective and less expensive annual treatments gave low leafy spurge control the first year of the study. (Cooperative investigation Dep. of Agronomy and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

Leafy spurge control in wooded areas with various herbicides. Lym, R. G. and C. G. Messersmith. Leafy spurge is a major problem in wooded areas, shelterbelts, and around homes. The purpose of these experiments was to evaluate the controlled droplet applicator (CDA) and compressed air (Hudson single nozzle hand pumped model) sprayer for application of picloram, dicamba and glyphosate to leafy spurge growing under trees. Also, dichlobenil 10%G was applied at one site as a preemergence treatment for leafy spurge control.

The experiments were established at Mandan, ND in a tree grove, at Walcott, ND in a wind break, and in a wooded area of the Sheyenne National Grasslands near McLeod, ND. The trees were Populus spp. (cottonwood and aspen) and ranged from 6 to 16 inches in diameter with some saplings intermixed. The demonstration at Mandan was established on 26 August 1981 under a partly cloudy sky, 70 F and 96% relative humidity. The plot size was 25 by 50 ft and unreplicated. The demonstration at Walcott was established on 17 September 1981 under a partly cloudy sky, 70 F and 35% relative humidity, except the dichlobenil treatments were applied on 24 November 1981 under a cloudy sky, 32 F and 87% relative humidity. The plots were 20 by 50 ft and unreplicated. All glyphosate treated plots received two 2,4-D dimethylamine retreatments in the summer of 1982 using the CDA with a solution concentration of 0.8 lb/gal. The experiment at the Sheyenne National Grasslands was established on 21 September 1982 under a clear sky, 69 F, and 42% relative humidity and the soil was moist. The plots were 25 by 50 ft and replicated four times in a randomized complete block design. The treatments using the CDA and compressed air sprayers were applied with single coverage at walking speed, except some overlap occurred as the applicator tried to prevent skipped areas while walking around trees. The solution concentration was adjusted to apply approximately the same herbicide rate per acre with each applicator and was higher for CDA than compressed air application, since the CDA uses much less volume per treated area.

Leafy spurge control with glyphosate ranged from 80 to 99% at Mandan two years after application using either applicator (Table 1). However, control had declined to 15 to 70% at Walcott by August 1983. The Walcott site had some standing water until late July 1983 due to high precipitation in the area, which may have enhanced leafy spurge reestablishment. Picloram at 0.25 and 0.5 lb/gal at Mandan and at 0.25 lb/gal at Walcott gave 80% leafy spurge control two years after application. Saplings which showed herbicide injury in 1982 at Mandan had recovered by 1983. Picloram at 0.5 lb/gal applied at Walcott gave 95% leafy spurge control and was the only satisfactory treatment applied with the compressed air sprayer after 24 months. Picloram plus 2,4-D applied with the CDA at 0.17 + 0.33 lb/gal gave 84 and 70% leafy spurge control in 1983 and 1984, respectively, but ranged from 0 to 30% control when applied with the compressed air sprayer at 0.03 + 0.12 to 0.03 + 0.24 lb/gal. Dichlobenil did not provide satisfactory leafy spurge control.

Leafy spurge control at Mandan and Walcott generally was better than at the Sheyenne National Grasslands. All treatments at the Grasslands provided 92% or better leafy spurge control when evaluated in June 1983 but control declined rapidly thereafter (Table 2). The addition of 2,4-D to picloram did not improve leafy spurge control compared to picloram applied alone. No tree injury resulted from any treatment in these experiments. (Cooperative investigation Dep. of Agron. and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

Table 1. Leafy spurge control by various herbicides applied with the controlled droplet and compressed air applicators under trees - Walcott and Mandan, ND.

			Control							
		Herbicide concen-	Mandan				Walcott			
Application	Herbicide	tration	6-82	9-82	6-83	9-83	6-82	9-82	8-83	10-84
		(lb/gal)	(%)							
CDA	Glyphosate	1.5	100	90	83	80	95	78	70	45
	Glyphosate	0.75/1.0	95	100	95	90	85	50	20	0
	Picloram	0.5	100	85	80	80	98	65	30	10
	Picloram	0.25	90	70	82	80	92	90	80	50
	Dicamba	1.0	90	70	82	80	98	0	0	0
	Pic+2,4-D	0.17+0.33	90	70	82	80	99	100	84	70
Compressed air	Glyphosate	0.38	100	100	93	90	92	95	15	0
	Glyphosate	0.2	99	90	98	99	85	60	30	0
	Picloram	0.03	70	40	58	20	75	0	0	0
	Picloram	0.06	98	100	80	30	100	100	95	50
	Dicamba	0.12	98	100	80	30	97	95	60	20
	Pic+2,4-D	0.03+0.12	80	40	10	0	90	90	15	0
	Pic+2,4-D	0.03+0.24	80	20	30	30	90	90	15	0
Granular	Dichlobenil	4 lb/A	80	20	30	30	20	0	0	0
	Dichlobenil	8 lb/A	80	20	30	30	60	30	0	0

[a] Damage to saplings.

Table 2. Leafy spurge control by various herbicides applied using the CDA at a wooded site in the Sheyenne National Grasslands near McLeod, ND.

		Control			
	Herbicide	1983		1984	
Herbicide	concentration	June	August	June	August
	(lb/gal)	(%)			
Picloram	0.25	92	60	49	48
Picloram	0.5	97	69	56	35
Picloram	0.67	100	77	57	49
Picloram + 2,4-D	0.2+0.4	92	48	28	42
Dicamba	1.33	92	75	60	30
Glyphosate	1.5	93	76	72	43
LSD (0.05)		9	35	38	16

Influence of spray adjuvant and spray volume on quackgrass control with glyphosate. Ball, D. A., S. D. Miller and H. P. Alley. Plots were established at the University of Wyoming Stock Farm, Laramie, Wyoming on July 9, 1984 to evaluate the influence of spray adjuvants and spray volume on quackgrass control with glyphosate. 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 unit calibrated to deliver 10 or 20 gpa both at 40 psi. The soil was classified as a sandy loam (61% sand, 18% silt, 21% clay), with 3.4% organic matter and a 7.8 pH. The quackgrass was in excellent condition 12 to 30 in. in height at the time of treatment.

Visual evaluations of quackgrass control were made 2, 4 and 8 weeks after herbicide application. Quackgrass control with glyphosate at 1.5 lb/A was better than at 0.75 lb/A. Addition of X-77 enhanced quackgrass control more than the addition of Frigate. Spray volume did not influence quackgrass control with glyphosate. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1285.)

Quackgrass control with glyphosate

Treatment[1]	Rate lb ai/A	Spray Volume gpa	Quackgrass Control[2] 2 week	4 week	8 week
			- - - - - -	%	- - - - -
glyphosate + Frigate	0.75	10	3	10	13
glyphosate + Frigate	1.5	10	16	20	60
glyphosate + X-77	0.75	10	6	16	46
glyphosate + X-77	1.5	10	36	53	83
glyphosate	0.75	10	6	10	30
glyphosate	1.5	10	10	20	30
glyphosate + Frigate	0.75	20	6	10	13
glyphosate + Frigate	1.5	20	10	16	53
glyphosate + X-77	0.75	20	13	13	30
glyphosate + X-77	1.5	20	26	43	83
glyphosate	0.75	20	6	10	16
glyphosate	1.5	20	3	10	43
Check	---	--	0	0	0

[1]Treatments applied July 9, 1984. Frigate and X-77 = 0.5% v/v.
[2]Visual evaluations July 23, August 9 and September 9, 1984.

Field bindweed shoot control resulting from glyphosate, SC-0224 and combinations with dicamba and 2,4-D. Alley, H. P, M. A. Ferrell and S. D. Miller. A dense stand of field bindweed infesting a previously cropped area was treated with glyphosate, SC-0224 and combinations of the two with dicamba and/or 2,4-D amine or ester formulations to evaluate the efficacy of individual and/or combinations for field bindweed burndown and shoot control. The field bindweed at time of treatment was past bloom and under drought stress. The soil was a sandy loam (76% sand, 9% silt, 15% clay, 13% organic matter with a 7.9 pH). All treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 10 gpa water carrier. Plots were 9 by 30 ft arranged in a randomized complete block.

Evaluations as to field bindweed burndown were made 2 months following treatment and shoot control approximately 1 year following application. Burndown evaluations, showed SC-0224 at comparable rates to glyphosate gave a higher percentage burndown. The addition of dicamba or 2,4-D to either glyphosate or SC-0224 dramatically increased burndown and data indicate dicamba or 2,4-D applied alone would be as effective and more economical for burndown than the combinations. Top growth control evaluations, 1 year following treatment, showed SC-0224 giving a higher percentage shoot control than comparable rates of glyphosate. SC-0224 at rates of 32 to 94 oz product/A resulted in 32 to 67% shoot control as compared to equivalent rates of glyphosate which resulted in 0 to 30% shoot control. The addition of dicamba or 2,4-D amine or ester to SC-0224 or glyphosate, at the rates applied did not increase percentage shoot reduction over the SC-0224 or glyphosate applied alone, as evaluated 1 year following treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1305.)

Field bindweed burndown and shoot control

Treatment	Rate/A	Percent	
		Burndown	Control
glyphosate	32 oz (product)	27	0
glyphosate	62 oz (product)	52	0
glyphosate	96 oz (product)	65	30
SC-0224	32 oz (product)	58	32
SC-0224	64 oz (product)	75	30
SC-0224	96 oz (product)	92	67
glyphosate/2,4-D (PM)[1]	54 oz (product)	99	6
glyphosate/2,4-DA (TM)	16 oz (product) + 0.5 lb	96	0
glyphosate/2,4-DA (TM)	32 oz (product) + 0.67 lb	94	10
glyphosate/2,4-DA (TM)	16 oz (product) + 0.5 lb	94	0
glyphosate/dicamba (TM)	32 oz (product) + 0.5 lb	100	0
SC-0224/dicamba (TM)	32 oz (product) + 0.5 lb	99	10
SC-0224/dicmaba (TM)	48 oz (product) + 0.5 lb	99	6

X-77 added to all treatments at 0.5% v/v.
[1]PM = package mix, TM = tank mix.

Evaluation of fall applications of glyphosate, dicamba, 2,4-D, SC-0224 and various combinations for field bindweed control. Jackson, G. D. and H. P. Alley. Various rates of glyphosate, SC-0224, dicamba, 2,4-D amine and combinations SC-0224/dicamba, glyphosate/dicamba, dicamba/2,4-D amine and glyphosate/2,4-D amine were applied to field bindweed after drybean harvest and 8 days after a freeze to evaluate the efficacy of individual and/or combinations for field bindweed top growth control at the Powell Research and Extension Center, Powell Wyoming. All treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 40 gpa water carrier. The plot area was worked March 5, 1984, the spring following fall application and 2.5 lb ai/A of cyanazine applied for annual weed control in corn. EPTC was used for annual weed control in the drybeans.

Field bindweed control evaluations and corn injury ratings were made on June 18, 1984, approximately 9 months following fall treatments. Field bindweed counts were taken from 60 ft of row, 9 in. wide in each replication. Corn injury ratings were 1 = slight stunting, 2 = severe stunting and stand reduction. Dicamba at rates of 1.0 to 4.0 lb ai/A and combinations of dicamba/SC-0224 and dicamba/2,4-D amine appeared to be the most effective treatments as a fall treatment for reduction in field bindweed top growth. Dicamba applied at 2.0 and 4.0 lb ai/A and the combination of dicamba/SC-0224 caused some early corn injury but by July 20 the crop had fully recovered. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1329.)

Field bindweed top growth control

Treatment[1]	Rate lb ai/A	Weed[2] Counts	Corn[3] Injury
SC-0224	2.0	36.0	
SC-0224	4.0	26.0	
dicamba	0.5	23.0	
dicamba	1.0	4.7	
dicamba	2.0	5.7	1
dicamba	4.0	0.0	2
SC-0224 + dicamba	2.0 + 0.5	0.3	1
SC-0224 + dicamba	2.0 + 1.0	0.7	1
glyphosate	4.0	13.7	
glyphosate + dicamba	2.0 + 0.5	19.3	
glyphosate + dicamba	3.0 + 1.0	9.7	
2,4-D amine	4.0	12.3	
2,4-D amine	10.0	9.3	
2,4-D amine + dicamba	2.0 + 1.0	5.0	
2,4-D amine + glyphosate	1.0 + 1.0	40.3	
2,4-D amine + glyphosate	2.0 + 1.0	14.0	

[1]Herbicides applied September 27, 1983.

[2]Bindweed counts June 18, 1984.

[3]1 = slight stunting; 2 = severe stunting and stand reduction.

Russian knapweed top growth control resulting from various herbicide treatments. Jackson, G. D. and H. P. Alley. The herbicides dicamba, glyphosate, chlorsulfuron and SC-0224 were applied to a dense stand of Russian knapweed growing on an abandoned non-crop site in Park County, Wyoming on June 24, 1983. Russian knapweed was in the late bud stage-of-growth with 12 to 18 in. vegetative growth at time of treatment. All treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 40 gpa water carrier. Plots were 9 by 30 ft with three replications arranged in a randomized complete block.

Visual top growth reduction evaluations were made on June 22, 1983 and June 15, 1984. All herbicide treatments gave immediate and complete top growth burndown as evaluated approximately 1 month following treatment. Only chlorsulfuron applied at 0.125 lb ai/A and dicamba applied at 2.0 and 4.0 lb ai/A resulted in 97 to 100% reduction in top growth. Glyphosate was more effective than an equivalent rate of SC-0224 when evaluated one year following treatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1306.)

Russian knapweed top growth control

Herbicides	Rate lb ai/A	Percent Top Growth Control July 22, 1983	June 15, 1984
SC-0224	0.75	100	17
SC-0224	1.5	100	30
SC-0224	3.0	100	37
glyphosate	3.0	100	63
chlorsulfuron	0.125	100	100
dicamba	2.0	100	97
dicamba	4.0	100	100

Longevity of Russian knapweed top growth control resulting from chlorsulfuron and dicamba. Jackson, G. D. and H. P. Alley. Various rates of chlorsulfuron and dicamba were applied to a dense stand of Russian knapweed growing on an abandoned non-crop site in Park County, Wyoming on June 9, 1982. Russian knapweed was in the early bud-stage with 6 to 12 in. of vegetative growth at time of treatment. All treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 40 gpa water carrier. Plots were 9 by 20 ft with three replications arranged in a randomized complete block.

Visual top growth control evaluations were made on August 1, 1982, June 23, 1983 and June 15, 1984, approximately 2 months, 1 and 2 years following application of the herbicides. All rates of chlorsulfuron and dicamba gave 100% topgrowth control when evaluated 2 months following treatment. Areas treated with chlorsulfuron at less than 0.125 lb ai/A were being reinfested when evaluated 1 and 2 years following treatment. Dicamba applied at 6 lb ai/A maintained 85% top growth reduction for 2 years after treatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1307.)

Longevity of Russian knapweed top growth control

Herbicides	Rate lb ai/A	Percent Control[3]		
		August 1 1982	June 23 1983	June 15 1984
chlorsulfuron	0.031	100	25[2]	15
chlorsulfuron	0.062	100	87[2]	72
chlorsulfuron	0.125	100	100	95
chlorsulfuron	0.25	100	100	100
dicamba	6.0	100	96	85

Russian knapweed shoot control evaluations using dicamba, picloram and dicamba/picloram combinations. M. A. Ferrell and H. P. Alley. Two dicamba formulations, picloram, combinations of dicamba/picloram and dicamba/2,4-D were compared to obtain efficacy data for the control of Russian knapweed. Treatments were applied July 17, 1983 to a dense stand of Russian knapweed with 6 to 30 in. growth, in full bloom. Three replications were used with individual plot size of 9 by 30 ft. A 6-nozzle CO_2 knapsack sprayer calibrated to deliver 40 gpa and a granular applicator were used to apply the chemicals

Visual shoot control evaluations were made July 17, 1984, one year following treatment. Four to six lb ai/A of dicamba 10G or dicamba 4DMA was required to reduce shoot growth 90% or greater. The dicamba/picloram combinations resulted in effective shoot control only when the rate of picloram, in the combination, was 0.5 lb ai/A. Dicamba rates higher than 4.0 lb ai/A caused moderate grass damage. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1308.)

Russian knapweed shoot control

Herbicides	Rate lb ai/A	Percent Shoot Control	Observations
dicamba 10G	6.0	93	moderate grass
dicamba 10G	8.0	100	damage
dicamba 4DMA + X-77[1]	2.0	73	
dicamba 4DMA + X-77	4.0	100	
picloram	0.25	70	
dicamba/picloram + X-77	0.5 + 0.25	70	
dicamba/picloram + X-77	0.5 + 0.5	92	
dicamba/picloram + X-77	1.0 + 0.25	80	
dicamba/picloram + X-77	1.0 + 0.5	98	
dicamba/2,4-DA + X-77	2.0 + 0.5	75	

[1]X-77 added at 0.5% v/v.

Canada thistle shoot control from glyphosate, SC-0224 and combinations with dicamba and 2,4-D. Ferrell, M. A. and H. P. Alley. A dense stand of Canada thistle infesting a pasture site was treated with glyphosate, SC-0224 and combinations of the two with either dicamba and/or 2,4-D amine or ester formulations to evaluate the efficacy of individual and/or combinations for Canada thistle shoot control. The Canada thistle at time of treatment ranged in size from 1 in. rosettes to 3.5 ft tall and past bloom stage-of-growth which made uniform application difficult. The soil was a sandy clay loam (57% sand, 18% silt, 25% clay, 1.7% organic matter with a 7.5 pH). All treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 10 gpa water carrier. Plots were 9 by 20 ft arranged in a randomized complete block.

Shoot control evaluations made one year following treatment showed that no individual treatment and/or combination was highly effective in reducing the stand of Canada thistle. Glyphosate, at the high rate of application, appeared to be more effective than comparable rates of SC-0224. Glyphosate at rates of 64 and 96 oz product/A killed all grass with plots covered with a dense stand of kochia. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1309.)

Canada thistle shoot control

Treatment	Rate/A	Percent Shoot Control
glyphosate	32 oz (product)	13
glyphosate	64 oz (product)	23
glyphosate	96 oz (product	43
SC-0224	32 oz (product)	0
SC-0224	64 oz (product)	20
SC-0224	96 oz (product)	13
glyphosate/2,4-D (PM)[1]	54 oz (product)	0
glyphosate/2,4-DA (TM)	16 oz (product) + 0.5 lb	0
glyphosate/2,4-DA (TM)	32 oz (product) + 0.67 lb	0
glyphosate/2,4-DE (TM)	16 oz (product) + 0.5 lb	0
glyphosate/dicamba (TM)	32 oz (product) + 0.5 lb	0
SC-0224/dicamba (TM)	32 oz (product) + 0.5 lb	0
SC-0224/dicamba (TM)	48 oz (product) + 0.5 lb	0

X-77 added to all treatments at 0.5% v/v.
[1]PM = package mix, TM = tank mix.

Evaluation of spring vs. fall original/retreatment combinations as affecting leafy spurge live shoot regrowth. Ferrell, M. A. and H. P. Alley. This experiment located near Lander, Wyoming was established for accumulation of original/retreatment and fall vs. spring application data. Four successive years of data have been collected since the experiment was established in the spring of 1980.

Original treatments were made May 23, and September 14, 1980. Liquid formulations were applied with a 13 nozzle truck mounted spray unit delivering 25 gpa water carrier. The granular formulations were applied with a hand operated centrifugal granular spreader. Retreatments were made May 29, and September 12, 1981, May 24, and September 24, 1983, and May 29, and September 15, 1983. The retreatments of picloram at 0.5 and 1.0 lb ai/A were terminated with the 1981 treatment. The leafy spurge was in the bud to flower stage-of-growth and 4 to 18 in. in height during the spring retreatments and had shed most of its seed when fall retreatments were made. Plots were 22.5 by 22.5 ft arranged in a split block design with two replications. The soil was a sandy loam (73% sand, 15% silt, and 12% clay) with 1.3% organic matter and pH of 7.6.

The area has been flood irrigated since application of original treatments. There was poor grass cover May, 1980 when plots were established. By September, 1981 grass was 20 to 24 in. in height and still green in treatment areas. Good grass cover has been maintained, in treatment areas, throughout 1982, 1983 and 1984.

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 percent leafy spurge shoot control has decreased in most of the original treatment plots over the four year period. The reduction in shoot control is also apparent since the retreatment of picloram was terminated with the 1981 application. The 2,4-D amine retreatment applied both in the spring and fall (S & F) is more effective than the treatment applied only in the spring or fall. There also appears to be little difference in the effectiveness of the original treatments whether spring or fall applied. There is considerable variation of percent leafy spurge shoot control between treatment and rates of application. This may be an indication of variable leaching due to soil type. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1310.)

Original[1] lb ai/A	Percent Shoot Control[2] — Retreatment lb ai/A[2]: dicamba 4L 2.0			picloram (K salt) 0.5			2,4-D Amine (S & F) 2.0			Check				picloram (K salt) 1.0			2,4-D Amine 2.0		
	'82	'83	'84	'82	'83	'84	'82	'83	'84	'81	'82	'83	'84	'82	'83	'84	'82	'83	'84
(Spring)																			
dicamba 4L 6.0	94	85	89	100	91	85	88	95	93	92	64	29	60	100	99	96	80	70	69
dicamba 4L 8.0	88	90	89	100	95	95	99	100	100	95	81	34	26	99	82	75	90	78	83
dicamba 5G 6.0	89	69	81	100	95	80	87	98	97	92	73	86	34	100	100	87	99	97	83
dicamba 5G 8.0	92	78	92	100	94	93	100	99	94	95	89	75	32	100	89	79	93	94	94
picloram (K salt) 1.0	97	74	93	100	97	85	99	100	96	96	98	80	84	100	77	62	100	96	89
picloram (K salt) 2.0	100	79	96	100	100	96	100	100	100	99	100	91	88	100	75	67	100	94	99
picloram (2% beads) 1.0	98	67	93	100	68	85	93	84	88	93	79	95	74	100	81	18	100	89	89
picloram (2% beads) 2.0	100	69	89	100	77	86	100	88	97	95	100	93	78	100	24	15	100	95	95
Check ---	92	91	89	100	83	56	93	54	50	0	0	0	0	100	100	99	55	33	14
shoots/sq ft										*19.8*	*18.3*	*16.5*	*11.1*						
(Fall)																			
dicamba 4L 6.0	76	81	75	100	94	81	90	99	92	70	57	61	40	100	93	83	82	70	55
dicamba 4L 8.0	87	88	80	100	92	86	90	95	87	83	44	50	44	100	95	83	89	68	67
dicamba 5G 6.0	99	81	91	100	90	81	97	98	98	89	52	39	17	100	97	90	98	79	95
dicamba 5G 8.0	99	93	92	100	93	87	98	98	97	93	85	61	30	100	100	99	97	84	71
picloram (K salt) 1.0	99	87	89	100	92	83	99	99	99	95	90	81	64	100	99	95	96	74	56
picloram (K salt) 2.0	100	96	97	100	97	93	100	100	100	99	99	93	79	100	100	100	99	93	92
picloram (2% beads) 1.0	100	91	98	100	96	83	100	100	99	99	100	96	88	100	97	89	100	86	96
picloram (2% beads) 2.0	100	86	95	100	86	73	100	100	100	99	100	94	88	100	91	66	100	85	95
Check ---	70	67	69	100	85	82	23	57	72	0	0	0	0	100	97	82	0	31	31
shoots/sq ft										*19.4*	*23.6*	*22.7*	*14.8*						

[1]Original treatments made May 23 and September 14, 1980; retreatments made May 29 and September 12, 1981; May 24, 1982; September 17, 1982; and May 29 and September 15, 1983. The retreatments of picloram (K salt) at 0.5 and 1.0 lb ai/A were terminated with the 1981 retreatment.
[2]Shoot counts May 27, 1981; May 24, 1982; May 29, 1983; and May 30, 1984.

Effect of original treatments, retreatments and combinations on leafy spurge control 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. Six 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 May 19, 1982, May 18, 1983, and May 22, 1984. 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 and 1983. Leafy spurge was in the bud to flower stage-of-growth and 8-14 inches in height each year when retreatments were applied. Plots were 11 by 22 ft. arranged in a split block design with two replications. The 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 97 to 100% shoot control as evaluated in 1984. The 0.5 lb ai/A of picloram is somewhat less effective but is still maintaining 91 to 100% shoot control except where the original treatment was dicamba at 4.0 and 8.0 lb ai/A. 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 (Table 1).

Forage production measurements have also been taken each year since establishment of the experiment (Table 2). Moisture conditions were limiting in 1979 and 1983 and were favorable in 1980, 1981, 1982 and 1984. Average forage production is greater in treatment areas as compared to the untreated check plot. However, a reduction in forage production is occurring over time as the original herbicide treated plots are being reinfested to the point where the leafy spurge is crowding out the desirable forage. To maintain leafy spurge control and increase forage production, retreatments should be made. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1311.)

Table 1. Leafy spurge shoot control

Original[1] Treatments lb ai/A	Percent Shoot Control Retreatment, lb ai/A[2]																													
	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	'84	1980	'81	'82	'83	'84	1980	'81	'82	'83	'84	1980	'81	'82	'83	'84	1980	'81	'82	'83	'84	1979	'80	'81	'82	'83	'84
picloram (K salt) 2.0	98	93	94	99	94	99	100	100	99	99	99	100	100	100	99	98	96	97	97	92	99	95	98	98	87	99	96	90	90	68	18
picloram (K salt) 1.0	76	84	83	86	84	96	99	99	86	94	99	100	100	100	98	96	90	96	95	78	99	89	98	94	71	97	94	84	78	80	67
picloram (K salt) 0.5	70	80	86	88	73	94	99	98	88	92	99	100	100	100	97	49	79	88	84	72	59	77	85	70	55	76	43	29	55	24	4
picloram (2% beads) 2.0	90	90	87	92	90	98	99	99	92	92	100	100	100	100	100	96	98	96	99	92	96	87	98	98	81	99	95	83	85	74	6
picloram (2% beads) 1.0	84	92	86	92	81	99	99	99	92	95	98	99	100	100	99	87	82	96	89	79	65	82	88	87	53	96	51	68	55	67	53
picloram (2% beads) 0.5	78	76	76	84	69	99	100	99	84	95	99	100	100	100	100	69	77	79	84	48	64	78	91	79	58	87	32	36	58	31	41
picloram/ 2,4-D amine 2.0 + 4.0	81	90	88	98	75	99	99	98	98	95	100	100	100	100	100	99	95	96	99	79	78	89	94	85	74	98	91	87	51	37	44
picloram/ 2,4-D amine 1.0 + 2.0	63	76	81	81	73	96	98	98	81	93	100	100	100	100	100	68	89	94	90	65	39	64	91	80	50	71	38	31	45	35	12
picloram/ 2,4-D amine 0.5 + 1.0	58	66	76	66	63	97	96	98	66	91	99	100	100	100	99	49	65	84	87	71	40	73	88	89	78	16	0	0	0	7	0
dicamba 4L 8.0	74	82	87	83	75	87	96	98	83	74	98	98	100	94	98	89	87	96	98	91	78	94	98	97	70	67	66	77	61	50	34
dicamba 4L 4.0	53	69	78	78	61	84	97	98	78	87	100	100	100	100	98	67	84	88	81	64	56	83	90	90	75	47	42	24	36	28	2
Check	9	58	62	78	78	96	99	97	78	95	93	100	100	100	98	72	85	92	95	82	11	63	84	66	47	--	--	--	--	--	--

[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.
[2]Retreatments of piclorm (K salt) at 0.5 and 1.0 lb ai/A terminated with 1981 treatments.

Table 2. Forage production

Treatments[1]	Rate lb ai/A	Air Dry Forage (Pounds/A)[2]						
		1979	1980	1981	1982	1983	1984	Average
piclorm (K salt)	2.0	1,098	1,010	1,832	2,200	313	224	1,113
picloram (2% beads)	2.0	992	601	2,278	2,506	212	600	1,198
picloram/ 2,4-D amine	2.0 + 4.0	1,054	520	1,776	2,622	345	783	1,183
piclorm (K salt)	1.0	896	558	1,337	2,400	392	624	1,035
picloram (2% beads)	1.0	981	786	1,552	1,867	299	312	966
picloram/ 2,4-D amine	1.0 + 2.0	1,240	1,160	850	896	139	380	778
piclorm (K salt)	0.5	1,111	947	818	1,298	355	375	817
dicamba 4L	4.0	1,137	665	708	1,324	366	315	753
dicamba 4L	8.0	917	471	862	1,356	190	689	748
picloram (2% beads)	0.5	1,005	621	620	890	168	358	610
picloram/ 2,4-D amine	0.5 + 1.0	930	616	676	564	78	294	526
Check	---	535	416	402	652	187	703	483

[1]Treatments made May 25, 1978.
[2]Harvested July 30, 1979; July 29, 1980; July 24, 1981; July 20, 1982; July 13, 1983; and August 7, 1984.

Evaluation of dicamba formulations for leafy spurge shoot control. Ferrell, M. A. and H. P. Alley. An experiment was conducted near Hulett, Wyoming to compare various liquid and granular formulations of dicamba for leafy spurge shoot control.

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 in. tall. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water carrier. Granular formulations were applied with a hand operated centrifugal broadcaster. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. The soil was a loam (38% sand, 47% silt, and 15% clay) with 1.8% organic matter and a pH of 7.8.

Leafy spurge shoot control in 1984 was generally less than in 1983 with all dicamba treatments except the 5% granules applied at 4.0 lb ai/A or dicamba 20% granules applied at 8.0 lb ai/A. Picloram 2% granules applied at 2.0 lb ai/A is maintaining 100% shoot control two years after application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1313.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent[2] Shoot Control 1983	Percent[2] Shoot Control 1984
dicamba pellets 10%	6.0	95	49
dicamba pellets 10%	8.0	92	70
dicamba 4DMA + X-77	6.0	83	67
dicamba 4DMA + X-77	8.0	98	82
dicamba 4DMA + 2,4-DLVE + X-77	4.0 + 0.5	97	73
dicamba pellets 10%	4.0	49	51
dicamba pellets 10%	8.0	96	70
dicamba pellets 5%	4.0	94	91
dicamba pellets 5%	8.0	93	78
dicamba pellets 20%	4.0	65	68
dicamba pellets 20%	8.0	95	91
picloram pellets 2%	2.0	100	100

[1]Treatments applied June 16, 1982. X-77 added at 0.125% v/v.
[2]Shoot counts May 18, 1983 and May 23, 1984.

Evaluation of new herbicides for control of leafy spurge. 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. The soil was a loam (38% sand, 47% silt and 15% clay) with 1.8% organic matter and a pH of 7.8.

Shoot counts taken on May 22, 1984, two years after treatment, indicate UC 77179 at 4.0 and 6.0 lb ai/A controlled 93 and 96% of the shoot growth, respectively, compared to the check. However, application of these rates resulted in bare ground. Percent leafy spurge control for all other treatments dropped to zero two years following application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1314.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent Shoot Control[2] 1983	1984	Observations
DPX-T6376 70WP + X-77	0.031	13	0	
DPX-T6376 70WP + X-77	0.062	19	0	
DPX-T6376 70WP + X-77	0.125	35	0	
DPX-T6376 70WP + X-77	0.25	52	0	
DPX-T6206 70WP + X-77	0.031	24	0	
DPX-T6206 70WP + X-77	0.062	42	0	
DPX-T6206 70WP + X-77	0.125	61	0	
DPX-T6206 70WP + X-77	0.25	30	0	
chlorsulfuron + X-77	0.031	25	0	
chlorsulfuron + X-77	0.062	42	0	
chlorsulfuron + X-77	0.125	30	0	
chlorsulfuron + X-77	0.25	21	0	
PPG 1259 3F	1.0	22	0	
PPG 1259 3F	2.0	20	0	
PPG 1259 3F	4.0	8	0	Moderate grass damage
UC 77179 80%WP	0.5	39	0	
UC 77179 80%WP	1.0	9	0	Slight grass damage
UC 77179 80%WP	2.0	30	0	Moderate grass damage
UC 77179 80%WP	4.0	87	93	Severe grass damage, bare ground
UC 77179 80%WP	6.0	96	99+	Severe grass damage, bare ground
Check	---	0	0	
shoots/ft²		*12.8*	*15.8*	

[1]Treatments applied June 16, 1982. X-77 added at 0.125% v/v.

[2]Shoot counts May 18, 1983 and May 22, 1984.

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 control of leafy spurge shoot regrowth.

Leafy spurge plants were mowed within 1 to 2 in. 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 in. 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 control evaluations on May 22, 1984, two years following herbicide treatment, indicate that mowing prior to herbicide treatment may allow use of reduced herbicide rates for leafy spurge control. The treatment of 1.0 lb ai/A of 2,4-D is still as effective as 0.5 lb ai/A of picloram, although shoot control has dropped from 91 to 85% for the 2,4-D LVE and from 86 to 75% for the picloram. More data is necessary to fully evaluate the value of mowing as a setup treatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1315.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent[2] Shoot Control 1983	Percent[2] Shoot Control 1984
dicamba	1.0	32	36
picloram (K salt)	0.5	86	75
2,4-DLVE	1.0	91	85
Check	---		
shoots/ft		*23.2*	*27.9*

[1]Plots mowed June 30, 1982 and treatments applied July 21, 1982.
[2]Shoot counts May 19, 1983 and May 22, 1984.

The effect of preemergence and postemergence herbicides on the control of yellow nutsedge and bermudagrass. Lange, A. H. and W. D. Edson. A heavy stand of yellow nutsedge and bermudagrass (6 to 12 inches) were sprayed May 24, 1984 and again on June 7. The area was periodically furrow irrigated. The early results showed partial control of bermudagrass. Fluazifop-butyl showed excellent activity on bermudagrass but no activity on nutsedge or broadleaf weeds. SC 1084 and AmHo 0664 showed good early effects. Even PPG 1013 showed excellent early bermudagrass control but was outstanding on yellow nutsedge and broadleaf weeds (Table 1). In a later reading (Table 2) fluazifop-butyl and SC 1084 showed good results on bermudagrass. The PPG 1013 continued to look good on nutsedge. The AmHo 0664 didn't have much nutsedge but the bermudagrass was so thick that it may have screened out the nutsedge.

A later trial with much lower rates showed some early effects but not enough to be significant. Therefore, the effective level of PPG 1013 is in the range of 1/2 pound per acre repeated as in the first trial. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The effect of the directed sprays on the control of well established bermudagrass, yellow nutsedge and several broadleaf weeds in young trees (425-73-502-146-2-84)

Herbicides	Lb/A	Average Weed Control 1/ Bermudagrass	Yellow Nutsedge	Broadleaf Weeds
Fluazifop-butyl	¼+¼	6.3	0.0	2.7
Fluazifop-butyl	1+1	7.7	0.0	5.7
SC 1084	¼+¼	3.7	0.0	2.3
SC 1084	1+1	6.7	0.0	0.3
AmHo 0664	¼+¼	4.7	0.0	2.7
AmHo 0664	1+1	7.0	0.0	1.7
PPG 1013	¼+¼	6.3	10.0	10.0
PPG 1013	1+1	8.0	10.0	10.0
Glyphosate	4	9.0	5.7	10.0
Check	-	0.0	0.0	3.7

1/ Average of 3 replications where 0 = no control and 10 = complete control. Treated 5/24 and 6/7/84. Evaluated 6/15/84.

Table 2. The effect of directed sprays on the control of weeds 2 months after treatment (425-73-502-146-2-84)

Herbicides	Lb/A	Average Control[1/] Yellow Nutsedge	Bermuda-grass
Fluazifop-butyl	¼+¼	4.7	8.7
Fluazifop-butyl	1+1	3.0	10.0
SC 1084	¼+¼	3.3	6.3
SC 1084	1+1	1.7	9.3
AmHo 0664	¼+¼	9.7	0.0
AmHo 0664	1+1	7.0	0.0
PPG 1013	¼+¼	7.5	0.0
PPG 1013	1+1	9.3	0.0
Glyphosate	4	3.3	6.0
Check	-	8.0	0.0

1/ Average of 3 replications where 0 = no control and 10 = total kill of weeds. Treated 5/24 and 6/7/84. Evaluated 8/2/84.

The effect of three preemergence herbicides on the control of yellow nutsedge. Lange, A. H. and W. D. Edson. A heavy stand of yellow nutsedge was rototilled and the herbicides sprayed June 6, 1984. Two days later (June 8) these herbicides were incorporated with sprinklers with 1/2 acre inch of water. The soil was a Hanford sandy loam with about 0.8 O.M. On August 2, the control was evaluated. All herbicides gave a degree of nutsedge control, but metolachlor appeared best for both yellow nutsedge and annual grasses. (University of California Cooperative Extension, Parlier, CA 93648)

The effect of three preemergence herbicides
on the control of nutsedge and annual grasses
(425-73-502-146-3-84)

Herbicides	Lb/A	Average Control 1/ Yellow Nutsedge	Annual Grasses
Metolachlor	2	8.1	7.0
Metolachlor	4	8.3	8.2
Metolachlor	8	9.5	9.0
Mon 097	2	6.5	4.5
Mon 097	4	6.3	7.8
Mon 097	8	8.0	8.5
Alachlor	2	8.2	4.8
Alachlor	4	4.7	4.5
Alachlor	8	6.3	7.0
Check	-	4.8	3.0

1/ Average of 3 replications where 0 = no control and 10 = total kill of weeds. Treated 6/6/84. Evaluated 8/2/84. Grasses were mostly lovegrass and crabgrass.

A comparison of postemergence herbicides for johnsongrass control. Lange, A. H. and W. D. Edson. A heavy stand of johnsongrass on a raised berm was divided up into 5 by 16 ft plots and sprayed with postemergence herbicides in 100 gpa of water (because of the heavy stand) on April 27, 1984. In addition to the treatment applied April 27, the grower had previously sprayed with 1/2 Lb/A of fluazifop-butyl in 30 gpa. On May 22 the second application of fluazifop-butyl and sethoxydim was applied, i.e., almost one month after the first treatment. On July 3 the plots were rated for control and again on October 10. The ratings show clearly superior johnsongrass control from the repeat application of fluazifop-butyl and sethoxydim. (University of California Cooperative Extension, Parlier, CA 93648)

A comparison of postemergence herbicides for johnsongrass control (425-54-502-108-1-84)

Herbicides	Lb/A	Average[1/] Johnsongrass Control 7/3	10/10
Sethoxydim+Pace	½+½	6.7	4.2
Sethoxydim+Pace	1+1	6.7	3.8
Fluazifop-butyl+Pace	½+½	6.7	5.0
Fluazifop-butyl+Pace	1+1	6.7	6.0
Glyphosate	2	2.7	0.5
Glyphosate	4	2.2	0.5
SC 0224	4	2.5	0.8
Check	-	2.7	0.0

1/ Average of 4 replications where 0 = no control and 10 = complete control of weeds. Treated 4/27 and 5/22/84. Evaluation dates at top of table.

The effect of water incorporated herbicides on the control of perennial bindweed. Lange, A. H. and W. D. Edson. A heavy stand of perennial bindweed was worked up and levied into small 20 ft by 25 ft basins. The herbicides were mixed in large tanks and metered into the basins. The air temperature was 103°F with a light breeze. The herbicides were metered into water moving at 60 gallons per minute. One thousand two hundred seventy-eight gallons per plot or 4.12 acre inches were used.

The early results with both herbicides were very good at the high rates. The bindweed control of the following spring was not as spectacular. The large amount of water gave deep penetration of both herbicides. The dicamba at 4 Lb/A would be expected to give a problem to sensitive crops like tomato with the method of application. The grower planted wheat but disked out our plots before we could evaluate these herbicides on fall planted wheat. (University of California Cooperative Extension, Parlier, CA 93648)

The effect of flooding in two herbicides on the control of perennial bindweed (425-24-502-3-83)

Herbicides	Lb/A Gal/A	Water for Incorp.	Average 1/ Bindweed Control 9/4/83	9/14/83	5/1/84
Metham	50	4 A"	8.0	6.0	5.0
Metham	100	4 A"	9.3	7.5	6.3
Dicamba	2	4 A"	5.3	5.8	3.5
Dicamba	4	4 A"	8.3	9.0	7.3
Check	0	4 A"	0.0	0.0	1.3

1/ Average of 4 replications where 0 = no effect and 10 = complete kill, i.e., no regrowth after treatment. Evaluation dates listed at top of table.

Evaluation of plant growth regulators for their control of field bindweed (Convolvulus arvensis L.) . Lauridson, T. C. and E. E. Schweizer. Some plant growth regulators may have the potential to improve field bindweed control when applied in conjunction with herbicides. Eight plant growth regulators were evaluated as pretreatments in a field study to determine their capability to improve field bindweed control over that of either glyphosate or 2,4-D.

These studies were conducted in a field uniformly covered with field bindweed. The soil type was a Fort Collins silty clay loam, with 2.7% organic matter and pH of 7.9. The field was irrigated as required to insure that field bindweed was growing actively when treated. Herbicide and plant growth regulator treatments were applied with a bicycle sprayer at 180 l/ha. Field bindweed shoots were counted in the fall shortly before the application of plant growth regulators and herbicides, and again the following spring. Plots were 5 m^2 within which two 1 m^2 quadrats were sampled for the number of field bindweed shoots. The same two sites in each plot were counted in the fall and spring. Data shown are the average percent reductions in the number of field bindweed shoots as a result of plant growth regulator and herbicide treatments. Each treatment was replicated four times in 1982 and six times in 1983 in randomized complete block designs. In 1982, plant growth regulators were applied September 21, followed by glyphosate and 2,4-D 3 days later. Field bindweed shoots were counted between May 23 and May 26, 1983. In 1983, glyphosate pretreatment was applied on September 27, followed by glyphosate and dicamba 3 days later. Field bindweed shoots were counted between May 22 and May 25, 1984.

Glyphosate and EL-500, applied as pretreatments, substantially improved field bindweed control over either glyphosate or 2,4-D alone (Table 1). Glyphosate applied as a herbicide at 1.68 kg/ha reduced the number of field bindweed shoots 41%, while the glyphosate pretreatment plus the regular glyphosate treatment resulted in a 79% reduction. Glyphosate pretreatment provided the greatest (38%) improvment caused by a plant growth regulator pretreatment when compared to either herbicide alone. Although EL-500 improved the control of shoots in all combinations studied, observation of the treated plots revealed that EL-500 may have too much residual herbicidal activity in soil. Improved control of field bindweed shoots found with EL-500 over glyphosate or 2,4-D alone probably resulted from the herbicidal residual activity of EL-500 rather than to its plant growth regulating effects. Based on these results, we selected only glyphosate for further study as a pretreatment in 1983.

Some of the other pretreatments in 1982 appeared to decrease field bindweed control as compared with the application of either herbicide alone. For example, as the rates of naptalam, mefluidide, and ethephon were increased, prior to the application of glyphosate or 2,4-D, field bindweed control was decreased (Table 1).

Glyphosate applied at 0.028 kg/ha as a pretreatment did not improve the control of field bindweed over any of the three herbicide treatments that were applied alone in 1983 (Table 2). Thus, the effect of glyphosate as a pretreatment in 1982 may have been an anomaly. However, environmental factors could also have reduced the effect of the glyphosate pretreatment in 1983. For example, while field bindweed appeared to be in excellent condition both years, less soil moisture was available for growth in 1983 than in 1982. Based on the 1982 data, further study may be warranted.

Table 1. Percent reduction in the number of field bindweed shoots on May 26, 1983 following pretreatment on September 21, 1982, and herbicide treatments on September 24, 1982 at Fort Collins, Colorado.

Pretreatment	Rate	Reduction in shoot count 2,4-D (2.24 Kg/ha)	Glyphosate (1.68 Kg/ha)
	(kg/ha)	- - - - - - - - -(%)-	- - - - - -
None		51	41
Ancymidol	0.0028	48	55
Glyphosate	0.028	64	79
Daminozide	2.24	65	47
Daminozide	4.48	37	46
Naptalam	1.12	20	64
Naptalam	4.48	17	20
Dikegulac sodium	1.12	22	53
Dikegulac sodium	4.48	22	53
EL-500	0.84	74	43
EL-500	1.68	52	50
Mefluidide	1.12	40	36
Mefluidide	4.48	25	18
Ethephon	0.84	42	53
Ethephon	1.68	21	44
LSD 0.05		39	

Table 2. Percent reduction in the number of field bindweed shoots on May 25, 1984 following pretreatment on September 27, 1983, and herbicide treatments on September 30, 1983 at Fort Collins, Colorado.

Plant growth regulator	Rate	Herbicide	Rate	Control
	(kg/ha)		(kg/ha)	(%)
		Dicamba	0.56	89
		Glyphosate	1.68	41
		Dicamba + Glyphosate	0.56 + 1.68	83
Glyphosate	0.028			34
Glyphosate	0.028	Dicamba	0.56	81
Glyphosate	0.028	Glyphosate	1.68	37
Glyphosate	0.028	Dicamba + Glyphosate	0.56 + 1.68	83
LSD 0.05				21

Evaluation of benazolin and dicamba to suppress the regrowth of field bindweed (Convolvulus arvensis L.) Lauridson, T. C. and E. E. Schweizer. Benazolin is a selective postemergence herbicide that effectively controls certain broadleaf weeds. Benazolin and dicamba, applied alone and in combination, were evaluated for their effectiveness to control field bindweed one year later.

The study was conducted on a field uniformly covered with field bindweed. The soil type was a Fort Collins silty clay loam, with 2.7% organic matter and pH of 7.9. Herbicide treatments were applied with a bicycle sprayer at 180 l/ha on September 30, 1983. Field bindweed shoots were counted in the fall before herbicide treatment and again at the same sites in each plot the following spring. Plots were 5 m^2, within which two 1 m^2 quadrats were sampled for the number of field bindweed shoots. Herbicide treatments were replicated four times in a randomized complete block design. Data shown for each herbicide treatment are the average percent reductions in the number of field bindweed shoots between the fall and spring evaluations.

Regrowth of field bindweed was suppressed as the rates of dicamba were increased from 0.14 to 0.56 kg/ha (Table 1). Benazolin decreased shoot number by only 41% at 0.28 kg/ha, thus this rate is not adequate to suppress regrowth of field bindweed. Combinations of benazolin plus dicamba resulted in a 24% decline in the predicted number of shoots (Table 1). Dicamba, applied alone at 0.28 and 0.56 kg/ha, was 9 and 15%, respectively, more effective in controlling regrowth than the same rates of dicamba applied in combination with 0.28 kg/ha of benazolin. This indicates that these two herbicides are possibly antagonistic on field bindweed.

Table 1. Percent reduction in the number of field bindweed shoots on May 25, 1984 following treatment on September 30, 1983 at Fort Collins, Colorado.

Herbicides	Rate	Reduction in shoot count		
		Found	Expected[a]	Difference
	(kg/ha)	----------	(%)	---------
Benazolin	0.28	41		
Dicamba	0.14	40		
Dicamba	0.28	63		
Dicamba	0.56	79		
Dicamba + Benazolin	0.14 + 0.28	41	65	-24
Dicamba + Benazolin	0.28 + 0.28	54	78	-24
Dicamba + Benazolin	0.56 + 0.28	64	87	-23
LSD 0.05		25		

[a]Synergism and antagonism were evaluated using the method of Colby (Weed Science 1967, 15:20-22)

PROJECT 2.

HERBACEOUS WEEDS OF RANGE AND FOREST

Terry Peterson - Project Chairman

Evaluation of herbicides for control of downy brome. Alley, H. P. and M. A. Ferrell. Downy brome is considered an invader with undesirable forage characteristics and tends to increase in density on overgrazed rangeland. This experiment was established to compare various herbicides applied in the fall for the control of downy brome in rangeland.

Plots were established on a uniform 2 to 3 in. tall stand of downy brome November 12, 1982 south of Buffalo, Wyoming. tall. The site contained a mature stand of grass in good condition. Liquid formulations were applied with a 6 nozzle knapsack spray unit in 40 gpa water carrier. Granular formulations were applied by hand. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. The soil was a sandy loam (76% sand, 9% silt, 15% clay) with 0.8% organic matter and a pH of 7.4.

Visual estimates of downy brome control and grass damage were made April 26, 1983 and July 11, 1984. The granular (5G) and wettable powder (WP) formulations of tebuthiuron were the most effective treatments for downy brome control. Tebuthiuron 80WP applied at 0.5 and 1.0 lb ai/A gave 98 and 100% control of downy brome, respectively. However, these treatments also resulted in reduced stands of native grass. Further evaluations should be made. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1325.)

Downy brome control

Treatment[1]	Rate ai/A	Percent Control[2] 4/83	7/84	Observations
chlorsulfuron 75DF	1/32 oz	0	0	
chlorsulfuron 75DF	1/16 oz	0	0	
chlorsulfuron 75DF	1/8 oz	0	0	
tebuthiuron 5G	0.25 lb	42	37	Slight grass damage
tebuthiuron 5G	0.5 lb	65	63	50% grass reduction
tebuthiuron 5G	1.0 lb	89	100	70% grass reduction
tebuthiuron 80W	0.25 lb	60	23	
tebuthiuron 80W	0.5 lb	96	98	20% grass reduction
tebuthiuron 80W	1.0 lb	100	100	70% grass reduction
EL 97517 50W	0.25 lb	86	0	
EL 97517 50W	0.5 lb	98	0	
EL 97517 50W	1.0 lb	99	0	
EL 187	0.25 lb	86	0	
EL 187	0.5 lb	93	0	
EL 187	1.0 lb	99	83	40% grass reduction
Check plants/ft²	---	300	---	

[1]Treatments applied November 12, 1982.
[2]Visual control evaluations April 26, 1983 and July 11, 1984.

Evaluation of herbicides for control of silky loco. Alley, H. P. and M. A. Ferrell. Silky loco is a native spring blooming, perennial forb which is poisonous to livestock. This experiment was established to compare 2,4-DLVE and picloram for silky loco control.

Herbicide treatments were established June 12, 1982 to silky loco in full bloom, with good succulent growth. Grass was in the heading stage-of-growth. Treatments were applied with a truck mounted spray unit in 15 gpa water carrier. Plots were 1.5 acres in size and arranged in a block design with one replication.

Visual estimates of silky loco control were made July 14, 1983 and July 31, 1984. 2,4-DLVE applied at 1.2 lb ai/A and picloram (K salt) applied at 0.6 pt/A gave 80 and 90% reduction in silky loco stand respectively; two years following treatment. Picloram at 1.2 pt/A maintained 100% control in 1984. The treated plots were evident as grass density and height were increased. (Wyoming Agr. Exp. Sta., Laramie, WY 82071, SR 1327.)

Silky loco control

Treatment[1]	Rate/A	Percent Control[2]	
		1983	1984
2,4-DLVE	0.6 lb	40	30
2,4-DLVE	1.2 lb	85	80
picloram (K salt)	0.6 pt	95	90
picloarm (K salt)	1.2 pt	100	100

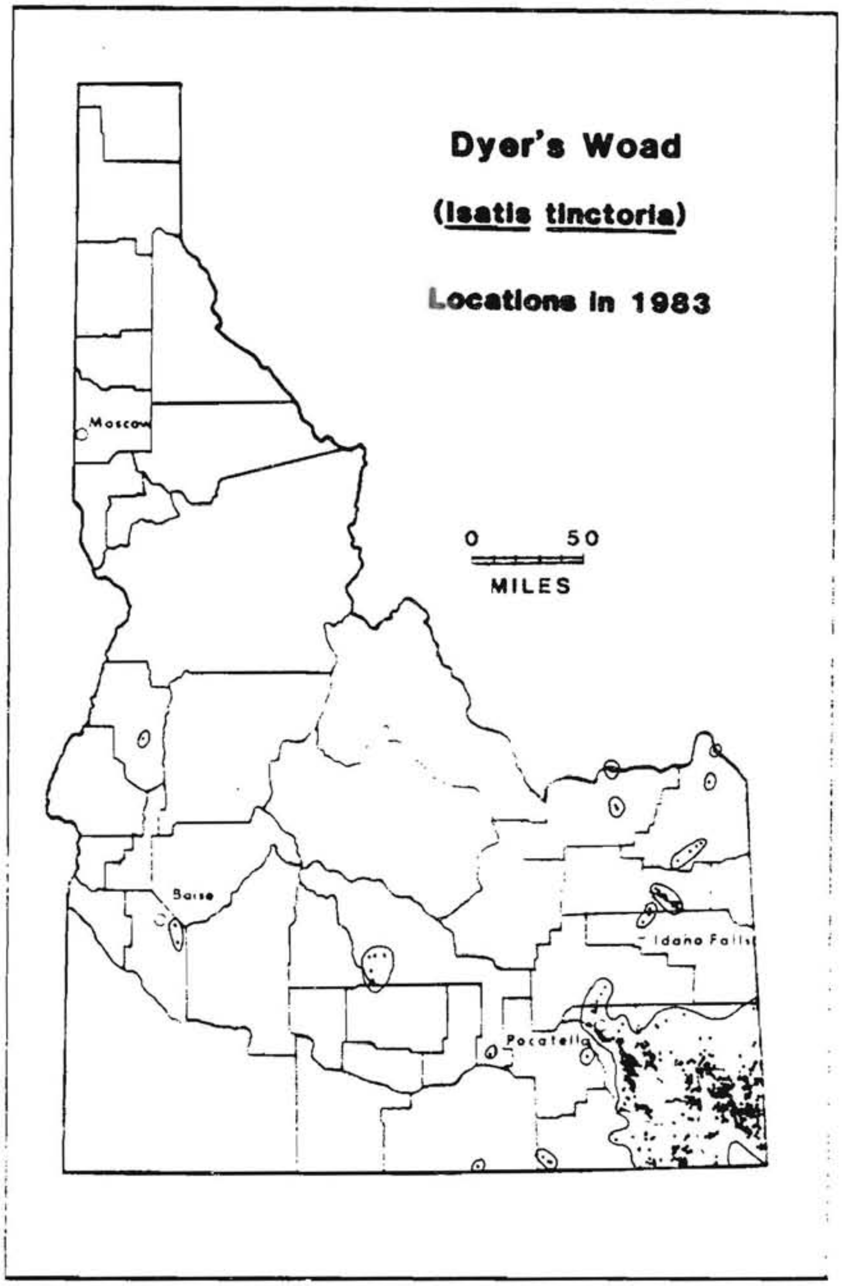
[1]Treatments applied June 12, 1983.
[2]Visual evaluations July 14, 1983 and July 31, 1984.

Status of dyer's woad infestations in Idaho. Callihan, R.H., S.A. Dewey, J.E. Patton, and D.C. Thill. Dyer's woad, (Isatis tinctoria L.) a biennial or perennial crucifer, was introduced into the Intermountain Northwest in the early 1900's. It now occurs in rangeland, pastures, crops, and disturbed areas in parts of northern Utah, western Wyoming and southeastern Idaho.

A field survey of dyer's woad was conducted in Idaho during May, June and July 1983. Emphasis was placed on detailed mapping of the species during the flowering season, and on the collection of the taxon and associated species in a variety of habitats throughout its present range in Idaho. Mapping information was collected from the ground and fixed-wing aircraft and recorded on topographic maps (1:24,000). This information was later transferred to maps of a smaller scale (1:125,000). Acreage estimates were made using a black-and-white video camera, and the images were processed by a microcomputer with a video image analysis computer program. Quarter-sections were also recorded for a computer-generated map of Idaho. Treated sites and areas of previous infestations were also noted.

Dyer's woad has spread along the Bear River Valley in Bear Lake, Caribou, and Franklin Counties, and north along the Marsh Creek and Portneuf River drainages in Bannock County. It was found primarily on the east side of these valleys, extending up the canyons, and generally on the south-facing slopes. Small populations were recorded on the Upper Snake River Plain along Highways 91 and 20, and Interstate 15 in Bingham, Bonneville, Jefferson, Madison, Fremont, and Clark Counties. Small, isolated, past or present occurrences were observed or reported for Teton, Blaine, Minidoka, Power, Oneida, Cassia, Jerome, Gooding, Ada, and Adams Counties. In 1983, dyer's woad was present in 1,300 quarter-sections, and occupied a total area of 9,648 ha in 16 counties.

Specimens of dyer's woad and 75 associated species were collected in 11 counties at 40 sites, which ranged in elevation from 899 m to 2316 m. Collections were made in several rangeland habitat types dominated by big sagebrush (Artemisia tridentata Nutt.) on steep to negligible slopes. Dyer's woad also was found in non-irrigated pastures and crops (e.g. crested wheatgrass, rye, wheat, and barley) and in irrigated alfalfa fields. Infestations also frequently occurred in disturbed areas such as roadsides, railroad embankments, gravel pits, and levees. Dyer's woad was found in dense to sparse stands and as isolated plants at elevations ranging from 889 to 2700 m. (University of Idaho Agricultural Experiment Station, Moscow ID 83843).



Occurrence of dyer's woad in Idaho in 1983. One dot represents a quarter-section on which dyer's woad was recorded. Encircled areas indicate regions extensively surveyed.

Pasture weed control in Idaho. Beck, K. G., D. C. Thill, and R. H. Callihan. A three year experiment was established in the spring of 1982 to evaluate the effects of various herbicide combinations on weed control and yield in a dryland pasture at Viola (see page 24 WSWS Research Progress Report, 1982; page 37 WSWS Research Progress Report, 1983; page 40 WSWS Research Progress Report, 1984). Visual evaluations for weed control were not taken in 1984 as no apparent differences could be discerned. Plots were hand-harvested on 7-31-84 and weed and forage dry weights were determined. No differences due to herbicide treatments among forage or weed yields were determined.

Plot to plot variability, deferred grazing, and high annual precipitation may have affected the experimental results. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 1. Influence of herbicide combinations on yield of forage and weeds on dryland pasture at Viola, Idaho.

Treatment	Rate[2]	Yield[1] Forage	Yield[1] Weeds
	(lb/A)	(lb/A)	(lb/A)
dicamba	0.125	1028	1481
dicamba	0.25	1496	900
dicamba	0.5	877	792
dicamba	1.0	953	1614
dicamba	2.0	1166	976
2,4-D	0.38	1393	996
2,4-D	0.75	1305	1223
2,4-D	1.5	918	1682
2,4-D	3.0	1200	1142
dicamba+2,4-D	0.125 + 0.38	1093	1117
dicamba+2,4-D	0.25 + 0.5	1164	1403
dicamba+2,4-D	0.25 + 0.75	1240	777
dicamba+2,4-D	0.5 + 1.0	993	1399
dicamba+2,4-D	0.5 + 1.5	782	1620
dicamba+2,4-D	1.0 + 2.0	1228	1607
dicamba+2,4-D	1.0 + 3.0	766	1636
picloram	0.25	1570	1275
picloram	0.5	1637	634
picloram	1.0	950	1506
check	-	913	1875
LSD (0.05)		NS	NS

[1]Oven dry weight
[2]Treatments applied 6-3-82

Evaluation of plains prickly pear control with herbicides. Ferrell, M. A. and H. P. Alley. Infestations of prickly pear 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 prickly pear cactus.

Plots were established June 3, 1982 on a mature stand of prickly pear 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 by 30 ft arranged in a randomized complete block design with three replications. The soil was a clay loam (36% sand, 37% silt and 27% clay) with 1.8% organic matter and a pH of 7.9.

Prickly pear control with picloram was higher in 1984 than 1983. Prickly pear control is excellent with picloram liquid (K salt) at 1.0 and 2.0 lb ai/A or picloram 2% granular formulation at 0.5 lb ai/A. No other treatments have provided effective control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1322.)

Plains prickly pear control

Treatment[1]	Rate lb ai/A	Percent Control[2] 1983	1984	Observations
triclopyr (4E)	0.25	0	0	No apparent grass damage in any plot
triclopyr (4E)	0.50	3	3	
triclopyr (4E)	1.0	0	3	
Dowco 290 (M-3972)	0.25	0	0	
Dowco 290 (M-3972)	0.50	0	7	
Dowco 290 (M-3972)	1.0	7	18	
picloram (K salt)	1.0	77	100	
picloram (K salt)	2.0	97	100	
picloram (2% pellets)	0.25	23	63	
picloram (2% pellets)	0.50	37	93	
picloram (10% pellets)	0.25	22	40	
picloram (10% pellets)	0.50	30	53	
Check	---	--	--	

[1]Treatments applied June 3, 1982.
[2]Percent control evaluations July 11, 1983 and August 6, 1984.

Spikeweed Control in Pastureland. Whitson, T.D., and Robert Costa. Spikeweed, an annual composite, has been reported as a pasture weed problem on alkali soils in several Oregon counties. A series of treatments were applied to determine their efficacy on spikeweed. The soil was a silt loam with a pH of 9.5 and a textural composition of 9.5% clay, 24.0% sand, and 67.0% silt. Herbicides were applied April 19, 1984 with a boom sprayer. The experiment was arranged as a randomized complete block design with 10 by 40 ft. plots. Percent spikeweed control was based on counts within four 16 sq. ft. quadrats. The control area contained 104 spikeweed plants per square foot. Perennial grasses were not present in sufficient populations to determine crop damage.

Weed control evaluations made July 18, 1984, approximately 3 months following treatment, showed that clopyralid picloram, dicamba, chlorsulfuron, and metsulfuron-methyl, and the herbicide combinations dicamba + 2,4-D amine each provided spikeweed control above 99%. Triclopyr and 2,4-D LV ester and amine formulations were only partially effective controls at these application rates. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Spikeweed Control in Pastureland

Herbicide	Application rate	plants/sq. ft.[a]	% Control[b]
clopyralid	0.25 lb ae/A	0	100
clopyralid	0.50 lb ae/A	0	100
clopyralid	1.0 lb ae/A	0	100
picloram	0.25 lb ae/A	0	100
picloram	0.5 lb ae/A	0	100
picloram	1.0 lb ae/A	0	100
dicamba	0.25 lb ae/A	4	96
dicamba	0.5 lb ae/A	0	100
dicamba	0.75 lb ae/A	0	100
2,4-D (LV ester)	0.75 lb ae/A	61	41
2,4-D (LV ester)	1.5 lb ae/A	47	55
2,4-D (LV ester)	2.0 lb ae/A	53	49
2,4-D (amine)	0.75 lb ae/A	80	23
2,4-D (amine)	1.5 lb ae/A	56	46
2,4-D (amine)	2.0 lb ae/A	70	33
triclopyr	0.75 lb ae/A	19	82
triclopyr	1.5 lb ae/A	5	95
triclopyr	2.0 lb ae/A	6	94
chlorsulfuron	0.75 oz ai/A	0	100
chlorsulfuron	1.5 oz ai/A	0	100
chlorsulfuron	2.25 oz ai/A	0	100
chlorsulfuron	3.0 oz ai/A	0	100
metsulfuron-methyl	0.75 oz ai/A	0	100
metsulfuron-methyl	1.5 oz ai/A	0	100
metsulfuron-methyl	2.25 oz ai/A	0	100
metsulfuron-methyl	3.0 oz ai/A	0	100
dicamba + 2,4-D (amine)	0.25 + 0.75 lb ae/A	1	99
dicamba + 2,4-D (amine)	0.5 + 1.5 lb ae/A	0	100
triclopyr + 2,4-D (LVE)	0.125 + 0.25 lb ae/A	67	36
triclopyr + 2,4-D (LVE)	0.25 + 0.50 lb ae/A	53	49
Untreated	---	104	0

[a]Counts were made in four 4 ft by 4 ft quadrats.

[b]% control was calculated as a percentage of the untreated control.

Effect of Herbicide Treatments on Tansy Ragwort Control. Whitson, T.D., Bob Hawkes, Jon Brown, Dave Humphrey, and Dave Langland. Past studies have indicated 2,4-D combinations to be effective controls for tansy ragwort. This study was conducted to evaluate the control of tansy ragwort with several newly developed herbicides in comparison with some older ones. The experiment was conducted in Linn County, Oregon on a McCully clay loam soil. The plots were 10 by 27 ft. and replicated four times in a randomized complete block design. The herbicides were applied on a pasture at 40 psi with a boom sprayer, on March 30, 1984.

Crop tolerance to the herbicide was visually evaluated and tansy ragwort stand counts were made August 28, 1984. Treatments of metsulfuron-methyl and chlorsulfuron caused grass browning for approximately 30 days following treatment but only slight grass height reduction at application rates of 0.141 and 0.197 lb ai/A was apparent at the time of evaluation. No other treatments caused grass injury. Small hop clover and white clover stand reductions were observed from applications of clopyralid, chlorsulfuron, metsulfuron-methyl, dicamba, and picloram. Excellent tansy ragwort control was obtained with clopyralid applications of 0.5 and 1.0 lb ai/A, chlorsulfuron and metsulfuron-methyl applications of 0.094, 0.141, 0.187 lb ai/A , 2,4-D (LV Ester) applications of 0.75, 1.5 and 2.0 lb ai/A, 2,4-D (Amine) applications of 1.5 and 2.2 lb ai/A, picloram applications of 0.25, 0.5, and 1.0 lb ai/A. Herbicide combinations of dicamba and 2,4-D (amine) applied at 0.25 + 0.75 lb ai/A and 0.5 + 1.5 lbs ai/A provided excellent control while triclopyr or triclopyr + 2,4-D (LVE) combinations did not adequately control tansy ragwort at the application rates tested.

(Crop Science Dept., Oregon State University and Oregon State Dept. of Ag., Corvallis, OR 97333)

Effect of Herbicide Treatments
on Tansy Ragwort Control

Herbicide	Rate (lb ai/A)	% Control[a]
clopyralid	0.25	75
"	0.5	94
"	1.0	100
chlorsulfuron	0.094	100
"	0.141	100
"	0.187	100
metsulfuron- methyl	0.094	100
"	0.141	100
"	0.187	100
dicamba	0.25	39
"	0.5	71
"	0.75	69
2,4-D (LV Ester)	0.75	98
"	1.5	100
"	2.0	96
2,4-D (Amine)	0.75	48
"	1.5	92
"	2.0	96
triclopyr	0.75	39
"	1.5	71
"	2.0	71
picloram	0.25	98
"	0.5	100
"	1.0	100
dicamba + 2,4-D(Amine)	0.25 + 0.75	96
"	0.5 + 1.5	100
triclopyr + 2,4-D (LVE)	0.13 + 0.25	64
"	0.25 + 0.5	87
untreated		0

[a]Based on counts made within (two) 4' by 4' quadrats in each treatment area.

The compatibility and efficacy of dye and herbicides under laboratory and field conditions. Zamora, D. L., D. C. Thill, and R. H.Callihan. Laboratory tests were conducted to determine the compatibility of Rhodamine B liquid red dye and Agmark RII dye at 0.25, 0.5, or 1.0% v/v with picloram and dicamba at 0.25 or 1.79% v/v. The herbicide concentrations were equivalent to 1 pt/A of Tordon 22K or Banvel 4S applied at 50 or 7 gpa. The herbicide was placed in the water and thoroughly mixed before adding the dye. The herbicide and dye mixture was mechanically agitated for 15 min followed by vacuum filtration in a Buchner funnel through Whatman no. 4 filter paper. Dry weight of the residue was determined after oven-drying the filter paper for 24 h at 40 C. Visually evaluated compatibility tests were conducted using picloram and dicamba at 0.25 and 1.79% v/v concentrations with rhodamine liquid and dry formulations and Agmark RII and Agmark PII dyes in combination with Compex and Bivert, compatibility agents, and Nalcotrol. The dye concentrations were 0.05, 0.1, and 0.2% v/v; Compex, Bivert, and Nalcotrol were used at concentrations of 0.25, 0.06, and 0.08% v/v, respectively.

Field experiments were established near Nez Perce, Idaho to determine the effect of Rhodamine B liquid red dye with picloram or dicamba on control of common crupina. The treatments were applied May 16 at the first location and May 22, 1984, at the second location with a CO_2 pressurized backpack sprayer calibrated to deliver 10 or 50 gpa at 40 psi. Common crupina was 3 in tall at the first location and 8 in tall at the second location. The experiments were randomized complete block designs with four replications and plots of 10 by 30 ft. The plots were harvested July 30, 1984, by clipping 3.1 ft^2 quadrats of common crupina from each plot.

Picloram and Rhodamine B liquid red dye produced the least residue in the laboratory tests evaluated by measuring dry weights of residue (Table 1). Agmark RII dye produced less residue when mixed with dicamba than did Rhodamine B dye. Visual evaluations of compatibility tests indicated that picloram alone at 0.25% v/v could be used with any dye tested and Nalcotrol without anticipating problems due to residue. At 1.79% v/v, picloram was not compatible with 0.1 and 0.2% v/v Rhodamine B dye when Nalcotrol was added. Visual evaluations indicated that dicamba alone, at 0.25% v/v was compatible with any dye tested except Rhodamine B liquid dye. Addition of Nalcotrol, as with picloram, caused compatibility problems. At 1.79% v/v, dicamba was compatible with the dyes only when mixed with Bivert.

There were no significant differences in yield of common crupina at both locations of the field experiments (Table 2) due to non-uniform stands at location one and poor control at location two caused by a late application. Early visual observations indicated no difference in control due to dye or gallonage. These compatibility experiments were conducted because of difficulties encountered using Agmark PII dye on a common crupina eradication project. This dye caused spray system plugging when applied at 7 gpa in a helicopter and 50 gpa with a spray gun. Rhodamine B liquid red dye was selected as an alternative, but was not used in the low volume applications with the helicopter. The dye eventually plugged the spray gun used at 50 gpa after approximately 1000 gallons of spray solution had been used. (Idaho Agricultural Experiment station, Moscow, Idaho 83843).

Table 1. Dry weight of residue obtained from mixtures of picloram or dicamba and rhodamine or Agmark RII dye.

	Concentration			
	Herbicide		Dye	Residue
	(% v/v)		(% v/v)	(mg)
Dicamba	0.25	Rhodamine B	0.25	40.0
			0.50	96.7
			1.00	186.7
	1.79		0.25	100.0
			0.50	74.0
			1.00	53.0
	0.25	Agmark RII	0.25	61.9
			0.50	4.1
			1.00	24.9
	1.79		0.25	36.0
			0.50	39.5
			1.00	16.9
Picloram	0.25	Rhodamine B	0.25	2.6
			0.50	0.0
			1.00	13.2
	1.79		0.25	0.0
			0.50	0.0
			1.00	1.8
	0.25	Agmark RII	0.25	53.1
			0.50	27.4
			1.00	18.8
	1.79		0.25	5.9
			0.50	13.0
			1.00	106.4
$LSD_{(0.05)}$				NS[1]

[1]The herbicide by concentration by dye by concentration interaction was not significant.

Table 2. Effect of rhodamine liquid red dye with picloram or dicamba on control of common crupina.

Treatment	Rate	Carrier volume	Yield Location 1	Yield Location 2
	(lb ai/A)	(gpa)	(lb/A)	
check	-	-	489	430
picloram	0.25	10	0	226
picloram	0.25	50	50	686
picloram + rhodamine	0.25 + 0.05% v/v	10	180	443
picloram + rhodamine	0.25 + 0.10% v/v	10	96	533
picloram + rhodamine	0.25 + 0.20% v/v	10	199	483
picloram + rhodamine	0.25 + 0.05% v/v	50	138	510
picloram + rhodamine	0.25 + 0.10% v/v	50	65	775
picloram + rhodamine	0.25 + 0.20% v/v	50	192	452
dicamba	0.50	10	35	774
dicamba	0.50	50	141	571
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.05% v/v	10	199	510
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.10% v/v	10	153	171
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.20% v/v	10	207	-
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.05% v/v	50	92	483
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.10% v/v	50	332	855
dicamba + Bivert + rhodamine	0.50 + 0.06% v/v + 0.20% v/v	50	391	941
$LSD_{(0.05)}$			NS	NS

Effect of selective herbicides on grass and common tansy in a lowland pasture. J. A. Ridgway, R.H. Callihan, C. H. Huston and D.C. Thill A study to evaluate the efficacy of several herbicides on common tansy was established in May, 1984 near Potlatch, Idaho. The herbicides tested were chlorsulfuron (75% dry flowable) at .03, .05, and .16 lb/A, dicamba (1.25 lb ai/gal EC) at 1.0, 2.0, and 3.0 lb/A, Lontrel 205 (a mixture of 0.5 lb 3,6-dichloropicolinic acid plus 2.0 lb 2,4-D/gal) at 0.5, 1.0, and 1.5 lb/A, metsulfuron (60% dry flowable) at .02, .03, and 0.05 lb/A, fluroxypyr (1.67 lb ai/gal EC) at 0.5, 1.0, and 1.5 lb/A, tebuthiuron (80% wettable powder) at 1.0, 2.0, and 3.0 lb/A, and triclopyr (4 lb ai/gal) at 0.5, 1.0, and 2.0 lb/A. All treatments were applied using a backpack sprayer calibrated to deliver 20 gpa at 40 psi through teejet 8002 flat fan nozzles. All plots were treated on June 1, 1984 and evaluated on June 22 and July 31, 1984. The experimental design was a split-plot randomized complete block replicated four times.

The averages of all dicamba and of all metsulfuron treatments resulted in the best tansy control (93% and 94 % respectively), while chlorsulfuron and Lontrel 205 treatments produced good control (82% and 84% respectively). Inadequate tansy control was obtained with triclopyr, fluroxypyr, and tebuthiuron (67%, 57%, and 50% respectively).

Damage to the principal grass species, reed canarygrass, was least with the chlorsulfuron treatments which resulted in a 26% increase in vigor as compared to the untreated check. Triclopyr, fluroxypyr, and Lontrel 205 treatments produced little damage (13%, 16%, and 12%). Reed canarygrass treated with metsulfuron or dicamba sustained moderate damage (51% and 32%), and the tebuthiuron treatment severely damaged reed canarygrass (87%).

Kentucky bluegrass vigor was not affected by the Lontrel 205, fluroxypyr or triclopyr treatments. Chlorsulfuron, dicamba, and metsulfuron moderately injured Kentucky bluegrass (14%-28%), but tebuthiuron damaged this grass extensively with an 89% reduction in vigor.

Timothy was slightly damaged by the fluroxypyr and triclopyr treatments (5% and 11% respectively), while Lontrel 205 and chlorsulfuron induced moderate damage (24% and 22%). The dicamba and metsulfuron treatments extensively damaged this grass (31% and 45%), and the tebuthiuron severely reduced grass vigor by 91%.

Smooth brome treated with fluroxypyr showed a 9% increase in grass vigor as compared to the untreated check, while triclopyr and Lontrel 205 produced only slight damage (9% and 13%, respectively). The chlorsulfuron, dicamba, and metsulfuron treatments resulted in moderate damage to smooth brome (24%, 27%, and 32%), while tebuthiuron severely reduced the vigor of this grass by 89%. Plant response differences due to rate were not statistically significant at P=.95; however dose-response trends are seen in several parts of the data. Reed canarygrass release appeared to be better under the influence of the two lower rates of chlorsulfuron than the higher rate, and this species appeared to suffer less injury from the lowest rate of dicamba, fluroxypyr and tebuthiuron than from the two higher rates of these compounds. Examination of the response of all species to dicamba rate suggests a consistent tendency towards suppression of all species as the rate increased from 1 to 3 lb/A. Likewise the response to tebuthiuron suggests that 1 lb/A suppressed all species, but less than the 2 and 3 lb/A rate. The 0.5 lb/A rate of trichlopyr did not affect Kentucky bluegrass or smooth brome, but the trend suggests suppression by 1 and 2 lb/A. Fluroxypyr at 0.5 lb/A did not appear to affect reed canarygrass, but a tendency to do so is suggested by responses to higher rates. Since the effect of these herbicides on any individual species is confounded by the effect on associated species, interpretation of these data must be done conservatively. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Herbicidal activity on common tansy and associated grass species.

Herbicide	Rate (lb/A)	CHYVU (%)	TYPAR (%)	POAPR (%)	PHLPR (%)	BROIN (%)
		Estimated biomass[1]				
Chlorsulfuron	.03	16	134	79	76	69
Chlorsulfuron	.05	20	138	95	81	74
Chlorsulfuron	.16	17	106	84	76	87
	ave.	18	126	86	78	76
Dicamba	1.0	14	79	88	84	95
Dicamba	2.0	4	70	78	66	71
Dicamba	3.0	3	59	72	58	54
	ave.	7	69	79	69	73
Lontrel 205	.50	19	68	96	69	104
Lontrel 205	1.0	17	111	99	86	76
Lontrel 205	1.5	14	85	108	74	82
	ave.	16	88	101	76	88
Metsulfuron	.02	6	46	79	56	70
Metsulfuron	.03	6	35	72	59	69
Metsulfuron	.05	4	67	64	49	65
	ave.	6	50	72	55	68
Fluroxypyr	.50	31	110	101	94	126
Fluroxypyr	1.0	80	83	95	95	104
Fluroxypyr	1.5	18	60	99	96	96
	ave.	43	84	98	95	109
Tebuthiuron	1.0	70	22	19	16	22
Tebuthiuron	2.0	40	8	7	7	7
Tebuthiuron	3.0	39	8	8	4	4
	ave.	50	13	11	9	11
Triclopyr	.50	48	84	110	89	108
Triclopyr	1.0	31	96	91	94	92
Triclopyr	2.0	22	81	95	85	74
	ave.	33	87	99	89	92
$LSD_{(<0.05)}$ (for averages)		34	47	29	28	42

[1]Estimated biomass expressed as percent of untreated check. 100=no effect, 0=complete control.

[2]Plant Designations: CHYVU = common tansy; TYPAR = reed canarygrass; POAPR = Kentucky bluegrass; PHLPR = timothy; BROIN = smooth brome.

Effect of picloram and fertilizer on meadow hawkweed and grass yields over a two-year period. Callihan, R. H., C. H. Huston, R. E. McDole, 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 25, 1983 and June 24, 1984. The samples were air-dried and weighed.

1983 Results

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

Grass yields in plots treated with fall and spring picloram plus high fertilizer, and the spring picloram plus low fertilizer treatments were greater than yields from 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.

1984 Results

On April 15, 1984, 50 lb/A nitrogen (NH_4NO_3) was applied to one-half of each plot, the other half was left untreated.

Treatments including 1982 spring applied picloram produced the lowest meadow hawkweed yields (Tables 1 and 2). 1982 fertilizer treatment did not interact with picloram or application time in affecting hawkweed yields (Table 3). However, hawkweed yields in fall treatments containing picloram tended to decrease with increased 1982 fertilizer (Table 1). Hawkweed yield in the fall picloram plus 125 lb/A nitrogen treatment did not significantly differ from that in spring picloram treatments. In treatments which received fall or spring picloram, except fall applied picloram plus 62.5 lb/A nitrogen, the 1984 nitrogen treatment strongly tended to produce lower hawkweed yields (Table 1).

When summed across fertilizer, grass yield was greatest in spring picloram treatments and least in fall and spring no-picloram treatments (Table 2). Grass yield increased with increasing 1982 nitrogen when summed across picloram and time (Table 3), however nitrogen alone applied in 1982 did not affect grass yield (Table 1).

In all treatments, except the spring untreated check, the addition of nitrogen in 1984 tended to increase grass yield compared to the corresponding no 1984 nitrogen treatment (Table 1). When summed across picloram, 1982 fertilizer and time 1984 nitrogen significantly increased grass yield from 2103 lb/A without nitrogen, to 2482 lb/A with nitrogen (Table 4).

Table 1. Effects of 1982 and 1984 treatments on 1984 yield of Meadow hawkweed and grass.

1982 Picloram	1982 Fertilizer	Time of Application	1984 Fertilizer	yield HEIPR	yield Grass
----------lb/A-----------			(lb/A)	-----lb/A-----	
0	0	Spring	0	876	1,401
0	0	Spring	50	1533	1,351
0	62	Spring	0	1000	1,520
0	62	Spring	50	1019	2,147
0	125	Spring	0	876	2,110
0	125	Spring	50	1217	2,145
0.38	0	Spring	0	11	2,917
0.38	0	Spring	50	0	3,432
0.38	62	Spring	0	130	3,102
0.38	62	Spring	50	0	3,608
0.38	125	Spring	0	0	2,752
0.38	125	Spring	50	0	3,150
0	0	Fall	0	1142	1,489
0	0	Fall	50	1243	2,174
0	62	Fall	0	1118	1,234
0	62	Fall	50	1098	1,511
0	125	Fall	0	860	2,068
0	125	Fall	50	1087	2,460
0.38	0	Fall	0	722	1,903
0.38	0	Fall	50	1113	2,024
0.38	62	Fall	0	693	1,962
0.38	62	Fall	50	651	2,441
0.38	125	Fall	0	299	2,776
0.38	125	Fall	50	152	3,357
$LSD_{0.05}$				515	891

Table 2. Effect of Picloram in spring and fall of 1982 on 1984 yield of hawkweed and grass.

Picloram	Time of 1982 Application	HIEPR	Grass
(lbs/A)		(lbs/A)	
0	Spring	1087	1780
0.38	Spring	24	3161
0	Fall	1091	1822
0.38	Fall	605	2407
$LSD_{0.05}$		211	363

Table 3. Effect of 1982 fertilzer on 1984 yield of hawkweed and grass.

Nitrogen	HIEPR	Grass
(lb/A)	(lbs/A)	
0	829	1428
62.5	713	2187
125	554	2603
$LSD_{0.05}$	(NS)	449

Table 4. Effect of 1984 fertilizer on 1984 yield of hawkweed and grass.

Nitrogen	HIEPR	Grass
(lb/A)	(lbs/A)	
0	645	2103
50	759	2482
$LSD_{0.05}$	(NS)	257

Establishment of intermediate wheatgrass in a yellow starthistle infested range. Callihan, R.H., C.H. Huston, and D.C. Thill. This study was established to determine the effectiveness of a rangeland drill, in conjunction with picloram or glyphosate treatments, to establish intermediate wheatgrass in yellow starthistle infested rangeland. Four treatments were established in a randomized complete block design on December 11, 1981 near Lapwai, Idaho. Treatments were: picloram at 0.38 lb/A followed by 15 lb/A drill-seeded intermediate wheatgrass: 1.0 lb/A glyphosate followed by 14 lb/A drilled intermediate wheatgrass seed: 14 lb/A drill-seeded intermediate wheatgrass seed, and non-treated check. All herbicides were broadcast sprayed in 20 gpa water at 40 psi using Teejet 5002 flatfan nozzles. Yields of yellow starthistle, intermediate wheatgrass, annual grasses, and forbs were measured on July 10, 1983 and June 26, 1984 by clipping 4.7 ft^2 quadrats.

1983 Harvest results

The only treatment providing adequate starthistle control was picloram followed by seeding. This treatment also produced the greatest intermediate wheatgrass and forb yields, 301 lb/A and 148 lb/A, respectively. The major forb component was moth mullein. Wheatgrass yields in all other treatments were less than 30 lb/A.

1984 Harvest results

The only treatment continuing to provide starthistle control was picloram followed by seeding, which reduced starthistle yield to 341 lb/A. This treatment also produced the greatest amount of wheatgrass, annual grass (primarily downy brome and medusahead) and forbs (moth mullein). Starthistle yield in the other treatments did not differ, ranging from 1166 to 1339 lb/A. Wheatgrass yield from plots seeded together with, or without, glyphosate did not differ from each other, but the yield of the glyphosate treatment plus seeding was greater than the unseeded check (20 lb/A). Mean annual grass yields ranged from 240 to 310 lb/A among the glyphosate-seed, seed-alone treatments, and the check. Mean forb yields ranged from 31 to 40 lb/A. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Establishment of intermediate wheatgrass

Treatment	Yield (lb/A) AGRIN	CENSO	Annual[1] grasses	VERBL
1983 Results				
0.38 lb/A picloram + seed(15 lb/A)	301	50	177	148
1.0 lb/A glyphosate + seed(15 lb/A)	28	518	96	30
Seed(15 lb/A)	27	412	184	34
Untreated Check	20	310	176	22
$LSD_{0.05}$	33	298	140	60
1984 Results				
0.38 lb/A picloram + seed(15 lb/A)	598	341	528	92
1.0 lb/A glyphosate + seed(15 lb/A)	101	1,156	255	31
Seed(15 lb/A)	114	1,117	240	40
Untreated check	20	1,339	310	35
$LSD_{0.05}$	95	207	132	53

Effects of burning and aerial seeding on yellow starthistle infested range two and three years after treatment. Huston, C.H., R.H. Callihan, and D.C. Thill. During the spring and fall of 1981, a study was established near Julietta, Idaho to determine the effects of burning and seeding of grasses on yellow starthistle control and range rehabilitation. Individual plots measured 250 by 170 ft and were replicated four times. The entire plot area was aerially sprayed with 6 oz/A picloram on June 10, 1981 and again in April, 1984. On October 9, 1981, controlled burn treatments were applied using a backfire to produce maximum combustion and ash. Seeded plots were split with one half receiving 15 lb/A intermediate wheatgrass seed, and the other half receiving 15 lb/A big bluegrass seed. Grass seed was broadcast using a cyclone spreader to simulate aerial seeding. Samples from each plot were harvested on August 15, 1983 and June 25, 1984, using 4.7 ft_2 quadrats. The samples were separated, dried and weighed.

1983 Harvest Results

Yellow starthistle, annual grass (downy brome, bulbous bluegrass, and medusahead) and forb (moth mullien, annual sunflower, and field bindweed) yields were not affected by burning or seeding. Intermediate wheatgrass yield in burned treatments (168 lb/A) was significantly greater than in unburned treatments (41 lb/A) and greater than big bluegrass yields in both burned and unburned treatments, (70 and 48 lb/A , respectively). Big bluegrass yields were not affected by burning.

1984 Harvest Results

Annual grass (downy brome, bulbous bluegrass, and medusahead) and forb (field bindweed and lupine) yields were not affected by burning or seeding. The mean annual grass and forb yields were 1237 and 53 lb/A, respectively. Intermediate wheatgrass yield was significantly greater in the burn treatment (201 lb/A) than in the no-burn treatment (48 lb/A). Burning did not affect big bluegrass yield compared to the no-burn treatment, 37 and 44 lb/A respectively. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effect of 1981 burning on 1983 and 1984 yields of intermediate wheatgrass and big bluegrass

	1983 Yields	
Treatment	Intermediate wheatgrass	Big Bluegrass
	--------(lbs/A)-------	
Burn	168	70
No Burn	41	48
$LSD_{0.05}$	84	84

	1984 Yields	
Treatment	Intermediate wheatgrass	Big Bluegrass
	--------(lbs/A)-------	
Burn	201	37
No Burn	48	44
$LSD_{0.05}$	130	37

Rehabilitation of yellow starthistle-infested rangeland with seeding, picloram, and fertilizer. 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 seeded in yellow starthistle infested rangeland. On April 5, 1983, the entire plot was tilled with a tandem disc to prepare the seedbed and remove presently growing annual grasses. Plot design was a split plot with fertilizer and/or picloram constituting the main treatmeents. 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 lb/gal) treatments of 0.25 lb/A were broadcast sprayed on April 7 using a backpack sprayer equipped with 8002 Teejet 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, 1983, using 4.7 ft^2 quadrats, and on June 29, 1984 using 2.5 ft^2 quadrats. Forage samples were separated, dried, and weighed.

1983 Results

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 nor 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 in affecting the yields.

Annual grass, predominantly medusahead and downy brome yields were highest in the picloram treated plots. Seeding or fertilizer alone did not significantly affect annual grass yields. Moth mullein yields were not affected by treatments.

1984 Results

Intermediate wheatgrass forage yield was greatest in seeded plots treated with picloram (995 lb/A) or picloram plus fertilizer (833 lb/A). Picloram and seeding interacted to produce a mean yield of 906 lb/A. Treatments with seed alone or seed plus fertilizer produced yields of 192 and 0 lb/A, respectively. Fertilizer treatments did not influence wheatgrass yield.

Yellow starthistle yield was lowest, (280 lb/A) in treatments receiving picloram plus seed. The picloram plus fertilizer treatment yielded 561 lb/A but did not differ from the yields from plots treated with picloram plus seed (334 lb/A) or the picloram alone (791 lb/A) treatments. Starthistle yield in treatments not receiving picloram ranged from 1114 to 1294 lb/A. Fertilizer treatments did not affect starthistle yield.

Annual grass yield was greatest in treatments receiving picloram alone (1071 lb/A), picloram plus fertilizer (1225 lb/A), and picloram plus seed plus fertilizer (1106 lb/A). Annual grass yields in treatments not receiving picloram or the picloram plus seed treatment ranged from 584 to 722 lb/A and were not significantly different from each other. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effects of seeding, picloram and fertilizer on species composition

1983 Yields

Treatment			Forage dry weights			
Seed	Picloram	Nitrogen	CENSO[1]	Angr[2]	AGRIN[3]	VERBL[4]
(lb/A)			(lb/A)			
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

1984 Yields

0	0.00	0	1294	687	0
0	0.00	50	1210	584	0
0	0.25	0	791	1068	134
0	0.25	50	561	1225	142
15	0.00	0	1167	722	192
15	0.00	50	1114	695	0
15	0.25	0	334	707	995
15	0.25	50	223	991	822
$LSD_{0.05}$			372	242	318

1 Yellow starthistle
2 Annual grasses = medusahead and downy brome
3 Intermediate wheatgrass
4 Moth mullein

PROJECT 3.

UNDESIRABLE WOODY PLANTS

Mike Newton - Project Chairman

Forage production and big sagebrush (Artemisia tridentata Nutt.) control from areas treated with tebuthiuron 20P six 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 was obtained by using point transects on August 5, 1981 and July 13, 1982 and visual evaluations July 20, 1983 and July 30, 1984. Forage was also clipped on these dates. Areas treated with 0.67 and 0.94 lb ai/A tebuthiuron are still showing some visual grass damage six years after application. However, forage production is considerably better with these treatments compared to the check. Sagebrush control six years following treatment, ranged from a low of 25% on the area treated with tebuthiuron at 0.31 lb ai/A to 98% control where the 0.67 and 0.94 lb ai/A rates were applied. There appears to be a decrease in sagebrush control, over time with the 0.31 lb ai/A rate, whereas control has remained the same at the 0.67 and 0.94 lb ai/A rates. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1316.)

Forage production and sagebrush control

Treatment[1]	Rate	Percent Control					Oven-dry Forage (lb/A)			
	lb ai/A	1979	1981	1982	1983	1984	1981	1982	1983	1984
tebuthiuron 20P	0.31	40	69	33	30	25	382 b[3]	518 a[3]	390 bc[3]	227 b[3]
tebuthiuron 20P	0.67	70	96	100	95	98	715 a	690 b	738 a	443 a
tebuthiuron 20P	0.94	80	99	96	98	98	552 ab	566 c	512 ab	216 b
Check	---	--	--	---	--	--	308 b	266 d	159 c	101 b

[1]Treatments applied November 11, 1978.

[2]Forage clipped from same areas in 1981, 1982, 1983 and 1984.

[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 August 2, 1984. Four years following application rates of 0.5 lb ai/A or higher are still resulting in considerable grass damage. However, the grass damage is not reflected in forage yields. The 0.5 lb ai/A rate appears to be the optimum and effective rate, resulting in 95 to 98% control for both formulations fall or spring applied. There appears to be little difference in control between the 10P and 20P formulations or between the fall and spring application dates four years after tebuthiuron application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1317.)

Sagebrush control, grass 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	68	517	0
tebuthiuron 10P	0.5	98	316	10 - 20
tebuthiuron 10P	0.75	99	361	25 - 40
tebuthiuron 10P	1.0	100	353	20 - 80
tebuthiuron 20P	0.25	52	307	0
tebuthiuron 20P	0.5	95	258	20 - 30
tebuthiuron 20P	0.75	96	195	20 - 50
tebuthiuron 20P	1.0	98	351	30 - 60
Check	---	0	126	0
Fall Treatment[2]				
tebuthiuron 10P	0.25	72	329	0
tebuthiuron 10P	0.5	96	331	0 - 20
tebuthiuron 10P	0.75	99	314	25 - 40
tebuthiuron 10P	1.0	100	223	60 - 80
tebuthiuron 20P	0.25	70	252	0
tebuthiuron 20P	0.5	98	282	15 - 20
tebuthiuron 20P	0.75	100	382	25 - 50
tebuthiuron 20P	1.0	100	279	40 - 70
Check	---	0	128	0

[1]Spring treatments applied May 5, 1980.
[2]Fall treatments applied September 16, 1980.
[3]Pecent control, forage production and grass damage evaluations August 2, 1984. Production from 2.5 ft diameter quadrat per replication.

Evaluation of applications of 10P and 20P formulations of aerial applied tebuthiuron for big sagebrush (Artemisia tridentata Nutt.) control. 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 were made August 1, 1984. All rates are showing 95% or better control of sagebrush with no apparent difference between formulations, four years after application. However, grass damage is evident with all treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1318.)

Big sagebrush control and forage production

Treatment[1]	Rate lb ai/A	Percent Control[2]	Grass Damage
tebuthiuron 20P	0.30	95	Moderate grass damage
tebuthiuron 20P	0.60	98	Heavy grass damage
tebuthiuron 20P	0.90	100	Heavy grass damage
tebuthiuron 20P	1.2	100	Heavy grass damage
tebuthiuron 20P 3/16" pellet	0.90	100	Heavy grass damage
tebuthiuron 10P	0.28	100	Heavy grass damage
tebuthiuron 10P	0.55	100	Moderate grass damage
tebuthiuron 10P	0.83	95	Heavy grass damage
tebuthiuron 10P	1.10	100	Heavy grass damage
Check	----	---	

[1]Treatments applied October 21, 1980.
[2]Percent control and grass damage evaluations August 1, 1984.

Evaluation of fall and spring applications of tebuthiuron 10P and 20P formulations for big sagebrush 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 operated 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 production clippings were made August 1, 1984. Four years after application grass damage is evident with all treatments and is especially pronounced at the higher rates. The grass damage is not reflected in the forage yields. Granular control is excellent with the 0.5 lb ai/A rate or higher. There is little difference in control between the 10P and 20P formulations or the fall and spring applications. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1319.)

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	78	425	5 - 15
tebuthiuron 10P	0.5	99	638	10 - 30
tebuthiuron 10P	0.75	98	361	20 - 40
tebuthiuron 10P	1.0	100	453	30 - 40
tebuthiuron 20P	0.25	57	290	10 - 15
tebuthiuron 20P	0.5	86	884	5 - 20
tebuthiuron 20P	0.75	99	488	5 - 25
tebuthiuron 20P	1.0	100	417	25 - 35
Check	---	0	417	0
Fall Treatment[2]				
tebuthiuron 10P	0.25	63	972	10
tebuthiuron 10P	0.5	95	876	10 - 35
tebuthiuron 10P	0.75	100	1,107	25 - 30
tebuthiuron 10P	1.0	100	745	40 - 75
tebuthiuron 20P	0.25	93	1,083	5 - 15
tebuthiuron 20P	0.5	100	1,326	5 - 35
tebuthiuron 20P	0.75	100	290	25 - 95
tebuthiuron 20P	1.0	100	211	50 - 80
Check	---	0	163	0

[1]Spring treatments applied June 24, 1980.
[2]Fall treatments applied September 6, 1980.
[3]Percent control, forage production and grass damage evaluations August 1, 1984. Production from 2.5 ft diameter quadrat per replication.

Evaluation of herbicides to control sand sagebrush. Ferrell, M. A. and H. P. Alley. Sand sagebrush is not particularly palatable to livestock. It is mainly a problem in southeastern Wyoming where it frequently occupies extensive acreages. This experiment was established to compare various herbicides for the control of sand sagebrush.

Plots were established June 14, 1982 on a mature and uniform stand of sand sagebrush. The sand sagebrush was 12 to 18 in. in height and in excellent condition with a good understory of grass 4 to 6 in. in height on the site. Liquid formulations were applied with a 6 nozzle knapsack spray unit in 40 gpa water carrier. Granular formulations were applied with a hand operated centrifugal granular applicator. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. The soil was a loamy sand (81% sand, 13% silt, and 6% clay) with 1.4% organic matter and a pH of 7.8.

No treatment effectively controlled sand sagebrush one year following application. However, when evaluated in 1984, two years following treatment, UC 77179 applied at 6.0 lb ai/A gave 100% control. UC 77179 at rates of 2.0 lb ai/A or higher destroyed the grass. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1320.)

Sand sagebrush control

Treatment[1]	Rate lb ai/A	Percent Control[2] 1983	1984	Observations 1984
DPX-T6376 70WP + X-77[3]	0.062	0	0	
DPX-T6376 70WP + X-77	0.50	0	0	
DPX-T6206 70WP + X-77	0.062	3	0	
DPX-T6206 70WP + X-77	0.50	25	0	
PPG-1259 3F	1.0	0	0	
PPG-1259 3F	2.0	13	0	
dicamba 4DMA	1.0	3	0	
dicamba 4DMA	2.0	3	0	
2,4-DLVE	1.0	35	0	
2,4-DLVE	2.0	62	16	
2,4,5-TLVE	1.0	27	0	
2,4,5-TLVE	2.0	33	7	
picloram (K salt)	0.5	0	0	
picloram (K salt)	1.0	35	33	
tebuthiuron 20P	0.25	17	0	
tebuthiuron 20P	0.5	20	7	
tebuthiuron 20P	0.75	0	10	
UC 77179 80WP	0.5	3	0	
UC 77179 80WP	2.0	50	50	100% grass kill
UC 77179 80WP	6.0	58	100	100% grass kill
triclopyr 4E	0.25	0	0	
triclopyr 4E	1.0	3	0	
triclopyr 4E + 2,4-DLVE	0.5 + 1.0	17	0	
Dowco 290	0.25	0	0	
Dowco 290	1.0	23	7	

[1]Treatments applied June 14, 1982.
[2]Evaluations June 15, 1983 and July 12, 1984.
[3]X-77 applied at 0.125% v/v.

Evaluation of sand sagebrush control with herbicides. Ferrell, M. A. and H. P. Alley. Sand sagebrush is not particularly palatable to livestock. It is mainly a problem in the southeastern parts of Wyoming where it frequently occupies extensive acreages. This experiment was established to compare various herbicides for the control of sand sagebrush.

Plots were established on a mature stand of sand sagebrush July 6, 1983, near Torrington, Wyoming. The sand sagebrush was 12 to 18 in. in height and in excellent condition with a good understory of grass 4 to 6 in. in height on the site. Liquid formulations were applied with a 6 nozzle knapsack spray unit in 40 gpa water carrier. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. The soil was a loamy sand (81% sand, 13% silt, and 6% clay) with 1.4% organic matter and a pH of 7.8.

Visual estimates of sand sagebrush control and grass damage were made July 12, 1984. The treatment of 0.5 gal/A of EH-737 (mixture of 2,4-D, MCPP and dicamba) appeared to be the most effective treatment, resulting in 100% sand sagebrush control with no grass damage. Triclopyr provided 93 to 96% control of sand sagebrush at the 4.0 and 8.0 lb ai/A rate, respectively. NC 28858 gave effective control of sand sagebrush but resulted in corresponding grass damage. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1323.)

Sand sagebrush control

Treatment[1]	Rate/A	Percent[2] Control	Observations
benazolin 50FL	1.0 lb	0	
benazolin 50FL	2.0 lb	3	
triclopyr 4E	4.0 lb	93	
triclopyr 4E	8.0 lb	96	
benazolin/triclopyr	0.5 + 4.0 lb	78	
benazolin/triclopyr	0.5 + 8.0 lb	92	
benazolin/picloram	0.25 + 0.25 lb	16	
benazolin/picloram	0.5 + 0.5 lb	30	
picloram (K salt)	0.25 lb	0	
picloram (K salt)	0.5 lb	16	
picloram (K salt)	1.0 lb	47	
benazolin/2,4,5-T	0.25 + 0.25 lb	30	
benazolin/2,4,5-T	0.5 + 0.5 lb	58	
2,4,5-T (ester)	1.0 lb	60	
2,4,5-T (ester)	2.0 lb	85	
*NC 28858 50WP	1.0 lb	87	90% grass reduction
*NC 28858 50WP	2.0 lb	93	100% grass reduction
*NC 28858 50WP	4.0 lb	90	100% grass reduction
EH-737	0.5 gal	100	

[1]Treatments applied July 6, 1983.
[2]Visual control evaluations July 12, 1984.
*Agral 90 added at 1.0% v/v.

Evaluation of greasewood control with herbicides. Alley, H. P. and M. A. Ferrell. Greasewood is a native deciduous shrub and is prevelant in many areas of Wyoming. It is characteristic of saline or saline alkaline plains and is among the most alkali resistant of the native shrubs. Greasewood can be an important range browse, making otherwise poor land available for winter use by sheep, cattle, and occasionally by horses. However, due to its high alkaline content greasewood must be supplemented with other forage and plenty of water. It has been known to produce bloating or poisoning and death if eaten without other feed. Lethal doses for sheep can be as low as 2 lb of green leaves if taken in a short time without other feed. This experiment was established to evaluate various herbicides for the control of greasewood.

Plots were established August 15, 1983 on greasewood 12 to 40 in. in height. Also present was an understory of pasture grasses 6 to 24 in. high. Liquid formulations were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier. Granular formulations were applied with a hand operated centrifugal granular applicator. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications.

Visual estimates of greasewood control and grass damage were made July 17, 1984. Triclopyr alone and in combination with benazolin gave the highest percentage control of greasewood, 86 to 92%. However, benazolin alone was not effective. NC 28858 at 4.0 lb ai/A resulted in 92% greasewood control, however, grass stands were also reduced 90 to 95%. The 1.0 lb ai/A rate of tebuthiuron 20P reduced grass stand 10% and benazolin/triclopyr at the 0.5 + 8.0 lb ai/A rate reduced grass stand 15%. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1324.)

Greasewood control

Treatment[1]	Rate/A	Percent[2] Control	Observations
benazolin 50FL	1.0 lb	3	
benazolin 50FL	2.0 lb	10	
triclopyr 4EC	4.0 lb	87	
triclopyr 4EC	8.0 lb	90	
benazolin/triclopyr	0.5 + 4.0 lb	92	
benazolin/triclopyr	0.5 + 8.0 lb	86	15% grass reduction
benazolin/picloram	0.25 + 0.25 lb	55	
benazolin/picloram	0.5 + 0.5 lb	62	
picloram (K salt)	0.25 lb	60	
picloram (K salt)	0.5 lb	80	
picloram (K salt)	1.0 lb	77	
benazolin/2,4,5-T	0.25 + 0.25 lb	27	
benazolin/2,4,5-T	0.5 + 0.5 lb	22	
2,4,5-T ester	2.0 lb	52	
*NC 28858 50WP	1.0 lb	7	
*NC 28858 50WP	2.0 lb	52	35% grass reduction
*NC 28858 50WP	4.0 lb	92	90-95% grass reduction
EH-737	0.5 gal	45	
tebuthiuron 20P	0.25 lb	5	
tebuthiuron 20P	0.5 lb	7	
tebuthiuron 20P	1.0 lb	42	10% grass reduction

[1]Treatments applied August 15, 1983.
[2]Visual evaluations July 17, 1984.
*Agral 90 added at 1.0% v/v.

Evaluations of DPX-T6376 for control of Douglas rabbitbrush (*Chrysothamnus viscidiflorus*) and mountain big sagebrush (*Artemisia tridentata vaseyana* (Rydb.)Beetle). Ferrell, M. A., H. P. Alley and T. D. Whitson. Trials as tests were established September 29, 1981 on fully developed rabbitbrush and sagebrush stands in order to evaluate several 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 and rabbitbrush control estimates were made August 2, 1984. Current sagebrush control has decreased from the evaluations made in 1982 and 1983. Control of rabbitbrush has remained comparable over the three year period. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1328.)

Percent control of Douglas rabbitbrush and mountain big sagebrush

Herbicide[1]	Rate lb ai/A	Percent Control[2]						Observations
		Sagebrush			Rabbitbrush			
		1982	1983	1984	1982	1983	1984	
DPX-T6376 75%WP	0.25	72	55	48	28	30	53	No apparent grass damage
DPX-T6376 75%WP	0.5	77	60	52	70	65	73	No apparent grass damage
DPX-T6376 75%WP	1.0	93	82	78	92	93	88	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 and August 2, 1984.

<u>Herbicide control evaluations on spreading wildbuckwheat and sand sagebrush</u>. Alley, H. P. and M. A. Ferrell. Both spreading wildbuckwheat and sand sagebrush are not particularly palatable to livestock and, therefore, increase with grazing pressure. This experiment was established to compare various herbicides for the control of spreading wildbuckwheat and sand sagebrush in rangeland.

Plots were established July 12, 1983. Conditions were dry and both the buckwheat and sand sage were in the post bloom stage-of-growth at the time of treatment. Associated grasses were mature and in fair condition. Livestock congregated on the area during the 1984 season making accurate control evaluations difficult. Liquid formulations were applied with a 6 nozzle knapsack spray unit in 40 gpa water carrier. Granular material was applied by hand. Plots were 9 by 30 ft arranged in randomized complete block design with three replications. The soil was a sand (91% sand, 2% silt, and 7% clay) with 0.8% organic matter and a pH of 7.4.

Visual estimates of spreading wildbuckwheat and sand sage control and grass damage were made July 11, 1984. Although control evaluations were difficult to obtain due to excessive livestock congregation on the treated plots, it appeared as though triclopyr showed the greatest potential for control of spreading wildbuckwheat and sand sagebrush. NC 28858 applied at the 4.0 lb ai/A rate resulted in 80 to 90% control of the two weed species, however, the grass stand was reduced by 95%. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1312.)

Spreading wildbuckwheat and sand sagebrush control

Treatment[1]	Rate/A	Percent Control[2]	
		Buckwheat	Sand sage
benazolin 50FL	1.0 lb	0	0
benazolin 50FL	2.0 lb	0	0
triclopyr 4EC	4.0 lb	95	95
triclopyr 4EC	8.0 lb	90	90
benazolin/triclopyr	0.5 + 4.0 lb	95	70
benazolin/triclopyr	0.5 + 8.0 lb	90	50
benazolin/picloram	0.25 + 0.25 lb	70	50
benazolin/picloram	0.5 + 0.5 lb	70	50
picloram	0.25 lb	0	0
picloram	0.5 lb	0	0
picloram	1.0 lb	0	90
benazolin/2,4,5-T	0.25 + 0.25 lb	0	70
benazolin/2,4,5-T	0.5 + 0.5 lb	0	70
2,4,5-T (ester)	1.0 lb	0	0
2,4,5-T (ester)	2.0 lb	0	90
*NC 28858 50WP	1.0 lb	0	70
*NC 28858 50WP	2.0 lb	50	70
*NC 28858 50WP	4.0 lb	80	90
EH 737	0.5 gal	40	95
tebuthiuron 20P	0.25 lb	0	0
tebuthiuron 20P	0.5 lb	0	0
tebuthiuron 20P	1.0 lb	0	0

[1]Treatments applied July 12, 1983.
[2]Visual evaluations July 11, 1984.
*Agral 90 added at 1.0% v/v.

Evaluation of herbicides for control of big sagebrush and resulting forage production. Ferrell, M. A., H. P. Alley and T. D. Whitson. Various rates of DPX-T6376, DPX-T6206, 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.).

Tests 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 material 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. The soil was a sandy loam (70% sand, 22% silt and 8% clay) with 0.8% organic matter and a pH of 6.5.

Treatments giving the highest percentage sagebrush control, and the least grass damage two years after treatment were: DPX-T6376 at 0.5 lb ai/A, DPX-T6206 at 0.125 and 0.5 lb ai/A, 2,4-D ester at 2.0 lb ai/A, 2,4,5,-T ester at 1.0 and 2.0 lb ai/A, PPG-1259 at 1.0 lb ai/A, and triclopyr 4E at 0.5 and 1.0 lb ai/A. Grass damage has remained comparable between years, with the herbicides PPG-1259, UC 77179 and tebuthiuron still resulting in considerable grass injury and stand reduction, especially at the higher rates of application. There is considerable variation in forage production between years. (Wyoming Agr. Exp. Sta., Laramie, WY 82071, SR 1321.)

Sagebrush control, forage production and grass damage

Herbicide[1]	Rate lb ai/A	Percent Control[2] 1983	1984	Air Dry Forage lb/A 1983	1984	Observations
DPX-T 6376 70% WP + X-77	0.031	54	33	526	310	
DPX-T 6376 70% WP + X-77	0.062	86	67	628	406	
DPX-T 6376 70% WP + X-77	0.125	87	68	530	348	
DPX-T 6376 70% WP + X-77	0.5	100	100	586	368	
DPX-T 6206 70% WP + X-77	0.031	68	58	494	282	
DPX-T 6206 70% WP + X-77	0.062	68	53	748	479	
DPX-T 6206 70% WP + X-77	0.125	91	88	564	609	
DPX-T 6206 70% WP + X-77	0.125	98	95	504	865	
PPG 1259 FL	1.0	100	100	532	631	0 - 30% grass reduction
PPG 1259 FL	2.0	100	100	102	404	60 - 80% grass reduction
PPG 1259 FL	4.0	100	100	94	203	80 - 95% grass reduction
dicamba 4DMA	1.0	0	7	344	224	
dicamba 4DMA	2.0	38	30	432	276	
2,4-D ester	1.0	63	55	506	300	
2,4-D ester	2.0	98	97	564	470	
2,4,5-T ester	1.0	93	90	436	281	
2,4,5-T ester	2.0	98	95	802	574	
tebuthiuron 20P	0.125	35	47	418	291	
tebuthiuron 20P	0.25	75	85	406	471	0 - 15% grass reduction
tebuthiuron 20P	0.5	92	93	210	368	10 - 50% grass reduction
tebuthiuron 20P	0.75	99	99	132	126	50 - 80% grass reduction
tebuthiuron 20P	1.0	99	99	120	139	50-75% grass reduction
UC 77179	0.5	91	83	126	385	40-70% grass reduction
UC 77179	1.0	100	100	352	107	90 - 98% grass reduction
UC 77179	2.0	100	100	0	0	100% grass reduction
UC 77179	4.0	100	100	0	0	100% grass reduction
UC 77179	6.0	100	100	0	0	100% grass reduction
triclopyr 4E	0.25	38	18	604	342	
triclopyr 4E	0.5	96	93	622	476	
triclopyr 4E	1.0	94	93	762	406	
triclopyr 4E/2,4-D ester	0.5 + 1.0	89	80	356	211	
Dowco 290 (M-3972)	0.25	8	5	476	243	
Dowco 290 (M-3972)	0.5	33	27	506	438	
Dowco 290 (M-3972)	1.0	43	27	442	312	
Check	---	---	---	304	176	

[1]Herbicide treatments applied June 10, 1982.

[2]Visual control evaluations May 23, 1983 and May 31, 1984 and production measurements July 19, 1983 and July 24, 1984. Production from 2.5 ft diameter quadrat per replication.

Evaluation of HOE-661 as a pre-burn desiccant in forest brushfields. Newton, M. and E. C. Cole. HOE-661 was evaluated for three seasons for potential uses in reforestation. Initial trials as a herbaceous weed control agent indicated that phytoxicity to Douglas-fir, grand fir and ponderosa pine were too severe to use as a selective weed control agent. It did not demonstrate residual effect in soil, and did not injure seedlings planted immediately after treatment. Rates of 1 to 3 pounds per acre, a.i. all produced the same effects in the Oregon Coast Range.

Lack of residual effect and non-selective rapid desiccation are desirable characteristics for a pre-burn desiccant. HOE-661 was applied in the first year to a Coast Range brushfield scheduled for burning, with an application rate of 1 pound a.i. per acre. Species included sword fern, miscellaneous grasses, vine maple, bigleaf maple sprouts, salmonberry, thimbleberry and evergreen huckleberry. Application was completed on a three-acre plot in late May, by helicopter equipped with D-8-46 nozzles delivering 10 gallons per acre. Surrounding areas were treated with 3 pounds a.i. of dinoseb or 2 pounds a.i. 2,4-D per acre. Within 30 days, fine vegetation was uniformly brown in the tops, but basal leaves were variable. Stems more than 1/4 inch in diameter were dry, but larger stems were progressively more moist. The HOE-661 unit appeared virtually identical to the areas treated with dinoseb. Burned July 9, the HOE-661 burned quickly and completely, with negligible soil scorching, again behaving much like dinoseb and somewhat better than 2,4-D.

In the following year, three similar plots were treated in the same way. In this case, one was burned in early summer, about one month after treatment, one was burned in late summer, and one was not burned. In all cases, it was noted that vegetation was well prepared for burning, but that fuel moisture remained above 28 percent in all stems more than 1/2 inch in diameter for at least 30 days. Differences were observed among species after 30 days, with red alder showing systemic stem damage, but vine maple remaining green. Unlike dinoseb, there was little tendency to "green up" later in the summer, and this product gave a longer period of satisfactory fuel condition. Both burns were hot and clean, leaving highly satisfactory site preparation. No data are available on respouting at this time. (Oregon State University Forest Research Laboratory, Corvallis, OR 97331).

Control of three evergreen brush species with herbicides. Newton, M., E. C. Cole and D. E. White. Varnishleaf ceanothus, hairy manzanita and Pacific madrone were treated with several herbicides in simulated aerial applications. Herbicides were applied broadcast with the "waving wand" technique by backpack sprayer at 10 gallons per acre in two passes in opposite directions. Plot size was 10 x 15 meters. Ten plants of each species were evaluated in each plot. Design was completely randomized, with three replications. The area treated was a five-year-old wildlfire in southwestern Oregon, and most plants were five-year-old germinants. Some of the madrones were sprout clumps. Herbicides used were DPX-T6376, triclopyr ester, hexazinone and 2,4-D ester. Applications were made in both July and August for several treatments, but triclopyr and 2,4-D were applied in July only.

Hairy manzanita was controlled well by DPX-T6376 at all rates in July, but not in August at any rate. The next most effective treatment was 2,4-D. Pacific madrone was controlled satisfactorily by all rates of DPX-T6376, although at 4 oz/ac there was an anomalous low reading. Again, this product was much more effective in July than in August; the lowest rate was much more effective in July than the highest rate in August. Hexazinone was surprisingly effective as a foliage spray independent of soil activity, producing excellent control in July and good control in August. Varnishleaf ceanothus was nearly eradicated by all rates of DPX-T6376 in July; the lowest rate was less effective in August unless Mor-Act adjuvant was added. Triclopyr was effective as a defoliant, but did not provide adequate stem kill. Hexazinone provided excellent control, with little injury to the occasional conifer that appeared in the plots. Similarly to triclopyr, 2,4-D produced defoliation with little stem kill. Although conifers were not present in sufficient numbers for a good evaluation, individuals contacted by any level of DPX-T6376 were killed, and some injury occurred in July treatments by herbicides other than hexazinone, decreasing in August. (Oregon State University Forest Research Laboratory, Corvallis, OR 97331)

Table 1. Control of hairy manzanita with herbicides.

Herbicide	Rate	Season	Defoliation ± SD	Stem kill ± SD
DPX-T6376	2 oz/Ac	July	97 ± 3.0	96 ± 3.8
	4		96 ± 5.8	93 ± 9.5
	8		98 ± 2.9	96 ± 6.4
		August		
	2		51 ± 26.6	22 ± 22.5
	4		46 ± 10.2	34 ± 15.4
	8		69 ± 3.1	51 ± 10.1
DPX-T6376 Plus Mor-Act (1Qt/ac)	2	August	33 ± 22.0	18 ± 21.2
	4		49 ± 10.4	29 ± 3.8
Triclopyr ester	16	July	38 ± 19.6	23 ± 20.7
	24		46 ± 4.7	24 ± 5.1
	32		53 ± 19.0	34 ± 22.0
Hexazinone	32	July	77 ± 25.2	62 ± 36.1
		August	57 ± 12.7	39 ± 16.0
2,4-D ester	32	July	79 ± 11.6	56 ± 22.1

Table 2. Control of Pacific madrone with herbicides.

Herbicide	Rate	Season	Defoliation ± SD	Stem kill ± SD
DPX-T6376	2 oz/A	July	91 ± 10.8	77 ± 16.5
	4		71 ± 22.2	62 ± 23.3
	8		89 ± 13.2	68 ± 21.9
	2	August	49 ± 20.7	13 ± 8.1
	4		37 ± 23.4	17 ± 16.2
	8		58 ± 9.3	29 ± 15.0
DPX-T6376 + Mor-Act (1 Qt/Ac	2	August	49 ± 36.7	23 ± 20.2
	4		65 ± 15.3	35 ± 19.3
Triclopyr ester	16	July	44 ± 22.3	26 ± 19.1
	24		69 ± 14.0	51 ± 15.2
	32		77 ± 5.6	48 ± 8.5
Hexazinone	32	July	93 ± 6.0	67 ± 18.8
		August	82 ± 12.9	62 ± 24.9

Table 3. Control of varnishleaf ceanothus with herbicides.

Herbicide	Rate	Season	Defoliation ± SD	Stem kill ± SD
DPX-T6376	2	July	100	99 ± .6
	4		98 ± 3.5	97 ± 5.2
	8		100	99 ± .3
	2	August	80 ± 15.6	65 ± 28.1
	4		96 ± 3.0	93 ± 3.5
	8		100	99 ± .6
DPX-T6376 (1 Qt/ac)	2		99 ± .6	98 ± 2.1
Triclopyr	16	July	84 ± 6.5	49 ± 26.9
	24		83 ± 6.0	45 ± 3.5
	32		93 ± 5.1	68 ± 16.9
Hexazinone	32	July	99 ± .6	91 ± 8.3
		August	97 ± 5.8	82 ± 9.5
2,4-D ester	32	July	93 ± 5.5	59 ± 19.1

Control of cholla cactus by individual plant treatment. Dickerson, George. Large areas of New Mexico rangeland are characterized by light to medium infestations of cholla cactus. Chaining is often uneconomical and often results in the spread of this pest due to scattering of the canes. Thus, many ranchers are interested in an easy way of chemically controlling this pest on an individual plant treatment basis.

All treatments were applied in June of 1982 at two locations in Eastern New Mexico (Tinnie and Gladstone). Liquid picloram was applied at rates of 2 and 4 lb ai/100 gal of water. The cholla canes were thoroughly wetted with the chemicals, which were pumped from a drum with a small, gasoline-powered sprayer and handgun. Plots were replicated by locations with approximately 30 plants occurring in each plot.

Picloram 10% pellets were applied to the base of other cholla plants with a tablespoon at rates of 0.89 oz per 1, 2 and 3 ft of cactus canopy. Plots were replicated by location with two replications occurring at Tinnie. Approximately 50 plants were treated in each plot. All liquid and granular plots were evaluated in the falls of 1982, 1983 and 1984.

Some browning of the cholla canes was noted in the fall of 1982 but none of the plants had died. Some kill was noted in most of the plots in 1983, but maximum kill occurred in the fall of 1984 (Table). Picloram applied as a foliar spray at 4 lb ai/100 gal H_2O and picloram 10% pellets applied at 0.89 oz ai/1 ft of canopy gave the best control (67% and 65% kill respectively). Two demonstrators near Roswell and Mosquero showed similar results using the picloram pellets. (Cooperative Extension Service, New Mexico State University, Las Cruces, New Mexico, 88003).

Effects of various rates of liquid and granular formulations of picloram on cholla control in Eastern New Mexico.

Chemical	Rate	% Kill[1/] 1983	1984
picloram	2 lb ai/100 gal H_2O	10	33
picloram	4 lb ai/100 gal H_2O	15	67
picloram 10% pellets	0.89 oz ai/1 ft of canopy	40	65
picloram 10% pellets	0.89 oz ai/2 ft of canopy	10	45
picloram 10% pellets	0.89 oz ai/3 ft of canopy	0	23

[1/] Chemicals were applied in June, 1982.

Effects of various rates and formulations of picloram on percent kill and canopy reduction of broom snakeweed in Eastern New Mexico. Dickerson, George. Dense populations of broom snakeweed often characterize the rangeland of Eastern New Mexico. Besides competing for water and nutrients with the local native grass species, broom snakeweed can also cause abortions in livestock. Granular formulations of picloram have been found to effectively control this pest, but control has often been sporadic, particularly with relatively low rates of the 10% formulation presently registered on rangeland.

In the spring and fall of 1981 and the fall of 1982, various rates of picloram 10% and 2% pellets were applied to established stands of broom snakeweed near Clovis, Portales and Roswell, New Mexico. Plots were arranged in a completely random block design with each location representing a replication. Each 50 ft^2 plot was evaluated for percent kill and percent canopy reduction in the falls of 1982, 1983 and 1984.

Both fall and spring applications of picloram 2% pellets at 1.0 lb ai/A gave excellent control of broom snakeweed (Table 1). The fall application gave the best results with an average of 99 percent kill and 100 percent canopy reduction. Picloram 2% pellets at 0.5 lb ai/A was as good or better than picloram 10% pellets at 1.0 lb ai/A. Broom snakeweed cover began to increase in almost all plots in 1984 due to germination of new seedlings. Seedlings growth was particularly heavy in those plots where the snakeweed had previously been controlled in 1982.

Table 1 Effects of various rates and formulations of picloram on percent kill and canopy reduction of broom snakeweed in Eastern New Mexico, 1981.

Formulation	Rate lb ai/A	% Kill [1/] (1982) Spring	Fall	% Canopy reduction Spring 1982	1984	Fall 1982	1984
picloram 2% pellets	1.0	92	99	95	75	100	87
picloram 2% pellets	0.5	74	81	82	93	95	80
picloram 10% pellets	1.0	75	71	81	61	79	76
picloram 10% pellets	0.5	53	53	64	30	70	83
Check	-	0	0	0	0	0	0

[1/] Applications period during 1981

Picloram 10% pellets applied at 1.00 lb ai/A in 1982 resulted in 95% snakeweed kill (Table 2). Similar results were achieved with picloram 2% pellets at half the rate. For almost all plots, canopy reductions was better using the 2% rather than the 10% pellets at the same rates when evaluated in 1984. Seedling germination was heavy in all plots in the fall of 1984. (Cooperative Extension Service, New Mexico State University, Las Cruces, New Mexico, 88003).

Table 2 Effects of various rates and formulations of picloram on percent kill and canopy reduction of broom snakeweed in Eastern, New Mexico, 1982.

Formulation	Rate lb ai/A	% Kill (1983)	% Canopy Reduction (1984)
picloram 2% pellets	0.25	67	54
picloram 2% pellets	0.50	95	76
picloram 2% pellets	0.75	96	76
picloram 2% pellets	1.00	98	85
picloram 10% pellets	0.25	47	18
picloram 10% pellets	0.50	70	69
picloram 10% pellets	0.75	85	79
picloram 10% pellets	1.00	95	82
Check	-	0	0

Control of mature snowbrush ceanothus. Stovicek R. F., R. H. Callihan, and D. C. Thill. Four herbicides; glyphosate, triclopyr amine salt, triclopyr ester and Trimec were applied to mature (20 yr old) snowbrush ceanothus on August 18, 1983. Both triclopyr treatments were applied at 2 lb ae/A, glyphosate at 3 lb ae/A and Trimec-D at 4 lbs ai/A (2.2 lbs ai/A 2,4-D, 1.3 lbs ai/A MCPP, and 0.9 lbs ai/A). Glyphosate and the triethylamine salt of triclopyr were applied with 1% non ionic surfactant. Treatments were applied in a water carrier at 20 gal/A, with teejet 8002 flatfan nozzles at 40 psi. Treatments were replicated 4 times in a randomized block design.

Evaluations were made in July of 1984 a year after applications. No differences were observed between the triclopyr amine, triclopyr ester and glyphosate treatments, where 93, 99 and 99% control was observed respectively. The Trimec treatments resulted in the least control (79%). Grand fir and Douglas fir were not adversly affected by glyphosate or the triclopyr treatments. Trimec caused needle necrosis and bud kill on both conifer species. Grasses were present in the check and triclopyr treated plots but absent in plots treated with glyphosate. (University of Idaho, Moscow, ID 83843)

Control of snowbrush ceanothus

Treatment	Foliar necrosis
	(%)
Triclopyr ester	99a
triclopyr salt	98a
Glyphosate	99a
Trimec	78b

Means followed by the same nunber are not significantly different at the 5% level using LSMEANS.

Basal application of triclopyr to forest shrubs. Callihan, R. H., R. F. Stovicek, D. C. Thill. A thin line of concentrated triclopyr ester was applied to Rocky Mountain maple, chokecherry, alder, willow, serviceberry, and snowbrush ceanothus 40 cm above the soil surface. Individual stems were completely encircled with the spray when possible. Approximately 0.8 mL/cm of stem diameter was applied to all species. Plants were treated on July 20, 1984 and evaluated in early September of the same year. Treatments were replicated 6 times in a completely randomized design.

Complete control (100%) was observed on willow, rocky mountain maple, and serviceberry.

Chokecherry control was 99%, however a series of branches on one of the chokecherry plants found along one axis possessed green healthy leaves. The degree of phytotoxicity increased along the axis in an acropetal direction (moving away from the application point). This implies that horizontal translocation of triclopyr was more restricted than vertical translocation. About 8 dm above the application ring the leaves on all branches were dead.

Complete top kill of rocky mountain maple was accompanied by nearly complete kill (>90%) of untreated adjacent clumps of that species. The untreated clumps were of comparable size to the treated clumps indicating that extensive basipetal and acropetal transport had occurred, with effective underground transfer to adjacent plants. Control of snowbrush ceanothus (26%) and alder (42%) were inadequate. The sites of application on alder stems were still visually identifiable by the discolored rings on the stem. Further inspection revealed that subepidermal tissue directly underlying the application was still green (apparently still living). (University of Idaho, Moscow, ID 83843)

Basal applications of triclopyr to shrubs

Species	Foliar necrosis	Standard deviation
	(%)	
willow	100	0.0
maple	100	0.0
serviceberry	100	0.0
chokecherry	99	1.2
snowbrush ceanothus	26	10.1
alder	43	21.8

Herbicides for brush dessication study. Stovicek R. F., R. H. Callihan and D. C. Thill. Brush burning is often used in forest site preparation. Herbicides can be used to dessicate woody species to improve the process. Applications were made on September 12, 1984 to four shrub species snowbrush ceanothus, ninebark, spiraea and snowberry, approximately 100 km southeast of Moscow, Idaho. Dinoseb (2.2 kg ai/ha) applied in a diluent consisting of a 1 to 3 ratio of diesel oil to water and Hoe661 (1.7 kg ai/ha) in plain water. Carrier rate was 190 L of carrier per ha. The air temperature was 18 C. Shrub species were evaluated on September 14, 1984 by estimating the percentage of necrotic leaf tissue. Some necrosis was present in the check due to normal senesence. The study was established on 9 m^2 plots and replicated 8 times in a randomized block design 15 miles east of Moscow, Idaho.

*HOE661 and dinoseb gave equal control for all species with the exception of snowbrush ceanothus, where HOE661 produced 68% necrosis. (University of Idaho, Moscow, ID 83843).

Brush dessication

	Treatment		
Species	Dinoseb	Hoe661	Check
	--------(%)---------		
snowbrush ceanothus	68a	39b	2c
ninebark	99a	99a	8b
snowberry	100a	100a	4b
spirea	100a	100a	9b

Percent leaf necrosis. Means followed by the same letter within columns are not different at the 5% level using GLM and separating means with the LSMEANS.

PROJECT 4.

WEEDS IN HORTICULTURAL CROPS

Robert Parker - Project Chairman

Desert saltgrass control in asparagus with sethoxydim and fluazifop-P-butyl. Ogg, A.G., Jr. Sethoxydim and fluazifop-P-butyl were evaluated under field conditions for desert saltgrass control in asparagus. On May 23, 1984, herbicides were applied in 26 gpa at 40 psi to quadruplicated plots one row wide (54 inches) by 150 feet long. Nontreated rows were left between treated rows. MorAct oil-surfactant concentrate was added to sethoxydim sprays at 1 qt/26 gal and to fluazifop-P-butyl sprays at 1% v/v. Saltgrass was mostly 4 inches tall and asparagus spears were up to 5 inches tall at treatment. All plots were retreated 30 days later. Treatments were evaluated by visual comparison of the growth and vigor of plants in treated rows to the growth and vigor of plants in the nontreated rows.

The first application of fluazifop-P-butyl controlled saltgrass only slightly better than the first application of sethoxydim; however, about one month after the second application, saltgrass control with fluazifop-P-butyl was much better than with sethoxydim (Table 1). By October, control of saltgrass with sethoxydim had deteriorated to a low level, whereas control with fluazifop-P-butyl remained excellent. Neither herbicide injured asparagus visibly. (USDA-ARS, Irr. Agri. Res. and Ext. Center, Prosser, WA 99350).

Table 1. Desert saltgrass control in asparagus with sethoxydim and fluazifop-P-butyl. 1984

Herbicide[2/]	Rate	% Saltgrass control[1/]			% Crop injury		
	Lb ai/A	6/22	8/1	10/3	6/22	8/1	10/3
Fluazifop-P-butyl	3/8 + 3/8	74 b	98 a	98 a	0	0	0
Fluazifop-P-butyl	3/4 + 3/4	84 a	98 a	98 a	0	0	0
Sethoxydim	1/2	68 c	50 b	26 b	0	0	0

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

2/ MorAct oil-surfactant concentrate added to fluazifop-P-butyl sprays at 1% v/v and to sethoxydim sprays at 1 qt/26 gal.

Herbicides for weed control in carrots. Crabtree, G.D., M.T. Madrid, Jr., and W.O. King. Combinations of linuron with fluazifop-butyl (PP-005) or sethoxydim provided broad spectrum weed control in a 1984 field trial conducted at Corvallis, OR on a sandy loam soil. All herbicide applications were postemergence to the crop with early applications at the one-leaf stage and late applications two weeks later when the carrots were about 3 inches tall and had 4 true leaves. Fluazifop-butyl (PP-005) and sethoxydim alone did not control dicotyledonous weeds and the planned hand removal of these weeds in plots without linuron was not done as needed, so crop yields were significantly reduced as a result of weed interference rather than herbicide injury. This problem existed to a lesser extent in the weeded check treatment. Results of representative treatments are summarized in the accompanying table. (Oregon State University, Department of Horticulture, Corvallis, OR)

Weed control and crop response in carrot herbicide trial

Herbicide	Application rate (lbs ai/A)	Timing	Weed control rating[1/] Wild radish	Nightshade	Grass	Carrot yield (kg/plot)
Fluazifop-butyl (PP-005)	0.125	Late post	22	20	69	6.75 c[3/]
Sethoxydim	0.25	Late post	14	32	67	4.15 c
Linuron	0.50	Late post	51	66	40	11.15 b
Linuron plus Fluazifop-butyl (PP-005)	0.50 0.125	Early post Late post	67	57	96	19.80 a
Linuron plus Linuron	0.50 1.00	Early post Late post	100	100	90	18.10 a
Linuron plus Linuron plus Fluazifop-butyl (PP-005)	0.50 1.00 0.25	Early post Late post Late post	100	100	100	19.32 a
Weeded check	--	--	--	--	--	10.65 b

1/ Ratings are a combination of visual evaluations of growth reduction and stand reduction with 0=no effect and 100=complete kill.
2/ All grass species rated together; included primarily barnyardgrass, ryegrass, and witchgrass.
3/ Means followed by the same letter are not significantly different at the 0.5 level.

Herbicides for weed control in chard and spinach. Crabtree, G.D., W.O. King, and M.T. Madrid, Jr. Control of wild radish and nightshade with diethatyl-ethyl or pyrazon was evaluated in a 1984 field trial at Corvallis, OR. Diethatyl-ethyl and pyrazon applied preemergence to the crops and weeds and followed with overhead irrigation, provided control of the two weed species except that wild radish was not controlled with diethatyl-ethyl. The highest rate (8.0 lbs ai/A) of diethatyl-ethyl appeared to reduce growth of chard and spinach but these crop responses were not statistically significant. Pyrazon, which was tested on chard only, had similar effects at the 6.0 lbs ai/A rate. (Oregon State University, Department of Horticulture, Corvallis, OR)

Weed control in chard and spinach

	Minimum application rate (lbs ai/A) for control			
	Diethatyl-ethyl		Pyrazon	
Weed species	Acceptable	Complete	Acceptable	Complete
Nightshade	2.0	8.0	2.0	3.0
Wild radish	--	--	3.0	6.0

Testing crucifer tolerance to several preemergence herbicides in Oregon. William, R.D., R.L. Rackham, R.B. McReynolds, John Leffel, Greg Loberg, Dave Fuller, and Steve Ferschweiler. A dozen trials involving nine crucifer crops were conducted to evaluate use of several preemergence herbicides over a broad range of planting dates, environmental, and soil conditions. Trials involving cauliflower, broccoli, and two each of red and white radish were not injured with various rates of napropamide, metolachlor, propachlor, or diethatyl-ethyl. However, root crops including radish, rutabaga, and turnip were more sensitive to diethatyl-ethyl than to other herbicides. Common cabbage was injured at the higher rates of each herbicide, whereas Chinese cabbage and Chinese mustard were sensitive to all herbicides at all rates. Weed control results are summarized below and correspond to general crop tolerance trends; namely, propachlor provided the best over-all weed control and crop tolerance with metolachlor a close second. When properly activated, napropamide also can improve weed control. (Oregon Extension Service, Ag-Services Inc., Waconda Seed, and Arco Seed cooperating)

Summary of weed control ratings for herbicides tested in crucifers

Weed	napropamide 2 to 4 lbs ai/A	metolachlor 2 to 3 lbs ai/A	propachlor 2 to 6 lbs ai/A	diethatyl ethyl 2 to 8 lbs ai/A
	- - - - - - - - (number of trials) - - - - - - -			
dog fennel	--	--	2	2
groundsel	--	1	1	--
shepardspurse	--	2	2	2
pigweed	1	1	1	--
nightshade[a/]	--	1	1	1
barnyardgrass	1	1	1	1

[a/] Another trial resulted in poor nightshade control for all treatments.

Crucifer[a/] tolerance to several preemergence herbicides

Treatment	Rate (lbs ai/A)	Crop phytotoxicity rating (0-10)[b/] radish (white)	turnip	rutabaga	Chinese cabbage 1	Chinese cabbage 2	Chinese mustard	cabbage
Check	--	0	0	0	0	0	0	0
Napropamide	1.5	0.2	0	0	0.6	0.8	2	0
	2.0	0.2	0	0	1.3	1	1	0
	4.0	0.2	0	0	1.5	1.8	7	0.5
Metolachlor	0.75	0	0	0	0.6	1	3.2	0
	1.0	0.2	0	0	6.1	2.2	6	0
	1.5	0	0	0	4.1	2.2	6.8	0
	2.0	0.2	0	0	--	5.8	8.5	0.8
	3.0	0	0	0.2	9.5	6.0	9	0.8
Propachlor	2.0	0	0	0	--	1.2	2	0
	2.5	0	0	0	--	1.0	2	0
	3.0	0	0	0	--	1.0	5.2	0
	6.0	0	0	0.2	--	5.0	8.8	1.0
Diethatyl ethyl[c/]	2.0 (1.5)	0.2	0.2	0.2	5.8	1.5	6.2	0
	4.0 (3.0)	0.2	0.2	0	9.5	3.2	8.5	0.2
	8.0 (6.0)	0.2	0.5	1.0	10.0	7.0	9.2	1.2
	(12.0)	--	--	--	--	9.0		
Napropamide + metolachlor	2.0 + 1.0	0	0	0	--	--	7.8	0.2
Napropamide + propachlor	2.0 + 2.5	0	0	0	--	--	8.2	0.5
Napropamide + diethatyl ethyl	2.0 + 2.0	0	0	0	--	--	8	0

a/ Crops not injured and not listed in the table were cauliflower, broccoli, two white and two red radish trials.
b/ Crop phytotcxicity ratings: 0=no injury, 10=complete kill.
c/ Rates of diethatyl for Chinese cabbage are stated in ( ).

Evaluation of herbicides for selective weed control in umbelliferous crops. Crabtree, G.D. and W.O. King. Two trials to evaluate control of common annual weeds in several umbelliferous crops were established in 1984 with seeding dates on May 29 and July 25. Both were on a low organic matter, sandy loam soil at Corvallis, OR and both included carrots, coriander, dill, fennel, parsley and parsnip. From the first trial, which included 25 treatments of 10 herbicides at various application rates, timings and combinations, those herbicides that appeared to provide the best control of wild radish and nightshade with the least effect on all crops were linuron, propazine and fluorochloridone. The most effective use of linuron was a split application of 0.5 lb ai/A at the crop one-leaf stage followed with 1.0 lb ai/A 3 weeks later. In these trials, where there was not a sufficient stand of grass weeds to evaluate, there was no benefit from adding a grass herbicide; but in previous studies where grass was a factor, the addition of fluazifop-butyl or sethoxydim broadened the spectrum of control and did not adversely affect the umbelliferous crops. Prometryne used as a single preemergence application at 1.0 lb ai/A was comparable to a split application of 0.5 lb ai/A preemergence and 0.5 lb ai/A applied psotemergence 5 weeks later. In comparing prometryne and propazine at the same application rates, propazine gave slightly better weed control and adequate crop tolerance. Prometryne provided excellent control of nightshade but marginally acceptable control of wild radish. Fluorochloridone applied preemergence at a rate of 0.25 lb ai/A provided good selective control in the six crops. Application rates of 0.5 lb ai/A or higher resulted in crop injury, with coriander and dill appearing to be most sensitive and carrots and fennel moderately sensitive.

In the second trial, most herbicide treatments provided excellent selective control of redroot pigweed and nightshade, the two weed species commonly present. There was some evidence of crop growth retardation in plots receiving a combination of propazine 0.5 lb ai/A applied preemergence followed with 0.5 lb ai/A of linuron 3 weeks later. This was in contrast to split applications of each herbicide with the same total amount applied. Fluorochloridone applied early postemergence caused excessive crop injury and did not adequately control the emerged weeds.

The overall assessment of these two trials would indicate that in comparing linuron and propazine, linuron remained the herbicide of choice for selective weed control in carrots and possibly parsnips; and if grasses are present they can be controlled without crop injury with a combined treatment including either fluazifop-butyl or sethoxydim. Propazine was the preferred herbicide for control of annual weeds in coriander, dill and fennel. There was no clear advantage for either of these herbicides in parsley. Fluorochloridone, applied preemergence to the crops and weeds provided outstanding selective control of the weeds present through the crop season. (Oregon State University, Department of Horticulture, Corvallis, OR)

Preemergence weed control in garlic. Zimmerman, M., R.B. McReynolds, and R.D. William. Growers cultivate garlic up to four times in central Oregon which may cause mechanical injury and possible yield losses. Preemergence herbicides were applied in adjacent trials with and without cultivation at two sites in central Oregon and at one site without cultivation in western Oregon. Although weed control was improved at one site in central Oregon with cultivation, garlic yields were similar regardless of cultivation or mechanical injury. Bensulide caused temporary yellowing of the foliage at one site, but yields were not reduced. Combinations of pendimethalin and chloroxuron provided excellent weed control for common and "French" garlic. (Oregon State University Cooperative Extension, Salem, OR)

Effect of cultivation on garlic yields in central Oregon

Herbicide treatment	Rate (lbs ai/A)	Weight (kg)/100 bulbs	
		no cultivation	cultivation
Check	--	4.2	4.1
Pendimethalin	1.0	4.4	4.3
Pendimethalin	1.5	4.3	4.5
Pendimethalin	2.0	4.5	4.2
Ethalfluralin	1.5	4.4	4.6
Ethalfluralin	2.5	4.7	4.4
Bensulide	6.0	5.2	4.3
Bensulide	9.0	5.4	5.0
Bensulide	12.0	5.2	4.7
Bensulide	18.0	4.4	4.5
Chloroxuron	3.0	4.1	4.1
Chloroxuron	6.0	4.5	4.6
Chloroxuron	9.0	4.0	4.6
Pendimethalin Chloroxuron	1.5 3.0	4.6	4.3
Bensulide Chloroxuron	6.0 3.0	4.5	4.2

Evaluation of bromoxynil and oxyfluorfen combinations for weed control in onions. Anderson, J.L. and M.G. Weeks. Studies were conducted in 1984 to compare the ME4 and AXF1240 formulations of bromoxynil for postemergence weed control in onions. Combinations with grass herbicides were also compared with oxyfluorfen combinations. Treatments were applied with a bicycle sprayer equipped with 8002 nozzles calibrated to deliver 300 l/ha at 40 psi. 'Golden Treasure' onions were treated at the 1 to 1¼ true leaf stage May 31, 1984 at the Farmington Field Station (see attached table). These treatments plus bromoxynil + fluazifop and oxyfluorfen + sethoxydim were also applied to commercial onion fields in west Layton and Corinne, UT on May 19 and 25, respectively. The west Layton plots also received a uniform DCPA preemergence treatment which controlled most annual weeds except heartleaf cocklebur; no combination of treatments effectively controlled cocklebur at this location. Strong winds and blowing sand nearly uprooted onion seedlings and scarred the leaf cuticle prior to postemergence treatments at the west Layton site, but did not appear to increase treatment phytotoxicity in this instance.

The standard ME4 formulation of bromoxynil gave better weed control than the newer AXF1240 formulation at all 3 sites. Very little phytotoxicity was noticed in any treatment plot this year. The addition of crop oil to the lower rate of bromoxynil + sethoxydim increased the grass control (especially in the AXF plots) without causing onion phytotoxicity. No differences in safety were observed between bromoxynil formulations. Crop oil was not included in the DPX-Y6202 + oxyfluorfen treatment which probably accounts for the reduced control of grassy weeds in these plots.

Plots at the Field Station received no additional weed control whereas plots with grower cooperators were hand weeded. Yield data from the station indicate that the bromoxynil ME4 treatments outyielded all other treatments. The increased yield over and above what was anticipated from weed control alone is unexplained. (Utah State University, Logan, Utah 84322).

Effects of postemergence herbicide combinations on onion weed control and yield.

Treatment[1]	Rate (kg/ha)	additive[2]	July 3, 1984 weed control[3] (%)	July 3, 1984 weeds[4] present	August 21, 1984 weed control (%)	August 21, 1984 weeds present	yield[3,5] (kg)
oxyfluorfen + fluazifop-P-butyl	.28 + .07	X-77	81 B	L,SP,BYG,N	68 AB	L,WG,BYG,M, RR	7.0 B
oxyfluorfen + fluazifop-P-butyl	.28 + .14	X-77	86 AB	SP,L	72 AB	WG,L,RR,BYG	6.7 B
oxyfluorfen + fluazifop-P-butyl	.28 + .21	X-77	91 A	L,SP,N,RR	85 A	L,RR,M,P,N	4.3 BC
oxyfluorfen + DPX-Y6202	.28 + .28		79 B	BYG,SP,L	65 B	BYG,WG,L,RR	5.1 B
bromoxynil (ME4) + sethoxydim	.56 + .28		94 A	RR,P,BYG,SG	85 A	RR,BYG,FT, M,SG,P,L	13.0 A
bromoxynil (ME4) + sethoxydim	.42 + .28	crop oil	87 AB	RR,SP,N	85 A	N,RR,SG,P, BYG	12.7 A
bromoxynil (AXF1240) + sethoxydim	.56 + .28		70 C	N,L,RR,BYG,PL	70 B	N,L,PL,RR, WG,FT,BYG	4.9 B
bromoxynil (AXF1240) + sethoxydim	.42 + .28	crop oil	81 B	RR,SP,L,N	80 AB	L,N,RR,M,FT	6.7 B
untreated control			0 D	BYG,L,SP,PL, RR,M,N,SG,P, PW	0 C	BYG,L,SP,PL, RR,M,N,FT,SG, P,PW	0.7 C

[1]Treated May 31, 1984 when onions were in 1-1¼ true leaf stage.

[2]X-77 surfactant added to fluazifop-P-butyl treatment of 0.25%, 1% AG-98 crop oil added where indicated.

[3]A common letter following weed control ratings or yield indicates values are not significantly different at the 5% level according to Duncans multiple range test.

[4]Weed present: BYG = barnyardgrass, FT = foxtail barley, L = lambsquarters, M = common mallow, N = hairy nightshade, P = common purslane, PL = prickley lettuce, PW = pineapple weed, RR = redroot pigweed, SG = stinkgrass, SP = shepherdspurse.

[5]Center 2 of 12 rows of each plot were harvested. Yields are the average weights from 9 m of row.

Field evaluation of onion cultivars for tolerance to bromoxynil and oxyfluorfen. Madrid, M.T. Jr. and G.D. Crabtree. Eight onion cultivars were evaluated for tolerance to 1.0, 2.0 and 4.0 Kg/ha of bromoxynil a.e. and 0.5, 1.0 and 2.0 Kg/ha of oxyfluorfen to detect differences in tolerance. A factorial experiment with herbicides as main plots and cultivars as sub-plots was established May 30, 1984 on Chehalis silty clay loam soil at the Horticulture Vegetable Research Farm, Oregon State University, Corvallis, Oregon. Herbicides were applied July 2, 1984 when onions were in the two-leaf stage. Evaluations on crop stand and growth reduction were made on August 2, 1984 and the crop was harvested September 28, 1984.

Analysis of data showed significant differences in crop stand and growth reduction due to the herbicide treatments. Significant differences in growth reduction and yield were likewise observed among the cultivars but no significant interaction between herbicides and cultivars were found. Bromoxynil at 4.0 Kg/ha caused the greatest reduction in crop stand (40.65%), highest growth reduction and lowest yield. While this rate is eight times the normal usage, it did not cause complete kill of any of the cultivars. Yellow Sweet Spanish Utah had the highest growth reduction and lowest yield among the cultivars indicating that it was most sensitive. All other cultivars did not show significant differences in growth reduction and yield. (Oregon State University, Department of Horticulture, Corvallis, OR)

Effect of herbicides on crop stand, growth reduction and yield of onion cultivars

Herbicide	Kg/ha	Crop stand (% of control)	Growth reduction (percent)	Yield (MT/ha)
Bromoxynil	1.0	79.75	25.93	13.10
Bromoxynil	2.0	64.89	43.68	12.88
Bromoxynil	4.0	59.35	52.50	9.78
Oxyfluorfen	0.5	79.17	17.50	18.30
Oxyfluorfen	1.0	82.81	12.18	19.38
Oxyfluorfen	2.0	88.67	7.18	16.50
Untreated check	--	100.00	12.18	18.13
	LSD: 0.05	42.40	49.70	NS
	CV (%)	31.00	136.00	89.65
Cultivar				
YSS* Currier		79.55	27.78	16.22
YSS Utah		76.01	43.03	9.16
YSS Valencia		73.08	28.21	11.19
Downing Yellow Globe		77.37	25.89	13.84
Early Yellow Globe		79.69	12.85	18.22
Golden Globe		78.89	15.00	16.55
Stockton Early Red		82.91	23.92	21.41
Walla Walla		86.46	18.92	16.92
	LSD: 0.05	NS	21.06	9.55
	CV (%)	28.65	58.55	42.07

YSS* - Yellow Sweet Spanish

Yellow nutsedge (Cyperus esculentus L.) control in chile pepper with bentazon and tankmixes of bentazon plus metolachlor. Anderson, W. P. and G. Hoxworth.

Chile pepper plants appear to have excellent tolerance to broadcast [over-the-top] and basally directed aqueous sprays of bentazon in tankmixes with crop oil, crop oil plus metolachlor, or with Dupont Surfactant WK at a concentration sufficient to kill emerged yellow nutsedge plants. Green chile pod yields indicate no adverse effect of these treatments.

Following the discovery at this location in 1983 that chile pepper plants tolerated over-the-top and basally directed sprays of bentazon at 1.1 kg/ha plus crop oil at .95 l/ha in 282 l/ha water, bentazon was applied June 8, 1984, at 1.1 kg/ha as broadcast [over-the-top] and basally directed aqueous sprays to chile pepper plants seeded March 7, 1984, in tankmixes containing (a) crop oil [.95 l/ha], (b) crop oil [.95 l/ha] plus metolachlor [2.2 kg/ha], (c) crop oil [.91 l/ha] plus metolachlor [3.4 kg/ha], and Dupont Surfactant WK [0.5% conc. by volume of aqueous mixture]. Each treatment was applied to its respective plot [two 1 m wide plant beds 6 m long] in the equivalent of 301 l/ha water using a knapsack-type sprayer. Each treatment was replicated twice.

For general weed control, the entire experimental area was treated preplant with pendimethalin at 1.1 kg/ha soil incorporated about 2.5 cm deep with a power-tiller/bedshaper on preformed plant beds. Two rows of chile pepper, var. New Mexico 6, were seeded on each bed and watered by furrow irrigation. Later emerging weeds were controlled by hoeing, with the exception of yellow nutsedge plants which were allowed to grow unchecked.

Emerged yellow nutsedge plants were effectively controlled by all treatments, as compared to the untreated controls. However, the best postemergence control of yellow nutsedge was obtained with tankmixes of bentazon plus crop oil plus metolachlor applied broadcast, with better than 98% control obtained. Metolachlor in the tankmixes increased the degree of control of the emerged yellow nutsedge plants [an apparent synergistic effect], compared with that obtained with bentazon plus crop oil. In addition, metolachlor provided residual control of subsequently developing yellow nutsedge plants following its leaching into the soil by irrigation and/or rainfall.

Subsequent to these results, eight 450 m long beds of pod-bearing chile pepper plants were sprayed broadcast [over-the-top] with a tankmix of bentazon [1.1 kg/ha] plus crop oil [.95 l/ha] plus metolachlor [3.4 kg/ha] in 301 l/ha water with no apparent adverse effect on the chile pepper plants and excellent control of emerged and later developing yellow nutsedge plants. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N.M. 88003.)

Response of barnyardgrass, green foxtail, and yellow foxtail to herbicides applied postemergence. Ogg, A.G., Jr., and G.T. Graf. Seventeen herbicide treatments were evaluated under field conditions for their effectiveness for controlling barnyardgrass, green foxtail, and yellow foxtail. On May 1, 1984, each grass species was planted in individual rows 24 inches apart. Bromoxynil was applied at 0.38 lb/A on May 22, 1984, as a uniform broadcast treatment to control broadleaved weeds. On May 31, 1984, herbicide treatments were applied in 25 gpa at 54 psi to triplicate plots 6 ft by 7 ft. MorAct oil-surfactant concentrate was added to all spray solutions at 1 qt/25 gal. At treatment, barnyardgrass had three or four leaves and was 1 to 2 inches tall, green foxtail had four leaves and was 1.5 inches tall, and yellow foxtail had three leaves and was 1.5 inches tall. Treatments were evaluated 18 and 29 days after application by visually comparing the growth and population of the treated grasses to the growth and population of the nontreated grasses.

Sethoxydim, haloxyfop, DPX-Y6202, clopropoxydim, and fenoxaprop-ethyl controlled all three grasses (Table 1). The greatest differential response of the grasses was observed with SC-1084 when control 18 DAT varied from 81% for yellow foxtail to 0% for green foxtail. Grasses also respond differentially to fluazifop-butyl, fluazifop-P-butyl (PP005), and diclofop-methyl. Generally, green foxtail was the most tolerant of the three grasses to those herbicides where differential control was observed. Except for the improved control of yellow foxtail and barnyardgrass by SC-1084, there were no significant changes in grass control between 18 and 29 days after treatment. (USDA-ARS, Irr. Agr. Res. and Ext. Center, Prosser, WA 99350).

Table 1. Response of barnyardgrass, green foxtail, and yellow foxtail to herbicides applied postemergence. 1984.

Herbicide	Rate Lb ai/A	Percent control (6/18/84) Yellow foxtail	Percent control (6/18/84) Barnyard-grass	Percent control (6/18/84) Green foxtail	Percent control (6/29/84) Yellow foxtail	Percent control (6/29/84) Barnyard-grass	Percent control (6/29/84) Green foxtail
Sethoxydim (Poast)	0.125	94 ab	96 ab	93 abc	99 a	99 a	98 a
	0.250	99 a	99 a	99 a	99 a	99 a	99 a
Fluazifop-butyl (Fusilade)	0.250	95 ab	94 bc	82 c	98 a	99 a	88 ab
Fluazifop-P-butyl (PP005)	0.125	96 ab	94 bc	82 c	99 a	96 a	74 b
	0.250	98 ab	99 a	94 ab	99 a	99 a	98 a
Haloxyfop (Dowco 453)	0.125	99 a	99 a	95 ab	99 a	99 a	99 a
	0.250	99 a	99 a	99 a	100 a	100 a	100 a
SC-1084	0.125	81 c	79 d	0 f	94 a	91 b	13 d
	0.250	91 b	92 c	53 e	99 a	99 a	40 c
DPX-Y6202 (Assure)	0.125	99 a	99 a	99 a	99 a	99 a	99 a
	0.250	100 a	99 a	100 a	100 a	100 a	99 a
Clopropoxydim (Selectone)	0.250	99 a	99 a	96 ab	100 a	99 a	99 a
	0.500	99 a	99 a	99 a	100 a	100 a	99 a
Fenoxaprop-ethyl (Whip)	0.125	98 ab	98 a	99 a	99 a	98 a	96 a
	0.250	99 a	99 a	99 a	98 a	98 a	97 a
Diclofop-methyl (Hoelon)	0.750	78 c	93 bc	70 d	76 b	98 a	72 b
	1.250	82 c	99 a	85 bc	72 b	99 a	79 b
Nontreated[2]	--	0	0	0	0	0	0

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

2/ Data for nontreated control plots were not used in the statistical analysis.

Postemergence grass control in canning peas with sethoxydim and two formulations of fluazifop-butyl. McReynolds, R.B. and R.D. William. Results from two postemergence grass herbicide trials conducted in canning peas indicated that sethoxydim at .25, .37 and .50 lbs ai/A produced faster grass kill than did fluazifop-butyl at .25 and .50 lbs ai/A. Sethoxydim results were also better than fluazifop-butyl (PP-005) rates of .12, .25 and .38 lbs ai/A. Two applications of PP-005 at .38 lbs ai did result in comparable weed control to a single application of sethoxydim at .37 lbs ai/A.

The substitution of either 0.1% or 1% X-77 surfactant in place of 1% crop oil to both herbicides did not alter their effectiveness. However, the deletion of crop oil or surfactant retarded control for PP-005 in both trials, but retarded sethoxydim in only one trial. Applications of crop oil only did not affect weed or crop growth.

Both trials were located on Woodburn silt loam in the northern Willamette Valley of Oregon. Plots were 1.5 m by 6 m and treatments were applied in a randomized complete block design with four replications. Water at the rate of 300 ml plus crop oil or surfactant were used as the carriers for each treatment. Temperatures were from 58°-63°F with 60-70% relative humidity under fully overcast skies when the herbicides were applied.

Pea varieties growing at site 1 and 2 were 'Marvel' and 'Novella,' respectively. Crop growth in both trials at the time of herbicide applications was 3-4 inches. Annual ryegrass (*Lolium multiflorum* Lam.) at site 1 was 1-6 inches tall. Annual ryegrass and wild oats (*Avena fatua* L.) at site 2 were 4-10 inches tall. Site 1 treatments were applied early (March 4 and site 2 on June 18), both approximately 3 weeks after planting. The second (late) applications of PP-005 were made at 25 and 23 days after the first applications at site 1 and site 2, respectively. In both cases the peas were at the 1% bloom stage of growth.

Weed control was rated 15 and 25 days after application at site 1 and at 14 days at site 2. Crop injury symptoms were not observed in any treatments. After 45 days the grasses had been effectively controlled in all treatments except the crop oil treatment and the check. (Oregon State University Cooperative Extension, Salem, OR).

Postemergence grass control ratings for sethoxydim, fluazifop-butyl, and fluazifop-butyl (PP-005)

			Weed control ratings[a/]		
	Rate	Crop	Site 1		Site 2
Herbicide	(lbs ai/A)	oil	15 days	25 days	23 days
Control	--	--	0	0	0
Crop oil	--	1%	0	0	0
Sethoxydim	.50	1%	8.9	9.9	9.1
Sethoxydim	.37	X-77	8.5[b/]	9.8	8.4[c/]
Sethoxydim	.37	1%	8.0	9.5	7.3
PP-005	.38 x2	1%	8.3	9.1	8.0
Fluazifop-butyl	.50	1%	8.4	8.9	6.3

Herbicide	Rate (lbs ai/A)	Crop oil	Weed control ratings[a/] Site 1 15 days	Site 1 25 days	Site 2 23 days
Sethoxydim	.25	1%	7.8	8.6	7.9
PP-005	.25	1%	7.1	8.6	6.9
Sethoxydim	.37	--	6.4	8.3	8.5
PP-005	.12	X-77	7.0[b/]	7.9	5.3[c/]
PP-005	.12	1%	7.1	7.3	6.0
Fluazifop-butyl	.25	1%	6.3	7.0	4.5
PP-005	.12	--	5.6	5.6	3.3

a/ Weed ratings: 0=no control, 10=complete control.
b/ 1.0% X-77 surfactant.
c/ 0.1% X-77 surfactant.

Effects of Herbicides on Potato Seedlings and Transplants. Whitson, T.D., Shelton C. Perrigan, Alvin R. Mosley, and S.R. James. Past studies have helped determine the efficacy of various herbicides applied preplant-incorporated and preemergence on potatoes grown from seed tuber sections. This study was done to determine the effects of commonly used herbicides on potatoes grown from seedling transplants and from field-sown true seed. Treatments were screened in the greenhouse, and those treatments having low potato phytotoxicity were applied in field studies. The experiments were conducted in a Deschutes sandy loam soil with a pH of 6.2 and O.M. content of 2.0%. Soils were steam sterilized in greenhouse experiments. Treatments were applied preemergence to true seeded potatoes and postemergence to 30-day old seedling transplants at a two node growth stage. Greenhouse treatments were arranged in a completely randomized design with seven replications. Field studies were replicated four times in a randomized complete block design.

Crop tolerance to herbicides was determined by variations in plant height and as visual injury ratings. Treatments showing promise in the greenhouse which were then repeated under field conditions included: alachlor 1.0 and 2.0 lb ai/A, metribuzin 0.25 lb ai/A, metolachlor 1.25, 2.5, and 5.0 lb ai/A, DCPA 4.0 and 8.0 lb ai/A, and ethalfluralin 0.75 lb ai/A. These treatments failed to control ladysthumb when applied postemergence in the field transplant trial; therefore, this species then totally predominated the transplant experiment. An additional treatment added to the field transplant study not screened in the greenhouse was EPTC applied preplant-incorporated at 4.2 lb ai/A. This treatment provided excellent weed control with no potato damage. Seedlings from true potato seed were severely stunted by all treatments in the greenhouse and the field.
(Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Effects of Herbicides on Potato Seedlings and Transplants (Greenhouse Study)

Herbicide	lb ai/A	Crop Injury[a]	Plant Height[b] 5-1-84 (cm)	Plant Height 5-10-84 (cm)
1. Alachlor	4.0	2.3	7.8	12.6
2. Alachlor	2.0	1.2	6.5	11.6
3. Alachlor	1.0	1.8	9.0	12.7
4. Metribuzin	1.0	5.0	0	0
5. Metribuzin	0.25	2.4	6.3	8.2
6. Metolachlor	5.0	1.9	8.5	14.4
7. Metolachlor	2.5	2.1	8.0	11.6
8. Metolachlor	1.25	1.2	8.8	14.1
9. DCPA	16.0	3.1	6.5	9.0
10. DCPA	8.0	1.9	9.5	13.1
11. DCPA	4.0	1.0	8.0	13.9
12. Ethalfluralin	3.0	3.8	5.8	5.4
13. Ethalfluralin	1.5	2.8	9.0	16.4
14. Ethalfluralin	0.75	1.6	7.3	13.7
15. Pendimethalin	3.0	4.1	4.0	4.7
16. Pendimethalin	1.5	3.6	7.0	7.4
17. Pendimethalin	0.75	3.0	6.5	9.1
18. Control	0	0	9.5	15.7

[a]Average of 7 replications 0 = no injury and 5 = dead.

[b]Measurement averages of 7 replications.

Postemergence grass control with sethoxydim and fluazifop-butyl in zucchini squash. McReynolds, R.B. Sethoxydim and two formulations of fluazifop-butyl were evaluated in zucchini squash for phytotoxicity and effectiveness in controlling perennial ryegrass (*Lolium perenne* L.) and volunteer wheat (*Triticum aestivum* L.). Nine treatments including a control were applied to squash in a randomized complete block design. On June 11, the herbicides were applied to squash with 3 to 4 true leaves prior to blossom formation. The trial was located in Clackamas County, Oregon on Woodburn clay loam soil. The herbicides were applied under cloudy conditions with a temperature of 68°F. The soil surface was dry in some areas. Treatments were applied in 60 ml of water per plot with 1% crop oil except in the control, sethoxydim .37 lb and fluazifop .50 lb ai/A rates. Grasses from 4 to 12 inches tall were uniformly distributed throughout the trial area.

Weeds were evaluated on June 22, 11 days after herbicide applications. Although treatment yields were not analyzed, crop injury symptoms were not observed anytime during the growing season.

All treatments produced acceptable levels of weed control. However, applications of sethoxydim and fluazifop-butyl (PP-005) were more active than fluazifop-butyl at all rates. The deletion of crop oil from the solutions resulted in delayed control for sethoxydim.

The average weed control ratings were highest for sethoxydim and fluazifop-butyl (PP-005) at the .25 lb ai/A rates. Fluazifop-butyl at the .50 lb rate was slower acting than PP-005 at .12 and .25 lb ai. One month after application, grasses in all plots except the check had been effectively controlled. (Oregon State University Cooperative Extension, Salem, OR).

Postemergence weed control with sethoxydim, fluazifop-butyl, and fluazifop-butyl (PP-005) in zucchini squash.

Treatment	Crop oil	Rate (lbs ai/A)	Average weed control rating[a/]
Control	--	--	0
Sethoxydim	1%	.25	8.4
PP-005	1%	.25	8.4
Sethoxydim	1%	.37	7.9
PP-005	1%	.12	7.9
Fluazifop-butyl	--	.50	7.5
Sethoxydim	--	.37	7.5
Fluazifop-butyl	1%	.50	7.1
Fluazifop-butyl	1%	.25	7.0

[a/] Weed control rating: 0=no control, 10=complete control.

The effect of T-tape injected metham on the control of annual weeds, nematodes, and the growth of processing tomatoes. Lange, A. H., W. D. Edson and P. A. Roberts. From February 9 through 13, 1984 prepared 66 inch tomato beds were treated using three drip lines with holes every 8 inches with metham at 37.5 gpa and 75 gpa. This experiment was part of a larger experiment comparing a large number of experimental nematacides including the standard 1,3-dichloropropene. Only the data for metham compared to the 1,3-D fumigant will be included in this report. The remainder may be published elsewhere.

At treatment the sandy loam soil had intermediate soil moisture. The temperatures were quite cool and there was considerable rainfall during and after application. The amount of drip irrigation used for soaking in the metham was 1 and 2 acre inch which penetrated to a depth of 11 to 12 inches. The experimental design was a randomized block replicated six times.

The annual weed control was excellent at both rates. The species were mostly pigweed and purslane. There was a little black nightshade and hairy nightshade in the untreated plots. By May 10, 1984 the tomatoes in the metham plots were twice the size of those in the untreated or 1,3-D plots. The thinning weights were taken April 19. Showed a 180% increase in fresh weight for the 37½ gpa rate and 162% for the 75 gpa rate.

The galling ratings indicated good nematode control with both 1,3-D and metham. The early growth stimulation in the metham plots suggest disease control in addition to nematode control when compared with the 1,3-D results. The yields also reflect the excellent early tomato growth which apparently resulted in a stronger and therefore productive mature plant. These results are striking and substantiate earlier results. (University of California Cooperative Extension, Parlier, CA 93648)

The effect of metham on the control of annual weeds and tomato stand and vigor, nematode galling and yields (425-10-506-186-2-84)

		Average 1/		Average 2/				
Herbicide	gpa	Weed Control	Stand and Vigor	Thinning Weight gms/plot	Plant Top Weight	Galling 5/10	Galling 8/3	Machine Harvest Yield tons/acre
1,3-D		1.7	6.5	30.1	2.7	0.3	0.7	14.1
Metham	37.5	9.8	8.8	67.5	4.8	0.5	1.9	18.6
Metham	75	9.5	8.2	63.1	4.1	0.3	1.2	19.8
Check	-	1.5	5.2	24.1	2.0	1.4	8.5	9.9

1/ Average of 6 replications where 0 = no weed control or no tomatoes and 10 = no weeds left or best tomato stand and vigor. Rated 4/18/84.
2/ Thinning weights taken 4/19/84. Harvested 8/3/84. Root samples evaluated 8/3/84.

The effect of repeated small applications of acifluorfen on the control of black nightshade and processing tomatoes. Lange, A. H. Because of the high wind of the season, young tomatoes and black nightshade in their first true leaf were sprayed May 25, 1984 using high gallonages (100 and 200 gpa) and low pressure (10 psi). The second application was made June 1.

The results clearly show the activity of high gallonage sprays in windy weather. They also show the excellent black nightshade control that can be obtained with repeated sprays as compared to single sprays. The best control was with an initial spray of 1/4 Lb/A in 100 gpa (the same concentration as 1/8 Lb/A in 50 gpa) followed by 1/2 Lb/A (the same concentration as 1/4 Lb/A in 50 gpa). The phytotoxicity was excessive with 1 Lb/A in 400 gpa. The highest thinning weights were with 1/16 Lb/A sprayed early followed after one week with 1/4 Lb in 100 gpa (which is equivalent in concentration to 1/32 Lb/50 gpa plus 1/8 Lb/50 gpa) originally found to be optimum under early spring low wind conditions in 1982 and 1983. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The effect of repeated acifluorfen sprays on the control of black nightshade and the effect of tomato growth (425-50-513-186-9-81)

				Average 1/					
				Black Nightshade Control			Tomato Phyto		
Herbicide	5/25	6/1	gpa	5/25	6/18	6/22	5/25	6/18	6/22
Acifluorfen	1/16 + 1/4		100+100	3.5	7.0	8.5	1.2	1.2	0.5
Acifluorfen	1/8 + 1/2		100+200	5.2	7.0	8.3	1.2	3.2	2.0
Acifluorfen	1/4 + 1/2		100+200	7.2	8.5	9.5	2.0	3.2	1.5
Acifluorfen	1/2		200	9.0	8.5	7.5	3.8	2.2	1.0
Acifluorfen	1/8 + 1		50+400	3.5	9.5	10.0	1.2	5.2	4.2
Check				0.2	0.0	0.0	0.5	0.5	1.4

1/ Average of 4 replications where 0 = no control or no effect and 10 = complete weed control or complete kill.

Table 2. The effect of repeated applications of acifluorfen on the growth of young processing tomatoes (425-50-513-186-9-81)

	Lb/A Applied		Average 1/	Tomato Vigor 2/	
Herbicide	5/25	6/1	Weight	6/18	6/22
Acifluorfen	1/16 + 1/4		502	8.8	9.5
Acifluorfen	1/8 + 1/2		394	6.8	8.0
Acifluorfen	1/4 + 1/2		390	6.8	8.5
Acifluorfen	1/2		464	7.8	9.0
Acifluorfen	1/8 + 1		260	4.8	5.8
Check			370	9.5	8.6

1/ Average of 4 replications. Thinning weights taken in grams.

2/ Average of 4 replications where 0 = no tomato vigor and 10 = best tomato growth.

The effect of water-banding in a sandy soil on direct seeded processing tomatoes. Lange, A. H., W. D. Edson, T. Belluominia and H. Kempen. Metham was applied February 3, 1984 with plastic water cans in a premade depression in the seedline at 25-200 gpa in 1/4 acre inch of water using a randomized block design. The plots were seeded with processing tomato seed by the grower on February 10. An early evaluation on March 7 showed considerable delay in the stand at the higher rates, but excellent weed control at all rates. A later reading on March 21 showed excellent pigweed control at all rates and excellent stand and vigor at rates of 100 gpa and less the 200 gpa was excessive when metham treated plots were seeded about one week after treatment. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The effect of metham applied by water-banding on tomato stand and early weed control (425-15-506-186-2-84).

			Average 1/	
Treatment	Gal/A	Acre Inch Irrigation	Tomato Vigor	Weed Control
Metham	25	1/4	6.2	9.5
Metham	50	1/4	5.0	9.5
Metham	100	1/4	1.0	10.0
Metham	200	1/4	0.0	10.0
Check (water)		1/4	6.0	7.5
Check (water)			6.8	6.2

1/ Average of 4 replications where 0 = no stand or weed control and 10 best tomato stand or best weed control. Evaluated 3/7/84.

Table 2. The effect of water-banded metham in the control of pigweed and the stand of processing tomatoes (425-15-506-186-2-84).

			Average 1/	
Treatment	Gal/A	Acre Inch Irrigation	Pigweed Control	Tomato Stand & Vigor
Metham	25	1/4	6.9	8.5
Metham	50	1/4	8.9	8.6
Metham	100	1/4	9.4	7.6
Metham	200	1/4	9.5	5.6
Check (water)		1/4	1.9	7.2
Check (water)			4.1	7.9

1/ Average of 4 replications where 0 = no pigweed control and 10 = best pigweed control and tomato stand and vigor. Tomatoes planted 7 days after treatment on 2/10/84. Evaluated 3/21/84.

Vegetable tolerance to postemergence grass herbicides. Wiles, L.J. and R.D. William. Tolerance of eight vegetables to sethoxydim and fluazifop-butyl (PP-005) was screened in a field trial at Corvallis, Oregon. The experiment was planted on June 25, but due to poor emergence, spinach and the cole crops were reseeded on July 10. Treatments were applied on August 1 and September 1. Crop tolerance was evaluated on the basis of visual symptoms.

Crop injury was observed after the first application only, with symptoms occurring on the cole crops (white patches and a dull appearance) and spinach, radish, and cucumbers (white patches and bronzing). Cucumbers were slightly injured with all rates of fluazifop-butyl while the addition of surfactant increased the phytotoxicity of both materials. Broccoli, spinach, and cucumbers appeared to be most sensitive. New growth and yields appeared normal, but variability in stand and plant age prevented yield evaluations and may have affected the phytotoxicity. Different environmental conditions and/or age of the plant at the second application may explain the lack of injury. Further trials are necessary to determine the potential for conditions under which injury may occur, although observed symptoms have only been temporary. (Oregon State University, Department of Horticulture, Corvallis, OR)

Phytotoxicity ratings[1/] for eight vegetable crops involving sethoxydim and fluazifop-butyl[2/]

Treatment	Rate (lbs ai/A)	Broccoli	Cabbage	Cauliflower	Cucumber	Spinach	Radish
Check	--	0	0	0	0	0	0
Crop oil	--	0	0	0	0	0	0
Sethoxydim + crop oil	0.25	0	0	0	0.5	0	0
Sethoxydim + crop oil	0.37	0	0	0	0	0.5	0
Sethoxydim + crop oil	0.50	0	0	0	1	0.5	0
Sethoxydim	0.37	0	0	0	0	0	0
Sethoxydim + surfactant	0.37	1	0.5	1	1	2	0
Fluazifop-butyl + crop oil	0.12	0	0	0	1.5	0	0
Fluazifop-butyl + crop oil	0.25	0	0	0	0.5	0.5	0
Fluazifop-butyl + crop oil	0.38	0	0	0	1	1	0
Fluazifop-butyl	0.12	0	0	0	1	0	0
Fluazifop-butyl + surfactant	0.12	0.5	0.5	0.5	1	1	1

1/ Mean of two replications where 0=no injury and 10=complete kill. Evaluated 8/14/84.

2/ Crops not injured and not listed in the table are parsley and lettuce. Fluazifop-butyl (PP-005).

The evaluation of preemergence, residual herbicides for the control of annual weeds in almond orchards. Vargas, Ron and Gerecke, Tom. A mature almond orchard growing on a Grangeville fine sandy loam soil under flood irrigation was treated with preemergence herbicides for the fourth consecutive year. Dates of treatments were 12/16/80, 11/20/81, 12/10/82 and 11/23/83. Paraquat at .5 ai per acre plus .25% X-77 were added to all treatments to kill the existing seedling chickweed, filaree and common groundsel. The almond orchard was divided into two tree plots, replicated four times in a randomized complete block design. The herbicides were applied with 8004 nozzles at 30 lbs. pressure in 50 gallons of water per acre.

An evaluation on 11/23/83, twelve months after the previous years application, indicated 80 to 85 percent control of filaree with oxyfluorfen and oxyfluorfen in combination with napropamide and oryzalin. An evaluation on 3/21/84 indicated acceptable control with most materials of the winter annual weeds present which were mainly filaree. Simazine at the one pound ai per acre rate was weak as was oryzalin and napropamide by themself. A later evaluation on 5/21/84 again indicated acceptable weed control with all materials except simazine at the one pound ai per acre rate and the simazine, oryzalin combination. (University of California Cooperative Extension, 128 Madera Ave. Madera, CA 93637)

WINTER ANNUAL WEED CONTROL IN ALMONDS

TREATMENTS*	#ai/A	EVALUATIONS[1/] FILAREE 11/23/84	WINTER ANNUALS 8/21/84	5/21/84
simazine	1	3.5	6.5	4.5
simazine	2	6.0	9.0	7.0
napropamide	4	2.25	3.5	9.5
oryzalin	4	5.25	7.0	9.25
oxyfluorfen	1.5	7.5	8.25	9.25
oxyfluorfen	1	6.25	7.25	9.5
simazine + napropamide	1 + 4	3.5	7.5	9.25
simazine + oryzalin	1 + 4	6.75	7.5	4.0
simazine + oxyfluorfen	1 + 2	7.75	9.75	10
oryzalin	6	4.5	6.0	8.75
oxyfluorfen + napropamide	2 + 4	8.0	9.0	9.5
oxyfluorfen + oryzalin	2 + 4	8.5	9.75	9.75
oxyfluorfen	2	8.0	8.0	10
check	-	4.0	0	10

*All plots Paraquat + X-77, .5 + .25%

[1/]Average of 4 replications were 0 = no control and 10 = 100 percent control

The effect of continued use of herbicide combinations in soil on young replanted almond trees. Lange, A. H. and W. D. Edson. Soils continuously treated with preemergence herbicides are from time to time subjected to replanting. These soils are usually ripped, releveled and fumigated before replanting. However, in the present trial only the old trees were removed and the soil rototilled twice in the winter of 1982 and the spring of 1983. Herbicides had been applied annually from March 1977 to November 1981. The soil (O.M. 0.75%, sand 59%, silt 33%, and clay 8%) was rototilled to a depth of 6 to 8 inches and planted to barley March 8, 1982. The barley was worked up after a few weeks and the plots were replanted to close planted Nonpareil and Carmel almonds on nemaguard rootstocks March 22, 1983.

The plots were retreated April 1, 1983 and again on March 14, 1984. In the summer of 1984 a large but consistent growth difference in favor of simazine was noted. The flaxleaved fleabane, cudweed and marestail were controlled best in combination with simazine. At the same time the control of annual summer grasses was poorest with simazine plus napropamide. Oxyfluorfen plus napropamide gave the poorest broadleaf weed control. The control of flaxleaved fleabane and marestail plus the control of annual grasses resulted in the best color and growth when observed during the summer, in the simazine plots and the poorest color and growth was in the oxyfluorfen plus napropamide plots. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The effect of soil applied herbicide combinations on weed control in young almond trees (425-73-501-146-1-77)

		Average Weed Control1/		
Herbicides	Lb/A	Spring2/ Broadleaf Weeds 5/29	Grass Control3/ 10/5	Bermuda-grass 10/5
Simazine+Oryzalin	1+6	7.1	8.0	6.8
Simazine+Napropamide	1+6	6.7	2.2	6.3
Oxyfluorfen+Oryzalin	2+6	3.0	9.7	8.3
Oxyfluorfen+Napropamide	2+6	1.3	8.5	7.3

1/ Average of 22-38 replications.
2/ Spring weeds were flaxleaved fleabane, marestail, cudweed, wild radish and black nightshade.
3/ Grass weeds included lovegrass, crabgrass, and barnyardgrass.

Table 2. The effect of soil applied herbicide combinations on seasonal growth of young almond trees (425-73-501-146-1-77)

Herbicides	Lb/A	Average 1/ Tree Vigor 10/5	Average Diameters (cm) 1983	Average Diameters (cm) 1984	% Increase
Simazine+Oryzalin	1+6	7.7	2.7	5.7	111
Simazine+Napropamide	1+6	7.7	2.7	5.6	107
Oxyfluorfen+Oryzalin	2+6	8.7	3.0	5.9	97
Oxyfluorfen+Napropamide	2+6	5.1	2.6	4.9	88

1/ Average of 20 replications with 8 trees per plot. Averaged where where 0 = no growth and 10 = most growth with best green color to the foliage.

Evaluation of dichlobenil, metolachlor and norflurazon on tuberization and control of yellow nutsedge in a pear orchard. Pereira, W., R.D. William, G. Crabtree, and D. Burkhart. In a two-year study, herbicides were applied to control yellow nutsedge (*Cyperus esculentus* L.) in a three-year old pear orchard in Hood River County, Oregon. The soil was a sandy loam with 1.9% organic matter. The primary objectives were to evaluate long-term control of yellow nutsedge tuberization and tuber survival. Six by six feet plots were randomized in a block design with four replications. Herbicides were applied in mid-January and March, representing winter and spring applications, respectively (Table 1). Yellow nutsedge control was evaluated using a visual rating system (0=no effect and 100=complete kill) and in the fall two soil samples were dug from each plot to assess herbicidal effect on tubers.

Consecutive applications of herbicides for two years provided the best control of yellow nutsedge with tuber production reduced by as much as 84% and 92% when compared to the untreated checks for preemergence applications of dichlobenil in winter and metolachlor in spring, respectively. Preemergence applications of dichlobenil in winter and its preplant incorporated application in spring afforded better control of nutsedge tuberization than its preemergence application in spring (Table 1). The enhanced control was probably related to reduced evaporative loss of dichlobenil when it was incorporated either mechanically or with water. Single annual preemergence applications of dichlobenil in winter and metolachlor in spring supplied some residual effect as evidenced by the fact that they reduced the number of new tubers in these plots treated the previous year to 41 and 29%, respectively, of the untreated check. Split applications of lower rates of metolachlor were as effective as a single application at the higher rate. (Oregon State University, Department of Horticulture, Corvallis, OR)

Table 1. Response of yellow nutsedge to single or repeated applications of dichlobenil and metolachlor

Treatment	Time of application*	Rate (Kg ai/ha)	1983 Foliage control (%)	1983 Tuber no. (#)	1983 Tuber weight (g)	1984 Foliage control (%)	1984 Tuber no. (#)	1984 Tuber weight (g)
Check	--	--	0	537	75	0	478	52
Dichlobenil	Pre W 1983	6	90	162	29	43	198	22
	Pre S 1983	6	22	442	65	12	415	41
	PPI S 1983	6	73	277	56	18	285	32
Metolachlor	Pre S 1983	4	89	129	13	56	138	15
Norflurazon	Pre S 1983	4	21	448	47	23	477	32
Dichlobenil	Pre W 83&84	6+6	83	248	38	93	57	11
	Pre S 83&84	6+6	19	461	67	33	215	34
	PPI S 83&84	6+6	66	315	53	98	106	20
Metolachlor	Pre S 83&84	4+4	90	165	21	96	48	4
Norflurazon	Pre S 83&84	4+4	12	420	41	43	199	16
Dichlobenil	Pre W 1984	6	--	--	--	56	145	18
	Pre S 1984	6	--	--	--	18	278	34
	PPI S 1984	6	--	--	--	96	109	17
Metolachlor	Pre S 1984	4	--	--	--	58	161	11
Norflurazon	Pre W 1984	4	--	--	--	29	330	25
LSD (5%)			18	82	14	17	59	10

*Pre, PPI, W and S = preemergence, pre-plant incorporated, winter and spring applications, respectively.

Dichlobenil and metolachlor surface applications for Canada thistle and yellow nutsedge control in red raspberries. Ross, E.V. and R.D. William. Applications of dichlobenil and metolachlor showed promise in 1984 in two trials for the control of yellow nutsedge (*Cyperus esculentus* L.) and Canada thistle (*Cirsium arvense* (L.) Scop.) in established red raspberries. The yellow nutsedge experiment was established on February 14, 1984 in Multnomah County, Oregon. The Canada thistle trial was established on March 27, 1984 in Clackamas County, Oregon. Plots of both experiments were 1.8 m by 3 m and replicated four times in a randomized block design. Dichlobenil granules were applied at 4 and 6 lbs ai/A. Metolachlor was applied at 4 and in split 2 + 2 lbs ai/A with a hand sprayer.

Yield data were not obtained due to a non-uniform raspberry stand caused by previous nutsedge competition. Crop tolerance was evaluated by visual observation and compared with check plots. Norflurazon was also applied in both experiments, but caused considerable crop injury. Weed control was evaluated by counting weeds and converting to a weed rating scale. The trials will be continued in 1985 in order to determine the effects of one and two year applications. (Oregon State University Cooperative Extension, Portland, OR).

Dichlobenil and metolachlor surface applications for Canada thistle and yellow nutsedge control in red raspberries.

		Weed control ratings[a/]	
	Rate (lbs ai/A)	Canada thistle	Nutsedge
Check	--	0	0
Dichlobenil	4.0	4.5	8.8
Dichlobenil	6.0	9.4	9.7
Norflurazon	4.0	1.0	3.7
Metolachlor	4.0	--	9.2
Metolachlor	2+2	--	6.1

a/ Weed control rating: 0=no control, 10=complete control.

Postemergence herbicide combinations for weed control in established orchards. Anderson, J.L. and M.G. Weeks. We have previously shown that annual weeds can be effectively and economically controlled with about four applications a year of glyphosate, dinoseb or paraquat in the tree rows of newly established orchards. In an effort to find an even more economical control of weeds in bearing orchards, trials were established in 1983 using combinations of postemergence and residual herbicides for a longer period of control effectiveness.

Glyphosate was used in many combinations because of its systemic action and effectiveness in controlling established perennial weeds. Oxyfluorfen, even though it is weak in controlling grassy weeds, was used in several combinations because of its rapid contact action plus some soil residual activity, and its effectiveness in controlling puncturevine with its contact action.

Plots were established in September 1983, in the tree rows of six-year-old tart cherry and apple plantings. Treatments were applied with a CO_2 powered backpack sprayer equipped with 8002 nozzles calibrated to deliver 300 l/ha at 40 psi. The cherry and apple trees had previously been used to study the effectiveness of postemergence herbicides in young trees. Both plantings had been seeded to Kentucky bluegrass sod between the tree rows.

Oxyfluorfen and paraquat treatments gave a much quicker knockdown of existing weeds than did glyphosate. Oxyfluorfen was particularly effective against puncturevine but did not give an adequate control of annual grasses (barnyardgrass, downy brome, stinkgrass and witchgrass) unless combined with glyphosate or simazine. Plots were evaluated December 2, 1983, and June 5, 1984; observations are summarized in the attached table. The postemergence herbicides generally gave effective kill of existing vegetation in the plots with the exception noted above and a failure to control mature dandelion and common mallow. By December 2nd young weeds had germinated in nearly every plot. Glyphosate by itself gave no residual control, and these plots contained many small grasses and broadleaved weeds. The oxyfluorfen plots contained mainly grasses and were generally freer of germinating weeds than comparable glyphosate or paraquat plots.

Combinations including diuron, norflurazon or simazine generally provided good weed control into June of 1984. Western salsify was present in the diuron and norflurazon plots but showed symptoms of herbicide toxicity. Orchard trees showed no phytotoxicity.

Glyphosate plots required retreatment twice during 1984. Annual grasses and encroaching Kentucky bluegrass in the oxyfluorfen plots was controlled with post emergent treatments of sethoxydim. (Utah State University, Logan, Utah 84322)

Effect of postemergence herbicide treatments on weed control in established apple and tart cherry orchards

Treatment[1]	Rate (kg/ha)	additive[2]	December 2, 1983 ave. weed control (%)	December 2, 1983 weeds[3] present	June 5, 1984 ave. weed control (%)	June 5, 1984 weeds[3] present
glyphosate	1.1	X-77	63	D,M	17	D,M,S,BYG, DB
glyphosate + oxyfluorfen	1.1 + 2.2	crop oil	90		68	S,BYG,DB
glyphosate + norflurazon	1.1 + 2.2	X-77	67	D,M	81	S,DB
glyphosate + diuron	1.1 + 2.2	X-77	77	D,M	86	S,DB
glyphosate + simazine	1.1 + 2.2	X-77	83	D,M	96	DB
oxyfluorfen	2.2	crop oil	60	BYG,DB,SG, WG,K	68	S,BYG,DB, K
oxyfluorfen + simazine	1.1 + 2.2	crop oil	77	BYG,DB,SG,WG	95	DB
paraquat + simazine	0.8 + 2.2	X-77	83	M,DB	94	DB

[1]Bearing apple and tart cherry orchards treated September 22, 1983.

[2]All oxyfluorfen treatments included 0.25% AG-98 crop oil; all glyphosate and paraquat treatments (except oxyfluorfen combinations) included 0.25% X-77 surfactant.

[3]Weeds present: D = dandelion, M = common mallow, S = western salsify, BYG = barnyardgrass, DB = downy brome, K = Kentucky bluegrass, SG = stinkgrass, WG = witchgrass.

Effects of herbicides for quackgrass control in strawberries 1983. Kloft, P.J., and R.L. Collins. Fluazifop-butyl and sethoxydim when applied to strawberries gave fair to good Quackgrass control with good crop tolerance.

A trial was established in the North Willamette Valley, near Hillsboro, Oregon in plots 4 by 12.5 feet and replicated four times in a randomized block design. The Benton variety strawberries were planted on June 1981, in 48 inch two row beds in a silt loam soil with 2% organic matter and a pH of 6.1. The plots received one irrigation of 5.5 inches water in early June and approximately 6.57 inches rainfall between the first application and final harvest.

Post emergence fluazifop-butyl 4E and sethoxydim 1.53E applications, using a plot sprayer, began when the new quackgrass growth was 5 inches tall and new berry growth. The second and third applications were made during berry bloom. Band applications over the berry row were made with a single 8003 nozzle. Herbimax emulsifiable oil adjuvant was applied with all herbicide treatments at 1 quart per acre. Crop and weed foliage was dry during all applications. There was no tillage in the plot area.

A single application sethoxydim and two applications of fluazifop-butyl at the high rates gave better weed control than multi applications of fluazifop at the lower rates. Higher rates of herbicides gave significantly higher yields than the untreated check. Surprisingly, the herbicide applications did not appear to burn or effect the bloom in any way. (Collins Agricultural Consultants, Inc., Hillsboro, Oregon 97123).

Table I

Effects of herbicides on
Quackgrass Control & Strawbery Yields
1983

Treatment	Rate lbs ai/A	Applic. dates 1/	Quackgrass Control 2/			Yield lbs/Plot 3/			
			4/15/83	5/10/83	5/21/83	5/25/83	6/4/83	6/10/83	Total
fluazifop-butyl	0.187	1, 2 & 3	3.8	4.5	3.8	1.2 bc	7.2 ab	3.0 abc	11.4 ab
fluazifop-butyl	0.25	1, 2 & 3	4.5	6.8	6.3	1.3 bc	7.3 ab	3.0 abc	11.7 ab
fluazifop-butyl	0.375	1, 2 & 3	5.5	7.0	6.3	1.7 abc	7.5 ab	3.8 a	13.0 a
fluazifop-butyl	0.5	1	5.8	6.5	6.3	1.6 abc	6.3 ab	3.7 ab	11.6 ab
fluazifop-butyl	1.0	1	7.3	8.5	8.5	1.4 bc	5.1 b	2.8 bc	9.3 b
fluazifop-butyl	1.0	1 & 2	6.5	8.8	8.8	1.8 ab	7.8 a	3.5 abc	13.0 a
fluazifop-butyl	1.0	1, 2 & 4	6.3	8.8	9.0	1.6 abc	6.1 ab	3.4 abc	11.2 ab
sethoxydim	1.0	1	6.0	8.0	8.0	2.2 a	7.5 ab	3.2 abc	12.9 a
check	---	---	-0-	-0-	-0-	1.0 c	5.5 ab	2.8 c	9.3 b

1/ Application dates: date 1: 3/15/83; date 2: 4/15/83; date 3: 5/10/83; date 4: 5/21/83

2/ 0 = No effect 10 = Complete elimination

3/ Values followed by a common letter are not significantly different (P=0.05) according to Duncan's Multi Range Test.

Effects of herbicides for control of quackgrass in strawberries 1984. Kloft, P.J. and R.L. Collins. Fall and spring applications of fluazifop-butyl and sethoxydim were compared for grass control and crop tolerance.

A trial was established in the North Willamette Valley, near Hillsboro, Oregon in plots 8 by 20 feet and replicated four times in a randomized block design. The Hood variety of strawberries were planted in June 1981, in 48 inch two row beds in a silt loam soil with 2% organic matter and a pH of 6.1. The plots received one irrigation in early June and approximately 39.24 inches of rainfall between the first application and final harvest.

Post emergence fluazifop-butyl 4.0E and sethoxydim 1.53E applications, using a plot sprayer, began when new active grass growth in the fall was 8 to 16 inches tall. The weather was very dry at this time. A second application was made in December on green grass 8 to 14 inches tall. Third and fourth applications were made in March and April on actively growing grass. In January there was a -4^{o} F. freeze for two weeks, which damaged the strawberry crowns, effecting yield. Broadcast applications were made over two bed (center entire bed and half of each adjoining bed) with a 5 by 8003 nozzle boom. Herbimax emulsifiable oil adjuvant was applied with all herbicide treatments at 1 quart per acre. There was no tillage in the plot area. A one row bed was harvested in three replicates only because of commercial picker problems.

The fall applications of these two herbicides generally were unsatisfactory, regardless of rate. The December application gave only fair control, but did not hold. The March applications generally gave good control especially when followed up by a treatment in April. Fluazifop-butyl at 0.5 to 1.0 lb ai/A gave the best control of quackgrass. Sethoxydim at 1.0 lb ai/A was less effective. There appears to be no advantage in making fall applications. (Collins Agricultural Consultants, Inc., Hillsboro, Oregon 97123).

Table I

Effect of herbicides on
Quackgrass Control & Strawberry Yields
1984

Treatment	Rate lbs ai/A	Applic. dates 1/	Quackgrass weed control 2/				Yields lbs/plot 3/	
			10/24/83	2/27/84	4/2/84	5/31/84	6/15/84	6/27/84
fluazifop-butyl	0.25	1, 3 & 4	2.1	1.2	5.7	8.0	7.9 a	13.1 ab
fluazifop-butyl	0.5	1, 3 & 4	3.0	3.2	6.2	8.8	8.8 a	14.3 ab
fluazifop-butyl	1.0	1 & 4	3.2	4.5	1.5	7.2	8.6 a	12.4 ab
fluazifop-butyl	0.5	1, 2 & 4	2.3	7.7	1.5	6.2	6.9 a	10.7 ab
fluazifop-butyl	1.0	1, 3 & 4	2.7	5.0	7.5	9.3	8.7 a	15.3 a
fluazifop-butyl	0.5	1 & 4	3.0	2.2	1.2	7.0	7.4 a	13.1 ab
sethoxydim	1.0	1 & 4	3.6	1.5	1.0	6.6	7.8 a	10.2 ab
check	---	---	-0-	-0-	-0-	-0-	6.0 a	8.3 b

1/ Application dates: date 1: 9/23/83; date 2: 12/16/83; date 3: 3/5/84; date 4: 4/16/84

2/ 0 = No effect 10 = Complete control

3/ Values followed by a common letter are not significantly different (P=0.05) according to Duncan's Multi Range Test.

Dichlobenil applications for field horsetail control in Marion blackberries. Sheets, W.A. and R.D. William. In previous tests, we noted that dichlobenil may control field horsetail the second year after treatment. To further elaborate on these initial observations, a test was established on February 16, 1984 in Washington County, Oregon on McBee silty, clay loam. Plots were 6 ft. x 15 ft. and were replicated four times. The 4G formulation was applied on the soil surface with a hand shaker device. Two sets of plots were treated in 1984 and one of these will receive a second treatment in 1985. A third set will be treated in 1985 only.

The initial evaluation was made on May 21, 1984 by counting visible horsetail shoots or stems in each plot except in the untreated control where hundreds of shoots were present. A second observation was made on August 2, 1984 using the standard rating system of 0 to 10. All treatments effectively reduced horsetail with 6.0 lb ai/A giving the best control. However, considering the cost of treatment, 3.0 lb ai/A also resulted in very economical control. No crop phytotoxicity was noted from any treatment. (Oregon State University Cooperative Extension, Hillsboro, OR)

Dichlobenil for control of field horsetail in Marion blackberries

Treatment	Rate (lbs ai/A)	No. of horsetail[1/] plants/plot May 21, 1984	Weed control rating[2/] August 1, 1984
Control	0	100's	0
Dichlobenil	2	34	7.3
Dichlobenil	3	29	8.3
Dichlobenil	4	9	8.8
Dichlobenil	6	9	9.3

1/ Numbers are the average of four replications.
2/ Weed control rating: 0=no control, 10=complete control.

The evaluation of tank mix application of contact and residual herbicides for the control of winter annual weeds in vineyard. Vargas, Ron and Gerecke, Tom. A trial was established in an 8 year old Thompson seedless vineyard growing on a Grangeville fine sandy loam soil under flood irrigation. The objective of this trial was to compare the efficacy of paraquat, diquat and glyphosate in combination with various residual materials. The vineyard was divided into three vine plots replicated three times in a randomized complete block design. At the time of application on 12/12/83 the two major weed species present were annual bluegrass and chickweed. The herbicides were applied with 8004 nozzles at 30 pounds pressure in 50 gallons of water per acre.

The first evaluation on 12/19/83 indicated a fast burn down of foliage by both paraquat and diquat as opposed to the slower translocated action of glyphosate. Subsequent evaluation on 1/4/84 and 2/14/84 indicated good to excellent chickweed (CW) and annual bluegrass (ABG) control with all combinations of materials. An evaluation of residual control on 5/29/84 showed oxyfluorfen to be weak on chickweed. Weed species present in the check plot included flaxleaf fleabane, annual sowthistle, cudweed, cheeseweed, marestail, common groundsel, chickweed and annual bluegrass. (University of California Cooperative Extension, 128 Madera Avenue, Madera, CA 93637)

WINTER ANNUAL WEED CONTROL IN VINEYARD

		EVALUATIONS[1/]					
		12/19/83	1/4/84		2/14/84		5/29/84
TREATMENTS*	#ai/A	Overall	CW	ABG	CW	ABG	Overall
simazine + paraquat	1.5 + .5	7	9.75	8.5	9.75	9.75	8.75
oxfluorfen + paraquat	2 + .5	8.5	9	9	9	9	3.75
simazine+oryzalin+paraquat	1.5 + 4 + .5	7	9.5	9	10	9.5	8.75
oxyfluorfen+oryzalin+paraquat	2 + 4 + .5	8.5	9	9	9	9.75	8
simazine + diquat	1.5 + .5	7.25	9.5	7	9.75	9	8.75
oxyfluorfen + diquat	2 + .5	8.75	8.5	8.5	8	8	2.75
simazine+oryzalin+diquat	1.5 + 4 + .5	7.25	9.25	7.75	10	9.25	10
oxyfluorfen+oryzalin+diquat	2 + 4 + .5	9	9	8.75	8.25	9	7
simazine + glyphosate	1.5 + .5	.5	4	6.25	10	9	9.25
oxyfluorfen + glyphosate	2 + .5	3	9	8.5	9	8.75	5
simazine+oryzalin+glyphosate	1.5 + 4 + .5	1	4.75	5.75	10	9.25	8.25
oxyfluorfen+oryzalin+glyphosate	2 + 4 + .5	2.75	8.75	8.5	9.75	8.75	8.25
check	-	0	1.5	1.25	0	0	0

*All plots X-77 @ .25%

[1/]Average of 3 replications were 0 = no control and 10 = 100% control

The evaluation of postemergence selective grass herbicides for the control of Johnsongrass in vineyard. Vargas, Ron and Gerecke, Tom. A replicated trial was established to compare the efficacy of various postemergence herbicides, glyphosate and SC-0224 on Johnsongrass growing in a Thompson seedless vineyard. The herbicides were applied to 8 to 16 inch johnsongrass on 4/4/84 and again to regrowth on 5/18/84. Materials were applied with 8002 nozzles at 30 pounds pressure in 20 gallons of water per acre. A petroleum based oil surfactant was applied with all treatments at the rate of one quart per acre.

An early evaluation on 4/24/84, 20 days after application and before the second application, indicated 50 to 80 percent control with the grass herbicides and close to 100 percent control with the 2 pound ai per acre rate of glyphosate. DPX-Y6202 at .5 pound ai per acre was giving 80 percent control. Subsequent evaluations indicated poor to excellent control. Glyphosate by itself and in sequential treatments with the various selective grass herbicides was exhibiting 76 to 93 percent control on 6/6/84. Haloxyfop-methyl and DPX-Y6202 at .5 + .5 pound ai per acre were exhibiting 90 percent control while sethoxydim and fluazifop-P-dibutyl were exhibiting poor to fair control. On 8/1/84 fluazifop-P-dibutyl at .5 + .5 pounds ai per acre was giving 93 percent control and haloxyfop-methyl 90 percent control. Glyphosate with sequential applications of selective grass herbicides was giving 60 to 86 percent control. Sethoxydim in this trial was giving unacceptable control. (University of California Cooperative Extension, 128 Madera Avenue, Madera, CA 93637)

JOHNSONGRASS CONTROL IN VINEYARD

TREATMENTS*	#ai/A 4/4/84 5/14/84 1st app/2nd app	Johnsongrass Control[1/] 4/24/84	6/6/84	8/1/84
fluazifop-P-dibutyl	.0625 + .0625	5.0	4.3	4.0
fluazifop-P-dibutyl	.125 + .125	5.0	5.0	7.3
fluazifop-P-dibutyl	.25 + .25	5.7	4.6	6.0
fluazifop-P-dibutyl	.50 + .50	6.0	7.0	9.3
sethoxydim	.25 + .25	5.3	5.0	.3
sethoxydim	.50 + .50	5.7	5.3	1.3
haloxyfop-methyl	.125 + .125	5.0	6.3	7.3
haloxyfop-methyl	.25 + .25	5.7	8.0	8.0
haloxyfop-methyl	.50 + .50	7.3	9.0	9.0
DPX-Y6202	.125 + .125	7.0	8.0	2.6
DPX-Y6202	.25 + .25	6.7	7.6	.6
DPX-Y6202	.50 + .50	8.0	9.0	4.6
glyphosate	2 + 2	10	8.0	7.0
SC-0224	2 + 2	9.7	8.3	5.6
glyphosate+fluazifop-P-dibutyl	2 + .25	9.7	9.0	8.6
glyphosate + sethoxydim	2 + .25	9.7	7.6	6.0
glyphosate + haloxyfop-methyl	2 + .25	9.3	9.0	7.0
glyphosate + DPX-Y6202	2 + .25	10	9.3	8.0
check	-	0	0	0

*All treatments Surfel @ 1 qt. per acre

[1/]Average of 3 replications were 0 = no control and 10 = 100 percent control

Lily tolerance to postemergence applications of metribuzin. McGrath, D., L. Riddle, and R.D. William. In 1982, several experiments demonstrated the usefulness of metribuzin as a spring applied postemergence herbicide in Easter lilies. To convince ourselves, the growers, and company representatives of the potential for using metribuzin postemergence in lilies, we conducted three field trials in commercial lily fields, two in Curry County, Oregon and one in Del Norte County, California. All three trials were established on April 13, 1984 on knappa sandy clay loam soils. Plots were 10 ft. sections of rows on 42 inch row spacings, replicated four times in a randomized complete block design. Split applications were made at 4 week intervals.

Crop tolerance was evaluated by grading mature bulbs at harvest according to commercial standards and by measuring yearling bulb weights. None of the treatments resulted in significant reduction in bulb size or yearling bulb weights. One trial was weeded just prior to harvest. The average time required to hand weed a ten foot section of row indicated that excellent weed control (knotweed, clover, spurry, plantain and annual ryegrass) was obtained by postemergence applications of metribuzin. (Oregon State University Cooperative Extension, Gold Beach, OR)

Lily tolerance to postemergence applications of metribuzin[a/]

Herbicide treatment	Rate (lbs ai/A)	Bulb size (inch) as % of total			
		5-6	7	8	9-11
Ace Commercials					
Weeded check	--	14 a	25 ab	42 a	19 a
Metribuzin	.25	10 ab	36 a	32 b	22 a
Metribuzin	.5	8 b	30 a	40 a	21 a
Metribuzin	.25+.25	6 b	16 b	51 c	27 a
Metribuzin	.5+.5	15 a	36 a	30 b	18 a
Metribuzin	.25+.25+.25	9 ab	36 a	36 ab	19 a

Herbicide treatment	Rate (lbs ai/A)	Bulb size (inch) as % of total		
		6-8	8-10	10-12
Nellie White Commercials				
Weeded check	--	2 a	61 a	37 a
Metribuzin	.25	2 a	60 a	38 a
Metribuzin	.5	3 a	68 a	31 a
Metribuzin	.25+.25	2 a	66 a	32 a
Metribuzin	.5+.5	6 a	67 a	29 a
Metribuzin	.25+.25+.25	5 a	67 a	27 a

Herbicide treatment	Rate (lbs ai/A)	Yearling bulb wt. (gm)	Time to weed (min)
Nellie White Bulblets			
Unweeded check	--	28 a	45 a
Metribuzin	.25	40 a	29 b
Metribuzin	.5	43 bc	4 c
Metribuzin	.25+.25	44 bcd	3 c
Metribuzin	.5+.5	48 d	0.2 d
Metribuzin	.25+.25+.25	45 cd	0.7 d

a/ Numbers are the average of four replications. Those numbers followed by the same letter are not significantly different at the 0.5 level.

Christmas tree tolerance to oryzalin and napropamide. Fletcher, R.A. and R.D. William. Oryzalin and napropamide are common agricultural herbicides, but have not been adopted by Christmas tree growers. Trials were established on April 11, 1984 to test these herbicides alone and in combination with common treatments of atrazine and hexazinone. Plots were 3.5 x 28.5 ft. and were replicated three times. Weeds present had emerged shortly before application and were in the 2-3 leaf stage. Measurements consisted of estimates of bare ground (scale 0-10, with 10 being totally bare ground), and the mix of broadleaf and grass weeds present. Ratings between broadleaf, grass, and bare ground will add to 10 for any given plot on a measurement date. Plots were evaluated on June 20, 1984 and again on November 11, 1984.

Hexazinone provided excellent control of newly emerging weeds, whereas oryzalin and napropamide were ineffective against emerging tall fescue, annual ryegrass, rattail fescue, false dandelion, and himalaya blackberry. Oryzalin improved residual control, but allowed rattail fescue to become established by mid-November. Needle damage was not apparent with any treatments. (Oregon Extension Service, Corvallis, OR)

Rating of bare ground, broadleaf, and grass weeds in Christmas trees using preemergence herbicides[a/]

Herbicide treatment	Rate (lbs ai/A)	Bare ground	Broadleaf weeds	Grass weeds
Check	--	0.5	3.1	6.4
Oryzalin	4.0	2.2	6.0	1.8
Oryzalin	8.0	3.0	5.8	1.2
Oryzalin	16.0	3.2	4.6	2.2
Napropamide	4.0	2.7	4.2	3.1
Napropamide	8.0	3.5	4.1	3.4
Atrazine	2.0	3.3	5.4	1.3
Atrazine	4.0	4.3	5.0	0.7
Hexazinone	1.0	8.2	1.5	0.3
Oryzalin + Atrazine	4.0 + 2.0	4.3	5.2	0.5
Oryzalin + Hexazinone	4.0 + 1.0	8.6	1.3	0.1
Napropamide + Atrazine	4.0 + 2.0	2.5	5.5	2.0

a/ Rated 6/20/84; Scale 0-10 where 0=no control and 10=complete control as bare ground.

Noble fir tolerance to hexazinone. Fletcher, R.A. and R.D. William. Recent needle damage problems in noble fir Christmas trees have been associated with annual applications of hexazinone. Plots were established on April 20, 1984 to test excessive rates of hexazinone. The noble fir were established in May, 1981 and have been treated annually with 1.5 lbs ai/A of hexazinone, except for the first year. The test area lies on a hilltop, with deep, well drained Jory clay loam soil. Plots were 5 x 10 ft. each, with four replications of each treatment. Spray was broadcast with a hand sprayer at a rate of 20 gal/A of spray solution. The site was free of grass at the time of spraying, but had a spotty stand of false dandelion (Hypochaeris radicata L.).

Checks in June, July and November revealed no significant differences in health of trees or foliage even at the higher rates. In one replication of the highest rate, however, one tree of the two exhibited yellowing of the leader, and a newly planted tree died soon after spraying. An interesting sidelight of the study was the degree of false dandelion control achieved. Even the highest rate failed to eradicate fall sprouting of the dandelions, whereas June evaluations showed complete control for all but the control plots. (Oregon Extension Service, Corvallis, OR)

Noble fir tolerance to hexazinone (Velpar)
and control of false dandelion[a/]

Herbicide treatment	Rate (lbs ai/A)	False dandelion % ground cover	Crop phytotoxicity
Check	--	58	0
Hexazinone	2.0	38	0
Hexazinone	4.0	25	0
Hexazinone	8.0	20	0
Hexazinone	16.0	12	0.5

a/ Ratings were 0-10: 0=no phytotoxicity, 10=complete tree kill.
b/ Rated 11/14/84.

Turfgrass suppression using postemergence herbicides. Brenner, L.K. and R.D. William. During the fall of 1983, sublethal rates of fluazifop-butyl, sethoxydim, and glyphosate were used to reduce growth of 'Manhattan II' perennial ryegrass (*Lolium perenne* L.). It was anticipated that herbicide activity would vary seasonally, therefore, the suppression trial was repeated in the summer of 1984. The experimental design was a randomized complete block with three replications. Individual plots measured 3 by 3 M. Herbicides were applied on May 29, 1984. All herbicides were combined with 1% crop oil except glyphosate.

Three weeks after application, 0.45 Kg ai/h fluazifop-butyl, 0.05 Kg ai/h sethoxydim, and 0.22 Kg ai/h of fluazifop-butyl (PP-005) had reduced grass growth by more than 50 percent, and were the most effective suppression treatments. Although less effective, fluazifop-butyl at 0.11 and 0.28 Kg ai/h, fluazifop-butyl (PP-005) at 0.06 and 0.13 Kg ai/h, sethoxydim at 0.02 and 0.01 Kg ai/h, and glyphosate at 0.39 Kg ai/h, provided 30 to 50 percent growth reduction. Glyphosate at 0.17 to 0.28 Kg ai/h resulted in inadequate and inconsistent suppression.

Six weeks following treatment, 0.45 Kg ai/h of fluazifop-butyl and 0.22 Kg ai/h of fluazifop-butyl (PP-005) were the only treatments still providing more than 20 percent growth reduction. A greater amount of grass regrowth was observed in all other treatments.

In contrast to the fall experiment, higher herbicide rates were needed in the summer in order to provide adequate grass suppression over a six week period. After six weeks, complete, vigorous turf regrowth occurred in all treatments with the exception of 0.39 Kg ai/h glyphosate. Moderate to high rates of all herbicides, except glyphosate, also reduced the development and quantity of seed stalks.

A separate experiment evaluated the impact of oil and surfactant combined with herbicides on grass suppression activity. Fluazifop-butyl at 0.11 Kg ai/h, and sethoxydim at 0.02 and 0.05 Kg ai/h were applied alone or combined with either 1% crop oil or 0.1% surfactant by total volume. Grass suppression was excellent with 0.05 Kg ai/h sethoxydim with or without crop oil or surfactant reducing growth by 66 percent. Although 0.11 Kg ai/h fluazifop-butyl and oil reduced grass growth by 53 percent, surfactant combined with fluazifop-butyl noticeably enhanced suppression, reducing growth by 60 percent. No turf injury occurred with any treatment, and grass regrowth was complete and vigorous after six weeks.

Controlling yellow nutsedge through drip irrigation. Lange, A. H. and W. D. Edson. A heavy stand of yellow nutsedge in a foot wide basin irrigated citrus nursery crop was treated by diluting two herbicides with the water for incorporation and injecting these diluted preemergence herbicides through a T-tape drip system with 6 inch spacing. Two drip lines were used one on either side of the nursery row. The herbicides were injected in 1/2 and 1 acre inch of water on March 20, 1984. The nutsedge had been knocked down with glyphosate by the grower. The day of application was sunny with temperatures at about 72-78°F and no wind. The plots were rated for nutsedge control on April 18, May 8, May 23, June 15 and September 19.

The control was spectacularly good when one considers that the application was made only once early in the season. Repeated applications, if safe, would be expected to give better nutsedge control. The norflurazon gave significant control, but never quite matched the metolachlor. The latter seemed to give season long nutsedge control. The combination was not outstanding but gave a degree of control. (University of California Cooperative Extension, Parlier, CA 93648)

The effect of two preemergence herbicides applied through the drippers on yellow nutsedge control (425-54-502-129-1-84)

Herbicides	Lb/A	Acre Inch1/	Average1/ Yellow Nutsedge Control 4/18	5/8	5/23	6/15	9/19
Metolachlor	2	1/2	9.5	8.8	8.5	8.5	9.8
Metolachlor	4	1	10.0	10.0	9.5	9.5	9.2
Norflurazon	2	1/2	8.2	8.0	8.3	7.8	8.0
Norflurazon	4	1	8.5	9.2	8.8	7.8	8.8
Metolachlor+ Norflurazon	2+2		8.5	8.2	8.8	7.5	6.5
Check			4.0	2.2	0.0	0.0	3.5

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

Effect of bentazon and glyphosate on tuberization of yellow nutsedge. Pereira, W., G. Crabtree, and R.D. William. Historically, little translocation to the site of action, failure to inhibit sprouting of tubers, and failure to inhibit new tuber formation have contributed to poor control of yellow nutsedge. The objective of this study was to examine the long-term influence of herbicides on new tuber formation. In a two-year study, herbicides were applied to control yellow nutsedge (Cyperus esculentus L.) in a three-year old pear orchard in Hood River County, Oregon, and in pots in greenhouse, growth chamber and outdoor conditions. Recent results indicate that glyphosate inhibits tuber formation when applied shortly before the tuber initiation stage. Combinations of glyphosate with oxyfluorfen provided more rapid top kill and synergistically improved control of tuber formation. This was the result of greater absorption and translocation of each of the herbicides when applied at the tuber initiation stage. Field results indicated that glyphosate provided better inhibition of tuber production than bentazon when these materials were applied in consecutive years. New tuber production in plots treated with these herbicides was 15% and 33%, respectively, as compared to the check. These herbicides were applied ten days apart in split applications in late June of each year. Split applications of glyphosate reduced tuber production slightly more than a single application. Single annual applications of bentazon and glyphosate reduced new tuber production in these previously treated plots to about 60% and 30%, respectively, of the untreated check. Single applications of these herbicides controlled nutsedge foliage for about 40 days but regrowth, mostly from dormant tubers, contributed to the amount of new tuber production. Therefore, repeated yearly applications of the herbicides are needed for a period of two to three years in order to achieve excellent control of yellow nutsedge. (Oregon State University, Department of Horticulture, Corvallis, OR)

The effect of applications of bentazon, glyphosate, and oxyfluorfen over a two year period on tuber production by yellow nutsedge

Treatment	Time of application		Rate (Kg ai/ha)	1983 Tuber number (#)	1983 Tuber weight (g)	1984 Tuber number (#)	1984 Tuber weight (g)
Check	--	--	--	550	88	587	65
Bentazon	1983	--	1/1	437	79	334	43
Glyphosate	1983	--	1/1	227	31	193	26
	1983	--	2/2	206	30	151	19
Bentazon	1983	1984	1/1+1/1	384	61	193	24
Glyphosate	1983	1984	1/1+1/1	189	30	102	21
	1983	1984	2/2+2/2	163	22	72	12
Bentazon	--	1984	1/1	--	--	340	39
Glyphosate	--	1984	1/1	--	--	236	41
	--	1984	2/2	--	--	202	31
Oxyfluorfen	--	1984	1.5	--	--	416	54
Glyphosate + Oxyfluorfen	--	1984	2+1.5	--	--	186	28
Glyphosate + Oxyfluorfen	--	1984	(2+1.5)/2	--	--	158	26
LSD (5%)				58	8	46	8

/ and + means split and repeated applications, respectively.

The control of annual weeds with water-banding metham in a Panoche clay loam with sprinkler irrigation. Lange, A. H., W. D. Edson and D. May. The grower's press wheels and sleds were pulled through the field in order to make two 4-inch press wheel marks for accurate water-band placement. The metham was applied on January 20, 1984 in 1/4 A" using the previously mentioned water-banding equipment. The metham was applied at 25, 50, and 100 gpa in the marks and seeded four days later on January 24. The field was sprinkled up on January 30. The tomato stand and vigor was slightly affected when compared with the water check but by March 30 the highest rate of metham looked the best. Weed pressure was not heavy but the recorded control was excellent (Table 1).

The thinning weights clearly suggested the better growth seen in all other trials where metham has been incorporated by water-banding or drip irrigation. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The effect of preplant water-banded metham on the stand of tomato and the control of weeds (425-10-513-186-1-84)

		Average 1/			
		Tomato Stand & Vigor		Weed Control	
Herbicide	Gal/A	3/16	3/30	3/16	3/30
Metham	25	8.7	8.0	9.3	10.0
Metham	50	7.7	8.0	10.0	10.0
Metham	100	7.3	9.7	10.0	10.0
Water only	0	9.0	9.5	6.0	10.0
Check	0	7.0	7.0	5.0	0.0
Pebulate+Napropamide (Grower)		-	9.0	-	5.3

1/ Average of 3 replications 1 bed by 100 feet long where 0 = no stand and 10 = best stand.

2/ Average of 3 replications where 0 = no weed control and 10 = best control of hairy and black nightshade. Evaluated 3/20/84.

Table 2. The effect of water-banded metham on fresh weight of tomato plants seeded 3 days after treatment in a Panoche clay loam soil (425-10-513-186-1-84)

Herbicide	GPA	Acre Inch Water for Incorp.	Average[1/] Thinning weights Hand Planted	Machine 2 MPH	5 MPH	Ave.
Metham	25	1/4	2479	1620	1318	1806
Metham	50	1/4	1958	1189	1075	1407
Metham	100	1/4	2111	1413	1295	1606
Water Check	-	1/4	1312	1157	1258	1242
Grower Check					754	

1/ Thinning weights of 42.5' rows by 3 replications.
Hand planted thinning weights based from 15' of row. Machine planted slow and m=normal speeds and checks thinning weights are averages of 42.5' of 2 rows per bed.
Hand planted and machine planted at slow speed (2 mph) thinning weights taken on 4/12/84.
Machine planted at normal planting speed (5 mph) and grower check thinning weights taken on 4/13/84.
Treated 1/20/84. Planted 1/24/84. Variety Castlepeet II.

Special Note: There is a possiblity that the 50 and 100 Lb/A rate were substituted one for the other. The results suggest this.

The residual activity of dicamba in a Panoche clay loam. Lange, A. H. and W. D. Edson. One of the most effective herbicides for the control of perennial bindweed is dicamba applied after a spring crop of grain prior to fall seeding. Dicamba must be used well in advance of using the land for susceptible crops like tomatoes. The soil was bedded up in the summer of 1983 and treated with 0.5 Lb/A to 8 lb/A in 50 gpa on August 4, 1983. There were no bindweed plants present. One acre inch of water was applied about 3 hours after application of dicamba. The annual weed control was excellent in all plots except the untreated check. On October 25 the entire experiment was sprayed with 1.7 Lb/A glyphosate to remove weed growth and seeded to 7 crops. Most plots were relatively clean due to the excellent annual weed control at all but the lowest rates. Broccoli was the most tolerant of the broadleaf crops and oats of the small grains. Sugar beets were the most sensitive.

The following spring (1984) the ground was reworked with a disk and bedded up and seeded into moist soil on April 6 and irrigated up with furrow irrigation. From the yields it appears that the grass crops are showing no carry-over effects. Although variable, it doesn't appear that there are any carry-over effects 8 months after application on tomatoes. The sugar beets showed injury only at the 8 lb/A level with some indication of yield loss down to 2 Lb/A. For a conservative answer then, we would have to stay at 2 Lb/A or less with susceptible crops if the dicamba is summer applied. It would then appear to be a good program to include fall application of glyphosate where possible to keep the residual activity of dicamba as low as possible unless a grass crop were to be used in rotation which appears always to be a good approach. With the dicamba residual activity as low as appears in this work, a safeguard of plug planting to get tomatoes off to a good, protected start would be worth some consideration. (University of California Cooperative Extension, Parlier, CA 93648)

Table 1. The residual effect of dicamba on seven crops seeded eleven weeks after treatment (425-78-502-3-83)

		Average Weights Per 10' of Row 1/						
		Carrots	Lettuce	Sugar Beets	Broccoli	Wheat	Barley	Oats
Herbicides	Lb/A	- - - - - gms - - - - -			- - - - - - - - kg - - - - - - - -			
Dicamba	1/2	251	2713	2133	4.57	6.3	8.1	10.3
Dicamba	1	169	1017	403	3.40	5.9	7.3	10.8
Dicamba	2	87	115	41	3.83	4.1	6.9	9.1
Dicamba	4	29	20	0	2.03	2.3	5.4	6.9
Dicamba	8	0	0	0	0.13	1.6	1.8	3.9
Check	-	414	3433	2433	5.60	6.4	8.3	9.9

1/ Average of 4 replications. Dicamba sprayed 8/4/83. Crops planted 10/25/83. All crops were cut off at ground level, except carrots and sugar beets; these weights are including roots. Weights taken 2/28/84.

Table 2. The effect of dicamba at 8 months on harvest plant weights of four annual crops (425-78-502-3-83).

		Average Total Plant Weight 1/ (gms)			
Herbicide	Lb/A	Milo	Barley	Tomato	Sugar Beets
Dicamba	1/2	1064	799	812	2176
Dicamba	1	1407	716	838	2837
Dicamba	2	1954	712	1052	2041
Dicamba	4	1945	884	564	2095
Dicamba	8	1543	1115	1226	321
Check	-	1827	731	1338	2640

1/ Average of 4 replications. Plant weights were measured to nearest gram.
Varieties used: Milo - Northup King NK129 Hybrid sorghum; Barley - Germains Gus Certified barley; Tomatoes - UC 82B Castle seed; Sugar Beets - no variety available.
All crops planted on 4/6/84. Treated 8/4/83. Evaluated 6/29/84.

PROJECT 5.

WEEDS IN AGRONOMIC CROPS

Sam Steadman - Project Chairman

<u>Kentucky bluegrass control in alfalfa</u>. Brewster, B.D. and A.P. Appleby. Five herbicides were applied in a trial on established alfalfa which was infested with a dense stand of Kentucky bluegrass. The experimental design was a randomized complete block with three replications and 2.5 m by 7.5 m plots. The herbicides were applied in a spray volume of 234 l/ha with water as the carrier. A compressed-air unicycle sprayer was used. The alfalfa was 5 cm to 8 cm tall and the Kentucky bluegrass was 8 cm to 12 cm tall when the herbicides were applied on April 6, 1984.

Visual evaluations of percent alfalfa injury and percent Kentucky bluegrass control were made on May 24 and August 14, 1984. No injury on the alfalfa was observed. All herbicides provided effective control for 2 mos., but by mid-August, haloxyfop-methyl was markedly better than the other herbicides. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Kentucky bluegrass control in alfalfa

Herbicide	Rate (Kg/ha)	Alfalfa injury		Kentucky bluegrass control	
		May 24	Aug. 14	May 24	Aug. 14
		(%)			
sethoxydim	0.56	0	0	90	40
fluazifop-P-butyl	0.56	0	0	90	50
fluazifop-butyl	0.56	0	0	88	60
DPX Y6202	0.56	0	0	90	83
haloxyfop-methyl	0.56	0	0	95	98
Check	0	0	0	0	0

Sethoxydim + 2,4-DB tank mixes on established alfalfa. Dewey, S.A. and P.W. Foote. An experiment was conducted at the Kimberly Research and Extension Center to evaluate phytotoxicity of sethoxydim + 2,4-DB tank mixes on established forage alfalfa. Treatments were applied on July 16, 1984 with a CO_2 backpack sprayer at 10 gal/A. Plots were arranged in a randomized complete block design with four replications. Alfalfa plants had 10 to 12 inches of second-cutting regrowth. Plots were evaluated visually 7 DAT and harvested August 2, 1984.

All treatments demonstrated injury symptoms 7 DAT. Alfalfa plants exhibited typical phenoxy symptoms on leaves and stems. Crop stunting was apparent 14 DAT and continued up until harvest. All treatments reduced yields significantly below those of the untreated check. (Plots, including checks, were essentially weed free.) Yield reduction was greater at the higher rate (1.5 lb ae/A) of 2,4-DB. Treatments containing crop oil concentrate (COC) produced yields lower than those without COC. Greatest yield reductions occurred in treatments of sethoxydim + COC + 1.5 lb ae of 2,4-DB. A cream-colored precipitate formed and collected on nozzle screens in each 2,4-DB tank mix. The relationship, if any, between this incompatibility and crop injury is not known. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Crop Injury and Forage Alfalfa Yields Resulting from 2,4-DB Tank Mixes

Treatment[1]	Rate	Crop Injury 7-23	Yield Dry Weight
	(lb ai/A)	%	(lb/Acre)
Sethoxydim + 2,4-DB	.1875 + 1.5	18	2507
Sethoxydim + 2,4-DB	.1875 + .75	13	2653
Sethoxydim + 2,4-DB	.2813 + 1.5	30	2262
Sethoxydim + 2,4-DB	.2813 + .75	13	2683
Sethoxydim + 2,4-DB	.4688 + 1.5	30	2239
Sethoxydim + 2,4-DB	.4688 + .75	14	2637
Sethoxydim + 2,4-DB + COC	.1875 + 1.5	30	1947
Sethoxydim + 2,4-DB + COC	.1875 + .75	18	2315
Sethoxydim + 2,4-DB + COC	.2813 + 1.5	28	2154
Sethoxydim + 2,4-DB + COC	.2813 + .75	13	2430
Sethoxydim + 2,4-DB + COC	.4688 + 1.5	35	2009
Sethoxydim + 2,4-DB + COC	.4688 + .75	16	2300
PP005 + 2,4-DB + COC	.1875 + 1.5	26	2400
PP005 + 2,4-DB + COC	.1875+ .75	13	2622
Check + COC	-	-	3381
Check	-	-	3519
LSD		6.3	252.8

1/ COC = crop oil concentrate (added at 1 quart/Acre)

Alfalfa establishment weed control. Dewey, S.A. and P.W. Foote. The efficacy and phytotoxicity of preplant and postemergence herbicides used in alfalfa stand establishment was evaluated at the Kimberly Research and Extension Center. Treatments were applied to 10 x 30 ft plots in a randomized complete block design with four replications. Preplant treatments were applied July 18, 1984 with a CO_2 backpack sprayer at 20 gal/A and were immediately incorporated to a depth of 2 to 4 inches with a roller harrow. Postemergence treatments were applied 17 August 1984 when alfalfa plants were 2 inches tall (second trifoliolate leaf emerged). Broadleaf weeds on August 17 ranged in size from cotyledon stage to 3 inches tall. Treatments were evaluated for seedling injury August 24 and September 3, and for weed control September 3. Plots were harvested October 16, 1984.

EPTC did not control redroot pigweed or common lambsquarters (the two predominant weed species present). Benefin provided excellent control of both weed species, but was noticeably weak on annual sowthistle. Some alfalfa stand thinning was noted with benefin, especially along corrugate shoulders where treated soil was thrown up in the process of forming irrigation corrugates. The phenoxy treatments all provided good weed control. Bromoxynil and an experimental formulation of bromoxynil (AFX 1240) gave excellent control of weeds. However, air temperatures were in the 90's on the day of application, and both bromoxynil treatments severely injured alfalfa. Bromoxynil and AFX 1240 reduced alfalfa yields 29 and 45% respectively when compared to the weeded check. Fresh weights in Table 1 represent total vegetative yield, including weeds. Fresh-weight yield of alfalfa alone (weeds removed) in the check treatment was 3258 lbs/Acre. (Univ. of Idaho Cooperative, Extension, Twin Falls, ID 83301)

Table 1. Effect of Herbicides on Weed Control, Crop injury, and Yield of New-seeding Alfalfa

Treatment	Rate (lb ai/A)	Type of Application	Crop Injury 8-24	Crop Injury 9-3	Weed Control[1] (9-3) Repw	Weed Control[1] (9-3) Colq	Yield Fresh Weight (lb/Acre)
EPTC	2.0	PPI	0	0	10	8	4472
EPTC	4.0	PPI	5	0	24	24	4089
benefin	1.13	PPI	8	4	96	98	4217
benefin	1.50	PPI	14	6	98	99	4089
bromoxynil	.50	POST	56	65	94	100	2300
AXF 1240	.50	POST	55	64	92	98	1789
MCPB	.50	POST	0	0	79	83	4217
2,4-DB (amine)	.50	POST	0	0	78	88	4344
2,4-DB (amine)	1.0	POST	0	0	89	92	4536
Check	-	-	-	-	-	-	4536
LSD (0.05)			4.7	6.3	5.4	7.1	733.9

1/ Repw = redroot pigweed, Colq = common lambsquarters

Quackgrass control and alfalfa seed yields in response to PP005 and sethoxydim. Dewey, S.A. and P.W. Foote. A trial was conducted near Twin Falls to evaluate PP005 for quackgrass control in established seed alfalfa, and to determine effects on seed yield and quality. Treatments were applied May 17, 1984 at 20 gal/A using a CO_2 backpack sprayer. Plots were arranged in a randomized complete block design with four replications. Alfalfa was 10 to 12 inches tall and quackgrass was 8 to 10 inches tall at the time of application. Quackgrass control was evaluated June 1 and June 18, and plots were hand-harvested September 18, 1984.

PP005 at .25 lb ai/A or greater provided excellent control of quackgrass during the entire growing season. Weed control ratings for all treatments at harvest essentially were unchanged from those of June 18. Seed yields from all herbicide treatments were significantly greater than those of the untreated check, with the highest yield corresponding to the highest rate of PP005. There was no indication of foliar injury or adverse effects on flowering from any treatment. Alfalfa seeds from each treatment will be tested for germination. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Quackgrass Control and Alfalfa Seed Yield in Response to PP005 and Sethoxydim

Treatment[1]	Rate	Quackgrass Control 6-1	Quackgrass Control 6-18	Seed Yield
	(lb ai/A)	%	%	(lb/Acre)
PP005 + COC	.063	39	63	1077
PP005 + COC	.125	48	76	946
PP005 + COC	.25	66	95	1246
PP005 + COC	.50	71	94	1412
sethoxydim + COC	.25	35	44	1014
Check	-	-	-	478
LSD (0.05)		13.3	6.6	463

1/ COC = crop oil concentrate; added at 1% of total spray volume

Sethoxydim + 2,4-DB injury on seedling alfalfa. Dewey, S.A. and P.W. Foote. Phytotoxicity of sethoxydim + 2,4-DB tank mixes on seedling forage alfalfa was evaluated at the Kimberly Research and Extension Center. Treatments were applied on August 17, 1984 with a CO_2 pressurized backpack sprayer calibrated to deliver 10 gal/A. Plots were 8 ft x 25 ft arranged in a randomized complete block design with four replications. The alfalfa plants were 1 to 2 inches tall at time of application, with most having the second trifoliolate leaf. Weeds (primarily redroot pigweed) ranged from the cotyledon stage to 3 inches tall. Crop injury was assessed August 24 and September 3, with weed control evaluated September 3. Alfalfa was harvested and fresh weights taken on October 16.

All treatments demonstrated some degree of crop injury 7 DAT, primarily in the form of necrotic leaf spotting. Symptoms were more severe at the higher rate (1.5 lb ae/A) of 2,4-DB with or without crop oil concentrate (COC). Injury also appeared to be increased by the addition of crop oil concentrate when 2,4-DB rates were held constant. Amount of sethoxydim in the tank mix did not appear to be a factor in crop injury 7 DAT. Necrotic spotting was not evident September 3, but plants appeared stunted by some treatments.

Weed control was essentially perfect in all plots during the entire season so yield reductions likely reflect herbicide injury rather than loss from weed competition. Four treatments (9, 11, 13, 14) significantly reduced (29 to 41 percent) alfalfa fresh weight yields below those of the untreated check plots. All 4 treatments contained crop oil concentrate.

A physical incompatibility was apparent between the 2,4-DB amine formulation used and sethoxydim. A cream-colored paste formed and collected on nozzle screens making it necessary to remove and clean them after every treatment. The incompatibility was most apparent in those tank mixes without COC, but occurred to a lessor degree even when COC was included. It has been reported that 2,4-DB amine will form a precipitate when applied using CO_2 as a propellant. What effect the incompatibility may have had on crop injury is not known. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Weed Control, Crop Injury, and Yield of New-Seeding Alfalfa as Affected by Graminicide Tank Mixes

	Treatment[1]	Rate (lb ai/A)	Visual Evaluation % Crop Injury 8-24	Visual Evaluation % Crop Injury 9-3	Visual Evaluation % Redroot Control 9-3	Yield Fresh Wt 10-16 (lb/A)
1	sethoxydim + 2,4-DB	.1875 + 1.5	7	2	99	2760
2	sethoxydim + 2,4-DB	.1875 + .75	5	2	99	2760
3	sethoxydim + 2,4-DB	.2813 + 1.5	7	2	98	2607
4	sethoxydim + 2,4-DB	.2813 + .75	6	2	98	2530
5	sethoxydim + 2,4-DB	.4688 + 1.5	8	4	99	2683
6	sethoxydim + 2,4-DB	.4688 + .75	5	2	99	3143
7	sethoxydim + 2,4-DB + COC	.1875 + 1.5	10	7	99	2645
8	sethoxydim + 2,4-DB + COC	.1875 + .75	6	3	98	2913
9	sethoxydim + 2,4-DB + COC	.2813 + 1.5	9	8	100	1802
10	sethoxydim + 2,4-DB + COC	.2813 + .75	6	2	99	2760
11	sethoxydim + 2,4-DB + COC	.4688 + 1.5	14	13	99	1993
12	sethoxydim + 2,4-DB + COC	.4688 + .75	7	3	99	2837
13	PP005 + 2,4-DB + COC	.1875 + 1.5	8	6	99	2165
14	PP005 + 2,4-DB + COC	.1875 + .75	5	3	98	2147
15	Check[2] + COC	-	-	-	-	2780
16	Check[2]	-	-	-	-	3067
	LSD (0.05)		1.7	3.0	NS	649

1/ COC = crop oil concentrate.

2/ Fresh-weight yield of check plots represents alfalfa weight only. Weeds were removed prior to weighing.

Bulbous bluegrass control in established dryland alfalfa. Evans, J.O. and R.W. Gunnell. Bulbous bluegrass has the ability to establish a carpet-like population in dryland alfalfa if frequent crop rotation is not practiced. Due to the sometimes steep, rocky nature of many northern Utah dryland alfalfa fields prolonging alfalfa stand life is desirable. Metribuzin has given effective chemical control when applied early postemergence to bulbous bluegrass in dormant alfalfa. This study was initiated to determine the effectiveness of later postemergence herbicide applications made after alfalfa had broken dormancy. The experiment was established in an eight year old stand of Ranger alfalfa with an average of 12 crowns per square meter and a height of 5 cm to 8 cm. Bulbous bluegrass was also 5 cm to 8 cm tall (6 leaf) with a population which completely occupied the space between alfalfa plants. Plots were 2.4m by 7.6m with 4 replications in a randomized block design. Treatments were applied with a bicycle sprayer delivering 187 l/ha at 30 psi. An oil concentrate at a rate of 1% of the total spray volume was added to all except the metribuzin and hexazinone treatments.

One month after treatment, fluazifop-P-butyl and Dowco 453ME had given excellent grass control at all rates tested. Control was also good when sethoxydim and DPX-Y 6202 were applied at 0.28 and 0.56 kg/ha. SC-1084 did not perform as well as other postemergence grass herbicides, and control with neither metribuzin nor hexazinone was adequate when applied at the late weed growth stage. A post harvest evaluation was not made since dry weather conditions prevented weed regrowth. None of the treatments caused measurable injury to the crop. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

Bulbous bluegrass control in established alfalfa with postemergence grass herbicides

Treatment	Rate (kg/ha)	Percent alfalfa injury 6-11-84	Percent control bulbous bluegrass 6-11-84
fluazifop-P-butyl + OC	.07+ 1%	0	91
fluazifop-P-butyl + OC	.14+ 1%	0	91
fluazifop-P-butyl + OC	.28+ 1%	0	95
fluazifop-P-butyl + OC	.56+ 1%	0	96
SC-1084 + OC	.14+ 1%	0	65
SC-1084 + OC	.28+ 1%	0	55
SC-0184 + OC	.56+ 1%	0	86
sethoxydim + OC	.14+ 1%	0	73
sethoxydim + OC	.28+ 1%	0	91
sethoxydim + OC	.56+ 1%	0	93
Dowco 453ME + OC	.14+ 1%	0	96
Dowco 453ME + OC	.28+ 1%	0	95
Dowco 453ME + OC	.56+ 1%	0	95
DPX-Y 6202 + OC	.14+ 1%	0	79
DPX-Y 6202 + OC	.28+ 1%	0	94
DPX-Y 6202 + OC	.56+ 1%	0	95
metribuzin	.28	0	18
metribuzin	.56	0	49
hexazinone	.56	0	43
check	-	-	-

Evaluation of postemergence herbicides for weed control in established alfalfa. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on June 26, 1984 to evaluate their efficacy for weed control in established alfalfa (var. Apollo). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (63% sand, 23% silt, 14% clay) with 1.0% organic matter and a 7.1 pH. The alfalfa had ½ in. of regrowth after the first cutting and field sandbur 4 to 5-leaves (1½ to 3 in.) at time of treatment.

Visual weed control and injury evaluations were made on July 12 and plots harvested for yield July 24, 1984. Field sandbur infestations were light averaging 1.2 plants/ft^2 in the untreated check. Little apparent alfalfa injury was observed with any treatment. Alfalfa yields in herbicide treated plots were equal to or greater than alfalfa yield in the untreated check. Field sandbur control was 90% or greater with all postemergence grass herbicides applied alone or in combination with 2,4-DB. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1283.)

Postemergence herbicides in established alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa Injury %	Alfalfa Yield lb/A	Fisb[2] Control %
AXF-1240	0.38	0	3640	0
AXF-1240	0.5	3	3944	0
bromoxynil	0.25	0	3713	0
bromoxynil	0.38	0	4015	0
bromoxynil	0.5	3	3222	0
2,4-DB	0.5	0	3992	0
DPX-Y6202 + OC	0.125	0	4294	100
PP-005 + OC	0.125	0	3923	95
PP-005 + OC	0.25	0	3933	100
fluazifop + OC	0.38	0	4383	93
sethoxydim + OC	0.2	0	3673	93
haloxyfop + OC	0.125	0	3581	100
DPX-Y6202 + 2,4-DB + OC	0.125 + 0.5	0	3757	97
PP-005 + 2,4-DB + OC	0.25 + 0.5	0	3306	98
sethoxydim + 2,4-DB + OC	0.2 + 0.5	0	3205	97
haloxyfop + 2,4-DB + OC	0.125 + 0.5	0	3912	100
Check	---	0	3281	0

[1]Treatments applied June 26, 1984. OC = Atplus 411F at 1 qt/A except 1% v/v with PP-005 and fluazifop. 2,4-DB = amine.
[2]Weed control and injury evaluations July 12 and harvest July 26, 1984.

Evaluation of postemergence herbicides for weed control in newly seeded alfalfa. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on May 30, 1984 to evaluate their efficacy for weed control in newly seeded alfalfa (var. Apollo II). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (76% sand, 14% silt, 10% clay) with 0.7% organic matter and a 8.3 pH. The alfalfa was in the 3 to 4-leaf stage (2 to 3 in.) and weeds small, less than 1½ to 2 inches at time of treatment.

Weed control and crop damage evaluations were made on June 19 and plots harvested for yield July 18, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Common lambsquarters, redroot pigweed, hairy nightshade and grass infestations (primarily field sandbur) were light averaging 1.0, 0.7, 0.7 and 1.4 plants/ft^2, respectively, in the untreated check. Bromoxynil and AXF-1240 injured alfalfa 13 to 20%; however, this was not reflected in a yield reduction. Broadleaf weed control was good with AXF-1240 or bromoxynil and grass control 80% or greater with all postemergence grass treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1284.)

Postemergence herbicides in newly seeded alfalfa

Treatment[1]	Rate	Alfalfa[2] Injury	Alfalfa[2] Yield	Weed Control[3] Colq	Weed Control[3] Rrpw	Weed Control[3] Hans	Weed Control[3] Gr
	lb ai/A	%	lb/A	%	%	%	%
DPX-Y6202 + OC	0.03	0	3139	0	0	0	91
DPX-Y6202 + OC	0.06	0	3335	0	0	0	94
DPX-Y6202 + OC	0.125	0	3116	0	0	0	100
DPX-Y6202 + OC	0.25	0	3055	0	0	0	100
DPX-Y6202 + OC	0.5	0	3350	0	0	0	100
sethoxydim + OC	0.2	0	3228	0	0	0	86
sethoxydim + OC	0.4	0	3439	0	0	0	100
PP-005 + OC	0.094	0	3554	0	0	0	83
PP-005 + OC	0.125	0	3615	0	0	0	91
PP-005 + OC	0.25	0	3423	0	0	0	94
PP-005 + OC	0.38	0	3366	0	0	0	94
PP-005 + OC	0.75	0	3477	0	0	0	100
fluazifop + OC	0.38	0	3189	0	0	0	91
haloxyfop + OC	0.06	0	3531	0	0	0	91
haloxyfop + OC	0.125	0	3531	0	0	0	94
haloxyfop + OC	0.25	0	3189	0	0	0	100
AXF-1240	0.38	15	3734	100	89	100	0
AXF-1240	0.5	18	3738	91	100	100	0
bromoxynil	0.25	13	3166	100	100	100	0
bromoxynil	0.38	13	3139	100	100	100	0
bromoxynil	0.5	20	3508	100	89	100	0
Check	---	0	3404	0	0	0	0

[1] Treatments applied May 30, 1984. OC = Atplus 411F 1 qt/A except 1% v/v with PP-005 and fluazifop.

[2] Weed control and alfalfa injury evaluations June 19 and harvest July 18, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft quadrats per replication.

Timing of herbicide application for control of yellow foxtail in established alfalfa. R.F. Norris, C.A. Schoner, R.A. Lardelli. DPX-Y6202, haloxyfop-methyl and fluazifop-butyl, applied preemergence or postemergence, were compared for long-lasting, selective control of yellow foxtail in alfalfa. The investigation was conducted in Yolo County, California.

Herbicide treatments were applied at three different growth stages to separate plots. The first application was on February 16, 1984 prior to emergence of yellow foxtail, when the alfalfa was 6 inches tall. The second application on May 25 followed the second cutting, with alfalfa regrowth approximately 4 inches tall and yellow foxtail 1 to 2 inches tall. The last treatment was applied on June 29 after the third cutting, when the alfalfa was 10 to 12 inches tall and yellow foxtail 3 to 4 inches tall.

The experimental design was a randomized complete block with four replications; the plots were 5 by 12 ft. All applications were made with a CO_2 backpack handsprayer, equipped with flat fan nozzles and calibrated to deliver 40 gal/A.

Visual evaluations of yellow foxtail control were made on July 19, August 20, and August 31. There was no phytotoxicity to the alfalfa from any of the herbicides. Preemergence: Haloxyfop-methyl applied at 0.9 lb/A provided substantial activity through August 31, whereas DPX-Y6202 at 0.9 lb/A and fluazifop-butyl at 0.45 lb/A resulted in poor control of yellow foxtail. Postemergence: application of haloxyfop-methyl and oil at 0.9 lb/A after the third cutting was the most effective treatment of all three herbicides tested. DPX-Y6202 plus oil at 0.9 lb/A and fluazifop-butyl plus oil at 0.45 lb/A were not able to adequately control the grass, and fluazifop-butyl only achieved moderate control at the higher rate applied. Timing of application appeared to have little affect on the grass with DPX-Y6202 and fluazifop-butyl. (Botany Department, University of California, Davis and Cooperative Extension, Woodland.)

Treatments	Time of Application PRE-EM 2/16	After 2nd cutting 5/25	After 3rd cutting 6/29	Yellow Foxtail Control 7/19	8/31
	------------ (lb/A)	------------		------- (%)	--------
DPX-Y6202	0.3			33 a	35 abc
DPX-Y6202	0.9			50 abcd	46 abcde
DPX-Y6202 + pace		0.3 + 1 qt		53 abcde	51 bcdef
DPX-Y6202 + pace		0.9 + 1 qt		76 de	80 efg
DPX-Y6202 + pace			0.3 + 1 qt	55 abcde	76 defg
DPX-Y6202 + pace			0.9 + 1 qt	63 abcde	85 fg
Haloxyfop-methyl	0.3			43 abc	28 abc
Haloxyfop-methyl	0.9			73 de	85 fg
Haloxyfop-methyl + pace		0.3 + 1 qt		43 abc	34 abc
Haloxyfop-methyl + pace		0.9 + 1 qt		65 bcde	60 cdef
Haloxyfop-methyl + pace			0.3 + 1 qt	58 abcde	70 defg
Haloxyfop-methyl + pace			0.9 + 1 qt	80 e	95 g
Fluazifop-butyl	0.15			33 a	18 ab
Fluazifop-butyl	0.45			35 ab	23 ab
Fluazifop-butyl + pace		0.15 + 1%		40 abc	25 ab
Fluazifop-butyl + pace		0.45 + 1%		58 abcde	43 abcd
Fluazifop-butyl + pace			0.15 + 1%	43 abc	35 abc
Fluazifop-butyl + pace			0.45 + 1%	50 abcd	60 cdef
Untreated check				35 ab	13 a

1/ Control rating: 0 = none; 100 = complete.

2/ Means with the same letters are not significantly different at 5% level according to the Duncan's multiple range test.

Annual broadleaf weed control in spring barley. Mengel, M. L. and D. C. Thill. In June 1984, an experiment was initiated at Potlatch, Idaho to study the effects of several herbicide treatments on broadleaf weed control in spring barley (var. Seven). Plots measured 10 by 25 feet, with treatments replicated three times in a randomized complete block design. 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 3.8% organic matter, pH 4.9, and a CEC of 14.0 meq/100 g. soil. All treatments were applied postemergence at the 4 to 5 leaf stage of crop growth just prior to tillering. Weather data at the time of application on June 13 was air temperature 63 F, soil temperature at 2 inch depth 64 F, and relative humidity 75%. Visual evaluations for crop injury and weed control were made July 2 and August 7. Plots were harvested on August 20, using a Hege small plot combine.

Best treatments for weed control from both evaluation dates were DPX-M6316 at 0.094 lb/A, DPX-M6316 + bromoxynil, and DPX-M6316 + bromoxynil MCPA, which all showed 100% control of all four weed species. All other treatments showed good (87%) to excellent (100%) control.

Crop injury, expressed as visual height reduction, was apparent at both evaluation dates from all DPX-M6316 treatments and tank mixtures. Increased crop injury at the late evaluation date for all treatments was partially due to a leaf rust infestation.

Although there was visual crop injury and height reductions from all DPX-M6316 treatments and tank mixtures, grain yield was not reduced for any treatment except DPX-M6316 + bromoxynil MCPA when compared to the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Annual broadleaf weed control in spring barley

Treatment[1]	Rate	Crop injury E	Crop injury L	Weed control ANTCO E	ANTCO L	CAPBP E	CAPBP L	CHEAL E	CHEAL L	POLCO[2] E	POLCO[2] L	Yield
	(lb ai/A)	(%)										(lb/A)
DPX-M6316	0.024	15	18	93	100	100	100	100	100	100	93	2891
DPX-M6316	0.047	15	21	98	100	100	100	100	100	100	100	2586
DPX-M6316	0.094	20	35	100	100	100	100	100	100	100	100	3045
DPX-M6316 + bromoxynil[3]	0.047 + 0.25	15	27	100	100	100	100	100	100	100	100	3084
DPX-M6316 + bromoxynil MCPA[4]	0.047 + 0.25	17	20	100	100	100	100	100	100	100	100	2735
bromoxynil	0.25	0	15	95	93	87	100	100	100	100	97	2883
bromoxynil MCPA	0.25	0	3	100	97	96	100	100	100	95	92	2898
check	-	-	-	-	-	-	-	-	-	-	-	2329
$LSD_{(0.05)}$		7	10	6	7	6	NS	NS	NS	3	5	449

1 All DPX-M6316 (75% DF) treatments included 0.5% vol/vol non-ionic surfactant, X-77.

2 Weed designations: ANTCO = mayweed; CAPBP = shepherdspurse; CHEAL = common lambsquarter; POLCO = wild buckwheat.

3 bromoxynil = 4EC

4 bromoxynil MCPA = 3EC

Canada thistle control in spring barley. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at Worland, Wyoming, May 17, 1984 to Canada thistle in the rosette stage (4 to 6 in. tall) and barley (var. Klages) in the 3 to 5-leaf stage to evaluate weed control and crop tolerance. 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 delivering 40 gpa at 40 psi. The soil was classified as a clay loam (25% sand, 35% silt, 40% clay) with 1.2% organic matter and a 7.6 pH.

Weed control and crop injury evaluations were made July 9, and plots harvested for yield August 8, 1984. Canada thistle infestations were heavy and uniform throughout the experimental area. None of the herbicide treatments injured barley. Barley yields were 13 to 34 bu/A higher in the herbicide treated than check plots. Canada thistle suppression exceeded 70% with all herbicide treatments. Dowco 290 alone gave Canada thistle suppression of 85 to 97% depending on rate. Dowco 290 mixtures with 2,4-D were generally less effective than Dowco 290 alone. Canada thistle suppression with picloram plus 2,4-D was similar to that with Dowco 290. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1299.)

Canada thistle control in spring barley

Treatment[1]	Rate lb ai/A	Cath[2] Suppression %	Barley[2] Injury %	Barley[2] Yield bu/A
Dowco 290 + 2,4-D (M-3785)	0.06 + 0.25	70	0	73
Dowco 290 + 2,4-D (M-3785)	0.09 + 0.37	76	0	90
Dowco 290 + 2,4-D (M-3785)	0.12 + 0.5	96	0	77
Dowco 290 (M-3972)	0.09	85	0	91
Dowco 290 (M-3972)	0.12	97	0	93
Dowco 290 (M-3972)	0.16	96	0	83
Dowco 290 (M-3972) + 2,4-D	0.12 + 0.37	73	0	82
Dowco 290 (M-3972) + 2,4-D	0.16 + 0.37	87	0	94
picloram + 2,4-D	0.02 + 0.37	91	0	82
Check	---	0	0	60

[1]Treatments applied May 17, 1984. 2,4-D = dimethylamine.
[2]Cath and barley injury evaluations July 9 and harvest August 8, 1984.

Evaluation of herbicides for broadleaf weed control in spring barley. Miller, S. D. and H. P. Alley. Research plots were established on May 24, 1984 at the Torrington Research and Extension Center to evaluate individual and/or herbicide combinations for broadleaf weed control in spring barley (var. Steptoe). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (83% sand, 10% silt, 7% clay) with 1.1% organic matter and a 7.5 pH. The spring barley was in excellent condition 3 to 4-leaves and common lambsquarters 3/4 to 1 in., wild buckwheat 1 to 1½ in., tumble mustard 3 to 4 in., hairy nightshade ½ to 1 in., and redroot pigweed 1/4 to 3/4 in. at time of treatment.

Weed control and crop damage evaluations were made on June 13, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Common lambsquarters infestations were heavy 15.4 plants/ft^2, hairy nightshade, wild buckwheat, kochia and redroot pigweed infestations moderate 5.7, 3.2, 3.3 and 2.6 plants/ft^2, respectively, and tumble mustard infestations light 0.5 plants/ft^2 in the untreated check. Barley injury was evident with treatments containing metribuzin or dicamba. Broad spectrum broadleaf weed control was good to excellent with bromoxynil alone or in combination with other herbicides and dicamba combinations with MCPA, metribuzin or chlorsulfuron. DPX-M6316 required rates of 0.03 to 0.06 lb/A to give similar broadleaf weed control as chlorsulfuron at 0.016 lb/A. The addition of 2,4-D to Dowco 290 improved broadleaf weed control compared to Dowco 290 alone. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1300.)

Broadleaf weed control in spring barley

Treatment[1]	Rate lb ai/A	Barley[2] Injury %	Barley[2] Stand Reduction %	Percent Control[2] Colq %	Hans	Wibw	Koca	Tumu	Rrpw
chlorsulfuron + X-77	0.016	0	0	100	0	97	97	100	100
DPX-M6316 + X-77	0.004	0	0	41	0	79	34	100	97
DPX-M6316 + X-77	0.008	0	0	65	0	59	91	100	95
DPX-M6316 + X-77	0.016	0	0	84	0	91	76	100	95
DPX-M6316 + X-77	0.03	0	0	94	0	94	85	100	100
DPX-M6316 + X-77	0.06	0	0	100	31	100	88	100	100
PPG-1013	0.02	0	0	76	4	87	100	100	100
PPG-1013	0.01	0	0	8	24	50	88	80	95
bromoxynil + acifluorfen	0.25 + 0.06	2	0	99	100	100	100	80	92
bromoxynil + acifluorfen	0.25 + 0.125	0	0	100	100	100	100	80	92
bromoxynil	0.25	0	0	99	97	100	100	100	77
bromoxynil	0.38	0	0	99	98	97	100	100	92
bromoxynil + metribuzin	0.25 + 0.125	3	5	100	100	100	100	100	100
bromoxynil + metribuzin	0.25 + 0.25	6	13	100	100	100	100	100	97
bromoxynil + metribuzin	0.38 + 0.125	2	3	100	96	100	100	100	97
bromoxynil + metribuzin	0.38 + 0.25	3	8	100	96	100	1000	100	97
bromoxynil + MCPA est	0.25 + 0.25	0	0	99	99	100	100	80	97
2,4-D	0.48	0	0	83	63	62	64	100	40
MCPA	0.48	0	0	86	69	56	68	70	0
metribuzin	0.25	10	6	100	63	96	97	80	92
EH-540	0.44	10	0	98	87	84	100	80	51
EH-541	0.37	10	0	91	86	94	84	80	51
EH-763	0.48	2	0	94	73	62	67	100	30
EH-786	0.48	0	0	92	82	77	64	100	39
dicamba + MCPA	0.09 + 0.25	12	0	92	93	97	91	100	74
dicamba + metribuzin	0.09 + 0.125	22	2	100	99	97	85	100	70
dicamba + metribuzin	0.09 + 0.25	19	2	99	98	97	96	100	88
dicamba + chlorsulfuron	0.09 + 0.008	10	0	94	87	94	90	100	100
dicamba + chlorsulfuron	0.09 + 0.016	15	0	97	91	97	85	100	97
Dowco 290	0.125	0	0	73	85	100	14	80	31
Dowco 290	0.16	0	0	84	87	96	49	80	39
Dowco 290 + 2,4-D (M-3785)	0.125 + 0.5	0	0	94	97	97	64	80	65
Check	---	0	0	0	0	0	0	0	0

[1]Treatments applied May 24, 1984. X-77 = 0.25% v/v, 2,4-D = dimethylamine, MCPA est = butoxyethyl ester and MCPA = dimethylamine.

[2]Weed control, barley injury and stand reduction evaluations June 13, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft quadrats per replication.

Evaluation of herbicides for wild oat control in spring barley. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatment were applied at Worland, Wyoming May 23 or June 4, 1984 to wild oat in the 1 to 2.5-leaf stage or 3 to 5-leaf stage; respectively, to evaluate their efficacy for wild oat control in spring barley (var. Klages). Barley generally had 1 to 2 more leaves than wild oat when the treatments were applied. 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 delivering 10 gpa at 40 psi. The soil was classified as a clay loam (27% sand, 32% silt, 41% clay) with 1.0% organic matter and a 7.7 pH.

Weed control and crop injury evaluations were made July 9 and plots harvested for yield August 7, 1984. Wild oat infestations were light averaging less than 1 plant/ft^2. None of the herbicide treatments injured barley or reduced yield compared to the untreated check. Wild oat control was 90% or greater with all treatments except the 1 to 2.5-leaf application of diclofop at 0.75 lb/A. Wild oat control with AC-222,293 was 95% or greater when applied alone or in combination with several herbicides for broadleaf weed control at both stages of application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1297.)

Wild oat control in spring barley

Treatment[1]	Rate lb ai/A	Wioa[2] Control %	Barley[2] Injury %	Barley[2] Yield bu/A
1 to 3 leaf				
AC-222,293 + X-77	0.38	95	0	78
AC-222,293 + X-77	0.5	98	0	72
AC-222,293 + X-77	0.62	99	0	73
AC-222,293 + 2,4-D + X-77	0.5 + 0.5	99	0	69
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	96	0	69
AC-222,293 + EH-541 + X-77	0.38 + 0.12	99	0	64
barban	0.38	91	0	65
diclofop	0.75	85	0	84
difenzoquat	1.0	99	0	68
barban + difenzoquat	0.38 + 0.25	89	0	83
barban + difenzoqaut	0.38 + 0.5	99	0	89
barban + diclofop	0.38 + 0.25	99	0	78
barban + diclofop	0.38 + 0.5	99	0	73
barban + bromoxynil	0.38 + 0.25	93	0	64
diclofop + bromoxynil	0.75 + 0.25	90	0	66
diclofop + bromoxynil + acifluorfen	0.75 + 0.25 + 0.06	91	0	65
diclofop + bromoxynil + acifluorfen	0.75 + 0.25 + 0.12	98	0	66
3 to 5-leaf				
AC-222,293 + X-77	0.38	99	0	69
AC-222,293 + X-77	0.5	98	0	64
AC-222,293 + X-77	0.62	99	0	63
AC-222,293 + 2,4-D + X-77	0.5 + 0.5	99	0	62
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	96	0	81
diclofop	1.0	95	0	74
difenzoquat	1.0	92	0	74
Check	---	--	--	64

[1]Treatments applied 1 to 3-leaf wild oat May 23, and 3 to 5-leaf wild oat applied June 4, 1984. X-77 = 0.25% v/v and 2,4-D = butoxyethyl ester.
[2]Wioa and barley injury evaluations July 9, and harvest August 7, 1984.

Wild oat control in irrigated spring barley. Morishita, D.W., D.C. Thill, and R.H. Callihan. An experiment in spring barley (var. Klages) was established in southern Idaho to determine the effectiveness of several herbicides applied post-plant incorporated (PoPI) and postemergence (Post) for wild oat (AVEFA) control. The experiment was arranged as a randomized complete block design with four replications. Plots were 10 by 25 ft in size. Soil type at the study site was a loam soil containing 1.7% organic matter and a soil pH and CEC of 7.3 and 14.7 meq/100 g soil, respectively. The PoPI treatments were applied April 25, 1984, seven days after the crop had been planted. Environmental conditions at that time were air temperature 36 F, soil temperature at 2 inches 40 F, relative humidity 56%, and cloud cover 100%. All postemergence applications were made May 25, 1984, at the 2 to 5 leaf stage of wild oat growth. Environmental conditions at that time were as follows; air temperature 47 F, soil temperature at 2 inches 52 F, relative humidity 75%, and cloud cover 80%. All PoPI treatments were applied with a CO_2 pressurized backpack sprayer and all Post treatments were applied with a CO_2 pressurized bicycle sprayer. Treatments were applied at either 10 or 20 gpa. The PoPI treatments were incorporated twice, in perpendicular directions, immediately after spraying, with a spike-tooth harrow to a depth of 2 inches. Visual evaluations for weed control and crop injury were taken July 18, 1984. The crop was harvested August 27, 1984, with a small plot combine.

Crop injury was observed on only one treatment, AC222,293 + fluorchloridone, however this was not reflected in the grain yield. Wild oat control ratings of 93% or greater were observed with AC222,293 alone or in combination with bromoxynil or DPX-M6316 and the sequential application of triallate followed with barban + bromoxynil. Highest yields were observed in the sequential application of triallate and bromoxynil and the tank mixture of diclofop + bromoxynil. All other herbicide treatments did not result in yields greater than the checks. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Formulations of herbicides used

Herbicide	Formulation
AC222,293	2.5 EC
barban	2 EC
bromoxynil	4 EC
diclofop	3 EC
difenzoquat	2 WS
DPX-M6316	5 DF
fluorchloridone	2 EC
triallate	4 EC
triallate	10 G

Wild oat control and yield in spring barley

Treatment	Rate	Appl date	Crop injury	AVEFA Control	Yield
	(lb ai/A)		---(%)----		(lb/a)
check	-	-	-	-	4637
triallate (GR)	1.25	4/25	0	48	5067
triallate (EC)	1.25	4/25	0	38	4805
triallate / bromoxynil	1.25/0.50	4/25 5/25	0	74	6034
triallate / barban	1.25/0.25	4/25 5/25	0	80	5435
triallate / barban + bromoxynil	1.25/0.25 + 0.50	4/25 5/25	0	93	5357
barban	0.25	5/25	0	39	4877
AC222,293[1]	0.63	5/25	0	100	5442
AC222,293 + bromoxynil[1]	0.63 + 0.50	5/25	0	98	4943
AC222,293 + DPX-M6316[1]	0.63 + 0.75 oz	5/25	0	100	4941
AC222,293 + fluorchloridone[1]	0.63 + 0.25	5/25	5	88	4877
diclofop	1.0	5/25	0	77	5089
diclofop + bromoxynil	1.0 + 0.50	5/25	0	88	5887
diclofop + DPX-M6316[1]	1.0 + 0.75 oz	5/25	0	87	5159
diclofop + fluorchloridone	1.0 + 0.25	5/25	0	76	4829
difenzoquat[1]	1.0	5/25	0	86	5405
bromoxynil	0.50	5/25	0	14	4913
DPX-M6316[1]	0.75 oz	5/25	0	15	4967
fluorchloridone	0.25	5/25	0	0	4652
check	-	-	-	-	4316
LSD (0.05)			3	30	1164

[1]0.5% v/v nonionic surfactant

Wild oat and broadleaf weed control in spring barley. Schaat, B. G., D. C. Thill, and R. H. Callihan. On May 17,1984, near Potlatch, Idaho and on May 25, 1984, near Deary, Idaho, experiments were initiated to study the effects of various herbicide treatments for controlling wild oat and broadleaf weeds in spring barley (var. Vanguard and Advance, respectively). Plots were 10 by 25 ft and treatments were replicated four times in a randomized complete block design. Treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 10 and 20 gpa at 40 psi and 3 mph. Soil type at both locations was a silt loam with 2.9 and 3.8% organic matter, pH 5.1 and 4.9, and CEC of 17.4 and 14.0 meq/100 g soil for location 1 (Potlatch) and location 2 (Deary), respectively. Climatological data at the time of application for all treatment dates at both locations are given in the following table:

	Location 1		Location 2	
Date of application	5/17/84	6/14/84	5/25/84	6/12/84
Type of application	PoPI	Post	PPI	Post
Air temp(F)	47	68	62	69
Soil surface temp(F)	48	73	64	72
Soil temp @ 2 in(F)	42	67	60	71
Relative humidity(%)	74	65	54	65
Cloud cover(%)	0	0	50	0
Stage of wild oat growth	-	3-5lf	-	3-4lf

Evaluation of crop injury and control of wild oat (AVEFA) and common lambsquarters (CHEAL) at location 1 was made July 15, 1984. At location 2, early evaluation of crop injury and control of coast fiddleneck (AMSIN) was made July 2, 1984, and late evaluation of wild oat, coast fiddleneck, and wild buckwheat (POLCO) control was made July 25, 1984.

No crop injury was observed among treatments when compared to the check at either location. All broadleaf weed species at both locations were effectively controlled (92% or greater) by all broadleaf weed herbicide treatments alone or in tank mix combination except wild buckwheat at location 2 with bromoxynil (HB4) and chlorsulfuron. At location 1 (Table 1), wild oat was effectively controlled (91% or greater) with all wild oat herbicide treatments except triallate, diclofop + DPX-M6316, AC222293 at 0.38 lb/A, AC222293 + bromoxynil (HB4), both treatments of AC222293 + fluorchloridone, and AC222293 + bromoxynil/MCPA. At location 2 (Table 2), wild oat was effectively controlled (96% or greater) with all wild oat herbicide treatments except diclofop + bromoxynil (ME4), diclofop + bromoxynil (2EC), diclofop + DPX-M6316, and AC222293 + Dpx-M6316. Split application of triallate/diclofop + bromoxynil and application of diclofop + bromoxynil (ME4) at both locations resulted in grain yields greater than their respective checks. In addition, at location 1, applications of diclofop + bromoxynil (HB4), AC222293 + bromoxynil (HB4), AC222293 + chlorsulfuron, and AC222293 + fluorchloridone at 0.38 + 0.25 lb/A and at location 2, applications of triallate/bromoxynil/MCPA, diclofop + chlorsulfuron, diclofop + DPX-M6316, AC222293 + DPX-M6316, bromoxynil (HB4), bromoxynil (2EC), and DPX-M6316 resulted in grain yields greater then their respective checks. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Wild oat and broadleaf weed control in spring barley at Potlatch, Idaho

Treatment	Rate	Date applied	Crop injury	Weed control AVEFA	Weed control CHEAL	Yield
	(lb ai/A)		---------------	(%)	-------------	(lb/A)
check	-	-	-	-	-	2906
triallate	1.25	5/17	0	86	0	3279
triallate/	1.25	5/17	0	99	100	3429
bromoxynil MCPA	0.38	6/14				
triallate/	1.25	5/17	0	99	0	3360
diclofop	0.75	6/14				
triallate/	1.25	5/17	0	100	100	3691
diclofop +	0.75	6/14				
bromoxynil(ME4)	0.38					
diclofop	1.0	6/14	0	94	25	3325
diclofop +	1.0	6/14	0	94	100	3599
bromoxynil(ME4)	0.38					
diclofop +	1.0	6/14	0	100	100	3476
bromoxynil(HB4)	0.38					
diclofop +	1.0	6/14	0	94	100	3381
bromoxynil(2EC)	0.38					
diclofop +	1.0	6/14	0	98	100	3286
chlorsulfuron	0.25oz					
diclofop +	1.0	6/14	0	72	100	3132
DPX-M6316	0.75oz					
diclofop +	1.0	6/14	0	96	100	3332
fluorchloridone	0.25					
AC222293	0.38	6/14	0	80	0	3379
AC222293	0.63	6/14	0	100	0	3232
AC222293 +	0.63	6/14	0	98	100	3322
bromoxynil(ME4)	0.38					
AC222293 +	0.63	6/14	0	92	100	3692
bromoxynil(HB4)	0.38					
AC222293 +	0.63	6/14	0	81	100	3420
bromoxynil(2EC)	0.38					
AC222293 +	0.63	6/14	0	91	100	3540
chlorsulfuron	0.25oz					
AC222293 +	0.63	6/14	0	94	100	3340
DPX-M6316	0.75oz					
AC222293 +	0.63	6/14	0	29	100	2993
fluorchloridone	0.25					
AC222293 +	0.38	6/14	0	11	100	3458
fluorchloridone	0.25					
bromoxynil MCPA	0.38	6/14	0	5	100	2559
bromoxynil(ME4)	0.38	6/14	0	5	100	2727
bromoxynil(HB4)	0.38	6/14	0	6	100	2918
bromoxynil(2EC)	0.38	6/14	0	0	100	2745
chlorsulfuron	0.25oz	6/14	0	0	100	2503
DPX-M6316	0.75oz	6/14	0	17	100	2888
fluorchloridone	0.25	6/14	0	0	98	2707
AC222293 +	0.63	6/14	0	75	100	3190
bromoxynil MCPA	0.38					
$LSD_{(0.05)}$			NS	23	13	540

All AC222293, DPX-M6316, and chlorsulfuron treatments included 0.5% v/v nonionic surfactant.
E = early evaluation, L = late evaluation.

Table 2. Wild oat and broadleaf weed control in spring barley at Deary, Idaho

Treatment	Rate	Date applied	Crop injury	Weed Control AVEFA	AMSIN		POLCO	Yield
	(lb ai/A)		---------------(%)	---------------				(lb/A)
			E	L	E	L	L	
check	-	-	-	-	-	-	-	1596
triallate	1.25	5/25	0	100	29	75	49	1781
triallate/	1.25	5/25	2	100	100	100	95	2061
bromoxynil MCPA	0.38	6/12						
triallate/	1.25	5/25	5	100	15	45	44	1716
diclofop	0.75	6/12						
triallate/	1.25	5/25	2	100	100	99	100	2303
diclofop +	0.75	6/12						
bromoxynil(ME4)	0.38							
diclofop	1.0	6/12	5	100	0	25	5	1744
diclofop +	1.0	6/12	5	75	100	100	100	2189
bromoxynil(ME4)	0.38							
diclofop +	1.0	6/12	4	100	100	100	100	1968
bromoxynil(HB4)	0.38							
diclofop +	1.0	6/12	0	75	98	92	74	1929
bromoxynil(2EC)	0.38							
diclofop +	1.0	6/12	2	75	100	100	100	2080
chlorsulfuron	0.25oz							
diclofop +	1.0	6/12	0	46	100	100	100	2315
DPX-M6316	0.75oz							
diclofop +	1.0	6/12	14	100	100	100	100	1660
fluorchloridone	0.25							
AC222293	0.38	6/12	2	100	19	38	38	1861
AC222293	0.63	6/12	0	100	19	8	80	2040
AC222293 +	0.63	6/12	0	96	69	100	99	2017
bromoxynil(ME4)	0.38							
AC222293 +	0.63	6/12	9	100	100	100	98	1957
bromoxynil(HB4)	0.38							
AC222293 +	0.63	6/12	4	100	100	100	100	1733
bromoxynil(2EC)	0.38							
AC222293 +	0.63	6/12	2	100	100	100	98	2001
chlorsulfuron	0.25oz							
AC222293 +	0.63	6/12	5	75	100	100	100	2150
DPX-M6316	0.75oz							
AC222293 +	0.63	6/12	6	100	100	100	100	2010
fluorchloridone	0.25							
AC222293 +	0.38	6/12	9	100	100	100	100	1925
fluorchloridone	0.25							
bromoxynil MCPA	0.38	6/12	4	5	100	100	100	1956
bromoxynil(ME4)	0.38	6/12	4	50	100	100	94	1921
bromoxynil(HB4)	0.38	6/12	4	5	100	100	74	2152
bromoxynil(2EC)	0.38	6/12	4	25	100	100	92	2155
chlorsulfuron	0.25oz	6/12	0	5	100	100	84	2031
DPX-M6316	0.75oz	6/12	2	0	100	100	92	2154
fluorchloridone	0.25	6/12	5	30	100	100	100	1848
AC222293 +	0.63	6/12	6	100	100	100	99	1770
bromoxynil MCPA	0.38							
$LSD_{(0.05)}$			NS	39	23	24	99	453

All AC222293, DPX-M6316, and chlorsulfuron treatments included 0.5% v/v nonionic surfactant.

Broadleaf weed control in spring barley. Schaat, B. G., D. C. Thill, and R. H. Callihan. On May 21, 1984, an experiment was initiated near Culdesac, Idaho to study the effects of various herbicide treatments on broadleaf weed control in spring barley (var. Advance). Plots were 10 by 25 ft 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 10.2% organic matter, pH 6.6, and CEC of 31.3 meq/100 g soil. Climatological data at the time of application for all treatment dates are given in the following table:

Date of application	5/21/84	6/6/84	6/11/84
Type of application	Post	Post	Post
Air temp(F)	72	62	66
Soil surface temp(F)	74	72	65
Soil temp @ 2 in(F)	70	68	65
Relative humidity(%)	80	78	75
Cloud cover(%)	30	20	20
Stage of crop growth	2-3lf	2-3lf/ 2-3til	4-5lf/ tiller

A crop height measurement and evaluation for control of catchweed bedstraw (GALAP) and henbit (LAMAM) was made July 2, 1984. Plots were harvested on August 28, 1984, with a small plot combine.

Both weed species were effectively controlled (91% or greater) by all herbicide treatments except DPX-M6316 applied late (6/11), and DPX-M6316 at 0.25 and 0.33 oz/A and metsulfuron applied mid-post (6/6). Crop height was reduced by all herbicide treatments applied mid-post (6/6) except DPX-M6316 + chlorsulfuron at 0.13 + 0.05 oz/A and chlorsulfuron. Crop height was not reduced by any treatment applied early (5/21) except bromoxynil + chlorsulfuron or any treatment applied late (6/11). No differences in grain yield occurred among treatments. However, grain yields for four out of the five treatments that resulted in the greatest crop height reduction were lower than 4094 lb/A. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in spring barley at Culdesac, Idaho

Treatment	Rate	Date applied	Crop height	Weed Control GALAP	Weed Control LAMAM	Yield
	(oz ai/A)		(cm)	-----(%)------		(lb/A)
check	-	-	124	-	-	4747
DPX-M6316	0.50	5/21	118	99	99	4235
DPX-M6316	0.75	5/21	118	100	100	4695
DPX-M6316	0.50	6/6	110	97	99	4868
DPX-M6316	0.75	6/6	106	99	90	4151
DPX-M6316	0.50	6/11	121	42	45	4493
DPX-M6316	0.75	6/11	119	62	74	4562
DPX-M6316	0.13	6/6	115	90	94	4266
DPX-M6316	0.25	6/6	112	89	68	4723
DPX-M6316	0.33	6/6	112	96	70	4570
DPX-M6316	1.0	6/6	98	100	92	4044
DPX-M6316	2.0	6/6	93	98	91	4007
DPX-M6316 +	0.13	6/6	116	94	92	4862
chlorsulfuron	0.05					
DPX-M6316 +	0.50	6/6	114	100	98	4470
chlorsulfuron	0.05					
DPX-M6316 +	0.75	6/6	110	99	98	4178
chlorsulfuron	0.05					
DPX-M6316 +	0.13	6/6	114	100	95	4573
chlorsulfuron	0.08					
DPX-M6316 +	0.50	6/6	110	100	92	4607
chlorsulfuron	0.08					
DPX-M6316 +	0.75	6/6	102	100	95	4669
chlorsulfuron	0.08					
DPX-M6316 +	0.13	6/6	108	95	96	4442
metsulfuron	0.05					
DPX-M6316 +	0.50	6/6	99	95	100	3796
metsulfuron	0.05					
DPX-M6316 +	0.75	6/6	101	99	96	4463
metsulfuron	0.05					
DPX-M6316 +	0.13	6/6	106	99	95	4741
metsulfuron	0.08					
DPX-M6316 +	0.50	6/6	97	96	95	4258
metsulfuron	0.08					
DPX-M6316 +	0.75	6/6	96	100	100	4094
metsulfuron	0.08					
metsulfuron	0.08	6/6	106	75	100	4241
chlorsulfuron	0.08	6/6	120	99	94	4321
bromoxynil MCPA	0.50lb	5/21	116	94	100	4628
bromoxynil +	0.25lb	5/21	113	100	100	4529
chlorsulfuron	0.25					
chlorsulfuron	0.25	5/21	118	100	100	4253
$LSD_{(0.05)}$			8	17	19	NS

All treatments except bromoxynil MCPA included 0.5% v/v nonionic surfactant.

Broadleaf weed control in spring barley. Schaat, B. G., D. C. Thill, and R. H. Callihan. An experiment was initiated to study broadleaf weed control in spring barley (var. Seven) near Potlatch, Idaho on May 17, 1984. Plots measured 10 by 25 ft 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 3.8% organic matter, pH 4.9, and CEC of 14.0 meq/100 g soil. Climatological data and stage of crop growth at the time of application for all treatment dates are given in the following table:

Date of application	5/17/84	6/1/84	6/11/84	6/19/84
Type of application	PES	Post	Post	Post
Air temp(F)	63	75	52	75
Soil surface temp(F)	70	80	54	76
Soil temp @ 2 in(F)	64	72	54	72
Relative humidity(%)	58	50	95	58
Cloud cover(%)	10	0	85	0
Stage of crop growth	-	2-3lf	3-4lf/ 1til	3-4lf/ 2-3til

Early evaluation of crop injury and control of mayweed (ANTCO), field pennycress (THLAR), wild buckwheat (POLCO), coast fiddleneck (AMSIN), common lambsquarters (CHEAL), common chickweed (STEME), and henbit (LAMAM) was made June 29, 1984. Late evaluation of crop injury and control of mayweed, field pennycress, and wild buckwheat was made July 30, 1984. Plots were harvested with a small plot combine on August 18, 1984.

Applications of bentazon M, bentazon + 2,4-D(amine), bentazon + bromoxynil, and chlorsulfuron effectively controlled (88% or greater) all weed species and did not cause any crop injury. Application of PPG-1013 at 0.20 and 0.40 lb/A, PPG-1013 + chlorsulfuron, fluorchloridone at 0.50 lb/A, and bentazon + MCPA(amine) + cyanazine effectively controlled all weed species, but produced unacceptable crop injury early in the season. Several other herbicide treatments effectively controlled (85% or greater) most weed species. Applications of bromoxynil at 0.38 (all formulations) and 0.5 (2EC) lb/A, SC5574 at 2.0 lb/A, fluorchloridone at 0.25 lb/A, bentazon + 2,4-D(amine), bentazon + bromoxynil, chlorsulfuron, and XRM3785 at both rates resulted in grain yields greater than the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in spring barley at Potlatch, Idaho

Treatment	Rate	Date applied	Crop injury		Weed control ANTCO		THLAR		POLCO		AMSIN	CHEAL	STEME	LAMAN	Yield
	(lb ai/A)		----	----	----	----	----	(%)	----	----	----	----	----	----	(lb/A)
			E	L	E	L	E	L	E	L	E	E	E	E	
check	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2243
bromoxynil(2EC)	0.38	6/1	2	0	98	99	100	99	89	78	100	100	56	81	2825
bromoxynil(4EC)	0.38	6/1	0	0	100	100	96	100	78	99	100	100	74	79	2895
bromoxynil(4HB)	0.38	6/1	0	0	100	100	98	100	92	98	100	100	71	99	2800
PPG-1013	0.20	5/17	16	0	100	100	100	100	99	100	100	100	98	100	2464
PPG-1013	0.40	5/17	29	0	100	100	100	100	99	96	100	100	100	100	1906
PPG-1013 +	0.01	6/1	10	0	94	95	97	100	91	71	100	100	72	100	1990
bromoxynil	0.25														
PPG-1013	0.02	6/1	15	0	65	52	92	100	69	80	99	94	76	100	2401
PPG-1013	0.01	6/1	9	0	18	11	22	75	27	10	75	52	31	100	2237
PPG-1013 +	0.01	6/1	6	0	22	15	90	100	10	25	80	100	35	100	2399
MCPA(Na)	0.25														
PPG-1013 +	0.01	6/1	12	0	100	99	100	100	100	91	100	100	100	100	2507
chlorsulfuron	0.13oz														
SC 5574	2.00	5/17	1	0	29	42	91	100	50	58	55	22	71	100	2760
SC 5574	3.00	5/17	1	0	56	41	79	100	80	85	75	69	78	100	2606
SC 5574	4.00	5/17	0	0	55	29	98	100	100	89	100	78	100	100	2441
fluorchloridone	0.25	6/11	2	0	52	66	100	100	78	99	99	100	100	100	2716
fluorchloridone	0.50	6/11	18	0	94	85	100	100	98	100	100	100	100	100	2485
bentazon M	0.75	6/11	0	0	98	99	100	100	96	88	91	100	98	98	2596
bentazon +	0.50	6/11	0	0	99	96	100	100	96	95	100	100	92	94	2908
2,4-D(amine)	0.40														
MCPA(amine)	0.50	6/11	0	0	12	26	100	100	27	31	18	100	54	41	2339
2,4-D(amine)	0.50	6/11	0	0	91	82	95	100	55	60	95	100	71	74	2564
bentazon +	0.50	6/11	0	0	100	100	100	100	100	100	100	100	100	95	2788
bromoxynil	0.30														
bentazon +	0.50	6/11	18	0	100	100	98	100	95	95	100	100	100	100	2199
MCPA(amine) +	0.25														
cyanazin	0.10														
bromoxynil(2EC)	0.50	6/11	0	0	100	100	100	100	98	98	100	100	71	95	2908
bromoxynil MCPA	0.50	6/11	1	0	98	100	100	100	100	81	100	100	90	100	2554
chlorsulfuron	0.25oz	6/11	0	0	100	100	100	100	100	89	100	100	100	100	2809
XRM3972	0.13	6/19	0	0	98	100	0	5	100	100	74	90	80	95	2593
XRM3972	0.09	6/19	0	0	98	100	0	0	98	100	45	71	50	79	2243
XRM3785	0.47	6/19	0	0	98	100	86	100	100	100	71	100	76	68	2999
XRM3785	0.63	6/19	0	0	100	100	94	100	100	100	51	98	74	89	2865
$LSD_{(0.05)}$			4	0	22	23	12	10	31	32	36	26	43	25	425

All chlorsulfuron treatments included 0.5 % v/v nonionic surfactant.
All bentazon treatments included 5 % v/v crop oil concentrate.
E=early evaluation, L=late evaluation

Wild oat and coast fiddleneck control in dryland barley using tank mix combination. Wright, S.D., L.W. Mitich, and R.S. Neilson. A trial was established in Tulare County to evaluate several herbicide tank mix combinations for wild oat and coast fiddleneck control in MC 72 barley. A second objective was to determine if herbicide rates could be lowered without reducing weed control by using the adjuvant Penetrator. Plots were 6 by 30 ft. with three replications arranged in a randomized complete block. Treatments were made with a CO_2 backpack sprayer calibrated to deliver 30 gpa except for barban which was applied with 8 gpa. Treatments were made on January 6, 1984, when wild oat was in the 2- to 5-leaf stage with the majority of plants in the 3- to 4-leaf stage, and the barley in the early tillering stage. Evaluations were made on March 28, 1984, and yields taken on May 30.

There were no significant differences in yield or bushel weights between treatments. Difenzoquat, diclofop and tank mixes containing barban gave effective wild oat control. The barban-diclofop combination and diclofop at the highest rate of application gave the most severe injury. The addition of Penetrator enhanced the activity of difenzoquat, diclofop and barban-difenzoquat tank mixes even when reduced rates were used.

No adverse effects were observed using tank mixes of barban-difenzoquat plus chlorsulfuron or chlorsulfuron plus difenzoquat. Bromoxynil, chlorsulfuron and tank mixes with Penetrator gave excellent control of coast fiddleneck. However, coast fiddleneck was not distrubuted evenly throughout all the plots.

The low rate of difenzoquat still gave good wild oat control if tank mixed with barban, but the same rate with Penetrator did not give comparable control. (University of California Cooperative Extension, Visalia, CA 93291)

Wild oat and coast fiddleneck control in dryland barley, Tulare County

Treatment	Rate lb/A	Wild oat control[1]	Fiddle-neck control[1]	Barley injury[1]	Yield lb/A	Bu. wt.
Difenzoquat + Triton	0.75 + .5%	10.0	7.5	0.7	3160	49.0
Difenzoquat	0.38	7.3	2.5	1.0	3647	48.3
Difenzoquat + Penetrator	0.38 + 12 oz.	8.4	2.5	2.7	3693	49.3
Diclofop[2]	1.10	10.0	2.5	5.8	3043	48.0
Diclofop	0.55	9.3	4.0	2.3	3462	49.7
Diclofop + Penetrator	0.55 + 12 oz.	10.0	0.0	1.8	3427	50.0
Barban + Diclofop	0.25 + 0.38	8.0	2.5	4.3	3410	50.0
Barban + Diclofop	0.25 + 0.38	9.3	2.5	2.7	3526	49.3
Barban + Diclofop + Chlorsulfuron	0.25 + 0.38 + .00017	9.3	10.0	1.0	3523	49.0
Barban + Difenzoquat + Bromoxynil	0.25 + 0.38 + 0.38	10.0	10.0	2.0	3511	50.3
Barban + Diclofop + Bromoxynil	0.25 + 0.38 + 0.38	10.0	10.0	1.8	3358	50.0
Chlorsulfuron	1/3 oz.	0.0	10.0	0.0	2856	49.3
Bromoxynil	0.38	0.0	10.0	0.0	3131	49.0
Difenzoquat + Chlorsulfuron Penetrator	0.38 + 1/6 oz. + 12 oz.	8.1	10.0	0.75	2937	49.0
Barban + Difenzoquat + Chlorsulfuron + Penetrator	0.13 + 0.19 + 1/6 oz. + 12 oz.	9.5	10.0	2.5	3359	49.7
Bromoxynil + Penetrator	0.19 + 12 oz.	0.0	10.0	0.0	3341	50.0
Chlorsulfuron	1/6 oz.	0.0	10.0	0.0	3258	49.3
Chlorsulfuron + Penetrator	1/6 oz. + 12 oz.	0.0	10.0	0.0	3368	49.3
Bromoxynil + Triton X-100	0.19 + .5%	0.0	10.0	0.0	3531	50.0
Check [2]	-	0.0	0.0	0.0	3085	50.0
			LSD	.05	N.S.	N.S.
			CV%		12.0	3.6

1 Based on a scale 0-10 where 0 = no control or injury and 10 = dead plants.

2 Maximum label rate for barley is only 1.0 lb/A.

Influence of liquid nitrogen on weed control in spring barley. Zamora, D. L., D. C. Thill, and R. H. Callihan. An experiment was established on June 14, 1984, near Potlatch, Idaho, to determine the effect of liquid nitrogen (uran) tank mixed with selected herbicides, on weed control in spring barley (var. Vanguard). The experiment was a randomized complete block design with four replications; plots were 10 by 30 feet. A CO_2 pressurized backpack sprayer, calibrated to deliver 20 gpa at 40 psi was used to broadcast the herbicides at 3 mph. At the time of application, the air temperature at the soil surface was 68 F, the soil temperature at 2 in was 67 F, relative humidity was 65%, and there was no cloud cover or dew present. The silt loam soil had a pH of 5.1, 2.9% organic matter, and a CEC of 17.4 meq/100 g soil. Crop stage at application was 4 to 5 leaf and tillering, the wild oat (AVEFA) had 3 to 5 leaves, and common lambsquarters (CHEAL) was in the seedling stage. Weed control evaluations were made on July 19, and the crop was harvested on August 15 with a small plot combine.

Wild oat control was not affected by tank mixes of diclofop and uran, or diclofop, bromoxynil, and uran at 35.4 lb nitrogen (N)/A. Wild oat control decreased to 97% for the latter tank mix when uran was applied at 53.1 lb N/A. Common lambsquarters control was not affected by any combination of diclofop and uran with bromoxynil. There were no differences in yield among the treatments. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Influence of liquid nitrogen on weed control in spring barley

Treatment	Rate	Weed control AVEFA	Weed control CHEAL	Yield
	(lb ai/A)	--------%--------		(bu/A)
check	-	-	-	43.0
diclofop	1.0	98.8	0.0	40.4
diclofop + uran[1/]	1.0 + 35.4	98.5	0.0	48.9
diclofop + uran	1.0 + 53.1	100.0	0.0	46.9
diclofop + uran	0.75 + 35.4	97.8	0.0	46.0
diclofop + uran	0.75 + 53.1	97.8	0.0	39.6
uran	35.4	0.0	0.0	40.5
uran	53.1	0.0	0.0	40.8
diclofop + bromoxynil	1.0 + 0.38	98.3	100.0	46.8
diclofop + bromoxynil + uran	1.0 + 0.38 + 35.4	99.8	100.0	40.7
diclofop + bromoxynil + uran	1.0 + 0.38 + 53.1	97.3	100.0	37.0
bromoxynil + uran	0.38 + 35.4	0.0	99.8	40.7
bromoxynil + uran	0.38 + 53.1	0.0	100.0	37.3
bromoxynil	0.38	0.0	100.0	42.9
LSD (0.05)		2.2	0.2	NS

[1/] Uran is a 32-0-0 liquid fertilizer with 3.54 lb N/gal, formulated as $CO(NH_2)_2 + NH_4NO_3$.

Ethalfluralin tank mixes on dry beans. Dewey, S.A. and P.W. Foote. An experiment conducted at the Kimberly Research and Extension Center to evaluate several dry-bean herbicides alone and in combination with ethalfluralin. Individual plots were arranged in a randomized complete block design and replicated four times. Preplant treatments were applied on June 28 and immediately incorporated with a rototiller to a depth of 3 inches. The postemergence treatment of bentazon + 1 qt/Acre crop oil concentrate was applied on July 17 when bean plants were entering the 2nd trifoliolate leaf stage. Treatments were applied with a CO_2 backpack sprayer at 20 gal/A. Weed counts (per 55 sq ft) were taken on August 13, and counts were used to compute percent weed control values. Injury evaluations were also made on August 13.

All treatments provided excellent control of grasses (primarily green foxtail) and redroot pigweed. Alachlor (standard formulation and MEA formulation) and metolachlor were weak on common lambsquarters. Control of hairy nightshade was excellent with most treatments. Tank mix combinations with the low rate of ethalfluralin controlled hairy nightshade as well as ethalfluralin alone at the high rate. Herbicide treatment did not alter bean seed yields compared to check. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Weed Control, Crop Injury and Seed Yield of Dry Beans As Affected by Ethalfluralin Tank Mixes

			% Weed Control[1] (8-13-84)				% Crop	Yield
Treatments	Rate lb ai/A	Timing	Hans	Colq	Repw	Grass	Injury (8-13)	(lb/A) (9-21)
ethalfluralin	.94	PPI	67	100	99	100	0	1214
ethalfluralin	1.50	PPI	93	100	100	100	0	1352
ethalfluralin + chloramben	.94+2.0	PPI	89	100	100	100	0	1567
ethalfluralin + metolachlor	.94+2.0	PPI	95	100	100	100	0	1393
ethalfluralin + EPTC	.94+3.0	PPI	91	100	99	100	0	1644
ethalfluralin + alachlor	.94+2.5	PPI	100	100	100	100	2.5	1498
ethalfluralin/bentazon	.94/1.0	PPI/POST	98	100	100	100	0	1357
trifluralin + EPTC	.75+3.0	PPI	94	100	100	100	0	1486
alachlor + EPTC	2.5+3.0	PPI	100	96	100	100	0	1367
fluchloralin	.75	PPI	61	98	97	100	0	1400
EPTC	4.0	PPI	96	94	90	98	0	1362
alachlor	3.0	PPI	93	55	99	99	5.5	1460
metolachlor	2.5	PPI	98	85	100	99	0	1422
alachlor (MEA)	3.0	PPI	98	76	100	99	1.3	1378
Check	-	-	0	0	0	0	0	1108
LSD (.05)			-	-	-	-	-	NS

1/ Hans = hairy nightshade, Colq = common lambsquarters, Repw = redroot pigweed, grass = primarily green foxtail

Dry bean varietal response to sethoxydim, bentazon and PP005. Dewey, S.A. and P.W. Foote. The phytotoxicity of sethoxydim, bentazon and PP005 was tested at the Kimberly Research and Extension Center on five dry bean varieties; pinto, pinks, great northerns, small reds, and large limas. Plots were 8 x 25 ft arranged in a randomized complete block design and replicated three times.

Treatments were applied July 10, 1984 with a CO_2 backpack sprayer calibrated to deliver 20 gal/A at 40 psi, when beans were developing the second trifoliolate leaf. On July 20 there were no visible signs of phytotoxicity to any variety.

The second half of the split sethoxydim/sethoxydim treatment was applied on July 27. This application was evaluated for phytotoxicity on August 3 with no visible sign of injury to any variety. The crop was harvested September 19 and yield data is reported in Table 1. Lima beans did not mature before killing frost, and were therefore not harvested. All plots were hand-weeded periodically during the season to minimize yield differences caused by weed competition.

Two treatments, PP005 and sethoxydim/sethoxydim caused Viva pinks to yield significantly lower than the check. No treatment reduced yields on the other bean varieties tested. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Dry Bean Variety Yield Response to Sethoxydim

		Yield (lb/Acre)			
	Rate lb ai/A	Sm. Reds (UI-36)	Pinks (Viva)	Pinto (NW590)	Gr. Northern (UI-59)
sethoxydim	.3	1701	2414	2255	1344
sethoxydim	.5	1805	2735	2601	1525
sethoxydim/ sethoxydim (split)	.5/.3	1931	2058	2439	1437
sethoxydim + bentazon	.3+.75	1789	2445	2282	1385
PP005	.25	1856	2159	2353	1400
Check	-	1936	2711	2548	1548
LSD (0.05)		NS	432.7	NS	NS

<u>Effect of preplant incorporated herbicides on hairy and cutleaf nightshade control and drybean stand.</u> Jackson, G. D, H. P. Alley and S. D. Miller. The herbicides ethafluralin, chloramben, alachlor, metolachlor and EPTC as individual treatments and/or in combinations, were evaluated for cutleaf and hairy nightshade control at the Research and Extension Center, Powell, Wyoming. Plots were established on irrigated land previously cropped to alfalfa. All herbicide treatments were applied with a 6-nozzle CO_2 pressurized knapsack sprayer in 40 gpa carrier. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. Treatments were applied May 15, 1984 and incorporated with a tandem disc within ½ hr of application.

Weed and drybean stand counts were made July 19, 1984. Alachlor applied at the rate of 3.5 lb ai/A and the combination of ethalfluralin/alachlor at 1.12 + 2.5 lb ai/A resulted in 100% control of both cutleaf and hairy nightshade. Ethalfluralin/EPTC at 1.12 + 2.5 lb ai/A was also an effective treatment, resulting in 100 and 93% control of cutleaf and hairy nightshade, respectively. Other herbicides and/or mixtures exhibited a weakness toward one of the nightshade species. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1303 .)

Hairy and cutleaf nightshade control

Herbicides	Rate lb ai/A	Crop Stand	Percent Control	
			Cuns	Hns
ethalfluralin	0.94	93	100	47
ethalfluralin	1.12	100	77	93
ethalfluralin	1.31	86	77	93
ethalfluralin + chloramben	1.12 + 1.8	100	77	70
ethalfluralin + alachlor	1.12 + 2.5	100	100	100
ethalfluralin + metalachlor	1.12 + 2.5	100	77	93
ethalfluralin + EPTC	1.12 + 2.5	95	100	93
alachlor + chloramben	2.5 + 2.0	100	24	100
metolachlor + chloramben	2.5 + 2.0	97	7	100
alachlor	3.5	86	100	100
metolachlor	3.5	84	100	70
Check	---	100	0	0

Weed control in great northern beans. Dewey, S.A. and P.W. Foote. A trial was conducted at the Kimberly Research and Extension Center to evaluate efficacy and phytotoxicity of several herbicides in great northern beans. Plots were arranged in a randomized complete block design and replicated four times. Treatments were applied with a CO_2 backpack sprayer in 20 gal/A. Preplant incorporated treatments were applied June 26, 1984. The plots were roller-harrowed 2 to 4 inches deep to incorporate the herbicides. Preemergence surface treatments were applied June 29 and postemergence applications were made July 27. Crop oil concentrate (COC) was added to all treatments containing bentazon.

Crop injury was assessed August 3 and August 14 and weed control evaluated August 14. Percent weed control values reported in Table 1 were calculated from weed counts (55 sq ft). Plots were harvested September 19, 1984.

Split applications of EPTC/lactofen (PPI/PES) resulted in the best nightshade control and overall weed control, with no evidence of crop injury. Treatments containing acifluorfen, and lactofen applied POST all resulted in significant crop injury. Uneven emergence and a variable stand of beans caused considerable variability in yields. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Weed Control in Great Northern Beans

Treatment	Rate	Timing	% Crop Injury 8-3	% Crop Injury 8-14	% Weed Control[4] (8-14) Hans	Colq	Repw	grass	(All Species)	Yield (lb/Acre)
bentazon + COC[1]	1.0	POST	6	2	87	0	23	0	30	1628
bentazon + acifluorfen + COC[1]	.75+.188	POST	43	24	84	0	70	20	47	1269
bentazon + acifluorfen + sethoxydim + COC[1]	.75 .188+.188	POST	44	26	73	24	70	0	50	1145
bentazon + sethoxydim + COC[1]	.75+.188	POST	0	0	76	7	58	0	44	1895
ethalfluralin	1.5	PPI	0	0	76	93	100	50	88	1752
alachlor	3.0	PES	0	0	53	23	50	70	41	1116
EPTC[3]	3.5	PPI	0	0	78	89	83	100	84	1530
metolachlor	2.5	PES	0	0	24	0	32	20	10	1431
lactofen	.25	PES	0	0	34	0	74	0	20	1601
EPTC[2]	3.5	PPI	0	0	57	58	78	100	64	1705
EPTC[3] /lactofen	3.0+.25	PPI/PES	0	0	95	90	100	70	94	1649
EPTC[3] /lactofen	3.0+.50	PPI/PES	0	0	98	91	100	70	96	1588
EPTC[3] /PPG1013	3.0+.15	PPI/PES	0	0	72	90	97	50	85	1949
metolachlor + lactofen	2.5+.25	PES	0	0	56	63	91	0	66	1972
metolachlor + PPG1013	2.5+.15	PES	0	0	34	53	97	0	56	1765

Table 1. Weed Control in Great Northern Beans (Continued)

Treatment	Rate	Timing	% Crop Injury 8-3	8-14	% Weed Control[4] 8-14) Hans	Colq	Repw	Grass	(All Species)	Yield (lb/Acre)
PPG1013	.20	PES	0	0	47	70	89	70	67	1519
lactofen	.15	POST	49	26	68	0	91	0	33	1257
EPTC[3] + trifluralin	3.0+.75	PPI	0	0	34	78	96	100	68	1825
Check (weedy)	–	–	–	–	0	0	0	0	0	1688
Check (weeded)	–	–	–	–	100	100	100	100	100	1971
LSD (0.05)			3.26	3.10						NS

1/ COC applied at 1 qt. per acre
2/ Trade name Eptam
3/ Trade name Genep
4/ Hans = hairy nightshade, Colq = common lambsquarters, Repw = redroot pigweed, grass = primarily green foxtail

Evaluation of postemergence herbicides for weed control in California 'Dark Red' kidney beans. Mitich, L.W., D.R. Orcutt and J.A. Roncoroni. Eight herbicides, individually and in combinations, were tested at the U.C. Davis experimental farm for their effectiveness in controlling redroot pigweed, black and hairy nightshades and barnyardgrass in 'Dark Red' kidney beans. Nineteen rates and combinations, including the control, were applied in a randomized complete block design with four replications. Beans were planted on June 14, 1984 and had 2 to 3 trifoliate leaves at the time of application. All three weed species also had 2 to 3 true leaves.

Herbicide applications were made on July 7 using a CO_2 backpack sprayer with 8002 nozzles at a rate of 20 gallons per acre. Each treatment was 10 feet wide (four 30-inch rows) by 20 feet long. Soil type was a Yolo sandy loam. Visual evaluation of weed control and crop phytotoxicity were made on August 2. Plots were harvested and yield data taken on September 28.

Excellent control of broadleaf species was obtained with AC 263,499 and acifluorfen. Bentazon, both alone and in combination with acifluorfen or HOE 33171 also gave excellent broadleaf control. Good control of barnyardgrass was obtained with HOE 33171 alone and in combination with bentazon. Flauzipop-butyl also provided good control, as did the high rate of SC 1084 and AC 263,499 at 0.06 lb/A. Both sethoxydin and AC 263,499 at 0.25 lb/A gave excellent barnyardgrass control. Phytotoxicity was pronounced in the high rates of both AC 263,499 and acifluorfen. This was reflected in the reduced yield in acifluorfen treatments but appeared to have no influence on yield in the AC 263,499 treatment. (University of California Cooperative Extension, Davis, CA 95616)

Postemergence herbicides in "Dark Red' kidney beans

Herbicide	Rate lb/A	Percent control[1,2,3] Pig-weed	Night shade	Barnyard-grass	Crop phytotoxicity	Bean[1,4] yield lb/A
AC 263,499[5]	0.03	85	95	48	0	1963.7 bcd
AC 263,499[5]	0.06	100	100	78	3	2054.4 cd
AC 263,499[5]	0.125	100	100	63	8	2042.7 bcd
AC 263,499[5]	0.25	98	100	95	23	2054.4 cd
SC 1084[6]	0.25	0	50	48	8	1568.8 abcd
SC 1984[6]	0.5	0	25	80	3	1769.5 abcd
Sethoxydin[6]	0.5	53	70	100	3	2051.2 cd
Fluazifop-butyl[6]	0.5	8	8	90	3	1781.2 abcd
Acifluorfen[7]	0.38	100	100	38	8	1248.6 ab
Acifluorfen[7]	0.5	100	100	65	13	1605.1 abcd
Acifluorfen[7]	1.0	100	100	25	25	1149.4 a
Bentazon[6]	1.0	98	100	48	3	1697.9 abcd
Acifluorfen + bentazon[7]	0.38 + 0.5	98	98	35	15	1195.3 a
Acifluorfen + bentazon[7]	0.38 + 0.75	100	98	70	20	1381.0 abc
Acifluorfen + bentazon[7]	0.5 + 0.5	98	100	18	8	1375.6 abc
HOE 33171	0.2	20	20	80	8	1887.9 abcd
HOE 33171 + bentazon	0.2 + 0.75	98	98	75	0	2196.3 cd
Diclofop	1.0	23	25	70	3	2009.6 bcd
Control	----------	50	70	40	13	118.3 a

1 All values are an average of four replications.
2 100% = total weed control or death of crop; 0% = no control or phytotoxicity.
3 No distinction made between black and hairy nightshade.
4 Yields followed by a common letter are not significantly different at the 5% level according to Duncan's multiple-range test.
5 With X-77 at 0.25 %
6 With crop oil at 1 qt/A
7 With AG 98 at 1 pt/A

Herbicide evaluation in pinto beans. Dewey, S.A. and P.W. Foote. Phytotoxicity and efficacy of several herbicides were evaluated in pinto beans at the Kimberly R&E Center in 1984. Treatments were applied to 8 x 25 foot plots in a randomized complete block design, replicated four times. All treatments were applied with a CO_2 backpack sprayer calibrated to deliver 20 gal/A. Preplant incorporated treatments were applied June 19, 1984 and were incorporated to a depth of 3 inches with a rototiller. Preemergence surface treatments were applied June 20, and postemergence treatments were applied July 4 as beans were entering the first trifoliolate leaf stage. A late postemergence application of bentazon + crop oil concentrate was made July 17 to earlier fluazifop-butyl and PP005 treatments. Weeds at the L. POST application were 2 to 6 inches tall, and beans were in the 2 to 3 trifoliolate leaf stage. Crop oil concentrate was added at 1 qt/A rate to treatments containing bentazon, and at 1 percent of total spray volume to treatments containing sethoxydim or PP005. When bentazon was tank mixed with sethoxydim a total of 1 qt/A crop oil concentrate was added. Weed seeds were broadcast and roller-harrow incorporated at the beginning of this study providing heavy stands of redroot pigweed and common lambsquarters, with moderate stands of hairy nightshade and green foxtail. Treatments were evaluated for crop injury and weed control July 19 and August 3. Beans were harvested October 9.

Preemergence surface applications failed to control any of the major weed species present. However, poor weed control from PES treatments is not uncommon under furrow irrigation in southern Idaho. Preplant incorporated treatments provided excellent control of both grassy and broadleaf weeds, while postemergence treatments were generally less effective. Early crop injury was noted from fluorochloridone and acifluorfen treatments. Fluorochloridone caused chlorosis of leaf tips and margins, while acifluorfen treatments resulted in severe leaf malformation. Fluorochloridone injury symptoms had disappeared within 3 weeks, while injury from acifluorofen remained visible until bean maturation and was reflected in bean yields. Six treatments produced significantly greater yields than the check. They were ethalfluralin, EPTC + trifluralin, EPTC + alachlor, bentazon + COC, bentazon + acifluorofen + sethoxydim + COC, and bentazon + sethoxydim + COC. Beans treated with ethalfluralin produced the highest yields. Better weed control and higher bean yields may have been obtained from PP005/bentazon or sethoxydim/bentazon applications if bentazon had been applied earlier. (University of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Herbicide Evaluation in Pinto Beans

Treatment 3/	Rate (lb ai/A)	Type of Application	% Weed Control (7-19) 1/ Repw	Colq	Hans	Grass	% Weed Control (8-3) 2/ BrLf	grass	Crop Injury 7-19	8-3	Yield lb/Acre
SC-1102	1.5	PES	0	0	0	10	0	0	1	0	936
SC-1102	3.0	PES	3	8	3	9	0	0	4	0	1348
fluorochloridone	.375	PES	14	21	11	6	0	0	19	4	946
fluorochloridone	.50	PES	16	20	14	9	0	0	21	6	1032
alachlor	1.5	PES	0	3	0	7	0	0	2	0	988
alachlor	3.0	PES	0	10	0	6	0	0	8	4	1051
fluazifop-butyl + COC/ bentazon + COC	.25/1.0	POST/L.POST	0	0	0	53	13	8	0	0	1057
PP005 + COC/ bentazon + COC	.063/1.0	POST/L.POST	0	0	0	28	11	5	0	0	1405
PP005 + COC bentazon + COC	.123/1.0	POST/L.POST	0	0	0	51	13	48	0	0	1557
PP005 + COC/ bentazon + COC	.25/1.0	POST/L.POST	0	0	0	96	18	87	0	0	1382
PP005 + COC/ bentazon + COC	.75/1.0	POST/L.POST	0	0	0	98	14	91	0	0	986
sethoxydim + COC	.25	POST	0	0	0	99	0	93	0	0	1028
ethalfluralin	1.5	PPI	100	100	100	100	100	100	0	0	2726
EPTC + trifluralin	2.5+.75	PPI	100	100	100	100	96	99	0	0	1938
EPTC + alachlor	2.5+2.5	PPI	100	100	100	100	92	97	3	0	2198

Table 1. Herbicide Evaluation in Pinto Beans (Continued)

Treatment[3/]	Rate (lb ai/A)	Type of Application	% Weed Control (7-19)[1/]				% Weed Control (8-3)[2/]		Crop Injury		Yield lb/Acre
			Repw	Colq	Hans	Grass	BrLf	grass	7-19	8-3	
bentazon + COC	1.0	POST	91	96	98	10	80	0	1	0	1976
bentazon + acifluorfen + COC	.75+.188	POST	79	94	95	15	73	0	17	4	1451
bentazon + acifluorfen + sethoxydim + COC	.75+.188+.188	POST	89	97	98	97	82	88	23	3	2079
bentazon + sethoxydim + COC	.75+.188	POST	85	96	96	93	69	81	0	0	1813
Check	-	-	-	-	-	-	-	-	-	-	1040
LSD			6.34	5.97	4.66	8.40	8.48	5.73	4.44	2.28	673.7

1/ Repw = redroot pigweed, colq = common lambsquarters, Hans = hairy nightshade, grass = mixture of green foxtail and barnyardgrass.
2/ Brlf = broadleaf weeds; same species as in 7-19 evaluation.
3/ COC = BASF crop oil concentrate.

Evaluation of preemergence and preemergence/postemergence herbicides in pinto beans. Miller, S. D. and H. P. Alley. Research plots were established on May 31, 1984 at the Torrington Research and Extension Center to evaluate the efficacy of preemergence and preemergence/postemergence herbicide treatments in pinto beans (var. UI 114). 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 unit delivering 40 gpa for preemergence and 20 gpa for postemergence treatments both at 40 psi. The soil was classified as a sandy loam (69% sand, 20% silt, 11% clay) with 1.0% organic matter and a 7.5 pH.

Weed control and crop stand evaluations were made on June 20 except hairy nightshade which was evaluated July 18 and plots were harvested for yield on August 29, 1984. Weed control and crop stand evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Redroot pigweed, hairy nightshade and common lambsquarters infestations were light 0.9, 0.7 and 1.8 plants/linear ft; respectively and grass infestations (primarily green and yellow foxtail) heavy 10.9 plants/linear ft in the untreated check. Several herbicide treatments reduced pinto bean stands slightly; however, all treatments increased pinto bean yields compared to the untreated check. Redroot pigweed control was good to excellent with all treatments except SD-95481, hairy nightshade control good to excellent with all treatments except PPG-884 or PPG-884 combinations with post grass herbicides, common lambsquarters control 95% or greater with all treatments except SD-95481 and grass control excellent with all treatments except PPG-884. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1292.)

Preemergence and preemergence/postemergence herbicides in pinto beans

Treatment [1]	Rate lb ai/A	Pinto beans Stand %	Yield lb/A	Percent Control [2] Rrpw	Hans	Colq	Gr
Preemergence							
alachlor	2.5	100	1801	100	100	100	100
alachlor (ME4)	2.5	100	1521	95	80	95	99
acetochlor	1.5	100	1645	100	86	100	99
acetochlor	2.0	100	1540	100	100	98	100
SC-0617	1.0	92	1778	100	91	100	99
SC-0617	2.0	100	1923	100	86	100	100
SC-5676	1.0	100	1690	89	86	97	99
SC-5676	2.0	100	1837	92	91	100	100
PPG-884	0.4	100	902	100	43	95	59
metolachlor	2.5	100	1729	100	100	100	99
SD-95481	0.75	100	877	71	0	85	99
Preemergence/Postemergence							
alachlor/acifluorfen	2.0 + 0.18	100	1610	95	100	98	98
alachlor/acifluorfen	2.0 + 0.25	100	1896	100	94	199	99
SD-95481/sethoxydim + OC 1 qt/A	0.4 + 0.2	100	1878	100	35	100	99
PPG-884/PP-005 + OC 1% v/v	0.4 + 0.125	98	1349	100	43	95	99
PPG-884/PP-005 = OC 1% v/v	0.4 + 0.25	98	1797	100	43	97	99
PPG-884/fluazifop + 1% v/v	0.4 + 0.37	86	1819	100	38	96	95
PPG-884/DPX-Y6202 + OC 1 qt/A	0.4 + 0.2	93	1476	95	29	95	100
PPG-884/haloxyfop + OC 1 qt/A	0.4 + 0.2	99	1752	100	40	98	100
Check	---	100	307	0	0	0	0

[1] Preemergence treatments applied May 31, 1984 and postemergence treatments June 19, 1984. ME4 = experimental formulation and OC = Atplus 411F.

[2] Crop stand and weed control counts July 3, except nightshade evaluations July 18 1984 based on two 6 in. by 5 ft quadrat counts per replication.

Evaluations of preplant incorporated herbicides in pinto beans. Miller, S. D. and H. P. Alley. Research plots were established on May 30, 1984 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated in pinto beans. 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 unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a multiweeder operating at 1½ to 2 in. Pinto beans (var. UI 114) were planted on May 31. The soil was classified as a sandy loam (69% sand, 20% silt, 11% clay) with 1.0 % organic matter and a 7.5 pH.

Weed control and crop stand evaluations were made on July 3 except hairy nightshade which was evaluated July 18 and plots were harvested for yield on August 29, 1984. Weed control and crop stand evaluations were determined by counting two 6 in. by 5 ft quadrats per replications. Common lambsquarters, hairy nightshade and redroot pigweed infestation were light 0.6, 0.6 and 0.8 plants/linear ft; respectively, and grass infestations (primarily green and yellow foxtail) moderate 4.1 plants/linear ft, in the untreated check. Several herbicide treatments reduced pinto bean stands slightly; however, all treatments increased pinto bean yields compared to the untreated check. Common lambsquarters, redroot pigweed and grass control was good to excellent with all treatments. Hairy nightshade control generally was better with herbicide combinations than with the individual herbicides. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1295.)

Preplant incorporated herbicides in pinto beans

Treatment[1]	Rate lb ai/A	Pinto beans Yield lb/A	Stand %	Percent Control[2] Colq	Hans	Rrpw	Gr
alachlor	3.0	1189	100	100	100	100	99
alachlor (ME4)	3.0	1037	98	100	74	100	100
trifluralin	0.75	1241	100	100	7	100	100
trifluralin + chloramben	0.75 + 1.5	1363	100	100	100	95	100
trifluralin + EPTC	0.75 + 2.0	1824	89	100	90	100	100
EPTC	3.0	945	100	100	77	100	99
EPTC/R-33865	3.0	1576	100	100	77	100	100
ethafluralin	0.75	979	86	100	50	100	99
ethafluralin	1.12	1583	100	100	77	100	100
ethafluralin	1.31	1606	97	100	94	100	99
ethafluralin + EPTC	0.5 + 2.0	1354	100	100	100	95	99
ethafluralin + EPTC	0.5 + 2.5	1448	87	100	100	100	99
ethafluralin + EPTC	0.75 + 2.0	1775	96	100	100	100	100
ethafluralin + EPTC	1.12 + 2.0	1540	98	100	100	100	100
ethafluralin + alachlor	0.75 + 2.5	1450	99	100	90	100	100
ethafluralin + alachlor	1.12 + 2.5	1863	100	100	100	100	100
ethafluralin + alachlor	1.31 + 2.5	1574	96	100	100	100	99
ethafluralin + metolachlor	0.75 + 2.5	1714	100	100	84	100	100
ethafluralin + metolachlor	1.12 + 2.5	1714	100	100	94	100	100
ethafluralin + metolachlor	1.31 + 2.5	1668	96	100	90	100	99
ethafluralin + PPG-884	0.5 + 0.25	1368	91	100	77	100	99
ethafluralin + PPG-884	0.5 + 0.4	1576	92	88	94	95	97
ethafluralin + PPG-884	0.75 + 0.25	1334	93	100	100	100	100
ethafluralin + PPG-884	0.75 + 0.4	1167	100	100	94	100	100
ethafluralin + chloramben	0.75 + 1.5	1148	97	100	100	100	99
ethafluralin + chloramben	1.12 + 1.5	1154	100	100	100	100	99
EPTC + PPG-884	2.0 + 0.25	1154	86	100	90	100	100
EPTC + PPG-884	2.0 + 0.4	1234	87	94	100	100	100
EPTC + PPG-884	2.5 + 0.25	1125	92	100	100	100	99
EPTC + PPG-884	2.5 + 0.4	1231	100	100	94	100	100
Check	---	212	100	---	---	---	---

[1]Treatments applied and incorporated May 30, 1984. ME4 = experimental formulation.

[2]Crop stand and weed control evaluations June 20 except nightshade evaluations July 18, 1984 based on two 6 in. by 5 ft quadrat counts per replication.

Wild proso millet control in field corn. Dewey, S.A., and P.W. Foote. An experiment near Twin Falls to evaluate various herbicides for control of wild proso millet in furrow-irrigated field corn. Treatments were applied to 8 x 25 foot plots in a randomized complete block design, replicated three times. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 20 gal/A. Preplant incorporated treatments were applied May 8 and incorporated with a rototiller 2 to 3 inches deep. The postemergence treatment was applied June 8 when corn was 3 to 4 inches tall and wild proso millet was 1/2 to 1 inch tall. Crop injury was evaluated June 6 and June 21. Visual weed control ratings were taken thoughout the growing season.

All materials tested provided good to excellent control of wild proso millet early in the growing season. However, by season's end control from several materials had dropped well below 90% control levels. Because new flushes of wild proso millet will normally continue to emerge during most of the summer, season-long performance of a herbicide is essential. Tridiphane + cyanizine did not perform as well as in previous tests, possibly a result of using furrow rather than sprinkler irrigation. Cycloate did not give satisfactory control of wild proso millet. EPTC and vernolate provided the best control. No effect from R25788 or the extender was observed. Crop injury on the June 6 evaluation was minimal and was likely aggravated by unseasonably cold, wet conditions. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Wild Proso Millet Control in Field Corn

	Treatment	Rate lb ai/A	Timing	Visual Eval. % Wild Proso Millet Control 6/6	6/21	7/9	7/24	8/31	Crop Injury 6/6	6/21
1.	EPTC	4.0	PPI	97	100	87	83	73	9	0
2.	EPTC + R25788	4.0	PPI	98	99	91	89	90	13	0
3.	vernolate	4.0	PPI	91	96	91	87	88	5	0
4.	vernolate + R25788	4.0	PPI	87	96	94	89	87	9	0
5.	cycloate	4.0	PPI	83	92	74	70	65	8	0
6.	cycloate + R25788	4.0	PPI	82	94	72	72	55	3	0
7.	EPTC + R25788 + extender	4.0	PPI	96	99	94	88	88	11	0
8.	vernolate + R25788 + extender	4.0	PPI	87	93	90	85	83	9	0
9.	cycloate + R25788 + extender	4.0	PPI	83	91	69	67	64	4	0
10.	EPTC + R25788 + cyanazine	3.0+1.5	PPI	94	100	96	91	88	11	0
11.	tridiphane + cyanazine	.50+1.5	PPI	86	97	72	69	48	11	0
12.	tridiphane + cyanazine	.50+1.5	POST	-	95	71	67	55	-	0
13.	Check	-	-	-	-	-	-	-	4	0
	LSD(.05)			7.0	4.4	13.9	10.1	11.5	8.3	-

Herbicide evaluation in field corn. Dewey, S.A. and P.W. Foote. Weed control and crop injury were evaluated in field corn at the Kimberly R&E Center in 1984. Treatments were applied to 10 x 30 ft plots arranged in a randomized complete block design, replicated four times. Herbicides were applied with a CO_2 backpack sprayer at 20 gal/A and 25 psi. Preplant incorporated treatments were applied June 26 and immediately roller harrowed to a depth of 2 to 4 inches. Preemergence surface treatments were applied June 29, and postemergence applications were made July 16 when the corn was 9 to 12 inches tall with 7 to 9 leaves. Injury ratings and weed counts were recorded on July 23, and overall broadleaf weed control was evaluated again on September 2. Plots were not harvested for yield.

Crop injury was noted in a few plots on July 23, but symptoms were very mild and short-lived. Herbicides providing 90 percent or greater broadleaf control at the last evaluation date were limited to SC1103, vernolate + extender, and metholachlor. Postemergence herbicides were the least effective broadleaf-control treatments. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Herbicide Evaluation in Field Corn

Treatment	Timing	Rate (lb ai/A)	Crop Injury (7/23)	Weeds per 75 sq ft[1] (7/23) Repw	Colq	Hans	Grass	Brdlf. Weeds[2] per 75 sq ft (9/3)	% Control (Brdlf. Weeds) (9/3)
SC 1102	PES	1.5	0	12.8	4.8	29.5	6.5	59.0	56
SC 1102	PES	3.0	0	7.3	2.0	13.3	1.5	26.0	81
SC 1103	PES	1.5	0	2.3	2.0	10.0	4.0	9.0	93
SC 1103	PES	3.0	0	2.0	2.0	12.5	3.5	8.8	93
fluorochloridone	PES	.375	1	4.0	2.8	20.3	4.8	14.8	89
fluorochloridone	PES	.50	0	7.5	1.0	14.5	.3	16.0	88
vernolate	PPI	3.0	0	2.8	2.0	7.0	.3	29.5	78
vernolate	PPI	4.0	0	1.5	.3	5.0	5.0	20.3	85
vernolate + extender	PPI	3.0	0	1.3	1.8	10.3	4.0	6.5	95
vernolate + extender	PPI	4.0	0	2.0	2.8	7.5	2.8	6.5	95
alachlor	PPI	3.0	0	.8	1.8	3.5	.8	21.8	84
metolachlor	PPI	2.5	1	2.3	1.3	5.3	0	5.5	96
tridiphane	PPI	.75	1	.8	.5	7.5	0	19.5	85
cycloate	PPI	4.0	0	4.3	1.3	1.3	1.8	35.3	74
bromoxynil	POST	.375	1	1.5	.3	.5	.8	65.5	51
bromoxynil	POST	.50	3	3.0	0	0	.3	66.8	50
AFX 1240	POST	.50	0	4.8	.3	.5	6.5	90.8	32
AFX 1240	POST	.75	0	2.8	0	0	.8	91.0	32
2,4-D	POST	.25	0	.8	2.0	3.0	0	75.3	44
Check		-	-	17.0	1.3	17.5	7.5	134.3	0
LSD (0.05)			NS	9.05	2.22	14.49	7.34	48.21	

1/ Repw = redroot pigweed, Colq = common lambsquarters, Hans = hairy nightshade, grass = primarily green foxtail

2/ Primarily same broadleaf species as in 7/23 evaluation

Preemergence weed control in silage corn. Evans, J.O. and R.W. Gunnell. Preemergence surface herbicide treatments were applied to a corn plot which had been planted one day prior to application. Soil type was a silt loam with a pH of 8.1 and an organic matter content of 2.93%. Treatments were applied with a bicycle sprayer which delivered 187 l/ha at 30 psi. Two days after application the plot area received a .25 cm rainfall. By first evaluation time the only weed uniformly populating the plot area was common lambsquarters. Weed control evaluations were made on a visual percentage basis July 19, 1984 and August 16, 1984. SC 1103 at 1.68 kg/ha and 3.36 kg/ha gave 100% lambsquarters control for both evaluations. Other promising treatments included lactofen at 0.45 kg/ha and pendimethalin at both 1.12 kg/ha and 2.24 kg/ha. None of the treatments caused corn injury. (Plant Science Department, UMC 48, Utah State University, Logan, Utah 84322)

Common lambsquarters control with preemergence surface herbicide applications

		Percent corn injury		Percent control common lambsquarters	
Treatment	Rate (kg/ha)	7-19-84	8-16-84	7-19-84	8-16-84
SC5676	1.68	0	0	63	61
SC5676	3.36	0	0	89	86
SC5676 R29148	3.36+ 0.56	0	0	79	75
SC0617	1.68	0	0	46	41
SC0617	3.36	0	0	78	76
SC0617 R29148	3.36+ 0.56	0	0	75	80
SC1102	1.68	0	0	53	56
SC1102	3.36	0	0	79	75
SC1103	1.68	0	0	100	100
SC1103	3.36	0	0	100	100
lactofen	0.22	0	0	78	76
lactofen	0.45	0	0	91	90
pendimethalin	1.12	0	0	94	93
pendimethalin	2.24	0	0	95	94
check	-	0	0	0	0

Yellow nutsedge control with preplant incorporated herbicides. Evans, J.O. and R.W. Gunnell. Controlling yellow nutsedge in corn with preplant incorporated herbicide treatments has been the subject of study for several years at a plot site in Weber County, Utah. Since metolachlor had previously given the highest level of nutsedge control this experiment emphasized tank mixing metolachlor with other corn herbicides. The plot was established April 30, 1984 in a loamy sand soil with a pH of 8.7 and an organic matter content of 1.28%. The soil surface was smooth and free of previous crop residue. Treatments were applied with a bicycle sprayer calibrated to deliver 187 l/ha at 30 psi. Plot size was 3.4m by 9.1m with 4 replications in a randomzied block design. After application, treatments were immediately incorporated with a tandem disc set to a cutting depth of 13 cm and a speed of 11 km/hr. The plot area was incorporated a second time with a Brillion seedbed maker set at a depth of 13 cm and a speed of 11 km/hr. Corn was planted May 1, 1984 to a depth of 5 cm, and had grown to a height of 10 cm by first evaluation time (May 25, 1984). Nutsedge plants ranged in height from 5 cm to 10 cm with an average population of 48 plants per square meter. Visual observations showed all treatments giving good to excellent control of yellow nutsedge, but by July 6, 1984, several treatments began to show significantly diminished control. Those treatments giving the best long-term nutsedge control were metolachlor alone at 3.9 kg/ha, metolachlor at 2.8 kg/ha plus EPTC + R25788 + R33865 at 2.24 kg/ha, and metolachlor at 2.8 kg/ha plus vernolate + R25788 + R33865 at 2.24 kg/ha. None of the treatments caused injury to the corn. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

Yellow nutsedge response to preplant incorporated herbicides

Herbicide	Rate (kg/ha)	Percent crop injury 25 May 1984	Percent crop injury 6 July 1984	Percent control yellow nutsedge 25 May 1984	Percent control yellow nutsedge 6 July 1984
metolachlor	2.80	0	0	91	80
metolachlor	3.90	0	0	96	91
metolachlor	2.80+	0	0		
cyanazine	1.12	0	0	93	81
metolachlor	2.80+	0	0		
atrazine	1.12	0	0	93	84
metolachlor	2.80+	0	0		
metribuzin	0.56	0	0	91	78
metolachlor	2.80+	0	0		
alachlor	1.12+	0	0		
atrazine	0.56	0	0	93	84
metolachlor	2.80+	0	0		
EPTC/R25788/R33865	2.24	0	0	97	91
metolachlor	2.80+	0	0		
vernolate/R25788/R33865	2.24	0	0	98	93
EPTC/R25788/R33865	6.72	0	0	96	60
vernolate/R25788/R33865	6.72	0	0	93	55
check	----	0	0	0	0

Postemergence weed control in silage corn. Evans, J.O. and R.W. Gunnell. A field study to determine the efficacy of several postemergence corn herbicide treatments was initiated July 5, 1984. Plot size was 3.4m by 9.1m with 4 replications in a randomized block design. At application corn was 50 cm tall with 9 plants per meter of row. Green foxtail was in the 2 to 5 leaf stage with 4 plants per square meter, and common lambsquarters averaged 2 to 4 inches tall with a population of 22 per square meter. Treatments were applied with a bicycle sprayer which delivered 187 l/ha at 30 psi. Weed control evaluations were made July 20, 1984 and August 15, 1984 and were based on visual comparison with untreated check plots. By final evaluation time several treatments had given excellent control of common lambsquarters, but only treatments containing tridiphane plus either atrazine or cyanazine adequately controlled green foxtail. As expected tridiphane alone plus oil concentrate did not effectively control either weed species. No significant crop injury was caused by any of the treatments. (Plant Science Department, UMC 48, Utah State University, Logan, Utah 84322)

Postemergence weed control in silage corn

Treatment	Rate (kg/ha)	percent corn injury 8-15-84	Percent control common lambsquarters 8-15-84	Percent control green foxtail 8-15-84
bromoxynil	0.42	0	86	0
bromoxynil	0.56	0	88	0
bromoxynil	0.42+			
atrazine	1.12	0	98	30
bromoxynil	0.56+			
atrazine	1.12	0	98	25
bromoxynil	0.42+			
atrazine	0.84+			
OC [1]	0.5%	0	98	42
AXF 1240	0.42	0	70	0
AXF 1240	0.56	0	89	0
AXF 1240	0.56+			
atrazine	1.12	0	95	0
AXF 1240	0.42+			
atrazine	0.84+			
OC	0.5%	0	97	34
tridiphane	0.84+			
OC	1%	0	20	20
tridiphane	1.12+			
OC	1%	0	43	20
tridiphane	0.84+			
atrazine	0.84+			
OC	1%	0	97	85
tridiphane	1.12+			
atrazine	0.84+			
OC	1%	0	96	81
tridiphane	1.12+			
atrazine	0.56+			
cyanazine	0.28+			
OC	1%	0	96	89
check	--	0	0	0

[1] Oil Conentrate

Effect of preemergence herbicide applications applied 16 and 0 days prior to planting corn on weed control and corn stand. Jackson, G. D., H. P. Alley and S. D. Miller. Several soil persistent herbicides and/or combinations were applied to prepared soil 16 and 0 days prior to planting corn to assess weed control and corn stand at the Powell Research and Extension Center, Powell, Wyoming. All treatments were applied with a 6-nozzle knapsack sprayer in 40 gpa water carrier on April 30 and May 16, 1984. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. The corn (var. Cargill 404) was seeded on May 16, 1984 immediately after the 0 day herbicide applications. One post planting cultivation was performed on June 20, 1984. The area was previously (1983) cropped to drybeans which received a trifluralin/bentazon treatment.

Weed control and corn stand evaluations were made on June 19, 1984. All herbicide treatments and/or combinations gave 100% wild mustard and wild buckwheat control without any reduction in corn stand. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1304.)

Weed control and corn stand

Herbicides	Rate lb ai/A	Stand Count %	Weed Control	
			Wimu	Wibu
16 Days Before Planting				
metolachlor/atrazine (PM)	2.0 + 1.6	100	100	100
atrazine 4L	1.6	100	100	100
cyanazine 4L	3.5	100	100	100
cyanazine/atrazine (TM)	2.3 + 1.2	100	100	100
cyanazine/atrazine (PM)	2.3 + 1.2	100	100	100
metolachlor/cyanazine	2.0 + 2.0	100	100	100
0 Days Before Planting				
atrazine 4L	1.6	100	100	100
cyanazine 4L	3.5	100	100	100
metolachlor/atrazine (TM)	2.0 + 1.6	100	100	100
metolachlor/atrazine (PM)	2.3 + 1.2	100	100	100
cyanazine/atrazine (TM)	2.3 + 1.2	100	100	100
cyanazine/atrazine (PM)	2.3 + 1.2	100	100	100
metolachlor/cyanazine (TM)	2.0 + 2.0	100	100	100
Check	---	100	---	---

Evaluation of preplant incorporated herbicides in corn. Miller, S. D. and H. P. Alley. Research plots were established on May 8, 1984 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated in corn. Plots were 9 by 30 ft in size with three replications arranged in a randomzied complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a multiweeder operating at 1½ to 2 in. Corn (var. Pioneer Hybrid 3747) was planted on May 9. The soil was classified as a sandy loam (72% sand, 18% silt, 10% clay) with 1.6% organic matter and a 7.6 pH.

Weed control and crop damage evaluations were made on June 12, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Common lambsquarters, kochia, hairy nightshade and grass populations (primarily green and yellow foxtail) were light averaging 0.5, 0.5, 0.5 and 1.5 plants/linear ft, respectively, in the untreated check. Corn was severely damaged by preplant incorporated applications of metolachlor alone or in combination with atrazine and probably related to the cool, wet spring. Common lambsquarters, kochia and grass control was 100% with all treatments and hairy nightshade control 100% with all treatments except the experimental formulation of alachlor or the alachlor-atrazine combination. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1296.)

Preplant incorporated herbicides in corn

Herbicide[1]	Rate lb ai/A	Corn[2] Injury %	Weed Control[2] Colq	Kocz	Hans	Gr
atrazine + metolachlor	1.2 + 1.5	83	100	100	100	100
metolachlor	3.0	70	100	100	100	100
acetochlor	2.0	0	100	100	100	100
cyanazine + atrazine	1.6 + 0.8	0	100	100	100	100
alachlor	3.0	10	100	100	100	100
alachlor (ME4)	3.0	0	100	100	60	100
alachlor + atrazine	2.0 + 1.0	0	100	100	60	100
alachlor + cyanazine	2.0 + 1.5	0	100	100	100	100
alachlor + EPTC + R-25788	2.0 + 2.0	0	100	100	100	100
alachlor + butylate + R-25788	2.0 + 2.0	0	100	100	100	100
EPTC + R-25788	3.0	0	100	100	100	100
EPTC + R-25788 + atrazine	3.0 + 1.0	0	100	100	100	100
EPTC + R-25788 + cyanazine	3.0 + 1.5	0	100	100	100	100
butylate + R-25788	3.0	0	100	100	100	100
butylate + R-25788 + atrazine	3.0 + 1.0	0	100	100	100	100
butylate + R-25788 + cyanazine	3.0 + 1.5	5	100	100	100	100
Check	---	0	0	0	0	0

[1]Treatments applied and incorporated May 8, 1984. ME4 = experimental formulation.
[2]Weed control and corn injury evaluations June 12, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft quadrats per replication.

Evaluation of postemergence herbicides in corn.. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center May 21, 1984 to evaluate their efficacy for weed control in corn (var. Pioneer Hybrid 3747). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (72% sand, 18% silt, 10% clay) with 1.6% organic matter and a 7.6 pH. The corn was in the 5-leaf stage (3 in. height) and foxtail (green and yellow) 3/4 in., common lambsquarters 8 to 10-leaf stage (2 in. height), kochia the rosette stage (1.5 in. height), redroot pigweed 2 to 4-leaf stage (3/4-1 in. height) and hairy nightshade 2 to 4-leaf stage (½-1 in. height) at time of treatment.

Weed control and crop damage evaluations were made on June 12, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replications. Common lambsquarters, kochia, hairy nightshade, redroot pigweed and grass infestations were light averaging 0.7, 0.1, 0.5, 0.2 and 0.7 plants/linear ft; respectively, in the untreated check. Corn was injured by bromoxynil combinations with cyanazine or cyanazine plus atrazine. Common lambsquarters, kochia and hairy nightshade control was excellent with all herbicide treatments, redroot pigweed control excellent with bromoxynil alone at 0.5 lb/A or 0.25 lb/A in combination with other herbicides and grass control fair to good with treatments containing atrazine or cyanazine. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1293.)

Postemergence herbicides in corn

Herbicide[1]	Rate lb ai/A	Crop[2] Injury %	Percent Control[2]				
			Colq	Kocz	Hans	Rrpw	Gr
atrazine + OC	1.0	0	100	100	100	100	79
AXF 1240	0.25	0	100	100	100	80	0
AXF 1240	0.5	0	100	100	100	100	0
AXF 1240 + atrazine	0.5 + 1.0	0	100	100	100	100	87
bromoxynil	0.25	0	100	100	100	70	0
bromoxynil	0.38	0	100	100	100	80	0
bromoxynil	0.5	0	100	100	100	100	0
bromoxynil + atrazine	0.25 + 1.0	0	100	100	100	100	87
bromoxynil + atrazine	0.5 + 1.0	0	100	100	100	100	73
bromoxynil + cyanazine	0.25 + 1.2	10	100	100	100	100	92
bromoxynil + atrazine + cyanazine	0.25 + 0.25 + 0.75	26	100	100	100	100	95
bromoxynil + atrazine	0.25 + 0.5	0	100	100	100	100	68
bromoxynil + atrazine + tridiphane	0.25 + 0.5 + 0.5	5	100	100	100	100	87
bromoxynil + 2,4-D	0.25 + 0.25	0	100	100	100	100	0
bromoxynil + dicamba	0.25 + 0.25	0	100	100	100	100	0
Check	---	0	0	0	0	0	0

[1]Treatments applied May 31, 1984. OC = AtPlus 411F 1 qt/A; 2,4-D = dimethylamine.
[2]Weed control and corn injury evaluations June 12, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft. quadrats.

Evaluation of preemergence herbicides in corn. Miller, S. D. and H. P. Alley. Research plots were estabished on May 9, 1984 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preemergence in corn (var. Pioneer Hybrid 3747). 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 unit deliverying 40 gpa at 40 psi. The soil was classified as a sandy loam (72% sand, 18% silt, 10% clay) with 1.6% organic matter and a 7.6 pH.

Weed control and crop stand evaluations were made on June 12, 1984 and were determined by counting two 6 in. by 5 ft quadrats per replication. Common lambsquarters, kochia, hairy nightshade, redroot pigweed and grass populations (primarily green and yellow foxtail) were light averaging 0.3, 0.1, 0.4, 0.2 and 0.3 plants/linear ft; respectively, in the untreated check. SC-5676 and SC-1103 at 3.0 lb/A reduced corn stand 29 and 37%, respectively. Grass control was excellent with all treatments except SC-1102 at 1.5 lb/A, kochia control excellent with all treatments except SC-1102 at 1.5 and 3.0 lb/A, hairy nightshade and redroot pigweed control 80% or greater with all treatments and common lambsquarters control excellent with all treatments containing triazine herbicides. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1294.)

Preemergence herbicides in corn

Herbicide[1]	Rate lb ai/A	Corn[2] Stand %	Percent Control[2]				
			Colq	Kocz	Hans	Rrpw	Gr
atrazine + metolachlor	1.2 + 1.5	100	100	100	100	100	100
pendimethalin + cyanazine	1.0 + 1.5	92	100	100	100	100	100
pendimethalin + atrazine	1.0 + 1.0	100	100	100	100	100	100
alachlor + cyanazine	2.0 + 1.5	100	100	100	100	100	100
SC-0617	3.0	90	75	100	100	100	100
SC-0617 + R-29148	1.5 + 0.25	96	83	100	100	100	100
SC-0617 + R-29148	3.0 + 0.25	89	75	100	100	100	100
SC-0617 + cyanazine + R-29148	1.5 + 1.25 + 0.25	100	100	100	100	100	100
SC-5676	3.0	71	75	90	88	100	100
SC-5676 + R-29148	1.5 + 0.25	96	100	100	88	80	100
SC-5676 + R-29148	3.0 + 0.25	89	75	100	88	100	100
SC-5676 + cyanazine + R-29148	1.5 + 1.25 + 0.25	92	92	100	100	100	100
SC-1102	1.5	89	75	60	82	100	77
SC-1102	3.0	86	75	60	82	100	100
SC-1103	1.5	96	100	100	100	100	100
SC-1103	3.0	63	100	100	100	100	100
Check	---	100	0	0	0	0	0

[1]Treatments applied May 8, 1984.
[2]Corn stand and weed control evaluations June 12, 1984 based on two 6 in. by 5 ft quadrat counts per replication.

Evaluation of postemergence herbicides in field corn. Mitich, L.W,. and N.L. Smith. A site on the UC Davis Experimental Farm was selected to evaluate weed control with bromoxynil, dicamba, 2,4-D ester, cyanazine, R-40244 and tridiphane. Corn (Cultivar: DeKalb XL 55A) was planted May 9, 1984 on 30 inch performed beds and furrow irrigated up. Barnyardgrass, common purslane, nightshade (hairy and black) and redroot pigweed emerged with the corn. Herbicides were applied with a CO_2 backpack sprayer (20 gpa) May 30 on 2- to 4-leaf weeds and 3- to 4-leaf corn (5 to 7 inches high). Air temperature at application was 90 F. Paraffin base oil (Surfel) @ 0.5% v/v was added to the cyanazine treatments. Four replications were employed in a randomized block design.

Visual evaluations of corn phytotoxicy and weed control were made June 7 and June 27. Temporary crop injury was noted June 7 from R-40244, bromoxynil and cyanazine. None of the herbicides were effective on barnyardgrass. Excellent control of the broadleaf species was obtained with cyanazine and dicamba. Bromoxynil and to a lesser degree 2,4-D were weak on purslane, however, nightshade and pigweed control was excellent. R-40244 was weak on the nightshade. The addition of tridiphane with cyanazine slightly enhanced control of barnyardgrass. (University of California Cooperative Extension, Davis, CA 95616)

Weed control in field corn with postemergence herbicides, 1984

Herbicide	Rate lb/A	Phyto[1]		% Control[1] Barnyardgrass		Purslane		Nightshade		R.R. Pigweed		Yield @ 15.5%	Analysis
		6/7	6/27	6/7	6/27	6/7	6/27	6/7	6/27	6/7	6/27		
R-40244	0.25 lb	2.8	0	1.0	0	7.5	9.3	2.5	1.5	4.0	6.0	7241	B
R-40244	0.5	3.0	0	1.8	0	8.3	9.8	3.3	1.5	4.5	9.5	10,065	A
R-40244	0.75	3.5	0	1.8	0.8	8.5	9.8	4.3	3.3	6.5	6.0	9375	AB
R-40244	1.0	4.0	0	2.8	0	8.5	10.0	5.8	8.9	8.0	9.5	9030	AB
Bromoxynil	0.5	2.3	0	0	0	2.8	4.8	10.0	10.0	10.0	10.0	7535	B
Dicamba	0.25	0	0	0	0	7.8	8.6	8.1	9.5	8.6	10.0	8593	AB
Dicamba	0.5	0	0	0	0.5	8.8	9.9	9.3	10.0	9.3	10.0	8890	AB
2,4-D ester	0.5	0	0	0	0.8	6.8	6.8	7.5	9.5	8.3	9.8	8153	AB
Cyanazine	1.0	1.5	0	2.0	1.0	10.0	9.9	10.0	10.0	10.0	10.0	8429	AB
Cyanazine + Tridiphane	0.5 0.5	2.8	0	4.5	1.5	10.0	9.9	10.0	10.0	10.0	10.0	9123	AB
Control		0	0	0	0	0	0	0	0	0	0	7383	B

Data is average of 4 replications

[1] 0 = No phytotoxicity or weed control; 10 = Complete control.

[2] Means followed by the same letter are not significantly different at the 0.5% level.

Evaluation of preplant incorporated herbicides in field corn. Mitich, L.W. and N.L. Smith. The performance of two relatively new herbicides, R-40244 and SC 1102, was compared to metolachlor, alachlor ME, vernolate, and safner, cyanazine and acetachlor in field corn on the UC Davis Experimental Farm. The test site was listed to 30-inch beds and herbicides were applied with a CO_2 backpack sprayer calibrated to deliver 40 gpa on May 8, 1984. Incorporation to a 2-inch depth using a Marvin Rowmaster power driven incorporator followed immediately. The site was planted May 9 to field corn (Cultivar: De Kalb XL 55A). A good stand of barnyardgrass, black and hairy nightshades, redroot pigweed and common purslane emerged with the corn following furrow irrigation. A randomized block design was utilized with four replications. Individual plot size was 10 by 20 ft. Nitrogen (ammonium nitrate) was applied at 160 units per acre. The site was furrow irrigated approximately every 10 days.

Metolachlor, alachlor and alachlor in combination with cyanazine or R-40244 gave excellent control of all weed species. SC 1102 was very effective in controlling barnyardgrass but the control of the broadleaf species was poor. R-40244 did not achieve adequate control at the rate tested. Grain yield from the untreated control was significantly lower than from the herbicide treated plots. (University of California Cooperative Extension, Davis, CA 95616)

Preplant incorporated herbicides in field corn

Herbicide	Rate lb/A	Phyto[1] 6/7/84	% Control[1] June 7, 1984 Barnyard-grass	Purslane	Night-shade[3]	Redroot pigweed	Yield @ 15.5%	Analysis[2]
Metolachlor	3	0	10.0	7.6	8.3	10.0	8811	ab
Alachlor ME	3	0	9.9	8.1	9.0	9.8	8991	ab
Vernolate + Safner	4	0.8	9.9	10.0	0.8	6.5	9462	a
R-40244 + Alachlor ME	0.33 + 3	0	9.9	9.5	9.6	10.0	10002	a
SC 1102	2	0	9.9	4.5	3.8	7.0	7395	bc
SC 1102	3	0.3	10.0	6.0	1.5	4.5	8232	ab
SC 1102	4	0.3	10.0	5.0	1.8	5.8	7339	bc
Alachlor ME + Cyanazine	3 1.5	0	10.0	10.0	10.0	10.0	9291	ab
Acetochlor	2	0	10.0	9.4	10.0	10.0	9148	ab
R-40244	0.33	0	0	4.3	4.0	3.5	7367	bc
Control		0	0	0	0	0	4474	d

All data is average of 4 replications.

1 0 = No control or phytoxicity. 10 = Complete control or crop loss.

2 Means followed by the same letter are not significantly different at the 0.5% level.

3 Black and hairy nightshade.

Effect of barnyardgrass competition on yield of field corn. Mitich, L.W. and N.L. Smith. A site on the UC Davis Experimental Farm was selected to study the competitive effects of barnyardgrass on yield of field corn. The area was fumigated with methyl bromide prior to establishing the experiment to eliminate existing weed seeds. Corn (Cultivar: DeKalb XL 55A) was planted on 30-inch preformed beds May 9, 1984. Low (1 barnyardgrass plant/ft. of row), medium (6 plants/ft.) and high (18 plants/ft.) densities of barnyardgrass were seeded in the corn seed row at various times in the season. These were left all season long, removed after 3 or 6 weeks or planted 3 or 6 weeks following corn emergence. A weedless season-long control was included. Initially, corn and barnyardgrass were irrigated up together. Barnyardgrass was hand thinned to the desired density. The plot area was not cultivated. Ample water and nitrogen fertilizer was supplied throughout the growing season. A randomized block design with four replications was used. Individual plots were 4 rows (10 ft.) wide by 20 ft. long.

Ten foot lengths were harvested out of the center two rows for yield. When compared to the control (weedless season long) yields were significantly reduced from the high and medium densities left season long and the high density removed after6 weeks. When barnyardgrass was planted 3 weeks after corn emergence, a satisfactory stand was obtained; however, if planted after 6 weeks, barnyardgrass could not be established satisfactorily. (University of California Cooperative Extension, Davis, CA 95616)

Barnyardgrass competition in field corn

		Barnyardgrass density[1]	Corn yield	Analysis[2]
Weedless	Season long		8925 lb	abcd
Weedy	Season long	Low	7821	cdef
Weedy	Season long	Med	7271	ef
Weedy	Season Long	High	6612	f
Weedless	After 3 weeks	Low	9091	abc
Weedless	After 3 weeks	Med	8491	bcde
Weedless	After 3 weeks	High	9581	ab
Weedless	After 6 weeks	Low	8833	abcd
Weedless	After 6 weeks	Med	7548	def
Weedless	After 6 weeks	High	6706	f
Weedless	First 3 weeks	Low	10,241	a
Weedless	First 3 weeks	Med	8632	bcde
Weedless	First 3 weeks	High	8166	bcde
Weedless	First 6 weeks	Low	9055	abc
Weedless	First 6 weeks	Med	8963	abcd
Weedless	First 6 weeks	High	9122	abc

[1] Density = low 1 plant/ft.; med. 6 plants/ft.; high 18 plants/ft.

[2] Means followed by the same letter are not significantly different at the 0.5% level.

Annual weed control in chickpeas. Callihan, R. H., C. H. Huston, and D. C. Thill. The efficacy of several pre- and postemergence herbicides was evaluated on chickpeas at Cameron, Idaho. 'UC-5' chickpeas were planted on April 26, 1984. The soil at this location is a silt loam with a pH of 5.5 , organic matter of 3.7%, and a CEC of 21.4 meq/100 g. Experimental design was a randomized complete block design replicated four times with individual plot size of 10 by 32 feet. Row spacing was seven inches.

Post-plant incorporated treatments of triallate (EC 4 lb/gal), metribuzin (75% dry flowable), and trifluralin (EC 4 lb/gal) were applied on May 4, 1983 with air temperature of 10 C, soil temperature at 6 inches of 9 C, and 80% relative humidity. All post-plant incorporated treatments were immediately incorporated by cross harrowing. Preemergence surface applications of dinoseb (EC 3.0 lb/gal), fluorchloridone (EC 2.0 lb/gal), and metribuzin were applied on May 7, 1984. The air temperature was 14 C, soil temperature at 6 inches was 11 C, and a relative humidity of 40%. Post-emergence treatments of Dowco 453 (EC 2.0 lbs/gal), fluazifop-P-butyl (EC 1.0 lb/gal), sethoxydim (emusifiable concentrate 1.5 lb.gal), and dinoseb (3 lb/gal) were applied on June 12, 1984 with an air temperature of 20 C, soil temperature of 14 C, and relative humidity of 20% under clear skies. All post-emergence treatments, with the exception of dinoseb, were applied with 1 qt/A Mor-act oil surfactant. All treatments were applied with a backpack sprayer calibrated to deliver 20 gpa at 40 psi using Teejet 8002 flatfan nozzles.

Excellent (95-100%) wild oat control was obtained with treatments of 0.1 and 0.2 lb/A Dowco 453, 0.06, 0.13, 0.25, and 0.75 lbs/A fluazifop-P-butyl, o.2 and 0.3 lb/A sethoxydim, and 1.25 lb/A triallate following a 3.0 lb/A preemergence dinoseb, and 0.13 lb/A fluazifop-P-butyl following a 0.38 lb/A preemergence metribuzin. Good (85-94%) wild oat control was obtained with 1.25 and 1.5 lb/A triallate and 1.25 triallate plus 0.38 lb/A metribuzin. Fair (68%) wild oat control was provided with 1.25 lb/A triallate plus 0.38 lb/A triflualin and poor (less than 65%) control with 3.0 lb/A dinoseb and 0.5 and 1.0 lb/A fluorchloridone.

Good to excellent (80-100%) control of common lambsquarters and henbit was obtained with all treatments except 0.38 lb/A metribuzin, and triallate plus trifluralin which provided fair and poor (78 and 42%, respectively) control of common lambsquarters.

Very slight (5%) crop injury was observed with the 3.0 lb/A preemergence dinoseb treatment and moderate (16 and 20%) injury with the 0.75 and 1.5 lb/A post-emergence dinoseb treatments on June 15, 1984. By July 22, injury from the post-emergence dinoseb treatments was slightly visible.

Weed pressure was not severe and all treatments, except the 0.75 lb/A dinoseb treatment, produced greater yields than the check. However, only the 1.25 and 1.5 lb/A triallate, 0.38 lb/A metribuzin, 0.06, 0.25 and 0.75 lb/A fluazifop-P-butyl, 0.3 lb/A sethoxydim, 0.2 lb/A Dowco 453, and triallate plus dinoseb treatments were significantly greater when harvested on August 18, 1984. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843).

Annual weed control in chickpeas

Herbicide	Rate	Appl.[1] Time	Crop Injury[2] 6/15	7/8	Yield	Weed control AVEFA	CHEAL	LAMAN
	(lb/A)		%	%	(lb/A)	(%)	(%)	(%)
Check	-	-	-	-	1516	-		
dinoseb	3.0	PES	4	5	1704	62	100	86
metribuzin	0.38	PES	0	0	1962	30	78	99
triallate	1.25	POPI	0	0	1920	87	100	100
triallate	1.50	POPI	0	0	2098	91	100	100
triallate+[4]	1.25							
metribuzin	0.38	POPI	0	0	2242	85	82	100
dinoseb/[4]	3.0	PES						
fluazifop-P-butyl[5]	0.06	Post	0	0	2022	97	100	98
dinoseb/	3.0	PES						
fluazifop-P-butyl[5]	0.13	Post	0	0	1860	99	100	100
dinoseb/	3.0	PES						
fluazifop-P-butyl[5]	0.25	Post	0	0	1954	100	100	94
dinoseb/	3.0	PES						
fluazifop-P-butyl[5]	0.75	Post	0	0	2039	99	99	91
dinoseb/	3.0	PES						
sethoxydim[5]	0.20	Post	0	0	1848	100	99	92
dinoseb/	3.0	PES						
sethoxydim[5]	0.30	Post	0	0	2103	100	99	88
dinoseb	1.50	Post	20	8	1622	38	100	100
dinoseb	0.75	Post	16	1	1476	40	100	99
dinoseb/	3.0	PES						
Dowco 453[5]	0.10	Post	0	0	1800	99	99	91
dinoseb/	3.0	PES						
Dowco 453[5]	0.20	Post	0	0	2115	100	99	98
triallate/	1.25	POPI						
dinoseb	3.0	PES	0	0	1962	95	99	98
fluorchloridone	0.50	PES	0	0	1695	38	99	100
fluorchloridone	1.0	PES	0	0	1555	52	100	100
metribuzin/	0.38	PES						
fluazifop-P-butyl[5]	0.13	Post	0	0	1901	95	86	100
triallate+	1.25							
trifluralin	0.38	POPI	0	0	1874	68	42	98
$LSD_{.05}$			5	4	410	24	19	12

1 PES = preemergence surface, POPI = postplant incorporated, Post = postemergence.
2 Crop injury as % of check, 0 = No injury, 100 = Complete crop kill.
3 Weed control as % of check, 0 = No control, 100 = Complete control.
4 + = Applied together; / = applied separately.
5 Applied with 1 qt./A Mor-act oil.

Annual weed control in spring peas. Callihan, R.H., C.H. Huston, and D.C. Thill. This study was initiated near Moscow, Idaho to evaluate the efficacy of several pre- and postemergence herbicides in spring peas. The soil at this location is a Naff-Thatuna silt loam with a pH of 6.1 and organic matter of 3.5%. The experimental design was a randomized complete block replicated four times with individual plot size of 10 by 32 ft.

Preplant incorporated treatments of ethalfluralin, trifluralin and triallate (all 4.0 lb/gal EC) were applied on May 18, 1984, and incorporated with a rototiller. Air temperature was 8 C with a relative humidity of 30%. 'Alaska' peas were planted on May 21 in seven-inch rows. Preemergence surface treatments of dinoseb (3.0 lb/gal) and fluorchloridone (EC 2.0 lb/gal) were applied on May 25. Air temperature was 10 C and soil temperature at 6 inches was 10 C and relative humidity was 70%. Post-emergence treatments of the dinoseb, (3 lb/gal) sethoxydim (1.5 lb/gal), SC1084 (2 lb/gal), fluazifop-P-butyl (1.0 lb/gal), and Dowco 453 (2.0 lb/gal) were applied on June 12. Air temperature was 14 C with a relative humidity of 20%. All post-emergence treatments were applied with 1 qt/A Mor-act oil surfactant. All treatments were applied using a backpack sprayer calibrated to deliver 20 gpa at 40 psi and equipped with Teejet 8002 flatfan nozzles.

All treatments, except 0.38 and 0.5 lb/A ethalfluralin, provided excellent (91-100%) field pennycress control. These ethalfluralin treatments produced poor (less than 55%) field pennycress control. The following treatments, all following a preemergence 6.0 lb/A dinoseb application, provided good to excellent (85 to 100%) wild oat control: 0.2 or 0.3 lb/A sethoxydim; and 0.1, 0.2 or 0.5 lb/A SC1084; 0.06, 0.13 fluazifop-P-butyl; and 0.1 or 0.2 lb/A Dowco 453.

Treatments of 0.5 lb/A trifluralin or 0.38 lb/A ethalfluralin with 1.25 lb/A triallate and 1.25 or 1.5 triallate preceding 6.0 lb/A dinoseb produced fair (70 to 84%) oat control. Poor (less than 70%) oat control was obtained with treatments of ethalfluralin, 6.0 lb/A dinoseb alone or preceding 1.0 lb/A dinoseb post-emergence, and 0.38 or 0.5 lb/A fluorchloridone.

Slight early-season chlorotic mottling of pea leaves was observed with fluazifop-P-butyl treatments. By mid-July, this injury was not visible. Treatments of fluorchloridone caused moderate chlorosis of pea leaves. By mid-July this injury was only slightly visible. No other treatments produced visible crop injury.

Peas were harvested on August 20, 1984. Those treatments providing excellent (95 to 100%) control produced the greatest yields. However, they were not always significantly greater than some treatments providing poor wild oat control. The untreated check had seed yields significantly lower than all treatments producing fair to excellent (70 to 100%) oat control. The fluorchloridone treatments produced the lowest seed yields. (University of Idaho Agricultural Experiment Station, Moscow, ID. 83843)

Weed control in spring peas

Herbicide	Rate	Appl.[1] Time	Crop injury[2] 6-15	7-12	Weed control[3] AVESA	THLAR	Yield
	(lb/A)		(%)	(%)	(%)	(%)	(lb/A)
Check	-	-					888
ethafluralin	0.38	PPI	0	0	22	15	1274
ethafluralin	0.5	PPI	0	0	56	54	1147
trifluralin +[4]	0.5	PPI	0	0	72	91	1417
triallate	1.25						
ethafluralin +	0.38	PPI	0	0	74	98	1445
triallate	1.25						
triallate/[4]	1.25	PPI	0	0	78	100	1428
dinoseb	6.0	PES					
triallate/	1.5	PPI	0	0	81	95	1522
dinoseb	6.0	PES					
dinoseb	6.0	PES	0	0	5	100	1162
fluorchloridone	0.38	PES	13	10	14	100	701
fluorchloridone	0.5	PES	23	11	20	100	809
dinoseb/	6.0	PES	0	0	31	100	1087
sethoxydim[5]	0.15	Post					
dinoseb/	6.0	PES	0	0	97	100	1615
sethoxydim[5]	0.2	Post					
dinoseb/	6.0	PES	0	0	98	100	1756
sethoxydim[5]	0.3	Post					
dinoseb/	6.0	PES	0	0	90	99	1479
SC1084[5]	0.1	Post					
dinoseb/	6.0	PES	0	0	96	99	1768
SC1084[5]	0.2	Post					
dinoseb/	6.0	PES	0	0	100	99	1501
SC1084[5]	0.5	Post					
dinoseb/	6.0	PES	0	0	12	100	1452
dinoseb	1.0	Post					
dinoseb/	6.0	PES	4	0	94	98	1510
fluazifop-P-butyl[5]	0.06	Post					
dinoseb/	6.0	PES	5	0	99	100	1619
fluazifop-P-butyl[5]	0.13	Post					
dinoseb/	6.0	PES	0	0	96	97	1579
Dowco 453[5]	0.10	Post					
dinoseb/	6.0	PES	0	0	99	99	1532
Dowco 453[5]	0.2	Post					
$LSD_{0.05}$			3	4	9	6	328

[1] PPI = preplant incorporated, PES = preemergence surface, Post = postemergence
[2] Crop injury as % of check, 0 = No injury, 100 = Complete kill
[3] Weed control as % of check, 0 = No control, 100 = Complete control
[4] + = Applied together, / = applied separately
[5] Applied with 1 qt./A Mor-act oil surfactant

Evaluation of herbicides for annual weed control in spring peas. Huston, C. H., R. H. Callihan, and D. C. Thill. This study was established near Cameron, Idaho to evaluate several pre- and post-emergence herbicides in spring peas. 'Alaska' peas were planted on May 13, 1984. The soil at this location was a silt loam with a pH of 5.1, organic matter of 3.9%, and a CEC of 19.7 meq/100 g. Experimental design was a randomized complete block replicated four times. Post-plant incorporated treatments of triallate (10% granular) and preemergence surface applications of dinoseb (EC 3.0 lb/gal), metribuzin (75% dry flowable), and fluorchloridone (emusifiable concentrate 2.0 lb/gal) were applied on May 18, 1984. Air temperature was 15 C, soil temperature at 6 inches was 10 C, and relative humidity was 20%. Triallate treatments were incorporated by raking. Post-emergence treatments were the EC of dinoseb (3.0 lb/gal), sethoxydim (1.5 lb/gal), diclofop-methyl (3.0 lb/gal), DPXY6202 (0.8 lb/gal) Dowco 453 (2.0 lb/gal), and fluazifop-P-butyl (1.0 lb/gal) and were applied on June 12, 1984. ALl treatments were applied using a backpack sprayer calibrated to deliver 20 gpa at 40 psi using Teejet 8002 flatfan nozzles. Air temperature was 16 C, soil temperature at 6 inches was 12 C, and relative humidity was 70 % under partly cloudy skies. All postemergence treatments, except diclofop-methyl, were applied with 1 qt/A Mor-act surfactant.

All sequential treatments of 6.0 lb/A dinoseb with 0.06, 0.13, 0.25, and 0.75 lb/A fluazifop-P-butyl, 0.1 and 0.2 lb/A Dowco 453, 0.1, 0.2, and 0.5 lb/A DPXY6202, and 0.2 lb/A sethoxydim provided excellent (99-100%) wild oat control by the July 12 evaluation.

The following treatments provided good (70 to 91%) wild oat control: 6.0 lb/a dinseb with 1.0 lb/A diclofop-methyl, 1.5 lb/A triallate with 6.0 lb/A dinoseb, 1.25 lb/A triallate with 6.0 lb/A dinoseb or 1.0 lb/A fluorchloridone. Treatments of 6.0 lb/A dinoseb, 0.38 lb/A metribuzin, 0.50 or 1.0 lb/A fluorchloridone, 0.38 lb/A metribuzin plus 0.5 fluorchloridone, and 1.0 lb/A post-emergence dinoseb with 0.5 lb/A sethoxydim provided poor (less than 65%) wild oat control.

Fair to excellent control (75 to 100%) of henbit was obtained with all treatments.

All fluorchloridone treatments induced moderate early-season chlorosis of pea leaves, while 0.38 lb/A metribuzin produced slight early-season chlorosis. By July 5, no visible injury was present. The post-emergence dinoseb plus sethoxydim treatment caused severe leaf necrosis and stand reduction throughout the season. DPXY6202 (0.2 and 0.5 lb/A) produced slight early-season chlorotic mottling of pea leaves, as did fluazifop-P-butyl treatments.

Peas were harvested on August 12, and pea seed yields, except for the severely reduced yields from the post-emergence dinoseb plus sethoxydim treatment, did not differ from the untreated check. The low yields are attributed to early death caused by fusarium and aphenomyces root rot. (University of Idaho Agricultural Experiment Station, Moscow, ID. 83843)

Pea crop response and weed control

					Weed control				
		Appl.	Crop injury		AVEFA		LAMAM		
Herbicide	Rate	time	6/24	7/10	6/24	7/10	6/24	7/10	Yield
	(lbs/A)		--------	--------	--------	%	--------	--------	(lbs/A)
Check	-	-	-	-	-	-	-	-	637
Dinoseb	6.0	PES	0	0	38	41	100	100	732
Metribuzin	0.38	PES	11	0	0	65	100	100	556
Fluorchloridone	0.50	PES	8	0	20	20	100	75	454
Fluorchloridone	1.0	PES	19	0	9	11	100	75	408
Metribuzin +[2]	0.38	PES	11	0	22	32	100	75	638
Fluorchloridone	0.5								
Triallate/[2]	1.5	POPI	0	0	92	84	100	75	596
Dinoseb	6.0	PES							
Triallate/	1.25	POPI	0	0	90	93	100	75	603
Dinoseb	6.0	PES							
Triallate/	1.25	POPI	18	0	81	82	100	75	664
Fluorchloridone	1.0	PES							
Dinoseb +	1.0	Post	61	55	48	71	100	100	60
Sethoxydim	0.5								
Dinoseb/	6.0	PES	0	0	72	91	100	75	692
Diclofop-Methyl	1.0	Post							
Dinoseb +	6.0	PES	20	0	75	100	100	100	753
Sethoxydim[3]	0.2	Post							
Dinoseb/	6.0	PES	0	0	75	100	100	75	771
DPX-Y6202[3]	0.1	Post							
Dinoseb/	6.0	PES	4	0	74	100	100	100	755
DPX-Y6202[3]	0.2	Post							
Dinoseb/	6.0	PES	5	0	78	100	100	100	778
DPX-Y6202[3]	0.5	Post							
Dinoseb/	6.0	PES	0	0	81	100	100	100	667
Dowco 453[3]	0.1	Post							
Dinoseb/	6.0	PES	0	0	80	100	100	100	704
Dowco 453[3]	0.2	Post							
Dinoseb/	6.0	PES	0	0	74	99	100	75	813
Fluazifop-P-butyl[3]	0.0	Post							
Dinoseb/	6.0	PES	2	0	76	100	100	100	854
Fluazifop-P-butyl[3]	0.13	Post							
Dinoseb/	6.0	PES	8	0	76	100	100	100	702
Fluazifop-P-butyl[3]	0.25	Post							
Dinoseb/	6.0	PES	10	0	84	100	100	75	584
Fluazifop-P-butyl[3]	0.75	Post							
$LSD_{.05}$			13	16	15	33	ns	36	265

[1] PES = Preemergence surface, POPI = Postplant incorporated, Post = Postemergence
[2] + = Applied together, / = applied separately
[3] Applied with 1qt/A Mor-Act oil.

Annual weed control in lentils. Huston, C. H., R. H. Callihan, and D. C. Thill. This study was established near Moscow, Idaho to evaluate several herbicides for control of annual weeds in lentils. The soil at this location was a Larkin silt loam with a pH of 6.1 and organic matter of 3.0%. 'Chilean' lentils were planted on May 20, 1984. The experimental design was a randomized complete block replicated four times with individual plot size of 10 X 32 ft. Preemergence surface treatments of dinoseb (3.0 lb/gal), metribuzin (75% dry flowable), and fluorchloridone (EC 2.0 lb/gal) were applied on May 25. Air temperature was 16 C, soil temperature was 11 C at 6 inches, and relative humidity was 25%. Post emergence treatments of the emulsifiable concentrates of Dowco 453 (2.0 lb/gal), SC1084 (2.0 lb/gal), diclofop-methyl (3.0 lb/gal), fluazifop-P-butyl (1.0 lb/gal), and sethoxydim (1.5 lb/gal) were applied on June 14. Air temperature was 20 C and the relative humidity 15%. All post-emergence treatments, with the exception of diclofop-methyl were applied with 1 qt/A Mor-act surfactant. All treatments were applied using a backpack sprayer calibrated to deliver 20 gpa at 40 psi using Teejet 8002 flatfan nozzles.

Excellent (92-100%) wild oat control was obtained with sequential treatments of 3.0 lb/A dinoseb with 0.1 or 0.2 lb/A Dowco 453, 0.1 or 0.2 lb/A SC1084, 1.0 lb/A diclofop-methyl, 0.06, 0.13, or 0.25 lb/A fluazifop-P-butyl, and 0.2, 0.3, or 0.5 lb/A sethoxydim. Treatments of 0.25 lb/A metribuzin or 0.5 or 1.0 lb/A fluorchloridone provided fair (71-83%) wild oat control. Poor control (less than 65%) was produced by treatments of 3.0 lb/A dinoseb, 0.25 lb/A metribuzin plus 0.5 lb/A fluorchloridone, and the sequential application of 0.5 lb/A fluorchloridone with 3.0 lb/A dinoseb.

All treatments produced excellent control (94-100%) of common lambsquarters and fair to excellent (75-100%) control of henbit with no significant difference between treatments. Lentils were not harvested for seed yields. (University of Idaho Agricultural Experiment Station, Moscow, ID. 83843)

Annual weed control in lentils

Herbicide	Rate	Appl.[1] time	Crop[2] injury	Weed control[3] AVEFA	CHEAL	LAMAM
	(lb /A)		(%)	(%)	(%)	(%)
Check	-	-	-	-	-	-
dinoseb	3.0	PES	0	58	94	88
metribuzin	0.25	PES	1	83	99	88
fluorchloridone	0.5	PES	12	71	95	89
fluorchloridone	1.0	PES	25	72	100	95
metribuzin+[4]	0.25					
fluorchloridone	0.5	PES	14	65	100	87
dinoseb/[4]	3.0	PES				
fluorchloridone	0.5	PES	10	37	100	89
dinoseb/	3.0	PES				
Dowco 453[5]	0.1	Post	0	100	99	85
dinoseb/	3.0	PES				
Dowco 453[5]	0.2	Post	0	92	100	89
dinoseb/	3.0	PES				
SC1084[5]	0.1	Post	0	99	99	87
dinoseb/	3.0	PES				
SC1084[5]	0.2	Post	1	100	97	88
dinoseb/	3.0	PES				
diclofop-methyl	1.0	Post	0	99	98	75
dinoseb	3.0	PES				
fluazifop-P-butyl[5]	0.06	Post	0	97	100	76
dinoseb/	3.0	PES				
fluazifop-P-butyl[5]	0.13	Post	1	100	96	81
dinoseb/	3.0	PES				
fluazifop-P-butyl[5]	0.25	Post	0	95	100	81
dinoseb/	3.0	PES				
sethoxydim[5]	0.2	Post	0	98	94	79
dinoseb/	3.0	PES				
sethoxydim[5]	0.3	Post	0	100	94	82
dinoseb/	3.0	PES				
sethoxydim[5]	0.5	Post	0	100	98	90
$LSD_{.05}$			6	38	NS	NS

[1] PES = preemergence surface, POPI = postplant incorporated, Post = postemergence.
[2] Injury as % of check, 0 = No injury, 100 = Complete crop kill.
[3] Weed control as % of check, 0 - No control, 100 = Complete control.
[4] + = Applied together; / = applied separately.
[5] Applied with 1 qt./A Mor-act oil.

Herbicide evaluation in lentils. Callihan, R.H., C.H. Huston, and D.C. Thill. A field trial was conducted at Moscow, Idaho to evaluate several pre- and post-emergence herbicides for weed control and crop tolerance in lentils. Prior to lentil planting, oat seeds were broadcast and harrowed in. 'Chilean' lentils were planted on May 22, 1984. The soil at the study location was a Naff-Thatuna silt loam with a pH of 6.0 and organic matter of 4%. Experimental design was a randomized complete block replicated four times with individual plot size of 10 by 32 feet. Preplant incorporated treatments of ethalfluralin (EC 4.0 lb/gal), triallate (EC 4.0 lb/gal) and metribuzin (75% DF) plus triallate were applied May 25, 1984, and incorporated with a rototiller. Preemergence surface treatments of dinoseb (EC 3.0 lbs/gal) and fluorchloridone (EC 2.0 lb/gal) were applied May 26. Air temperature was 10 C, soil temperature at 6 inches was 10 C, and relative humidity was 70%. Postemergence treatments of the EC of sethoxydim (1.5 lb/gal), diclofop-methyl (3.0 lb/gal), fluazifop-P-butyl (1.0 lb/gal), and Dowco 453 (2.0 lb/gal) were applied June 12. All postemergence treatments with the exception of diclofop-methyl were applied with 1 qt/A Mor-act oil surfactant. Air temperature was 14 C, soil temperature was 12 C, and relative humidity was 20%. All treatments were applied with a backpack sprayer using Teejet 8002 flatfan nozzles calibrated to deliver 20 gpa at 40 psi.

All treatments resulted in (25% or less) mayweed control. Excellent (95-100%) oat control was provided by the sequential treatments of dinoseb (3.0 lb/A) plus sethoxydim (0.2 or 0.5 lb/A), diclopfop-methyl (1.0 lb/A), fluazifop-P-butyl (0.13 lb/A), DPX-Y6202 (0.1, 0.2 or 0.5 lb/A), and Dowco 453 (0.1 or 0.2 lb/A). Triallate (1.5 lb/A) with dinoseb (3.0 lb/A) treatment provided fair (75%) oat control while all remaining treatments produced poor (60% or less) oat control.

Moderate leaf chlorosis and plant stunting was present in treatments of fluorchloridone (0.38 or 0.5 lb/A) plus metribuzin (0.25 lb/A). A slight early season chlorotic mottling was present in the fluazifop-P-butyl (0.13 lb/A) treatment. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843.)

Weed control in lentils

Herbicide	Rate (lb ai/A)	Appl. Time	Crop injury 6/19	Crop injury 7/21	Weed control AVESA	Weed control ANTCO
Check	-	-	(%)	(%)	(%)	(%)
Ethalfluralin	0.5	PPI[1]	0	0	22	2
Ethalfluralin +[2]	0.5	PPI				
Metribuzin	0.25		0	0	21	24
Ethalfluralin +	0.5	PPI	5	2.5	60	25
Triallate	1.25					
Triallate/	1.25	PPI	0	0	51	25
Dinoseb	3.0	PES				
Triallate/	1.5	PPI	0	0	74	25
Dinoseb	3.0	PES				
Fluorchloridone	0.38	PES	20	11	25	25
Fluorchloridone	0.5	PES	25	21	15	25
Fluorchloridone +	0.38	PES	20	16	8	25
Metribuzin	0.25					
Dinoseb/	3.0	PES	0	0	40	25
Sethoxydim[3]	0.15	Post				
Dinoseb/	3.0	PES	0	0	99	25
Sethoxydim[3]	0.2	Post				
Dinoseb/	3.0	PES	0	0	100	25
Sethoxydim[3]	0.5	Post				
Dinoseb/	3.0	PES	0	0	95	25
Diclofop-Methyl	1.0	Post				
Dinoseb/	3.0	PES	0	0	45	25
Fluazifop-P-butyl[3]	0.06	Post				
Dinoseb/	3.0	PES	5	0	97	25
Fluazifop-P-butyl[3]	0.13	Post				
Dinoseb/	3.0	PES	0	0	99	25
DPX-Y6202[3]	0.1	Post				
Dinoseb/	3.0	PES	0	0	99	25
DPX-Y6202[3]	0.2	Post				
Dinoseb/	3.0	PES	0	0	99	25
DPX-Y6202[3]	0.5	Post				
Dinoseb/	3.0	PES	0	0	99	25
Dowco 453[3]	0.1	Post				
Dinoseb/	3.01	PES	0	0	100	25
Dowco 453[3]	0.2	Post				
$LSD_{0.05}$			11	4	26	21

[1] PPI = Preplant incorporated, PES = Preemergence surface, Post = Post emergence
[2] + = Applied together, / = applied separately
[3] Applied with 1qt/A Mor-Act oil.

Grain Sorghum performance on chemical fallow plots. Anderson, R. L., D. E. Smika, and A. B. Page. Due to an ususually wet winter and spring in 1982 in east-central Colorado, (13 in of precipitation from Jan 1 to May 31) grain sorghum was planted in chemical fallow plots in June of the fallow season. Herbicides were applied at three dates prior to the June 15, 1982 planting of sorghum. Chlorsulfuron at 0.063 and 0.093 lb/A applied in May 1981 eliminated all sorghum plants. Chlorsulfuron at 0.010 and 0.031 lb/A was applied in September 1981; Grain yields, compared to the atrazine standard, were reduced at both rates. Propham applied in February, 1982 also severely injured sorghum, reducing grain yields 90% compared to the atrazine standard. The chlorsulfuron and propham treatments also reduced test weight and forage yields of sorghum when compared to the atrazine treatment. (USDA-ARS, Akron, CO 80720)

Grain and forage yields of sorghum planted in chemical fallow plots

Treatment	Rate (lbs/A)	Date of application	Grain yield (bu/A)	Test weight (lb/bu)	Forage yield (lb/A)
Chlorsulfuron	0.062	May 81	0	0	0
Chlorsulfuron	0.093	May 81	0	0	0
Metribuzin + atrazine	0.5 + 0.75	Sep. 81	20.3	57.2	2,840
Atrazine	1.0	Sep. 81	35.8	54.4	3,220
Chlorsulfuron	0.010	Sep. 81	23.4	49.3	2,344
Chlorsulfuron	0.031	Sep. 81	5.7	48.3	1,274
Propham	1.5	Feb. 82	3.4	45.3	930
Propham	2.0	Feb. 82	3.5	45.3	1,610
Check (bladed before planting)	---		20.9	53.4	3,100

Limited tillage within a chemical fallow program. Anderson, R. L. An experiment was initiated in 1982 to determine the effect of tillage and chemical fallow operations on soil compaction and winter wheat establishment. Two herbicides, atrazine at 1.0 lb/A and metribuzin + atrazine at 0.75 + 0.5 lb/A, were applied on August 31, 1982 to a Platner loam soil. Three tillage treatments of 0, 2, and 4 sweep-blade operations were imposed on each herbicide treatment. If excessive weed growth occurred during the summer of 1983, paraquat + 2,4-D ester at 0.3 + 0.3 lb/A was applied. Soil compaction was measured by a penetrometer on September 19, 1983. 'Vona' winter wheat was planted on September 21, 1983 at 45 lb/A.

The weather conditions for the fallow season included two severe hail storms in late July and early August, 1982 and a wet spring followed by a hot, dry period in August and September, 1983. These weather conditions resulted in compacted soil at the surface, as the penetrometer readings for the three tillage treatments within the atrazine-alone treatment were 308.6, 73.9, and 31.3 lbs/in^2 for the 0, 2, and 4 tillage operation treatments, respectively. Due to compaction of the soil surface, a firm, moist seedbed was not obtained when planting winter wheat, resulting in reduced seedling establishment. At time of harvest, visual differences in stand were evident, as well as significant difference in plant population. This effect was not detected with grain yield, as no significant differences between conventional tillage and any herbicide treatment were found. This demonstrates the ability of wheat to compensate for unfavorable conditions which occur early in the growing season. The highest yields occurred with the four tillage operation treatments with either herbicide. (USDA-ARS, Akron, CO 80720)

Effect of tillage on agronomic variables of winter wheat

Management System							
Herbicide	Rate	Tillage operations	Stand reduction[a]	Height maturity	Population	Grain yield	Grain weight
	lb/A	no.	%	in	plts/ yd-row	bu/A	lb/bu
Conventional tillage	--	4	0	25.0	110.1	41.2	62.0
Atrazine	1.0	0	28	22.1	74.8	36.7	59.3
Atrazine	1.0	2	12	22.8	83.9	37.3	61.1
Atrazine	1.0	4	2	24.8	105.2	43.7	61.2
Metribuzin + atrazine	0.75 + 0.5	0	22	21.5	58.1	34.9	57.9
Metribuzin + atrazine	0.75 + 0.5	2	15	22.6	91.4	40.3	60.7
Metribuzin + atrazine	0.75 + 0.5	4	2	23.9	103.5	50.1	61.8
LSD (0.05)			13	3.4	16.6	11.0	2.8

[a] Visual evaluation made on July 18, 1984.

Chemical fallow screening at Lewiston and Idaho Falls, Idaho. Lish, J. L., D. C. Thill, and R. H. Callihan. A fallow herbicide screening experiment was conducted at two locations in Idaho. Herbicides were applied to standing stubble near Lewiston and Idaho Falls located in northern and southeastern Idaho, respectively. Experimental units were 10 by 30 ft and the experiment was a randomized complete block design with four replications. Treatments were applied with a CO_2-pressurized backpack sprayer in 10 gpa water at 45 psi. Weed control was evaluated visually on June 6 at the Lewiston location and June 26 at the Idaho Falls location. Species present were downy brome (BROTE), volunteer wheat (TRZAX), prickly lettuce (LACSE), tumble mustard (SYSAL), pineappleweed (MATMT), and jointed goatgrass (AEGCY), at the Lewiston location, and prostrate knotweed (POLAV), prickly lettuce (LACSE), smallseeded falseflax (CMAMI), and common lambsquarters (CHEAL), tansy mustard (DESPI), and shepherdspurse (CAPBP), at the Idaho Falls location. Environmental data is listed in Table 1.

Table 1. Application weather and soil data.

	Idaho Falls		Lewiston	
	10/21/83	5/31/84	11/17/83	3/29/83
Air temperature (F)	47	85	43	49
Soil temperature (F) @ 2 in	46	81	42	48
Relative humidity (%)	69	22	88	67
Wind speed/Direction (mph)	0-6 SW	4-7 SW	3-5 W	0-3 W
Cloud cover (%)	0	0	50	50
Dew	none	none	heavy	light
Soil pH	7.6		5.4	
CEC (me/100 g)	15.3		14.1	
OM (%)	1.6		2.4	
silt (%)	48.0		62.4	
sand (%)	36.8		19.6	
clay (%)	15.2		18.0	

Spring applied treatments generally resulted in better broad-spectrum weed control than fall applied treatments at both locations (Table 2 and 3). Spring applied Mon8776 provided good to excellent control of all species present at both locations. However, fall application of Mon8776 did not control downy brome, prickly lettuce, common lambsquarters, or erect knotweed. The best fall application over all species at both locations was atrazine + cyanazine + glyphosate. The poor control with Mon8776-3 at 0.92 lb/A at the Idaho Falls location is unexplained. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Chemical fallow screening at Lewiston, Idaho.

Treatments[1] Herbicide	Rate	Time of Application	Weed Control BROTE	TRZAX	LACSE	CRUCIF[2]	MATMT	AEGCY
	(lb ai/A)		(% of check)					
metribuzin+glyphosate	0.67+0.38	Fall	92	90	90	98	98	100
atrazine+cyanazine+ glyphosate	0.2+3+ 0.28	Fall	94	100	100	98	100	100
pronamide	0.25	Fall	79	69	0	19	86	75
pronamide	0.38	Fall	91	94	0	12	32	100
pronamide+oxyflourfen	0.25+0.13	Fall	90	91	31	88	90	100
pronamide+oxyflourfen	0.25+0.19	Fall	92	99	35	95	75	100
pronamide+oxyflourfen	0.25+0.25	Fall	89	98	34	70	50	100
pronamide+glyphosate	0.25+0.19	Fall	95	96	12	12	0	100
pronamide+glyphosate	0.25+0.28	Fall	94	98	29	50	25	100
pronamide+glyphosate+ oxyflourfen	0.25+0.1+ 0.13	Fall	96	99	59	69	68	100
oxyflourfen+glyphosate	0.13+0.28	Fall	76	85	76	91	100	100
oxyflourfen+glyphosate	0.13+0.19	Fall	58	66	76	90	100	100
oxyflourfen+glyphosate	0.25+0.19	Fall	66	90	95	94	100	100
pronamide+glyphosate	0.38+0.28	Fall	98	99	11	36	25	100
SC0224 (sulfosate)	0.28+0.5	Fall	50	68	36	58	98	100
glyphosate	0.28+0.5	Fall	40	54	25	34	82	100
SC0224+R40244	0.28+0.5	Fall	62	68	91	99	95	100
glyphosate+R40244	0.28+0.5	Fall	40	55	88	100	100	100
MON8776	1.01	Fall	12	75	90	71	100	100
MON8776	1.37	Fall	21	90	91	80	100	100
SC0224	0.28+0.5	Spring	94	100	66	78	86	100
glyphosate	0.28+0.5	Spring	93	99	66	74	75	100
MON8776	1.01	Spring	94	99	92	88	100	92
MON8776	1.37	Spring	96	100	92	92	95	100
MON877-3	0.68	Spring	91	95	90	84	95	100
MON8776-3	0.92	Spring	95	74	85	74	94	100
glyphosate+dicamba	0.28+0.5	Spring	92	99	89	89	88	100
SC0224+dicamba	0.28+0.5	Spring	96	99	94	98	98	100
LSD 0.05	-	-	21	23	28	29	37	14
C.V.	-	-	19	18	32	28	33	10

[1]Nonionic surfactant (0.05% v/v) added to all treatments containing glyphosate, SC0224, or MON8776-3. SC0224 and glyphosate rates expressed as lb ae/A.
[2]Tansy mustard and tumble mustard were evaluated together.

Table 3. 1984 Chemical fallow screening near Idaho Falls, Idaho.

Treatment		Time of	Weed control					
Herbicide[1]	Rate	application	LACSE	CHEAL	DESPI	POLAV	CMAMI	CAPBP
	(lb ai/A)		--------------(% of check)-------------					
metribuzin + glyphosate	0.67 + 0.38	Fall	94	66	95	88	98	100
atrazine + cyanazine + glyphosate	0.2 + 3 + 0.28	Fall	95	92	100	100	100	100
pronamide	0.25	Fall	5	22	25	25	8	50
pronamide	0.38	Fall	38	40	50	72	39	75
pronamide + oxyfluorfen	0.25 + 0.13	Fall	28	30	75	25	75	75
pronamide + oxyfluorfen	0.25 + 0.19	Fall	86	32	100	50	100	100
pronamide + oxyfluorfen	0.25 + 0.25	Fall	58	46	98	38	99	100
pronamide + glyphosate	0.25 + 0.19	Fall	42	0	52	38	58	75
pronamide + glyphosate	0.25 + 0.28	Fall	49	36	54	12	61	75
pronamide + glyphosate + oxyfluorfen	0.28 + 0.1 + 0.13	Fall	74	54	100	88	98	98
oxyfluorfen + glyphosate	0.13 + 0.28	Fall	91	72	100	38	98	100
oxyfluorfen + glyphosate	0.13 + 0.19	Fall	59	41	88	0	100	100
oxyfluorfen + glyphosate	0.25 + 0.19	Fall	62	59	100	50	100	100
pronamide + glyphosate	0.38 + 0.28	Fall	69	35	72	38	80	100
SC0224 (sulfosate)	0.28	Fall	39	38	32	0	51	75
glyphosate	0.28	Fall	61	64	22	25	65	100
SC0224 + R40244	0.28 + 01	Fall	62	62	72	18	76	100
glyphosate + R40244	0.28 + 0.5	Fall	68	72	100	81	96	100
MON8776	1.01	Fall	58	58	75	25	92	100
MON8776	1.37	Fall	54	58	72	0	91	98
SC0224	0.28	Spring	94	90	98	50	71	92
glyphosate	0.28	Spring	86	85	76	75	75	100
MON8776	1.01	Spring	99	100	99	99	99	100
MON8776	1.37	Spring	99	99	100	99	99	100
MON8776-3	0.68	Spring	99	100	100	96	98	100
MON8776-3	0.918	Spring	59	61	5	0	10	75
glyphosate + dicamba	0.28 + 0.5	Spring	100	98	100	100	100	100
SC0224 + dicamba	0.28 + 0.5	Spring	100	100	100	100	98	100
$LSD_{(0.05)}$	--	--	37	43	37	45	26	36
C.V.	--	--	38	49	34	62	23	28
plants/ft^2	--	--	0.3	1	0.2	0.1	3	0.1

[1] All treatments except pronamide, pronamide & oxyflourfen, and Mon8776 were applied with 0.5% v/v nonionic surfactant. SC0224 and glyphosate rates expressed as lb ae/A.

Fallow season herbicide application effects on wheat yield in Idaho. Lish, J. M., D. C. Thill, and R. H. Callihan. Herbicide screening trials were established at Lewiston, Arbon, and Soda Springs in the 1982-83 fallow season. Weed control data is summarized in the 1984 WSWS Research Progress Report. The Lewiston location was disked in mid-June and planted to winter wheat in early October. The Soda Springs and Arbon locations were disked in mid-July and planted to wheat in the spring of 1984. Grain was harvested with a small plot combine on July 31 at Lewiston and September 13 at Soda Springs and Arbon.

There was no visual evidence of crop injury or residual weed control due to herbicide carryover. Grain yield at Lewiston was low (30 bu/A average) due to a heavy jointed goatgrass infestation in two replications (data not shown). Effects of fallow treatments on wheat at Lewiston were not detected because grain yield varied greatly among plots. There were no differences in yield between the checks and treatments at Soda Springs or Arbon (Table). However, some treatments resulted in higher yields than other treatments. Spring application of glyphosate + chlorsulfuron at 0.28 lb/A + 0.25 oz/A resulted in one of the highest yields at Soda Springs whereas the same treatment at the higher chlorsulfuron rate of 0.5 oz/A resulted in the lowest yield. This effect did not occur at the Arbon location. Spring application of glyphosate + metribuzin and glyphosate + DPXT6376 (metsulfuron) at 0.28 lb/A + 0.5 oz/A resulted in higher yields than fall applied glyphosate, propham + dicamba, or glyphosate + chlorsulfuron at the Arbon location. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Spring wheat yield after 1983 season herbicide treatment at Arbon and Soda Springs, Idaho.

Treatment[1]	Rate[2]	Time of application	Yield Arbon	Yield Soda Springs
	(lb a.i./A)		-------lb/A---------	
propham + glyphosate	3 + 0.28	Fall	1390	2452
metribuzin + glyphosate	0.67 + 0.28	Fall	1143	2287
glyphosate	0.28	Fall	1636	2152
atrazine + cyanazine + glyphosate	0.2 + 3 + 0.28	Fall	1655	2236
propham + dicamba	3 + 0.5	Fall	1155	2349
pronamide + glyphosate	0.25 + 0.28	Fall	1802	2262
pronamide + glyphosate	0.38 + 0.28	Fall	1850	1885
pronamide + dicamba	0.25 + 0.5	Fall	1817	2278
pronamide + chlorsulfuron	0.38 + 0.25	Fall	1811	2234
pronamide + chlorsulfuron	0.38 + 0.5	Fall	1932	2394
glyphosate + dicamba	0.28 + 0.5	Fall	1652	2188
dalapon + dicamba	3 + 0.5	Fall	1398	2482
glyphosate + chlorsulfuron	0.28 + 0.25	Fall	1278	2416
glyphosate + chlorsulfuron	0.28 + 0.5	Fall	1259	2167
glyphosate + DPX6376	0.28 + 0.25	Fall	1712	2369
glyphosate + DPX6376	0.28 + 0.5	Fall	1530	2606
atrazine + chlorsulfuron + glyphosate	0.28+0.25+0.28	Fall	1680	2609
propham + chlorsulfuron + glyphosate	3 + 0.25 + 0.28	Fall	1680	2609
glyphosate + metribuzin	0.28 + 0.67	Spring	2090	2195
glyphosate	0.28	Spring	1594	2207
SC0224	0.28	Spring	1863	2157
glyphosate + dicamba	0.19 + 0.25	Spring	1606	2106
glyphosate + dicamba	0.28 + 0.25	Spring	1283	2621
glyphosate + dicamba	0.28 + 0.5	Spring	1555	2243
glyphosate + chlorsulfuron	0.28 + 0.25	Spring	1590	2597
glyphosate + chlorsulfuron	0.28 + 0.5	Spring	1966	1739
glyphosate + DPX6376	0.28 + 0.25	Spring	2016	2478
glyphosate + DPX6376	0.28 + 0.25	Spring	1998	2022
check	-	-	1870	2262
check	-	-	1422	2179
LSD (0.05)			585	241

[1]Treatment included 0.5% v/v nonionic surfactant.
[2]Chlorsulfuron and DPX6376 are reported as oz. a.i./A. Glyphosate and SC0224 are reported as lb ae/A.

Chemical fallow screening at Rockland and Lewiston, Idaho. Lish, J. M., D. C. Thill, and R. H. Callihan. Fall and spring herbicide treatments were applied in standing stubble near Rockland and Lewiston located in southeastern and northern Idaho, respectively. Herbicides were applied in 10 gpa water with a CO_2 pressurized backpack sprayer at 45 psi. The experimental design was a randomized complete block with four replications. Experimental units were 10 by 30 ft. Environmental data is listed (Table 1). Downy brome (BROTE), prickly lettuce (LACSE), cereal rye (SECCE), and erect and prostrate knotweed (POLYG) were evaluated at the Rockland location on May 30 and June 26. Downy brome (BROTE), volunteer wheat (TRZAX), prickly lettuce (LACSE), tumble mustard (SYSAL), pineappleweed (MATMT), and jointed goatgrass (AEGCY) were evaluated at the Lewiston location on June 6. Wheat yield will be reported in 1986.

Table 1. Application weather and soil data.

	Rockland		Lewiston	
	10/22/83	5/16/84	11/17/83	3/29/84
Air temperature (F)	59	47	43	49
Soil temperature @ 2 in (F)	47	48	42	48
Relative humidity (%)	42	60	88	67
Cloud cover (%)	20	10	50	50
Wind speed/Direction (mph)	3-6 W	0-6 W	3-5 W	0-3 W
Dew	none	none	light	light
Soil pH	7.1		5.4	
OM (%)	1.9		2.4	
CEC (me/100 g)	19.4		14.1	
sand (%)	26.6		19.6	
silt (%)	56.8		62.4	
clay (%)	16.6		18.0	

All spring treatments resulted in good broadspectrum weed control except DPX-Y6202 and DPX-B5882 applied alone. The best weed control across all species at both locations with fall application was with DPX-Y6202 + chlorsulfuron, combinations of pronamide + DPX-T6376 (metsulfuron) or chlorsulfuron, and atrazine + cyanazine + glyphosate. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

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

Treatment		Time of	Weed Control					
Herbicide	Rate[2]	Application	BROTE		LACSE		SECCE	POLYG[3]
			5/30	6/26	5/30	6/26	6/26	6/26
	(lb ai/A)		---------------(% of check)-------------					
metribuzin+glyphosate	0.07+0.38	Fall	78	92	25	0	83	33
DPX-5882+glyphosate	0.5+0.28	Fall	80	85	100	100	98	100
DPX-5882+glyphosate	1.0+0.28	Fall	84	92	100	100	98	100
DPX-5882	0.5	Fall	25	18	95	92	71	100
DPX-Y6202+Moract	0.05+2.5	Fall	90	91	72	40	100	50
DPX-Y6202+Moract	0.06+2.5	Fall	97	92	30	18	94	25
DPX-Y6202+Moract	0.09+2.5	Fall	98	93	98	100	100	58
DPX-Y6202+DPXT6376	0.06+0.25	Fall	94	91	100	100	95	42
DPX-Y6202+chlorsulfuron	0.06+0.25	Fall	95	91	98	96	85	100
DPX-T6376+glyphosate	0.13+0.28	Fall	69	39	100	100	96	25
DPX-T6376+glyphosate	0.25+0.28	Fall	61	68	98	100	75	75
DPX-T6376+pronamide+ glyphosate	0.25+0.38+ 0.19	Fall	79	82	100	100	100	100
chlorsulfuron+glyphosate	0.25+0.28	Fall	64	51	95	100	96	100
DPX-T6376+pronamide	0.25+0.25	Fall	86	89	100	100	82	100
DPX-T6376+pronamide	0.25+0.25	Fall	58	86	62	28	91	98
chlorsulfuron+ pronamide	0.25+0.25	Fall	80	84	100	100	99	100
atrazine+cyanazine+ glyphosate	0.2+3+ 0.28	Fall	91	91	91	44	99	48
DPX-B5882+glyphosate	0.5+0.28	Spring	100	98	97	70	100	56
DPX-B5882+glyphosate	1.00+0.28	Spring	100	96	99	100	100	80
DPX-B5882	0.5	Spring	20	26	94	100	75	94
DPX-Y6202+Moract	0.05+2.5	Spring	85	91	48	0	100	0
DPX-Y6202+Moract	0.06+2.5	Spring	94	94	74	54	98	48
DPX-Y6202+Moract	0.09+2.5	Spring	81	98	42	29	99	30
DPX-Y6202+DPXT6376	0.06+0.25	Spring	60	94	100	100	100	100
DPX-Y6262+chlorsulfuron	0.06+0.25	Spring	84	96	98	100	100	100
DPX-T6376+glyphosate	0.13+0.28	Spring	99	94	100	100	100	100
DPX-T6376+glyphosate	0.25+0.28	Spring	99	97	100	100	99	100
chlorsulfuron+ glyphosate	0.25+0.28	Spring	99	94	100	95	99	100
LSD (0.05)			24	22	27	29	NS	44
CV			21	19	22	26	20	42
plants/ft^2			4	4	0.5	0.7	0.3	0.1

[1]DPX-B5882, DPX-T6376, chlorsulfuron, and glyphosate treatments or tank mixes included nonionic surfactant 0.5% v/v.
[2]DPX-B5882, DPX-T6376, and chlorsulfuron rates are oz a.i./A. Glyphosate rate is lb ae/A.
[3]Erect knotweed and prostrate knotweed were evaluated together.

Table 3. Weed control in chemical fallow at Lewiston, Idaho.

Treatment[1] Herbicide	Rate	Time of Application	Weed Control BROTE	TRZAX	LACSE	SSYAL	MATMT	ABGCY
	(lb ai/A)		----------------(% of check)----------------					
metribuzin+glyphosate	0.07+0.38	Fall	97	59	94	100	98	88
DPX-B5882+glyphosate	0.5+0.28	Fall	84	20	100	100	96	80
DPX-B5882+glyphosate	1.0+0.28	Fall	59	51	100	100	100	78
DPX-B5882	0.5	Fall	29	10	100	100	100	30
DPX-Y6202+Moract	0.05+2.5	Fall	75	71	56	85	48	75
DPX-Y6202+Moract	0.06+2.5	Fall	82	52	49	38	32	82
DPX-Y6202+Moract	0.09+2.5	Fall	79	71	25	62	24	100
DPX-Y6202+DPXT6376	0.06+0.25	Fall	90	72	100	88	94	86
DPX-Y6202+ chlorsulfuron	0.06+0.25	Fall	92	79	100	100	96	91
DPX-T6376+glyphosate	0.13+0.28	Fall	78	65	100	82	75	100
DPX-T6376+glyphosate	0.25+0.28	Fall	83	59	100	100	88	90
DPX-T6376+pronamide+ glyphosate	0.25+0.38+ 0.19	Fall	99	96	100	100	94	100
chlorsulfuron+ glyphosate	0.25+0.28	Fall	91	54	86	94	94	99
DPX-T6376+pronamide	0.25+0.25	Fall	91	78	100	78	81	96
DPX-T6376+pronamide + glyphosate	0.25+0.25 + 0.19	Fall	99	94	100	100	85	99
chlorsulfuron+ pronamide	0.25+0.25	Fall	92	80	89	88	82	92
atrazine+cyanazine+ glyphosate	0.2+3+ 0.28	Fall	98	95	100	90	100	98
DPX-B5882+glyphosate	0.5+0.28	Spring	98	100	99	99	97	99
DPX-B5882+glyphosate	1.00+0.28	Spring	98	99	100	100	98	98
DPX-B5882	0.5	Spring	41	0	98	100	99	61
DPX-Y6202+Moract	0.05+2.5	Spring	96	98	44	75	38	88
DPX-Y6202+Moract	0.06+2.5	Spring	99	99	20	54	40	96
DPX-Y6202+Moract	0.09+2.5	Spring	99	100	18	48	21	100
DPX-Y6202+DPX-T6376	0.06+0.25	Spring	98	98	93	100	99	95
DPX-Y6202+chlorsulfuron	0.06+0.25	Spring	94	95	100	100	99	68
DPX-T6376+glyphosate	0.13+0.28	Spring	100	100	100	110	99	100
DPX-T6376+glyphosate	0.25+0.28	Spring	100	100	100	110	100	100
chlorsulfuron+ glyphosate	0.25+0.28	Spring	99	99	100	100	98	100
LSD (0.05)	-	-	18	21	23	29	29	26
CV	-	-	15	20	19	23	25	21
plants/ft^2	-	-	8	2	0.2	0.2	2	3

[1]DPX-B5882, DPX-T6376, and chlorsulfuron rates are oz a.i./A. DPX-B5882, DPX-T6376, chlorsulfuron, and glyphosate treatments or tank mixes included nonionic surfactant 0.5% v/v. Glyphosate rate is lb ae/A.

Evaluation of spring application of terbutryn alone or in combination with other herbicides for weed control in fallow. Miller, S. D. and H. P. Alley. Research plots were established on May 14, 1984 at Chugwater, Wyoming to evaluate terbutryn formulations alone or in combination with other herbicides for weed control in fallow. 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (69% sand, 16% silt, 15% clay), with 1.1% organic matter and a 7.2 pH. Downy brome was 3/4 to 1 in., wild buckwheat 2 to 4-leaf stage (1 to 2 in.), erect knotweed 2 to 4-leaf stage (½ to 1 in.), Russian thistle ¼ to ½ in., and tansy mustard 1/2 to 3/4 in. rosette at the time of treatment.

Visual weed control evaluations were made on June 21. Wild buckwheat infestations were heavy 29.6 plants/ft^2, Russian thistle, erect knotweed and downy brome infestations moderate 4.9, 3.7 and 3.4 plants/ft^2, respectively; and tansy mustard infestations light 1.6 plants/ft^2 in the untreated check. The terbutryn 80W and 80WDG formulations performed similarly in fallow. The 80W formulations of terbutryn resulted in higher levels of downy brome control than with the 80WDG formulation; however, the reverse was true with tansy mustard. No treatment gave over 70% tansy mustard control. Wild buckwheat control was 85% or greater with all treatments except terbutryn 80WDG/HOE-0661 combinations at the low rate, erect knotweed control 90% or greater with all treatments except terbutryn 80WDG-paraquat combinations at the low rate, Russian thistle control good to excellent with all treatments and downy brome control 90% or greater with terbutryn WDG combinations with glyphosate or paraquat. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1286.)

Spring application of terbutryn for weed control in fallow

Treatment[1]	Rate lb ai/A	Weed Control[2]				
		Wibw	Tamu	Erkw	Ruth	Dobr
		- - - - - - - - - -		%	- - - - - - - - - -	
terbutryn 80W + X-77	1.2	92	13	100	99	40
terbutryn 80W + X-77	1.6	85	13	95	93	70
terbutryn 80W + X-77	2.0	95	0	100	100	85
terbutryn 80WDG + X-77	1.2	85	20	99	100	40
terbutryn 80WDG + X-77	1.6	85	40	100	100	45
terbutryn 80WDG + X-77	2.0	97	47	100	100	57
terbutryn 80WDG + HOE-0066 + X-77	1.6 + 0.38	78	0	97	97	45
terbutryn 80WDG + HOE-0066 + X-77	1.6 + 0.25	97	0	99	100	74
terbutryn 80WDG + glyphosate + X-77	1.6 + 0.19	97	53	99	99	57
terbutryn 80WDG + glyphosate + X-77	1.6 + 0.28	93	0	98	100	90
terbutryn 80WDG + glyphosate + X-77	1.6 + 0.38	97	0	100	99	91
terbutryn 80WDG + SC-0224 + X-77	1.6 + 0.19	97	33	97	98	67
terbutryn 80WDG + SC-0224 + X-77	1.6 + 0.28	97	0	99	99	65
terbutryn 80WDG + SC-0224 + X-77	1.6 + 0.38	87	0	100	99	70
terbutryn 80WDG + paraquat + X-77	1.6 + 0.25	86	62	66	83	91
terbutryn 80WDG + paraquat + X-77	1.6 + 0.5	90	62	99	99	93
Check	---	0	0	0	0	0

[1]Treatments applied May 14, 1984. X-77 = 0.25% v/v.
[2]Visual weed control evaluations made on June 21, 1984.

Evaluation of herbicides applied in the early spring for weed control in fallow. Miller, S. D. and H. P. Alley. Research plots were established on April 17, 1984 at Chugwater, Wyoming to evaluate individual and/or herbicide combinations for weed control in fallow. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broacast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (69% sand, 16% silt, 15% clay) with 1.1% organic matter and a 7.2 pH.

Visual weed control evaluations were made on June 21. Russian thistle, downy brome and wild buckwheat infestations were heavy 21.2, 9.4 and 7.4 plants/ft^2, respectively; kochia infestations moderate 5.2 plants/ft^2 and erect knotweed and tansy mustard infestations light 3.2 and 2.0 plants/ft^2; respectively, in the untreated check. Broad spectrum weed control was excellent with all treatments except FMC-57020 at 0.125 to 0.5 lb/A alone or R-40244 at 0.5 lb/A alone. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1288.)

Early spring application of herbicides in fallow

Treatment[1]	Rate lb ai/A	Percent Control[2]					
		Kocz	Erkw	Wibw	Ruth	Tamu	Dobr
cyanazine 4L + metribuzin 4L	2.0 + 0.5	100	100	100	99	100	100
cyanazine 4L + R-40244	2.0 + 0.5	100	100	100	99	100	100
FMC-57020	0.125	88	95	58	20	17	6
FMC-57020	0.25	93	97	78	68	33	13
FMC-57020	0.5	97	100	99	93	92	70
FMC-57020	0.75	98	100	98	92	95	88
FMC-57020 + chlorsulfuron	0.25 + 0.03	99	100	100	99	100	94
FMC-57020 + chlorsulfuron	0.5 + 0.03	100	100	100	99	100	96
metribuzin + R-40244	0.5 + 0.5	100	100	100	99	100	100
R-40244	0.5	85	96	88	92	99	0
dicamba + cyanazine 80W + X-77	0.25 + 2.0	100	100	100	98	99	100
dicamba + metribuzin+ X-77	0.25 + 0.5	100	100	95	89	97	98
terbutryn + chlorsulfuron + X-77	1.5 + 0.016	100	100	100	99	99	94
terbutryn + chlorsulfuron + X-77	2.0 + 0.016	100	100	100	100	100	93
terbutryn + R-40244 + X-77	1.5 + 0.5	100	100	95	99	100	93
ametryn + chlorsulfuron + X-77	1.5 + 0.016	100	100	100	100	100	99
ametryn + R-40244 + X-77	1.5 + 0.5	100	100	95	99	100	99
Check	---	0	0	0	0	0	0

[1]Treatments applied April 17, 1984. X-77 = 0.25% v/v.
[2]Visual weed control evaluations made on June 21, 1984.

Evaluation of spring applied herbicides for weed control in fallow. Miller, S. D. and H. P. Alley. Research plots were established on May 14, 1984 at Chugwater, Wyoming to evaluate individual and/or herbicide combinations for weed control in fallow. 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 unit delivering 10 gpa at 40 psi. The soil was classified as a sandy loam (69% sand, 16% silt, 15% clay) with 1.1% organic matter and a 7.2 pH. Downy brome was 3/4 to 1 in., wild buckwheat 2 to 4-leaf stage (1 to 2 in.), erect knotweed 2 to 4-leaf stage (½ to 1 in.), Russian thistle ¼ to ½ in., and tansy mustard 1/2 to 3/4 in. rosette at the time of treatment.

Visual weed control evaluations were made on June 21. Wild buckwheat and erect knotweed infestations were heavy 36.4 and 12.0 plants/ft^2, repectively; Russian thistle and downy brome infestations moderate 7.0 and 5.0 plants/ft^2, respectively; and tansy mustard infestations light 2.4 plants/ft^2 in the untreated check. No treatment effectively controlled downy brome. Broad spectrum broadleaf weed control was good to excellent with all treatments except glyphosate/2,4-D combinations as a tank or package mix and SC-0224 combinations with 2,4-D or R-40244. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1287.)

Spring applied herbicides in fallow

Treatment[1]	Rate lb ai/A	Weed Control[2] Tamu	Erkw	Wibw	Ruth	Dobr
		- - - - - - -		%	- - - - - -	
XRM-4703	0.25	100	100	100	100	0
XRM-4703	0.5	100	100	100	100	0
Dowco 290 (M-3972)	0.25	97	96	97	95	0
Dowco 290 (M-3972)	0.5	100	97	100	98	0
Dowco 290 + 2,4-D (M-3785)	1.25	94	92	91	98	0
Dowco 290 + 2,4-D (M-3785)	2.5	100	100	100	100	38
glyphosate + dicamba + X-77	0.28 + 0.125	80	97	87	99	50
glyphosate + dicamba + X-77	0.38 + 0.125	99	100	100	100	63
glyphosate + dicamba + X-77	0.28 + 0.25	79	95	92	98	48
glyphosate + dicamba + X-77	0.38 + 0.25	100	100	99	100	70
glyphosate + 2,4-D + X-77	0.28 + 0.25	99	97	58	97	37
glyphosate + 2,4-D + X-77	0.38 + 0.5	97	97	73	98	47
glyphosate + dicamba + chlorsulfuron + X-77	0.38 + 0.25 + 0.016	100	100	99	100	63
glyphosate + 2,4-D (Pk)	0.28 + 0.5	87	77	61	84	35
glyphosate + 2,4-D (Pk)	0.38 + 0.67	92	90	65	95	55
glyphosate + 2,4-D (Pk) + dicamba	0.28 + 0.5 + 0.125	100	99	99	98	40
glyphosate + 2,4-D (Pk) + dicamba	0.38 + 0.67 + 0.125	100	100	100	100	65
glyphosate + 2,4-D (Pk) + dicamba	0.28 + 0.5 + 0.25	100	100	99	100	57
glyphosate + 2,4-D (Pk) + dicamba	0.38 + 0.67 + 0.25	99	100	100	100	57
glyphosate + 2,4-D (Pk) + chlorsulfuron	0.28 + 0.5 + 0.016	98	99	93	99	65
glyphosate + 2,4-D (Pk) + chlorsulfuron	0.38 + 0.67 + 0.016	100	99	99	99	67
glyphosate + 2,4-D (Pk) + metsulfuron	0.28 + 0.5 + 0.016	100	100	100	99	37
glyphosate + 2,4-D (Pk) + metsulfuron	0.38 + 0.67 + 0.016	100	100	99	99	42
SC-0224 + 2,4-D	0.28 + 0.025	98	98	68	98	32
SC-0224 + 2,4-D	0.38 + 0.5	96	95	70	97	48
SC-0024 + dicamba	0.28 + 0.125	92	99	98	99	48
SC-0224 + dicamba	0.38 + 0.25	100	100	99	100	67
SC-0224 + R-40244	0.28 + 0.5	95	78	65	92	65
Check	---	0	0	0	0	0

[1]Treatments applied may 14, 1984. X-77 = 0.25% v/v, glyphosate + 2,4-D (Pk) = package mix.
[2]Visual weed control evaluations made on June 21, 1984.

Chemical fallow weed control with spring applied herbicides. Yenne, S. P., D. C. Thill, and R. H. Callihan. A field experiment was conducted near Waha, Idaho to evaluate annual weed control in wheat stubble with several spring applied herbicides. All treatments were applied with a CO_2 pressurized backpack sprayer. Treatments containing glyphosate were applied in 10 gpa water carrier, on March 31, 1984, and the remaining treatments were applied in 20 gpa of water, on March 30, 1984. Application data is reported in Table 1. The experiment was a randomized complete block design with four replications. Volunteer wheat (TRZAX) and downy brome (BROTE) control was visually evaluated on April 27, 1984 and on July 3, 1984.

Volunteer wheat and downy brome control was excellent (> 86%) one month after treatment with fluazifop plus oxyfluorfen, fluazifop-p-butyl (PP005) plus oxyfluorfen, PP005 plus chlorsulfuron, glyphosate alone or in combination with oxyfluorfen or chlorsulfuron, Mon 8776 alone or in combination with chlorsulfuron or metsulfuron (DPX 6376), and Mon 8776-3. Only PP005 plus chlorsulfuron effectively controlled (86%) downy brome 3 months after treatment. In addition, volunteer wheat was controlled with application of fluazifop (0.25 lb/A), PP005 (0.13 and 0.25 lb/A) and PP005 plus metsulfuron or dicamba. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 1. Weather data at the time of application.

Date	March 30	March 31
Air temp (F)	50	50
Soil temp (F) @ 2"	46	45
% Relative humidity	65	65
% Cloud cover	0	0
Wind (mph)	5 - 10	0 - 4
Dew	none	none
Soil moisture	moist	moist

Table 2. Chemical fallow weed control at Waha, Idaho.

Treatments	Rate	Weed Control[1] TRZAX early	TRZAX late	BROTE[2] early	BROTE late
	(lb ai/A)	----------(%)---------			
fluazifop + moract	0.06+1.00	74	43	63	3
fluazifop + moract	0.13+1.00	86	73	75	23
fluazifop + moract	0.25+1.00	89	98	68	36
fluazifop + chlorsulfuron + moract	0.13+.016 1.00	83	63	79	56
fluazifop + DPX-T6376[3] + moract	0.13+.016 1.00	80	83	76	58
fluazifop + oxyfluorfen + moract	0.13+0.13 1.00	93	90	90	28
fluazifop + dicamba + moract	0.13+0.50 1.00	74	50	69	35
PP005[4] + moract	0.06+1.00	84	62	78	28
PP005 + moract	0.13+1.00	91	95	78	53
PP005 + moract	0.25+1.00	93	100	68	73
PP005 + chlorsulfuron + moract	0.13+.016 1.00	92	99	88	86
PP005 + DPX-T6376 + moract	0.13+.016 1.00	89	97	70	44
PP005 + oxyfluorfen + moract	0.13+0.13 1.00	94	100	91	51
PP005 + dicamba + moract	0.13+0.50 1.00	89	95	75	18
chlorsulfuron + X77	0.25+0.50% v/v	43	0	25	0
DPX-T6376 + X77	0.25+0.50% v/v	25	0	28	0
oxyflurofen	0.13	10	10	10	0
dicamba	0.50	33	0	33	0
glyphosate[5] + X77	0.28+0.50% v/v	94	100	88	68
glyphosate + oxyfluorfen + X77	0.28+0.13 0.50% v/v	91	92	88	56
glyphosate + oxyfluorfen + X77	0.19+0.13 0.50% v/v	90	98	88	35
glyphosate + oxyfluorfen + X77	0.28+0.25 0.50% v/v	92	98	86	53
glyphosate + chlorsulfuron + X77	0.28+.016 0.50% v/v	93	98	89	78
MON8776	1.01	95	93	91	68
MON8776	1.37	96	98	94	68
MON8776 + chlorsulfuron	1.01+.016	96	100	89	74
MON8776 + DPX6376	1.01+.016	94	100	86	76
MON8776-3 + X77	0.68+0.50% v/v	96	100	89	68
Plants / sq. ft		5 to 10		150	
$LSD_{0.05}$		20	38	20	32

[1]Percent control is visual rating compared to the untreated check
[2]TRZAX = volunteer winter wheat; BROTE = downy brome;
[3]DPX 6376 = metsulfuron
[4]PP005 = fluazifop-p-butyl
[5]lb ae/A

Weed control in winter cereals underseeded with legumes. Wright, S.D. and L.W. Mitich. While several herbicides are available for weed control in winter cereals, herbicide options are very limited when cereals are underseeded with legumes. An experiment was conducted in Tulare County in 1983, to evaluate several herbicide treatments for their effectiveness in controlling weeds and their effect on the legumes (horsebeans, field peas and vetch) which were planted as part of a winter forage blend that also included oats, wheat and barley. The test site was infested with a heavy population of common chickweed, and a light stand of coast fiddleneck, pineappleweed, London rocket, shepherdspurse, henbit and little mallow. Plot size was 6 by 20 ft. replicated four times with a 1 ft. untreated strip between plots. The herbicides were applied on November 17, 1982 with a CO_2 backpack sprayer calibrated to deliver 15 gpa at 29 psi. The weather was foggy and the temperature 50 F. The cereals were in the early tillering stage, the horsebean 3- to 5-inches tall (8 leaves) and the peas and vetch 2- to 3-inches tall. Evaluations on weed control and crop injury were made on February 2, 1983, and March 16. Yield was taken on certain treatments on April 1.

The dinoseb treatments gave about 50% control of common chickweed and suppressed the growth of the surviving plants. The cereals sustained temporary injury from the dinoseb but recovered within 3 weeks. Cereals did not fully recover from the dinoseb plus bromoxynil treatments but this combination gave somewhat better control of common chickweed than dinoseb alone. Dinoseb and bromoxynil, each at 0.13 lb/A, were safe on vetch. Dinoseb, bromoxynil and MCPA at all rates of application were safe on peas. Only 2,4-D and dicamba plus MCPA killed the peas. Dinoseb was the only noninjurious treatment on horsebeans. There was no significant difference in yield between the harvested treatments. Estimated TDN was lowest in plants harvested from the check plots. (University of California Cooperative Extension, Visalia, CA 93291)

Winter forage - weed trial summary

Treatment	Rate lb/A	February 2, 1983 chickweed control[1]	February 2, 1983 injury cereal	Day of treatment: March 16, 1983 — Cereal injury	Cereal ht.[2]	Horsebeans injury	Horsebeans ht.	Horsebeans pop[3]	Peas injury	Peas ht.	Peas pop.	Vetch injury	Vetch ht.	Vetch pop.
Dinoseb	.75	4.7	3.5	1.0	34	1.0	36	10.2	2.3	35	3.7	1.0	30	3.2
Dinoseb + Bromoxynil	.75 .13	5.5	4.5	2.5	33	3.7	34	7.2	1.8	31	4.0	1.8	32	3.5
Dinoseb Bromoxynil	.75 .25	5.5	5.2	2.5	31	4.5	33	5.0	1.5	29	2.7	1.5	28	4.5
Dinoseb + bromoxynil	.75 .38	5.5	5.2	3.0	32	6.5	31	3.7	2.5	34	4.0	2.0	21	4.2
Bromoxynil	.13	1.7	1.2	1.0	35	4.3	33	3.5	1.3	30	1.7	3.0	32	3.0
Bromoxynil	.25	1.7	1.2	2.0	34	5.8	33	3.5	3.8	28	2.5	6.8	27	0.7
Bromoxynil	.38	2.7	2.0	1.0	33	8.5	29	1.0	4.0	43	3.5	7.8	27	0.2
Bromoxynil + MCPA	.13 .25	2.7	1.5	1.0	33	9.0	36	0.5	2.3	34	4.5	9.0	29	0.5
MCPA	.25	2.0	1.0	1.0	35	7.8	34	4.5	3.3	30	2.7	1.0	-	-
MCPA	.50	1.5	1.5	1.0	33	9.0	33	0.5	1.5	32	2.7	10.0	-	-
MCPA	.75	2.7	2.2	1.0	35	9.8	-	-	2.8	33	2.5	10.0	-	-
Dicamba + MCPA	.16 .31	5.0	1.2	1.3	34	10.0	-	-	10.0	-	-	10.0	-	-
2,4-D	.48	1.7	1.2	1.3	34	9.8	-	-	9.3	-	-	-	-	-
Check	0	1.0	1.2	1.3	33	1.0	35	9.5	4.3	25	5 .5	1.3	31	3.2

1 Control and injury ratings are based on a 1-10 scale where 1 = no effect and 10 = dead plants.

2 Plant height in inches.

3 Plants per square yard.

Residual effects of DPX-M6316 on pea and lentil production. Flom, D. G., D. C. Thill, and R. H. Callihan. A field study was conducted near Moscow, Idaho to evaluate the effects of surface applied DPX-M6316 (75DF) on peas and lentils planted up to five weeks after herbicide application. Herbicide treatments were applied to field cultivated soil on May 18, 1984. All treatments were applied broadcast with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Environmental conditions when the treatments were applied were: air temperature 65 F, soil temperature 60 F at three inches, and relative humidity 46%. The experiment was a randomized complete block design with four replications with a split-plot design of treatments. Main plots were planting time (0, 1, 2, 3, 4 and 5 weeks after application) and crop (peas and lentils), and sub-plots were the herbicide treatment rates (0, 0.5, 1.0, and 2.0 oz ai/A). Sub-plots measured 5 by 30 feet. The effect of DPX-M6316 on the density and height of naturally occurring broadleaf weeds was evaluated in non-planted plots at five weeks after application. Weed density (#/ft^2) and plant height were both reduced with increasing concentration of DPX-M6316 (Table 1). Visual evaluations for crop injury were made on July 1, 1984. Crop injury was less for peas than for lentils and little injury was observed in either crop at planting dates after week one (Table 2). Crop plant stand was measured at crop maturity on August 29, 1984 (Table 2). Only lentils planted at zero weeks resulted in decreased stands with increasing herbicide rate. Plant stands of pea and lentil planted four and five weeks after herbicide application were reduced due to weed interference in direct relationship to weed populations. All plots were harvested using a Hege combine on September 7, 1984. Reduced seed yields of lentils occurred in DPX-M6316 treated plots at the initial date of planting (Table 2). Pea and lentil yields were also reduced at later planting dates by interference with existing weeds. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Weed control with DPX-M6316 at Moscow, Idaho

Rate	Weed density[1] LAMAM[2]	THLAR	CHEAL	All broadleaf	Weed plant height[1] LAMAM	THLAR	CHEAL	All broadleaf
(oz ai/A)	------(#/ft^2)-------			---------	---------(inches)----------			
check	22	5	4	31	2	4	3	2
0.5	19	2	2	23	2	2	2	2
1.0	12	1	0	13	1	1	2	1
2.0	8	0	0	8	1	0	1	1
LSD (0.05)	3.9	1.6	1.4	4.7	0.4	0.8	1.1	0.3

[1]density and height measured on June 21, 1984
[2]LAMAN = henbit, THLAR = pennycress, field, CHEAL = lambsquarters, common

Table 2. Effect of DPX-M6316 on pea and lentil at Moscow, Idaho

Rate	Lentil X^2= 0	1	2	3	4	5[3]	Pea X^2= 0	1	2	3	4	5[3]
	Visual Crop injury[1]											
(oz ai/A)	---------%----------						----------%---------					
0.5	34	9	1	0	0	-	30	11	0	0	0	-
1.0	46	25	1	6	0	-	34	14	1	0	0	-
2.0	66	44	9	14	3	-	45	18	4	0	3	-
LSD (0.05)	NS	16	5	NS	NS	-	NS	NS	NS	NS	NS	-
	Crop plant stand[4]											
	---------(#/yd)-------						--------(#/yd)------					
check	41	42	50	36	25	0	11	13	13	8	8	0
0.5	39	40	45	44	33	3	9	14	13	10	11	3
1.0	32	40	48	49	44	19	13	12	16	11	11	6
2.0	25	36	45	47	41	42	9	15	13	11	13	8
LSD (0.05)	11	NS	NS	8	9	13	3	NS	NS	3	5	4
	Crop Yields[5]											
	--------(lb/A)-------						---------(lb/A)------					
check	628	602	593	93	6	0	709	773	469	100	10	0
0.5	437	684	452	96	26	0	623	939	706	143	76	1
1.0	421	541	440	149	42	2	796	715	773	304	284	1
2.0	354	437	561	168	51	3	673	857	690	291	304	22
LSD (0.05)	254	NS	NS	NS	23	3	NS	NS	282	145	152	20

[1]visual crop injury evaluations were made on July 1, 1984
[2]number of weeks after herbicide application when the crop was planted
[3]insufficient crop stand to evaluate for crop injury
[4]crop stand counts were made on August 29, 1984
[5]crops were harvested on September 7, 1984

Italian ryegrass control in meadowfoam. Brewster, B.D. and Arnold P. Appleby. Propachlor and five postemergence grass herbicides were evaluated for efficacy and crop tolerance on meadowfoam. The trial was designed as a randomized complete block with five replications and 2.5 m by 9 m plots. The herbicides were applied in a spray volume of 234 l/ha. An oil concentrate was added to the postemergence treatments at a rate of 2.3 l/ha. A unicycle, compressed-air plot sprayer was used to apply the herbicides. Propachlor was applied on October 20, 1983, prior to crop and weed emergence. Sethoxydim, haloxyfop-methyl, DPX Y6202, and diclofop-methyl were applied on February 3, 1984, when the meadowfoam was 5 cm to 12 cm in diameter and the Italian ryegrass had 2 to 4 tillers. Fluazifop-P-butyl was applied on March 27, 1984, when the meadowfoam was 20 cm to 30 cm in diameter and the Italian ryegrass was 20 cm to 30 cm tall.

Visual evaluations were made on November 9, 1983 and April 27, 1984. Meadowfoam seed yields were obtained on July 14, 1984.

Propachlor stunted the meadowfoam but seed yields were greater than the untreated control because of the reduction from Italian ryegrass interference. All postemergence treatments controlled the Italian ryegrass that was not controlled by the propachlor. Even the high rates of the postemergence herbicides did not injure the crop. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Effect of herbicides on Italian ryegrass and meadowfoam

Herbicide	Rate (Kg/ha)	Meadowfoam injury Nov. 9, 1983	Meadowfoam injury Apr. 27, 1984	Italian ryegrass control Nov. 9, 1983	Italian ryegrass control Apr. 27, 1984	Meadowfoam seed yield (Kg/ha)
		(%)	(%)	(%)	(%)	
Applied Oct. 20, 1983						
propachlor	3.36	28	0	74	84	800 b[1]
propachlor	5.04	30	0	81	82	870 ab
Applied Oct. 20, 1983/Feb. 3, 1984						
propachlor/ sethoxydim	3.36/ 0.56	26	0	76	100	920 ab
propachlor/ sethoxydim	3.36/ 1.12	38	0	82	100	1060 a
propachlor/ haloxyfop-methyl	3.36/ 0.28	30	0	80	100	880 ab
propachlor/ haloxyfop-methyl	3.36/ 0.56	38	0	80	100	1040 a
propachlor/ DPX Y6202	3.36/ 0.28	32	0	76	100	970 ab
propachlor/ DPX Y6202	3.36/ 0.56	30	0	76	100	920 ab
propachlor/ diclofop-methyl	3.36/ 1.12	38	0	82	100	930 ab
propachlor/ diclofop-methyl	3.36/ 2.24	36	0	78	100	950 ab
Applied Oct. 20, 1983/Mar. 27, 1984						
propachlor/ fluazifop-P-butyl	3.36/ 0.28	36	0	80	98	960 ab
propachlor/ fluazifop-P-butyl	3.36/ 0.56	36	0	78	100	860 ab
Check	0	0	0	0	0	480 c

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

The use of chlorsulfuron and metsulfuron in small grain-pulse crop production systems in Idaho. Beck, K. G., D. C. Thill, and R. H. Callihan. A long term experiment was established in the fall of 1981 to assess the effects of several rates of chlorsulfuron and an analog, metsulfuron (DPX-T6376), on crop injury, yield, and weed control in winter wheat and spring barley (non-rotational); additionally, residual effects of the test herbicides are being evaluated in lentil, pea, and spring barley (rotational crops) systems. Three basic rotational schemes are being employed: A regime of alternating cereals (non-rotational) with rotational crops every other year; two consecutive years of cereals (non-rotational) with a subsequent switch to rotational crops; and three consecutive years of cereals (non-rotational) then revolved to rotational crops. Test herbicides are applied only during years when in cereals. Weed control in rotational crops is accomplished through the use of conventional herbicides.

Soil samples are taken from plots just prior to and immediately after spraying test herbicides to determine dissipation rates. Also, just prior to planting rotational crops, soil samples are taken to determine the residual amount of test herbicide. Lentil biomass samples are taken at harvest then frozen for subsequent analysis of test herbicide residue. Additionally, grain samples from treated non-rotational cereals are taken post harvest to determine germination percentages.

Rotational crops. Peas and lentils were treated with dinoseb and rotational spring barley was sprayed with bromoxynil for weed control (application data Table 3; rates Table 1). Also, rotational crops were sprayed with 0.8 lb ai/A of diclofop for wild oat control. No injury was observed in any rotational crop 348 days after test herbicide application (Table 2).

No differences were observed in biomass yield (Table 1) among test herbicide treatments for peas and lentils (rotational spring barley biomass was not determined). No differences due to treatment were found in seed or grain yield for peas or rotational spring barley, respectively (Table 1; lentil seed yield was not determined).

Non-rotational crops. Winter wheat and spring barley application data for test herbicides and checks are presented in Table 3 and rates in Table 1. In addition, non-rotational spring barley was treated with diclofop at 0.8 lb ai/A for wild oat control. Differences were observed in spring barley grain yield due to herbicide treatment (Table 1). Greatest grain yields resulted with chlorsulfuron at 0.25 oz ai/A while metsulfuron at 0.25 oz ai/A was associated with the lowest yield. No treatment had grain yields significantly lower than the check. No differences among treatments were observed in grain yield of winter wheat.

Slight injury to non-rotational spring barley was observed however, no differences among herbicidal treatments were found (Table 2). No injury was observed in winter wheat.

Mayweed (10-12 plants/sq ft) (ANTCO) control in winter wheat ranged from 56 to 98% (Table 2). Chlorsulfuron at 0.125 oz ai/A provided the greatest control in the first evaluation and the lowest control was associated with the sprayed check. In evaluation two, chlorsulfuron and metsulfuron at 0.25 and 0.125 oz ai/A, respectively, provided the best control of mayweed while the sprayed check again resulted in the lowest control.

No differences were observed among herbicide treatments for weed control in non-rotational spring barley. Good to excellent (86 to 100%) control of mayweed (9-17 plants/sq ft), redroot pigweed (5-15 plants/sq ft), and common lambsquarters (12-20 plants/sq ft) was achieved with all rates of test herbicides and sprayed checks. The excellent weed control observed for common lambsquarters and the injury noted in non-rotational spring barley may have been associated with or enhanced by the presence of 0.5% v/v non-ionic surfactant included in all test treatments and sprayed checks.

To compare this year's results with those of 1983, please see page 215 WSWS Research Progress Report, 1984. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

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

		Rotational Crop Biomass[1]		Rotational Crop Yield[2,3]		Grain Yield[3]	
Treatment[4]	Rate	Lentils	Peas	Peas	Spring Barley	Winter Wheat	Spring Barley
	(oz ai/A)	---------------(lb/A)---------------				(bu/A)	(lb/A)
chlorsulfuron	0.0625	1790	1623	549	3003	79	2109
chlorsulfuron	0.125	2778	1944	775	2989	76	2234
chlorsulfuron	0.25	2243	2063	722	2778	74	2450
chlorsulfuron	0.5	2635	1654	568	3087	68	1981
DPX-T6376	0.0625	2300	1535	469	3030	79	2163
DPX-T6376	0.125	2087	1942	647	2858	78	1568
DPX-T6376	0.25	2085	1898	692	3114	77	1935
check		2234	2324	743	2715	81	1772
LSD (0.05)	NS	NS	NS	NS	NS	NS	356

[1]Oven dry weight
[2]Lentil seed yield not determined
[3]Rotational crops treated with test herbicide 348 days (on 6-4-83) prior to planting; previously treated with test herbicides on 4-26-82; spring barley (non-rotational) previously treated with test herbicides on 4-26-82, 4-26-83 and treated during 1984 growing season 6-23-84; winter wheat previously treated with test herbicides on 4-26-82 and treated during 1984 growing season 5-19-84
[4]Winter wheat treated with chlorsulfuron and DPX-T6376 at noted rates; spring barley (non-rotational) treated with chlorsulfuron at noted rates and DPX-T6376 at 0.125, 0.25, and 0.5 oz ai/A; check plots in winter wheat and spring barley (non-rotational) treated with bromoxynil at 0.5 lb ai/A. Peas and lentils treated with 6 lb ai/A of dinoseb in 1984. Rotational spring barley treated with bromoxynil at 0.5 lb ai/A in 1984. All test herbicides applied with 0.5% v/v non-ionic surfactant (X-77)

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

		Rotational Crop Injury[1]			Crop injury				Weed control	
					Winter Wheat[2]		Spring Barley[3]		Winter Wheat	
Treatment	Rate	Lentils	Peas	Spring Barley	EVAL 1	EVAL 2	EVAL 1	EVAL 2	ANTCO[4]	ANTCO[5]
	(oz ai/A)	---	---	---	---	(%)	---	---	---	---
chlorsulfuron	0.0625	3	0	0	0	0	15	15	93	93
chlorsulfuron	0.125	0	0	0	4	0	8	0	91	94
chlorsulfuron	0.25	0	0	0	0	0	4	0	79	98
chlorsulfuron	0.5	0	0	0	0	0	8	5	80	84
DPX-T6376	0.0625	5	4	0	0	0	9	6	88	98
DPX-T6376	0.125	0	0	0	0	0	13	10	85	86
DPX-T6376	0.25	1	0	0	0	0	6	4	79	65
check		0	0	0	5	0	5	1	69	56
LSD (0.05)		NS	NS	NS	NS	NS	NS	NS	14	24

[1]Evaluation taken 7-10-84; for treatment history see footnotes Table 1

[2]Evaluations 1 and 2 taken 6-8-84 and 7-23-84, respectively; for treatment history see footnotes Table 1

[3]Evaluations 1 and 2 taken 7-12-84 and 7-23-84, respectively; for treatment history see footnote Table 1

[4]Evaluation taken 6-8-84

[5]Evaluation taken 7-23-84

Table 3. Application Data 1984.

	Rotational Crops		Non-Rotational Crops	
	Sp. Barley	Lentils and Peas	Winter Wheat	Spring Barley
Date of application	6-23-84	5-24-84	4-26-83	6-4-83
Treatments applied	bromoxynil	dinoseb	chlorsulfuron metsulfuron bromoxynil	chlorsulfuron metsulfuron bromoxynil
Method of application	broadcast	broadcast	broadcast	broadcast
Type of application	post	pre-emergence	post	post
Temp (F) air/soil surface	50/50	41/41	64/60	60/60
Soil Temp (F)/depth (in.)	48/2	68/2	52/6	56/2
% relative humidity	66	--	60	74
% cloud cover	0	100	100	0
Wind (mph)/direction	0	0	0-4.5/west	0-4/east
Dew present	yes	none	yes	yes
Carrier/volume (gpa)	water/20	water/21.6	water/19.6	water/20
Nozzle size (flat fan)	8002	8003	8002	8002
Boom press (psi)/ht (in.)	40/20	40/20	40/20	40/20
Sprayer type/speed (mph)	CO_2 bicycle/3	tricycle/2.3	CO_2 backpack/3	CO_2 backpack/3

Repeated applications of herbicide tank-mixes in peppermint. Brewster, B.D., and A.P. Appleby. Repeated treatments of tank-mixed herbicides at half-rates applied on November 15, 1983, and January 27, 1984, were compared to single applications at full rates on December 15, 1983 in a peppermint field near Philomath, Oregon. Treatments were applied in water at 234 l/ha with a unicycle compressed-air sprayer. The trial was conducted as a randomized complete block design with three replications and 2.5 m by 6 m plots. The soil was a Willamette silt loam.

Visual evaluations on March 28, 1984 were made on the basis of percent crop injury or weed control. No significant injury to the crop occurred. All treatments controlled Italian ryegrass, panicle willowweed, annual sowthistle, and annual bluegrass. Paraquat plus terbacil was the least effective treatment on spotted catsear, but the repeated application greatly improved control.

Herbicide	Rate (kg/ha)	Peppermint	Italian ryegrass	Panicle willowweed	Annual sowthistle	Spotted catsear	Annual bluegrass
		(control or injury)					
Repeated treatments Nov. 15, 1983/Jan. 27, 1984		(%)					
1. paraquat + oxyfluorfen	0.28 + 0.28/ 0.28 + 0.28	0	100	100	100	98	100
2. paraquat + diuron	0.28 + 1.34/ 0.28 + 1.34	0	100	100	100	77	100
3. paraquat + terbacil	0.28 + 0.9/ 0.28 + 0.9	0	100	100	97	83	100
4. paraquat + diuron + oxyfluorfen	0.28 + 1.34 + 0.28/0.28 + 1.34 + 0.28	0	100	100	100	100	100
5. paraquat + terbacil + oxyfluorfen	0.28 + 0.9 + 0.28/0.28 + + 0.9 + 0.28	3	100	100	100	100	100
Single treatments, Dec. 15, 1983							
6. paraquat + oxyfluorfen	0.56 + 0.56	0	100	100	100	88	100
7. paraquat + diuron	0.56 + 2.68	0	100	100	100	70	100
8. paraquat + terbacil	0.56 + 1.8	0	100	100	100	17	100
9. Check	0	0	0	0	0	0	0

Quackgrass control in peppermint. Brewster, B.D. and A.P. Appleby. A trial was conducted in an 8-yr-old peppermint field to compare DPX Y6202 and haloxyfop-methyl for quackgrass control. The trial was designed as a randomized complete block with three replications and 2.5 m by 7.5 m plots. The herbicides were applied in a spray volume of 234 l/ha with a unicycle compressed-air plot sprayer. An oil concentrate was added to each treatment at 2.3 l/ha. Applications were made on October 24, 1983, February 3, 1984, and March 30, 1984. The growth stages of the peppermint and quackgrass are listed in Table 1. Treatments were either single applications of 0.56 Kg/ha or applications of 0.28 Kg/ha on two dates.

Haloxyfop-methyl was considerably more effective than DPX Y6202 on quackgrass when applied in October or February, but both chemicals were more effective with later applications (Table 2). Repeated applications were not more effective than applying the total amount of herbicide in a single application. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Table 1. Quackgrass and peppermint height on treatment date

Treatment date	Quackgrass height	Peppermint height
	(cm)	
Oct. 24, 1983	20-25	8-16
Feb. 3, 1984	8-16	2
Mar. 30, 1984	10-16	2-5

Table 2. Quackgrass control and peppermint injury with DPX Y6202 and haloxyfop-methyl

Herbicide	Rate (Kg/ha)	Application date	Peppermint injury			Quackgrass control		
			May 15	June 7	July 6	May 15	June 7	July 6
			(%)					
DPX Y6202	0.56	Oct. 24, 1983	0	0	0	57	33	13
haloxyfop-methyl	0.56	Oct. 24, 1983	0	0	0	85	73	47
DPX Y6202	0.28/0.28	Oct. 24/Feb. 3, 1984	0	0	0	70	43	13
haloxyfop-methyl	0.28/0.28	Oct. 24/Feb. 3, 1984	0	0	0	92	75	62
DPX Y6202	0.56	Feb. 3, 1984	0	0	0	88	82	43
haloxyfop-methyl	0.56	Feb. 3, 1984	0	0	0	99	95	96
DPX Y6202	0.28/0.28	Feb. 3/Mar. 30, 1984	0	0	0	92	82	72
haloxyfop-methyl	0.28/0.28	Feb. 3/Mar. 30, 1984	0	0	0	99	95	96
DPX Y6202	0.56	Mar. 30, 1984	0	0	0	99	98	98
haloxyfop-methyl	0.56	Mar. 30, 1984	0	0	0	99	99	99
Check	0	--	0	0	0	0	0	0

Evaluation of several herbicides for weed control in established red clover. Mitich, L.W., N.L. Smith and R.L. Sailsbery. A red clover seed field in Glenn County was selected to evaluate 13 herbicides for crop tolerance and weed control performance. Herbicides were applied January 10, 1984, to seedling Italian ryegrass, redstem filaree, annual sowthistle and common groundsel in Sapparo red clover. Paraquat was applied alone and in tank mixes with diuron, prodiamine, norflurazon, oryzalin, oxyfluorfen and chlorpropham. Pronamide, bentazon, dalapon and 2,4-D (amine) were applied individually. 2,4-DB (amine) was tank mixed with sethoxydim or applied alone. Surfactant (X-77 @ 0.25% v/v) was included with all paraquat and dalapon treatments. A paraffin base oil (Surfel @ 1 qt./A)was added to bentazon and sethoxydim. A CO_2 backpack sprayer calibrated to deliver a spray volume of 20 gpa was used to apply herbicides to 10 by 20 ft. plots replicated 3 times in a randomized block design. Soil type was Arbuckle gravelly loam.

Visual evaluations were made 1, 2 and 3 months after application. Clover injury from paraquat declined as the season progressed, however, 2,4-D and dalapon injury increased. Dalapon injury was severe. Weed control from the oxyfluorfen-paraquat mix was excellent. Control from diuron, prodiamine, norflurazon, oryzalin and chlorpropham was poor on annual sowthistle. Poor weed control also occurred from the pronamide, bentazon, dalapon, 2,4-D and 2,4-DB treatments. (University of California Cooperative Extension, Davis, CA 95616)

Evaluation of herbicides in established red clover, 1984

					Control[2]									
		Phyto[1]			Italian ryegrass		Redstem filaree		Sowthistle		Common groundsel			
Herbicide	lb/A	1/31	2/29	4/3	2/29	4/3	2/29	4/3	2/29	4/3	2/29	4/3		
Paraquat	0.75 lb.	3.3	1.0	1.3	10.0	6.7	10.0	6.7	1.7	4.0	10.0	10.0		
Diuron + Paraquat	2 + 0.75	4.0	1.7	1.3	10.0	10.0	10.0	10.0	0.7	0	10.0	10.0		
Prodiamine + Paraquat	2 + 0.75	3.7	0.3	1.3	9.7	6.7	10.0	6.7	0	0.7	10.0	7.0		
Norflurazon + Paraquat	2 + 0.75	4.0	2.3	2.7	10.0	10.0	7.7	3.3	0	2.5	10.0	10.0		
Oryzalin + Paraquat	2 + 0.75	4.0	1.3	0.3	10.0	10.0	9.3	6.7	0.3	3.0	10.0	10.0		
Oxyfluorfen + Paraquat	2 + 0.75	4.7	2.0	1.7	10.0	9.7	10.0	10.0	10.0	10.0	10.0	10.0		
Chlorpropham + Paraquat	3 + 0.75	3.7	2.0	1.0	10.0	10.0	6.0	0	0.3	0.7	10.0	10.0		
Oxyfluorfen + Oryzalin + Paraquat	2 + 2 + 0.75	4.7	1.7	1.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Pronamide	1	1.3	0	0.3	7.7	6.7	0	1.3	0	0.7	0.7	0		
Bentazon	1	1.7	0	0.3	0	0	6.7	3.3	0	1.5	0	0		
Dalapon	4	1.3	2.3	9.0	6.3	5.5	0	1.3	3.0	0	3.3	3.0		
2,4-D amine	0.5	2.0	2.7	5.3	0	0	1.7	0	4.7	0	2.0	0		
2,4-DB amine	1.5	0	1.0	1.0	0	0	1.3	0	5.7	3.5	1.0	0		
Sethoxydim + 2,4-DB amine	0.5 + 1.5	1.3	0.7	0.3	10.0	10.0	2.3	0	7.7	10.0	1.0	0.7		
Control		0	0	0.3	0	0	3.3	0.6	0	0	0	0		

Data is average of 3 replications.

[1] Phytotoxicity: 0 = none; 10 = loss of stand.

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

Effects of MCPA and bentazon application on leaf tissue nitrogen and paddy yield of rice. Dickey, J.B., J.E. Hill and D.E. Bayer. In 1983, three herbicide treatments (bentazon and MCPA at 1 kg/ha and unsprayed), three preplant N rates (68, 102, and 136 kg N/ha), and two topdressed N rates (0 and 34 kg N/ha) were established in split-split plots. Herbicide treatments were main plots, preplant N rates were subplots, and topdressed N rates were sub-subplots. The main plots were arranged in four randomized, complete blocks. Ammonium sulfate was drilled preplant and seed was broadcast onto the flooded field on May 28, 1983. At 38 days after planting (the early-tillering stage of rice growth), the uppermost, fully-extended leaves in each plot were randomly sampled, N was topdressed as ammonium sulfate, and herbicide treatments were applied with a backpack sprayer in 187 l of water/ha. Leaves were also sampled at 6, 12, 18, 24, and 30 days after treatment (DAT).

Contrary to the results of previous studies in 1981 and 1982, no significant depression in leaf tissue nitrogen (LTN) was observed prior to 12 DAT. From 12 DAT onward, LTN in the MCPA treatments was higher than in bentazon or unsprayed treatments (table). Results from similar studies in 1981 and 1982 showed significant depression of LTN at 6 DAT followed by recovery around 12 to 15 DAT and in 1982, LTN in MCPA treatments was significantly higher at 22 DAT and afterwards, as in 1983. Both of the earlier trials were planted by broadcasting seed onto dry ground before flooding, which resulted in poor stands. In 1983, the trial was established by water seeding resulting in a thick stand.

MCPA temporarily arrests root and shoot growth, reducing both the rice plant's biomass and its capability to take up N. The former effect is more pronounced in thin stands due to a higher rate per plant and/or spraying of the exposed root crown. Stunting of roots in 1983 was observed to be neither severe nor prolonged. This may account for the depression in LTN shortly after spraying in 1981 and 1982 and the lack of it in 1983. The higher LTN levels in the MCPA treatment following a 12 day recovery period are consistent with 1982 data and probably reflect relatively lower shoot biomass being supported by recovered or unarrested root growth.

Differences in weed control were significant. Blunt spikerush and roughseed bulrush were the dominant species and their control was superior with MCPA (table). Although weed control and LTN differences favored the MCPA treatment, there were no significant yield differences in 1983 (table).
(University of California Cooperative Extension, Davis, CA 95616)

Summary of 1983 herbicide effects

Herbicide	Rate (kg ai/ha)	Leaf tissue nitrogen (%) Days after treatment 0	6	12*	18*	24**	30**	Blunt** spikerush and roughseed bulrush plants/m²	Paddy yield at 14% moisture (kg/ha)
MCPA	1.1	5.03	4.32	3.62	3.21	2.85	2.61	0.0	7719
Bentazon	1.1	5.01	4.16	3.28	2.71	2.42	2.32	13.2	7844
Unsprayed	--	5.01	4.35	3.37	2.80	2.45	2.42	87.9	7190

* Significant at the 5% level.
** Significant at the 1% level.

Molinate timing, rate and formulation for barnyardgrass control in water-seeded rice. Hill, J. E., J. E. Wrysinski, B. W. Brandon and E. J. Roncoroni. The control of barnyardgrass and related watergrasses is essential to rice production in water-seeded rice. Changes in timing, rate or formulation of molinate, were evaluated to determine whether the control of these weeds was equivalent to or better than the standard practice of 3 to 6 lb/A postemergence in one or more applications. All preplant incorporated (ppi) treatments were established in 3 by 9 m plots and incorporated by harrowing 1 week prior to flooding. One molinate-impregnated fertilizer treatment was used. All other treatments received similar rates of nonimpregnated fertilizer. Preemergence surface (pes) treatments were applied on the soil surface 5 days prior to flooding. The fields were flooded on May 14, 1984, and presoaked rice was water-seeded by hand into the plots on May 16. Postemergence treatments were made on May 29.

Barnyardgrass control was evaluated by counting plants on June 12 and by visual ratings on July 5 and August 8. Based on our evaluations (table) treatment timing (ppi, pes, post) was less important than the rate and formulation since some treatments within all timings were effective. The 3 lb/A rate of molinate 10G applied ppi was much less effective than higher rates of 4 or 5 lb/A. The molinate-impregnated fertilizer treatment was nearly as effective as the best molinate treatments despite its low rate of application, and warrants further investigation. The 10G formulation alone or with the extender, R-33865, was equally effective whereas the 3S and 8E formulations were not effective whether incorporated (ppi) or left on the surface (pes). The molinate-impregnated fertilizer formulation was also effective as tested ppi.

Rice injury was determined by stand counts on June 28 and visual ratings on June 12. Visual observations showed good rice tolerance to all treatments. Rice stand was significantly reduced only in those plots where weeds were not controlled (8E and 3S formulations, untreated), indicating that weed competition was responsible for reduction in stand. Harvest yields (table) were significantly higher where good weed control was obtained.

(Department of Agronomy and Range Science, University of California, Davis, CA 95616)

Time, rate and formulation of molinate for barnyardgrass (byg) control in water-seeded rice

Treatment	Timing	Rate lb/A	byg counts/ft^2	byg[1] rating (7/5)	byg[1] rating (8/8)	Rice counts/ft^2	Rice[2] tolerance rating	Yield cwt/A
Molinate 10G	PPI	3	13.2	5.4	6.4	37.6	9.3	41.4
Molinate 10G	PPI	4	3.5	8.8	9.1	40.8	9.1	61.5
Molinate 10G	PPI	5	2.1	8.9	8.8	39.5	8.6	63.9
Molinate 10G + R-33865	PPI	5	6.9	7.9	8.6	45.8	8.6	56.7
Molinate 3S	PPI	5	13.5	3.3	4.3	33.2	8.6	37.8
Molnate 8E	PPI	5	16.5	3.0	3.3	32.4	9.0	31.6
Molinate .75% 32-16-0[3]	PPI	2.3	4.9	8.3	9.1	43.5	8.8	58.7
Molinate 10G	PES	5	2.1	9.0	9.5	41.0	8.4	63.2
Molinate 10G + R-33865	PES	5	1.9	8.6	9.0	42.8	9.0	61.2
Molinate 3S	PES	5	12.4	2.8	2.5	34.5	8.5	36.9
Molinate 8E	PES	5	16.2	3.0	2.6	31.7	8.1	31.2
Molinate 10G	Post	5	0.6	9.6	10.0	38.3	7.5	68.1
Molinate 10G + R-33865	Post	5	1.7	8.8	9.0	39.2	8.1	66.7
Untreated	--	--	19.8	0.8	5.6	30.0	7.5	25.5
CV (%)			61.9	25.9	9.9	16.7	12.1	18.8
LSD (.05)			7.3	2.3	1.2	9.1	1.5	13.6

[1] Rating on 0 to 10 scale: 0 = no weeds controlled; 10 = all weeds controlled.
[2] Tolerance on 0 to 10 scale: 0 = all plants dead; 10 = no plants dead.
[3] Molinate impregnated fertilizer (0.75% molinate).

Effects of chlorsulfuron plus surfactant on safflower. Anderson, R. L. An experiment was initiated in 1984 to determine if the addition of surfactant to chlorsulfuron applied to safflower resulted in crop injury. The chlorsulfuron-surfactant combination was applied to 'Hartman' safflower at three height ranges: 2-5 in (rosette growth stage), 6-8 in and 8-12 in. Trifluralin at 1.5 lb/A was applied ppi to ensure weed-free conditions. Chlorsulfuron at 0.25 oz/A + Triton X-77 at 0.5% (v/v) was applied with a tractor-mounted sprayer equipped with hollow cone nozzles, which delivered 34 gpa at 65 psi. Soil type was a Weld silt loam with 10 in of stored soil water at the date of planting. Visual evaluations were made on July 9, 1984 while plant variables were measured at harvest, September 20, 1984.

Safflower was more tolerant to chlorsulfuron + surfactant at the later applications, as agronomic variables were significantly affected only when chlorsulfuron + surfactant was applied to safflower at 2-5 in height. This treatment resulted in a significant yield loss, compared to the control, but yield loss did not occur with the later treatments. If applied to safflower taller than 5 in, chlorsulfuron shows potential as a postemergence herbicide to control broadleaf weeds in safflower. (USDA-ARS, Akron, CO 80720).

Effect of chlorsulfuron plus surfactant applied to safflower at three plant heights.

Safflower height at time of spraying (in)	Date of spray	Injury (visual) (%)	Ground cover (visual) (%)	Height (in)	Stand (plts/ yd-row)	Grain Yield (lb/A)	100-kernel weight (g)
Control (trifluralin alone)	-	0	65	16.8	14.5	1620	2.7
2-5	June 12	58	30	10.2	8.8	1140	2.7
6-8	June 21	6	58	15.7	14.8	1400	2.9
8-12	June 28	0	68	17.5	11.8	1540	2.8
LSD(0.05)		14	15	2.1	3.3	370	NS

Postemergence weed control in sugarbeets. Dewey, S.A., J.J. Gallian, P.W. Foote and S.K. Kober. Phenmedipham, desmedipham, ethofumesate and fluazofop-butyl alone and in combination were evaluated for efficacy and crop injury when applied as postemergence split treatments at the Kimberly R&E Center. Plots were arranged in a randomized complete block design and replicated four times. Treatments were applied with a tractor-mounted CO_2 sprayer delivering 9.8 gal/A at 30 psi. The first application for all treatments was made on May 18, 1984 when the weeds and sugarbeets were in the cotyledonary stage. The second application was made on May 26 when a second flush of weeds was in the cotyledon stage. Visual crop injury ratings and weed counts of the six most common weeds were made on June 13. (Table 1) A third herbicide application was made (treatment #2 only) on June 14 and final weed counts and crop injury ratings were made July 9, 1984. (Table 2)

Split-application treatments with low rates of phenmedipham + desmedipham were effective in controlling annual broadleaf weeds if applied when weeds were in the cotyledon stage. Injury to the crop was minimal, and injury symptoms were no longer evident 21 DAT. Addition of low rates of ethofumesate may have improved weed control, but did not significantly increase crop injury. (University of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Postemergence Weed Control in Sugarbeets - June evaluation

Treatments[1/]	Rate lb ai/A	Weeds per 6 sq ft June 13, 1984[2/] Colq	Hans	Cuns	Repw	Grft	Flwe	All Species[3/]	% Crop Injury
1. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate	.163 + .163/ .163 + .163 + .094	3.3	2.3	0	1.3	3.0	.3	10.0	21
2. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate	.163 + .163/ .163 + .163 + .094	1.5	2.0	.5	2.0	3.8	.5	10.3	26
3. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate	.163 + .163/ .163 + .163 + .188	.8	1.8	0	1.0	4.5	0	8.0	21
4. desmedipham + phenmedipham/ desmedipham + phenmedipham	.163 + .163/ .488 + .488	1.8	3.8	.3	3.8	6.8	1.0	17.3	17
5. Check	-	17.0	25.0	2.0	16.3	8.5	4.8	73.5	-
LSD (0.05)		3.82	7.97	1.29	6.33	3.82	1.15	12.08	NS

1/ Treatment application dates were 18 May, 26 May, and 14 June 1984. Slash (/) designates split application; plus (+) designates tank mix.
2/ Weed abbreviations: Colq = common lambsquarter, Hans = hairy nightshade, Cuns = cutleaf nightshade, Repw = redroot pigweed, Flwe = flixweed, Grft = green foxtail.
3/ Data from all six individual weed species combined.

Table 2. Postemergence Weed Control in Sugarbeets - July evaluation

Treatments 1/	Rate lb ai/A	Weeds per 6 sq ft July 9, 1984 2/ Colq	Hans	Cuns	Repw	Grft	Flwe	All Species 3/	% Crop Injury
1. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate	.163 + .163/ .163 + .163 + .094	2.3	.5	.3	1.3	4.0	0	8.3	16
2. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate/ desmedipham + phenmedipham + ethofumesate + fluazifop- butyl	.163 + .163/ .163 + .163 + .094 .365 + .365 + .282 + .25	1.0	.3	0	.3	.5	0	2.0	14
3. desmedipham + phenmedipham/ desmedipham + phenmedipham + ethofumesate	.163 + .163/ .163 + .163 + .188	1.8	2.5	0	1.5	3.0	1.3	10.0	14

Table 2. Postemergence Weed Control in Sugarbeets - July evaluation (Continued)

Treatments[1]	Rate lb ai/A	Weeds per 6 sq ft July 9, 1984[2] Colq	Hans	Cuns	Repw	Grft	Flwe	All Species[3]	% Crop Injury
4. desmedipham + phenmedipham/ desmedipham + phenmedipham	.163 + .163/ .488 + .488	.5	.3	3	0	2.5	0	3.5	20
5. Check		18.0	8.0	1.0	7.3	6.0	3.5	43.8	-
LSD (0.05)		4.63	3.01	NS	3.39	2.03	1.54	5.70	NS

1/ Treatment application dates were 18 May, 26 May, and 14 June 1984. Slash (/) designates split application; plus (+) designates tank mix.
2/ Weed abbreviations: Colq = common lambsquarter, Hans = hairy nightshade, Cuns = cutleaf nightshade, Repw = redroot pigweed, Flwe = flixweed, Grft = green foxtail.
3/ Data from all six individual weed species combined.

Evaluation of postemergence herbicides in sugarbeets. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center June 1, 1984 to evaluate their efficacy for weed control in sugarbeets (var. Holly Hybrid 30). Plots were 5.5 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 3-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (66% sand, 23% silt, 11% clay) with 0.9% organic matter and a 7.6 pH. The sugarbeets were in the cotyledon to 6-leaf stage and foxtail (green and yellow) 1 to 1½ in., common lambsquarters 2 to 8-leaf stage (½ to 2 in.), hairy nightshade 2 to 4-leaf stage (½ to 1 in.) and redroot pigweed cotyledon to 6-leaf stage (¼ to 1½ in.) at time of treatment.

Weed control and crop stand evaluations were made on June 20, 1984 and were determined by counting two 3 in. by 10 ft quadrats per replication. Common lambsquarters, hairy nightshade, redroot pigweed and foxtail populations were light averaging 0.5, 1.1, 0.2 and 0.2 plants/linear ft; respectively, in the untreated check. None of the herbicide treatments injured or reduced stand of sugarbeets. Grass control ranged from 72 to 100% with the postemergence grass control herbicides and was good to excellent with DPX-Y6206 at 0.06 lb/A or higher, sethoxydim at 0.2 lb/A or higher, PP-005 at 0.25 lb/A or higher and haloxyfop at 0.1 lb/A or higher. Grass control was similar when the grass control herbicides were applied alone or in combination with desmedipham/phenmedipham. Broadleaf weed control with desmedipham/phenmedipham ranged from poor to fair depending on species. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1291.)

Postemergence herbicides in sugarbeets

Herbicide[1]	Rate lb ai/A	Sugarbeet[2] Stand %	Percent Control[2]			
			Colq	Hans	Rrpw	Gr
DPX-Y6202 + X-77	0.03	100	0	0	0	72
DPX-Y6202 + X-77	0.06	100	0	0	0	89
DPX-Y6202 + X-77	0.12	100	0	0	0	89
DPX-Y6202 + X-77	0.25	100	0	0	0	89
DPX-Y6202 + X-77	0.5	100	0	0	0	100
sethoxydim + OC	0.2	100	0	0	0	100
sethoxydim + OC	0.3	100	0	0	0	100
sethoxydim + OC	0.4	100	0	0	0	100
PP-005 + OC	0.094	100	0	0	0	72
PP-005 + OC	0.12	100	0	0	0	72
PP-005 + OC	0.18	100	0	0	0	84
PP-005 + OC	0.25	100	0	0	0	100
PP-005 + OC	0.38	100	0	0	0	100
PP-005 + OC	0.75	100	0	0	0	100
fluazifop + OC	0.38	100	0	0	0	72
haloxyfop + OC	0.1	100	0	0	0	100
haloxyfop + OC	0.2	100	0	0	0	100
haloxyfop + OC	0.3	93	0	0	0	100
SC-1084 + OC	0.25	97	0	0	0	72
SC-1084 + OC	0.5	97	0	0	0	84
desm/phen	1.0	100	43	61	80	33
desm/phen + OC	1.0	94	56	75	100	45
desm/phen + DPX-Y6202 + X-77	1.0 + 0.12	100	56	73	87	89
desm/phen + sethoxydim + OC	1.0 + 0.3	100	49	77	87	63
desm/phen + PP-005 + OC	1.0 + 0.18	100	56	74	87	84
desm/phen + PP-005 + OC	1.0 + 0.25	97	60	77	87	89
desm/phen + haloxyfop + OC	1.0 + 0.1	100	52	80	87	100
desm/phen + SC-1084 + OC	1.0 + 0.25	100	60	77	87	89
Check	---	100	0	0	0	0

[1]Treatments applied June 1, 1984. X-77 = 0.25% v/v, OC = Atplus 411F at 1 qt/A except 1% v/v with PP-005 and fluazifop and desm/phen = 1:1 mixture of desmedipham + phenmedipham (1.0 lb/A = 0.5 + 0.5).

[2]Sugarbeet weed control and stand counts June 20, 1984, from two 3 in. by 10 ft quadrats per replication.

Influence of preplant herbicide, application timing and spray volume on desmedipham-phenmedipham combinations in sugarbeets. Miller, S. D. and H. P. Alley. Research plots were established at the Torrington Research and Extension Center to evaluate the influence of preplant herbicide, application timing and spray volume on the efficacy of desmedipham-phenmedipham combinations applied postemergence in sugarbeets. Plots were 11 by 150 ft in size with three replications arranged in a randomized complete block. The soil was classified as a sandy loam (66% sand, 23% silt, 11% clay) with 0.9% organic matter and a 7.6 pH. Preplant herbicides were applied in a 7-inch band with a tractor mounted sprayer delivering 34.5% gpa at 40 psi, incorporated to a depth of 1½ to 2 in. immediately after application with a PTO-driven incorporation unit and Holly Hybrid 30 sugarbeets planted May 4, 1984. Desmedipham-phenmedipham treatments included early repetitive applications and regular timing treatments applied in carrier volumes of 3.2 (micro max) and 8.0 gpa (flat fan) with a tractor mounted sprayer. The initial application in the repetitive treatments was applied May 25, 1984 when sugarbeets were in the cotyledon to 2-leaf stage and foxtail (green and yellow) ¼ to ½ in., common lambsquarters 2 to 4-leaf stage (½ to 1 in), hairy nightshade cotyledon to 2-leaf stage (1/4 to 3/4 in.), redroot pigweed cotyledon to 2-leaf stage (¼ to ½ in.) and kochia ½ in. rosette. The second application in the repetitive treatments and the regular timing treatments were applied June 1, 1984 to sugarbeets in the cotyledon to 4-leaf stage and foxtail ½ to 1 in.; common lambsquarters 2 to 8-leaf stage (½ to 2 in.), hairy nightshade 2 to 4-leaf stage (¼ to 1½ in.), redroot pigeweed cotyledon to 6-leaf stage (¼ to 1½ in.) and kochia ½ to 1 in. rosette.

Weed control and crop stand evaluations were made on June 12, 1984 and were determined by counting two 3 in. by 10 ft quadrats per replication. Kochia, common lambsquarters, hairy nightshade, redroot pigweed and foxtail infestations were light averaging 0.1, 0.2, 0.2, 0.1 and 2.5 plants/linear ft; respectively, in the untreated check. Sugarbeet stands were reduced 28% by preplant incorporated applications of ethofumesate at 2.5 lb/A. Postemergence applications of desmedipham-phenmedipham combinations over the top of ethofumestate increased stand reductions 10 to 17%. Sugarbeet stand reductions with desmedipham-phenmedipham combinations alone ranged from 5 to 12%. Weed control with ethofumesate was generally good and postemergence applications of desmedipham-phenmedipham over the top of ethofumesate had little influence on weed control. Weed control with cycloate was fair to good. Postemergence applications of desmedipham-phenmedipham alone was slightly more effective as an early repetitive than regular timing treatment; however, method of application had little influence on weed control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1289.)

Desmedipham-phenmedipham combinations in sugarbeets

Treatment[1]	Rate lb ai/A	Sugarbeet stand %	Percent Control[2]				
			Kocz	Colq	Hans	Rrpw	Gr
cycloate +	3.0 +	100	0	78	100	80	97
desm-phen repetitive (Flat fan)	0.5 + 0.5	100	29	100	100	100	97
desm-phen repetitive (Micro max)	0.5 + 0.5	92	0	100	100	100	97
desm-phen regular (Flat fan)	1.0	100	100	100	100	100	99
desm-phen regular (Micro max)	1.0	83	58	100	100	100	99
ethofumesate +	2.5 +	72	72	91	100	100	94
desm-phen repetitive (Flat fan)	0.5 + 0.5	62	72	100	100	100	100
desm-phen repetitive (Micro max)	0.5 + 0.5	58	100	100	100	100	100
desm-phen regular (Flat fan)	1.0	55	72	100	100	100	100
desm-phen regular (Micro max)	1.0	55	100	100	100	100	100
Check +	---	100	---	---	---	---	---
desm-phen repetitive (Flat fan)	0.5 + 0.5	88	0	100	100	100	16
desm-phen repetitive (Micro max)	0.5 + 0.5	88	0	87	87	100	15
desm-phen regular (Flat fan)	1.0	95	29	78	80	100	35
desm-phen regular (Micro max)	1.0	92	0	87	67	80	0

[1]Preplant herbicides applied and incorporated May 4, 1984. The initial application in the repetitime treatments applied May 25, 1984. The second application in the repetitive treatment and regular timing treatments applied June 1, 1984. Desm-phen = 1:1 mixture of desmedipham + phenmedipham (1.0 lb/A = 0.5 + 0.5).

[2]Sugarbeet weed control and stand counts June 13, 1984 from two 3 in. by 10 ft quadrats per replication.

Evaluation of preplant, preemergence and complementary preplant or preemergence/postemergence treatments in sugarbeet. Miller, S. D. and H. P. Alley. Research plots were established at the Torrington Research and Extension Center to evaluate the efficacy of preplant or preemergence herbicide treatments alone or in combination with desmedipham-phenmedipham postemergence in sugarbeets. Plots were 5.5 by 50 ft in size with three replications arranged in a randomized complete block. The soil was classified as a sandy loam (66% sand, 23% silt, 11% clay) with 0.9% organic matter and a 7.6 pH. Preplant herbicides were applied in a 7-inch band with a tractor mounted sprayer delivering 34.5 gpa at 40 psi, incorporated to a depth of 1½ to 2 in. immediately after application with a PTO-driven incorporation unit and Holly Hybrid 30 sugarbeets planted May 4, 1984. Preemergence or postemergence herbicide treatments were applied broadcast with a CO_2 pressurized 3-nozzle knapsack unit delivering 40 gpa at 40 psi on May 5 and June 1, 1984; respectively. The sugarbeets were in the cotyledon to 4-leaf stage and foxtail (green and yellow) 1 to 1½ in., common lambsquarters 2 to 8-leaf stage (½ to 2 in.), hairy nightshade 2 to 4-leaf stage (½ to 1 in.), redroot pigweed cotyledon to 6-leaf stage (¼ to 1½ in.) and kochia the rosette stage (½ to 1 in.) at the time of postemergence herbicide application.

Weed control and crop stand evaluations were made on June 13, 1984 and were determined by counting two 3 in. by 10 ft quadrats per replication. Plots were harvested for yield October 3, 1984. Common lambsquarters, kochia, hairy nightshade, redroot pigweed and foxtail populations were light averaging 0.2, 0.1, 0.7, 0.5 and 0.1 plants/linear ft; respectively, in the untreated check. Sugarbeet stand, when compared to the untreated check, was reduced 25 to 51% by preplant applications of ethofumasate plus diethatyl with or without a complementary postemergence treatment, preemergence applications of SC-1102 at 3 lb/A with or without a complementary postemergence treatment and a preplant application of cycloate plus ethofumesate with a complementary postemergence treatment. Broad spectrum weed control was good to excellent with cycloate plus ethofumesate, all complementary preplant/postemergence treatments and preemergence applications of ethofumesate plus diethatyl with a complementary postemergence treatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1290.)

Preplant, preemergence and complementary preplant or preemergence/postemergence treatments in sugarbeets.

Treatment[1]	Rate lb ai/A	Sugarbeet Stand %	Sugarbeet Yield ton/A	Sugarbeet Sucrose %	Percent Control[2] Colq	Kocz	Ns	Rrpw	Gr
Preplant									
cycloate	3.0	100	16.2	13.9	85	100	100	100	100
ethofumesate	2.0	95	15.5	13.6	75	100	100	100	83
cycloate + ethofumesate	1.0 + 1.0	80	19.6	13.7	90	60	100	100	100
cycloate + ethofumesate	1.5 + 1.5	80	21.8	13.5	100	100	100	100	100
ethofumesate + diethatyl	2.0 + 2.0	49	15.2	12.5	60	100	100	100	100
Preemergence									
ethofumesate + diethatyl	2.0 + 2.0	92	15.1	13.5	75	40	96	100	100
SC-1102	1.5	100	21.9	13.2	50	60	25	100	100
SC-1102	3.0	57	15.1	13.2	0	100	36	100	100
Complementary Preplant/Postemergence									
cycloate/desm-phen	2.0 + 0.67	100	15.6	13.3	100	100	100	100	100
ethofumesate/desm-phen	1.5 + 0.67	100	17.0	13.4	90	100	100	100	100
cycloate + ethofumesate/desm-phen	1.0 + 1.0 + 0.67	100	16.8	13.7	100	100	100	100	100
cycloate + ethofumesate/desm-phen	1.5 + 1.5 + 0.67	65	12.5	13.4	100	100	100	100	100
ethofumesate + diethatyl/desm-phen	2.0 + 2.0 + 0.67	69	17.6	12.9	100	60	100	100	100
Complementary Premergence/Postemergence									
ethofumesate + diethatyl/desm-phen	2.0 + 2.0 + 0.67	82	20.3	12.9	100	100	100	100	100
SC-1102/desm/phen	1.5 + 0.67	82	15.5	13.6	50	100	100	100	100
SC-1102/desm-phen	3.0 + 0.67	65	15.8	12.0	60	100	100	100	100
Check	---	100	19.2	13.4	---	---	---	---	---

[1]Preplant treatments applied May 4, preemergence treatments May 5 and postemergence treatments June 1, 1984. Desm-phen = 1:1 mixture of desmedipham + phenmedipham (0.67 lb/A = 0.335 + 0.335).

[2]Sugarbeet weed control and stand counts June 13, 1984 from two 3 in. by 10 ft quadrats per replication.

Evaluation of time of sethoxydim application for johnsongrass control in sugar beets. R.F. Norris, R.L. Sailsbery, and R.A. Lardelli. A field study was conducted to evaluate postemergence control of johnsongrass in sugar beets. Sethoxydim and oil was evaluated at 0.50 lb/A on two different application dates. The first treatment was applied on 5/31/84 when the sugar beets were 1 foot and the johnsongrass 1 to 2.5 feet tall. On 6/14/84, when the johnsongrass reached the 2.5 to 4.5 ft. growth stage and the sugar beets were approximately 1.5 ft tall, the second treatment was applied. A CO_2 backpack handsprayer, operated at 30 psi with flat fan nozzles, was used for the application and delivered 40 gal/A of total spray solution. The plot size was 10 ft by 30 ft, and each treatment was replicated four times in a complete randomized block design.

The trial was evaluated on 8/23/84. Johnsongrass control was satisfactory on both application dates. However, for complete control, an additional treatment would be needed.

Yields of all treatments were obtained. There was a significant increase in root yield and sucrose per acre for both application dates. The yield increase for this experiment would be equivalent to about $250 per acre. (Botany Department, University of California, Davis and Cooperative Extension, Orland, CA 95963.)

Treatments:	Rate	Johnsongrass Control 8/23/84[1/]	Sugar Beet Harvest 9/20/84 Beets/ 100 ft	Beets[2/]	Sugar	Sugar[2/]
	(lb/A)	---- (%) ---	#	(T/A)	(%)	(T/A)
Untreated check		38	105	30.6b	12.4	3.8b
Sethoxydim + oil applied 5/31/84	0.50 + 1 qt.	78	112	39.2a	13.0	5.1a
Sethoxydom + oil applied 6/14/84	0.50 + 1 qt.	75	110	38.4a	12.4	4.8a

1/ Control rating: 0 = none; 100 = complete.

2/ Means with the same letters are not significantly different at 5% level, according to the Duncan's multiple range test.

Postemergence herbicide combinations for control of barnyardgrass in sugar beets. R. F. Norris, F. R. Kegel and R. A. Lardelli. A trial was established in San Joaquin County to investigate the antagonism encountered between phenmedipham/desmedipham and sethoxydim for postemergence annual grass control.

A sugar beet field with severe infestation of barnyardgrass was selected near Stockton, California. The sugar beets had been planted on June 30, 1984 with herbicide treatments applied postemergence on the morning of July 22, 1984. The barnyardgrass was 1 to 4 inches tall, and the sugar beets had 2 to 6 true leaves at the time of spraying. Broadleaf weeds present were common purslane at approximately 2 to 3 inches. Treatments were applied with a CO_2 backpack sprayer with 8004 flat fan nozzle operated at 30 psi and delivering 40 gal/A. Plot size was 5 feet (2 beds) by 10 feet; each herbicide treatment was replicated four times. Soil moisture was 10% (w/v) at time of application. Air temperatures at and following spraying ranged from 58°F to 85°F. The field was not irrigated until August 8, 1984.

None of the treatments caused any injury to the sugar beets. All rates of sethoxydim and oil, when applied alone, provided good grass control. Phenmedipham/desmedipham showed very little activity on the grasses. A strong antagonism was observed between all rates of sethoxydim with oil and phenmedipham/desmedipham. This became much more noticeable by the second evaluation, especially where no oil was added. (Botany Department, University of California, Davis and Cooperative Extension, Stockton.)

Treatment	Rate	Weed Control[1/] Barnyardgrass 8/3	8/13	Purslane 8/13
	(lb/A)	----------- (%)		----------
Untreated check		5 a	0 a	23 abcdefg
Pace oil adjuvant	1 qt.	15 ab	0 a	25 abcdef
Phenm. + Desm.	1.00	20 ab	0 a	69 g
Phenm. + Desm. + pace	1.00 + 1 qt.	33 bc	5 a	58 fg
Sethoxydim	0.20	40 cd	18 ab	0 a
Sethoxydim + pace	0.20 + 1 qt.	68 efg	86 fg	8 a
Sethoxydim + Phenm. + Desm.	0.20 + 1.00	68 efg	49 cd	53 defg
Sethoxydim + Phenm. + Desm. + pace	0.20 + 1.00 + 1 qt.	86 g	63 def	55 efg
Sethoxydim	0.30	55 de	66 def	28 abcdef
Sethoxydim + pace	0.30 + 1 qt.	75 fg	93 g	13 ab
Sethoxydim + Phenm. + Desm.	0.30 + 1.00	63 ef	31 bc	48 bcdefg
Sethoxydim + Phenm. + Desm. + pace	0.30 + 1.00 + 1 qt.	80 fg	63 def	48 bcdefg
Sethoxydim	0.40	60 ef	81 fg	20 abcde
Sethoxydim + pace	0.40 + 1 qt.	75 fg	95 g	10 a
Sethoxydim + Phenm. + Desm.	0.40 + 1.00	75 fg	53 cde	48 bcdefg
Sethoxydim + Phenm. + Desm. + pace	0.40 + 1.00 + 1 qt.	85 g	78 efg	50 bcdefg

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

<u>Bentgrass control in birdsfoot trefoil</u>. Brewster, B.D. and A.P. Appleby. Five herbicides were evaluated for efficacy on colonial bentgrass in birdsfoot trefoil near Airlie, Oregon. Treatments were applied with a unicycle, compressed-air plot sprayer on May 16, 1984. The spray volume was 234 l/ha. The plots were 2.5 m by 6 m and were arranged in a randomized complete block design with two replications. Crop oil concentrate was added to each treatment at a rate of 2.3 l/ha. The trefoil was 10 cm to 15 cm tall when the herbicides were applied.

No injury symptoms were seen on the birdsfoot trefoil on June 5 or July 13. Although all herbicides affected the colonial bentgrass, only DPX Y6202 and haloxyfop-methyl produced over 90% control in the July evaluation. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331.

Efficacy of five herbicides applied on May 16 on colonial bentgrass in birdsfoot trefoil

Herbicide	Rate (Kg/ha)	Visual evaluations: Birdsfoot trefoil injury, June 5	Birdsfoot trefoil injury, July 13	Colonial bentgrass control, June 5	Colonial bentgrass control, July 13
		(%)			
sethoxydim	0.28	0	0	75	35
sethoxydim	0.42	0	0	70	50
fluazifop-butyl	0.28	0	0	45	80
fluazifop-butyl	0.42	0	0	75	80
fluazifop-P-butyl	0.28	0	0	70	85
fluazifop-P-butyl	0.42	0	0	80	80
haloxyfop-methyl	0.28	0	0	65	90
haloxyfop-methyl	0.42	0	0	80	98
DPX Y6202	0.28	0	0	75	80
DPX Y6202	0.42	0	0	75	100
Check	0	0	0	0	0

Tolerance of winter wheat to clopyralid. Brewster, B.D. and A.P. Appleby. Spring applications of clopyralid are effective in controlling Canada thistle and could be useful in reducing this problem in tolerant crops. This trial was undertaken to evaluate the effect of clopyralid on fall-planted wheat. The trial site was a relatively weed-free stand of 'Stephens' wheat in 36 cm wide rows growing on a Woodburn silt loam near Corvallis, Oregon. Treatments were applied on March 27, 1984, with a unicycle, compressed-air sprayer. Spray volume was 234 l/ha. Plots were 2.5 m by 7.5 m in a randomized complete block design with three replications. The wheat had one to two nodes and was 40 cm to 45 cm tall when the treatments were applied.

Visual evaluations on April 13 and June 5 did not reveal any injury to the crop. The yields of wheat grain obtained in July increased as the rate of clopyralid increased, but none of the differences were statistically significant. Combinations of clopyralid with 2,4-D or MCPA also did not cause visible symptoms on the wheat nor reduce wheat yields.
(Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Effect of clopyralid on winter wheat yield

Herbicide	Rate (Kg/ha)	Wheat injury April 13	Wheat injury June 5	Wheat yield[1] (Kg/ha)
		(%)	(%)	
clopyralid	0.07	0	0	6650
clopyralid	0.14	0	0	6830
clopyralid	0.28	0	0	7100
clopyralid	0.56	0	0	7200
clopyralid + 2,4-D amine	0.14 + 0.56	0	0	7060
clopyralid + MCPA amine	0.14 + 0.56	0	0	6980
Check	0	0	0	6460

[1]Differences not significantly different at the 5% level.

Canada thistle control in spring wheat. Dewey, S.A. and P.W. Foote. Four herbicides for control of Canada thistle in spring wheat were evaluated individually or in combination at the Kimberly R&E Center. Plots measuring 8 x 25 ft were arranged in a randomized complete block design and replicated three times.

All treatments were applied on May 22, 1984 using a CO_2 backpack sprayer at 20 gal/A and 40 psi. Wheat plants were 10 to 14 inches tall and fully tillered. The first node was detectable in approximately 10% of the plants. Thistle plants were 4 to 6 inches tall with rosettes 8 to 12 inches wide.

Thistle control was evaluated on June 1, June 29 and July 20. XRM 3972 (Dowco 290) alone or in combination with chlorsulfuron, dicamba, or 2,4-D gave better control of Canada thistle than did 2,4-D or dicamba alone. XRM 3972 alone did not control common lambsquarters. A poor grain stand and non-uniform thistle distribution contributed greatly to yield variability. (Univ. of Idaho Cooperative Extension, Twin Falls, ID 83301)

Table 1. Canada Thistle Control and Yield of Spring Wheat

Treatment	Rate lb ai/A	Timing	% Canada Thistle Control 6-1	6-29	7-20	Yield lb/A
XRM 3972 + 2,4-D	.125+0.5	POST	62	93	91	3109
XRM 3972 + chlorsulfuron	.125+.016	POST	65	91	89	2971
XRM 3972 + dicamba	.125+.125	POST	67	87	85	2738
2,4-D	.50	POST	27	45	33	3309
chlorsulfuron	.016	POST	57	94	86	2585
dicamba	.125	POST	33	70	55	3134
XRM 3972	.125	POST	52	75	82	2979
Check	-	-	-	-	-	2611
LSD (0.05)			10.9	13.9	14.1	NS

Postplant incorporated and preemergence herbicides for wild oat control in spring wheat. Evans, J.O. and R.W. Gunnell. Postplant incorporated and preemergence surface herbicide treatments were applied May 21, 1984 to Fieldwin spring wheat which had been planted May 18, at a depth of 5 cm. Soil type was a silt loam with a pH of 8.1 and 2.93% organic matter. Prior to crop planting wild oat seed was hand broadcast throughout the plot area and incorporated during secondary tillage seedbed preparation. In addition, Cayuse variety tame oats were planted perpendicular to wheat rows at a rate of 24 kg/ha at a depth of 5 cm to insure a uniform oat population. Plot size was 2.4m by 6.1m in a randomized block design with 3 replications. Treatments were applied with a bicycle sprayer calibrated to spray 187 l/ha at 30 psi. Postplant incorporated treatments were applied first and were immediately incorporated twice in opposite directions to a depth of 3 cm with a drag type spike tooth harrow. Preemergence surface treatments were then applied to the untreated portion of the harrowed plot. First rainfall (.25 cm) occurred 2 days after herbicide application, and within 10 days after application an additional 1.2 cm of rain had fallen.

The experiment was evaluated on a visual percentage basis July 18, 1984 and August 16, 1984. Since wild oat seed did not germinate uniformly, the Cayuse tame oat planting was used as the weed indicator species. None of the preemergence surface treatments gave acceptable oat control, but postplant incorporated treatments of triallate at 1.40 kg/ha and SD95481 at 1.12 kg/ha gave good oat control. Only the postplant incorporated UC82042 treatment at 6.72 kg/ha caused slight crop injury. (Plant Science Department, UMC 48, Utah State University, Logan, Utah 84322)

Wild oat response to postplant incorporated and preemergence surface herbicide applications in spring wheat.

Treatment	Rate (kg/ha)	Percent wheat injury 7-18-84	8-16-84	Percent control wild oat 7-18-84	8-16-84
UC82042 (popi)	2.24	0	0	20	0
UC82042 (popi)	4.48	0	0	33	20
UC82042 (popi)	6.72	3	0	50	42
UC82042 (pre)	2.24	0	0	0	0
UC82042 (pre)	4.48	0	0	7	0
UC82042 (pre) Z7653-A (pre)	2.24+ 2.24	0	0	13	0
Z7653-A (popi)	4.48	0	0	68	57
Z7653-A (pre)	4.48	0	0	13	0
SD95481 (popi)	0.56	0	0	68	70
SD95481 (popi)	1.12	0	0	87	85
SD95481 (pre)	0.56	0	0	10	20
SD95481 (pre)	1.12	0	0	37	40
triallate (popi)	1.40	0	0	92	88
triallate (pre)	1.40	0	0	53	50
check	-	0	0	0	0

Postemergence weed control in spring wheat. Evans, J.O. and R.W. Gunnell. The introduction of new herbicides for broadleaf weed control in small grains provides an opportunity to address problems of herbicide efficacy, crop safety, and economics through intelligent tank mixing of new compounds with older, well-established herbicides. On July 2, 1984, postemergence herbicide treatments were applied to a uniform stand of Fieldwin spring wheat which was 20 cm tall. Common lambsquarters at the 3 cm to 8 cm growth stage was the predominant weed species with an average of 66 plants per square meter. Redroot pigweed at a height of 3 cm to 6 cm and 18 plants per square meter was the only other species encountered in a uniform population. Treatments were applied to 2.4m by 9.1m plots with 4 replications in a randomized block design using a bicycle sprayer calibrated to deliver 187 l/ha at 30 psi. Visual estimates of crop and weed injury were made on July 19, and August 15, 1984. Indications after first evaluation were that tank mixes containing MCPA or 2,4-D provided the best broadleaf weed control. By August 15, treatments of dicamba plus chlorsulfuron, dicamba plus metsulfuron, and metsulfuron plus bromoxynil were equivalent in control to the MCPA plus dicamba, chlorsulfuron plus 2,4-D, and metsulfuron plus 2,4-D tank mixes. Weed control with metsulfuron or chlorsulfuron applied alone at the highest use rate was also acceptable. Treatments containing fluorochloridone caused crop chlorosis and stunting from which the crop did not recover. Other treatments caused no detectable crop injury. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

Broadleaf weed response to postemergence herbicides

Treatment	(g/ha)	Percent wheat injury 7-19-84	Percent wheat injury 8-12-84	Percent control: common lambsquarters 7-19-84	Percent control: redroot pigweed 7-19-84	Percent control: common lambsquarters 8-12-84	Percent control: redroot pigweed 8-12-84
dicamba	140	0	0	35	53	42	38
dicamba	140+						
MCPA	560	3	0	88	90	95	92
dicamba	140+						
chlorsulfuron	9	0	0	28	38	82	90
dicamba	140+						
chlorsulfuron	18	0	0	60	60	95	94
chlorsulfuron	18	0	0	18	30	88	92
fluorochloridone	560	15	10	61	71	70	68
fluorochloridone	840	18	10	49	52	75	78
fluorochloridone	560+						
chlorsulfuron	18	18	12	53	49	92	87
chlorsulfuron	9+						
2,4-D	280	0	0	90	88	96	97
chlorsulfuron	9+						
bromoxynil	280	5	0	78	74	89	88
metsulfuron	4	0	0	30	28	76	86
metsulfuron	9	0	0	58	63	94	90
metsulfuron	4+						
2,4-D	280	0	0	86	85	99	98
metsulfuron	4+						
dicamba	140	0	0	61	69	97	98
metsulfuron	4+						
bromoxynil	280	0	0	49	53	94	97
check	-	0	0	0	0	0	0

The influence of fall and spring-applied herbicides 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 1983 at the University of Idaho Plant Science farm at Moscow, ID to study the influence of both time and type of herbicide application on broadleaf weed control in winter wheat (var. Stephens). The dominant weed species at this site were narrowleaved montia (MONLI), a winter annual, and mayweed (ANTCO), functioning as an annual or extremely late-germinating winter annual. The objective of this experiment was to investigate a trend observed in similar studies where fall-applied treatments resulted in poorer visual weed control ratings but higher grain yields than comparable spring-applied treaments.

All treaments were replicated four times on 10 by 30 foot plots in a randomized complete block design. The treatments were broadcast applied with a CO_2-pressurized backpack sprayer calibrated to deliver 20 gpa at 45 psi and 3 mph with 8002 flat fan nozzles.

Various herbicides were applied singly or in tank mixtures at four times during the growing season: PES, fall post, spring post I, and spring post II. Surface-applied treatments pre-emergent to both the crop and weeds (PES) were applied two days after planting (9/24/83). Treatments applied postemergence to the crop and narrowleaved montia, but pre-emergent to the mayweed (fall post) were made 70 days after planting (12/1/83). Spring postemergence treatments were applied after the crop began tillering and had developed 3.5 to 4.5 inch adventitious roots (spring post I) on 5/19/84, or when the crop was in the late boot to early heading stage (spring post II) on 6/13/84. The latter application timing was made much later than optimum due to inclement weather, preventing application at the proper growth stage.

Visual evaluations of crop stand and vigor reduction--SR and VR, respectively--as well as weed control as a percent of check were made twice during the growing season. The first evaluation was made just prior to the application of the early spring post treatments (5/17/84) and included SR, VR, and weed control ratings for the PES and fall post treatments. The second evaluation was made 33 days after application of the late spring post treatments and included SR,VR, and mayweed control ratings for all treatments. An evaluation of narrowleaved montia control with the spring-applied treatments was not done since it had begun to senesce prior to the application of those treatments.

Increased stand reduction of the crop was observed with increasing rates of PPG-1013 applied both PES and fall post (see Table 1). Some vigor reduction was associated with the high rate of of PPG-1013 applied PES, 2,4-D at 0.75 lb ai/A, and 2,4-D + dicamba at 0.38 + 0.125 lb ai/A. As mentioned previously, the phenoxy treatments were applied later than is recommended.

Mayweed control was good to excellent (82 to 99%) with all spring-applied treatments except metribuzin applied at 0.25 lb ai/A which resulted in 75% control. The early evaluation of fall-applied treatments indicated poor mayweed control with all treatments except PPG-1013 applied PES at all rates, PPG-1013 applied applied post at 0.06 lb ai/A, and chlorsulfuron at 0.016 lb ai/A applied post. The late evaluation of the fall-applied treatments indicated a slight trend towards decreased mayweed control.

All of the fall-applied treatments showed good to excellent (83 to 100%) control of narrowleaved montia at the early evaluation date except chlorsulfuron at 0.021 lb ai/A applied PES which, inexplicably, gave poor (25%) control. The late evaluation indicated a similar degree of control with the exception of fluorochloridone at 0.5 lb ai/A, RH 0265 at 0.13 lb ai/A, and bromoxynil + MCPA (formulated tank mixture, 3 lb/gal) at 0.38 lb ai/A.

Fall applications that gave good early control of narrowleaved montia resulted in grain yields greater than the check; exceptions to this are PPG-1013 at all rates, chlorsulfuron at 0.021 (PES) and 0.016 lb ai/A (post) and chlorsulfuron + bromoxynil at 0.008 + 0.25 lb ai/A. Spring-applied chlorsulfuron + dicamba at 0.008 + 0.06 lb ai/A, metribuzin + bromoxynil at 0.25 + 0.25 lb ai/A, and terbutryn + MCPA at 1.00 + 0.38 lb ai/A also resulted in grain yields greater than the check. In general, a trend towards increased grain yield with fall-applied treatments over that of comparable spring-applied treatments seems to be present. This same trend was observed to a greater degree in a similar study conducted during the 1982-83 growing season. (Idaho Agricultural Experiment Station, Moscow, 83843)

Herbicide formulations used

Herbicide	Formulation
bromoxynil	4EC
bromoxynil/MCPA	3EC/3EC (butoxyethyl ester)
chlorsulfuron	75DF
dicamba	4EC
diuron	80WP
fluorochloridone	2EC
MCPA	2EC (sodium salt)
metribuzin	75DF
PPG-1013	1EC
RH 0265	2EC
terbutryn	80WP
2,4-D	4EC (LV ester)

Table 1. Broadleaf weed control at Moscow, ID

Treatment	Rate	Type of application	SR	VR	Weed Control ANTCO E[1]	ANTCO L[2]	MONLI E	MONLI L	Yield
	(lb a.i./A)		-----	-----	-----	%	-----	-----	(bu/A)[3]
check	0.00	-	0	0	0	0	0	0	22
fluorochloridone	0.50	PES	0	0	48	45	83	25	38
PPG-1013	0.10	PES	54	1	86	60	96	99	25
PPG-1013	0.20	PES	81	0	96	82	100	99	8
PPG-1013	0.40	PES	90	10	100	94	100	100	3
chlorsulfuron	0.016	PES	0	0	38	39	91	99	38
chlorsulfuron	0.021	PES	10	4	8	8	25	25	26
RH 0265	0.13	F.POST[4]	0	0	0	5	84	50	40
PPG-1013	0.03	F.POST	40	0	65	55	92	99	16
PPG-1013	0.06	F.POST	84	1	95	85	98	100	8
bromoxynil + MCPA	0.38	F.POST	0	0	18	14	95	50	35
chlorsulfuron[5]	0.016	F.POST	0	0	88	65	98	99	32
chlorsulfuron + bromoxynil	0.008 + 0.25	F.POST	4	0	14	0	92	99	26
chlorsulfuron + bromoxynil	0.016 + 0.25	F.POST	5	0	58	54	83	99	39
chlorsulfuron + dicamba	0.008 + 0.06	F.POST	0	0	19	30	92	87	39
chlorsulfuron + dicamba	0.016 + 0.125	F.POST	1	0	62	62	97	99	43
bromoxynil + MCPA	0.38	S.POST I	·8	1		86			30
chlorsulfuron	0.016	S.POST I	2	1		92			29
chlorsulfuron + bromoxynil	0.008 + 0.25	S.POST I	5	6		97			34
chlorsulfuron + bromoxynil	0.016 + 0.25	S.POST I	2	1		99			31
chlorsulfuron + dicamba	0.008 + 0.06	S.POST I	1	0		92			35
chlorsulfuron + dicamba	0.016 + 0.125	S.POST I	2	0		94			29
diuron + bromoxynil	0.60 + 0.25	S.POST I	8	1		85			32
metribuzin	0.25	S.POST I	11	1		74			33
metribuzin + bromoxynil	0.25 + 0.25	S.POST I	4	2		94			40
terbutryn + MCPA	1.00 + 0.38	S.POST I	1	0		95			35
2,4-D	0.75	S.POST II	11	16		88			30
2,4-D + dicamba	0.38 + 0.06	S.POST II	6	4		86			16
2,4-D + dicamba	0.38 + 0.125	S.POST II	12	10		82			11
$LSD_{(0.05)}$			16	7	32	20	19	32	12

[1]Early evaluation, 5/17/84;
[2]Late evaluation, 7/16/84;
[3]Test weight = 55 lb./bu.;
[4]See text;
[5]All post-applied chlorsulfuron treatments included 0.5% v/v nonionic surfactant;

Response of six winter wheat cultivars to diclofop-methyl and take-all disease. Geddens, R.M., A.P. Appleby, and R.L. Powelson. Oregon wheat growers often use post-emergence applications of diclofop-methyl(DM) for control of wild oats and Italian ryegrass. Questions have arisen over the effect of DM on growth of wheat under stress from plant disease. Research was undertaken to determine the influence of DM on growth and disease severity in six winter wheat cultivars infected with take-all disease, a prevalent, highly destructive soil-borne disorder caused by the fungus, *Gaeumannomyces graminis* var. *tritici*(GGT).

An experiment established at Hyslop Research Farm, Corvallis, Oregon, in 1982-83, included a factorial combination of DM at 0(herbicide check) and 1.12 kg ai/ha, and soil-incorporated, ground, GGT-colonized oat seed inoculum at 0(disease check) and 100 kg/ha, tested on each of six winter wheat cultivars. Cultivars examined were Stephens, Hill 81, Hyslop, Nugaines, Daws, and McDermid. Treatments were arranged in a randomized, complete block design in seven replications. Circular microplots 0.1 m^2 in area(36 cm diameter) were established 1 m apart. Take-all inoculum was spread evenly over the microplot by hand and incorporated to a depth of 20 cm. Inoculum was incorporated 1 day prior to planting. Seed of each cultivar were planted by block on Nov 12 through Nov 14, with three seed per plot. Poor germination necessitated transplanting. Wheat seedlings of each cultivar were grown in a growth chamber at 13 C and 12 h photoperiod for 3 weeks prior to transplanting into microplots on Feb 1. DM was applied on Mar 3 with a unicycle sprayer equipped with compressed air. DM application was made in 234L/ha water and at 124 kPa. Herbicide check plots were covered with 2.8 by 4.7 cm rectangles of weighted wrapping paper to exclude herbicide spray. The entire plot area was handweeded three times during the growing season to insure complete weed control. Individual plants were harvested by block on Jul 14 through Jul 17. Plants were cut 5 cm above the soil surface. Fresh weights and number of fertile tillers per plant were then determined. Soil cores, 16 cm by 16 cm, were dug in each microplot to a depth of 10 cm to recover root systems directly adjacent to the crown. Soil was washed from the roots and disease severity assessed by determination of the percentage of the root system of each subsample exhibiting blackened lesions characteristic of take-all disease.

Variations in fresh weight per plant among cultivars depended upon whether take-all disease was present. Take-all reduced fresh weights in all cultivars except Stephens. Reductions from take-all, however, were statistically significant(p=.05) only in Nugaines and Daws. Differences among cultivars also depended upon herbicide treatment. Examination of the three-way interaction suggested that sensitivity to DM in some cultivars may depend upon the presence of take-all disease(Table 1). Fresh weights of Stephens and Nugaines were reduced substantially(15% and 17% reductions, respectively) when DM was applied in the absence of disease. If diseased, however, these cultivars produced higher fresh weights(8% and 23% increases, respectively) when treated with DM. Similar results for Stephens have been noted in related experiments. Variations in fertile tiller number per plant among cultivars also depended upon the presence of take-all disease. Take-all reduced tiller number in Nugaines and Daws. Tiller numbers in Stephens, Hyslop, and McDermid were relatively insensitive to take-all, while Hill 81 produced more tillers when diseased. The marginally significant cultivar X disease X herbicide interaction suggests that the effect of DM may depend upon both the cultivar and level of take-all present(Table 2). Only the level of take-all inoculum significantly affected the severity of take-all symptoms(p=.01). Symptoms observed in the uninoculated microplots were probably due to residual take-all inoculum in the soil from previous cereal or grass crops. Examination of the cultivar X disease X herbicide interaction again suggests that DM may influence the severity of take-all symptoms on some cultivars(Table 3). Stephens is of particular interest because this cultivar is highly popular with Oregon wheat growers. Roughly 70% of the soft white winter wheat acreage in Oregon was planted to Stephens in 1984. Previous research also confirms that application of DM to this cultivar often results in reduced disease severity when take-all is present. In other cultivars, however, application of DM to diseased plants could result in increased take-all injury. (Crop Sci. and Bot./Pl. Path. Depts., Oregon State Univ., Corvallis, OR 97331)

Table 1. Effects of diclofop-methyl on fresh weight of six winter wheat cultivars under stress from take-all disease.

	Fresh weight per plant (g)[1]			
	Take-all absent		Take-all present	
Cultivar[2]	Check	DM	Check	DM
Stephens	142	121	127	138
Hill 81	162	113	109	110
Hyslop	191	119	122	114
Nugaines	112	93	90	111
Daws	92	136	73	119
McDermid	152	113	142	116

[1]No statistically significant differences among cultivar x disease x herbicide interaction means; standard error of the difference between two interaction means, 31.3.

[2]Cultivar x herbicide interaction significant at the 9% level; LSD, 9%, for interaction means, 38.2.

Cultivar x disease interaction significant at 5% level; LSD, 5%, for interaction means, 43.9.

Cultivar, disease, and herbicide main effects significant at the 1% level.

Table 2. Effects of diclofop-methyl on tiller production in six winter wheat cultivars under stress from take-all disease.

Cultivar[2]	Fertile tillers per plant[1]			
	Take-all absent		Take-all present	
	Check	DM	Check	DM
Stephens	23	21	24	24
Hill 81	23	22	44	20
Hyslop	33	28	28	28
Nugaines	44	36	31	28
Daws	24	23	19	20
McDermid	33	22	28	22

[1]Cultivar x disease x herbicide interaction significant at 7% level; LSD, 7%, for interaction means, 9.8.

[2]Cultivar x disease interaction significant at 1% level; LSD, 1%, for interaction means, 9.8.

Cultivar and herbicide main effects significant at 1% level.

Table 3. Effects of diclofop-methyl on disease severity in six winter wheat cultivars under stress from take-all disease.

Cultivar	Percent of root system with take-all lesions[1]			
	Take-all absent[2]		Take-all present	
	Check	DM	Check	DM
Stephens	3	<1	37	22
Hill 81	<1	<1	25	30
Hyslop	1	1	46	32
Nugaines	<1	<1	21	31
Daws	<1	1	29	29
McDermid	5	<1	25	20

[1]No statistically significant differences among cultivar x disease x herbicide interaction means; standard error of the difference between two interaction means, 8.8.

[2]Disease main effects significant at the 1% level; LSD, 1%, for disease main effects, 6.6.

Alterations in winter wheat response to take-all disease by herbicide type and rate. Geddens, R.M., A.P. Appleby, and R.L. Powelson. Wheat growers routinely utilize post-emergence, foliar-applied herbicides for control of annual grass and broadleaf weeds. Efficacy of herbicides is usually measured in terms of the degree of weed control, with little consideration for non-phytotoxic responses by the crop. Research was undertaken to determine the influence of four post-emergence herbicides at several rates on the severity of injury to winter wheat from the destructive soil-borne fungus, *Gaeumannomyces graminis* var. *tritici*(GGT), responsible for take-all disease.

A split-split plot experiment was established at Hyslop Research Farm, Corvallis, Oregon, in 1983-1984. Main-plot treatments included two rates of take-all inoculum, 45 and 90 kg/ha of ground, GGT-colonized oat seed, plus an uninoculated check. Ground, sterile oat seed were incorporated into the check and 45 kg/ha plots to insure that all plots received the same total amount of organic matter. Sub-plots were four herbicides, diclofop-methyl(DM), dinoseb(DB), mecoprop(MP), and difenzoquat(DT). These compounds were chosen because previous research had indicated that they may affect the degree of take-all injury in wheat. Sub-sub-plots were three rates, plus an untreated check. Each set of treatments was replicated four times in a randomized complete block. Individual plots were 3.1 m by 6.1 m. Rates of each herbicide corresponded to multiples of 0.5, 1.0, and 1.5 times a standard rate commonly used for weed control in wheat grown in the Willamette Valley. Mecoprop, however, is not registered for use in cereals in Oregon. Rates for herbicides are shown in Table 1. Ground oat inoculum was spread evenly by hand over each main-plot, then incorporated to a depth of 8-12 cm with a Rototerra power tiller. Stephens winter wheat was planted on Oct 19 at 100 kg/ha seeding rate. Seed were planted 3-5 cm deep on 17.8 cm rows. The entire trial area was oversprayed for weed control with diuron at 1.8 kg ai/ha on Oct 27, and chlorsulfuron at 16.8 g ai/ha and bromoxynil at 0.6 kg ai/ha on Dec 1. Supplemental herbicides were applied to eliminate weed competition with the wheat as a factor influencing crop growth. Herbicide treatments were made on Jan 11 when the wheat was in the one- to two-tiller stage of development. Treatments were applied with a unicycle sprayer equipped with compressed air and a 2.4 m boom. Herbicides were applied in 234 L/ha water at 124 kPa. Fresh weight samples were taken on Apr 23(2-3 node), Jun 4(head emergence), and Jul 3(medium milk). Two subsamples were taken from each plot with 0.3 m of row per subsample. Plants were cut 5 cm above the soil surface. Fresh weight and tiller number per subsample were immediately determined. Disease assessments taken at the time of the final fresh weight sampling were based on the percentage of total grain heads per plot exhibiting the desiccated whitehead symptom characteristic of take-all disease. Plots were harvested on Aug 1 with a Hege small-plot combine. Data were analyzed in an analysis of variance and treatments means subjected to either means separation with the F-LSD or regression analysis.

Treatment effects were most pronounced at the first sampling date. Regardless of herbicide, the effect of increasing rate on both fresh weight per unit area and tiller density depended upon the level of take-all inoculum, and presumably disease(Table 2). Increasing herbicide rate when disease was absent caused reductions in fresh weight per unit area, but no consistent change in tiller density. When plants were

were under stress from take-all, however, increasing herbicide rate produced an increase in both fresh weight per unit area and tiller density. Maximum fresh weight at the low level of inoculum occurred at the 0.5X standard rate, while maximum fresh weight at the high level of inoculum occurred at the 1.0X standard rate. Maximum tiller density for both levels of inoculum occurred at the 1.0X standard rate. Data from the first sampling date further suggest that the effect of herbicide rate on tiller density may depend on the specific herbicide being tested(Table 3). Tiller density in DM and DB treatments increased with increasing rate to a maximum at the 1.0X standard rate. Tiller density in the DT treatments continued to increase with increasing rate up to the highest rate tested, ie. 1.68 kg ai/ha. Tiller density was relatively insensitive to MP, with a small reduction at rates greater the 0.5X standard. Effects of the herbicides on fresh weight and tiller density were either lost or obscured by high levels of variation at sampling dates 2 and 3. The small reduction in tiller density produced by MP was still detectable at the third sampling date. Visible symptoms of take-all injury were evident by the third sampling date over all inoculated plots. Consistent reductions in fresh weight were observed at this time as inoculum rates increased. Visual assessments of disease severity over whole plots indicated a consistent reduction in the incidence of take-all symptoms with increasing herbicide rate(Table 4). This effect was apparently a general response to increasing rate, and did not depend upon the specific herbicide applied. Neither individual herbicides nor rates affected grain yield. Grain yield responded to take-all disease in a manner similar to the response of fresh weight noted earlier, with a 0.2% reduction in fresh weight and grain yield with each added kg/ha of take-all inoculum. Research is currently underway to determine the mechanism of growth alteration by these herbicides in plants infected with take-all disease. (Crop Science and Bot./Pl. Path. Depts., Oregon State Univ., Corvallis, OR 97331)

Table 1. Herbicide formulations and rates

Herbicide	Formulation	Applied rate (Kg ai/ha) as a multiple of a standard field rate		
		0.5X	1.0X	1.5X
diclofop-methyl	Hoelon 3EC	0.70	1.40	2.10
dinoseb	Dinitro 3EC	0.84	1.68	2.52
mecoprop	Mecomec 2S	1.23	2.46	3.69
difenzoquat	Avenge 2S	0.56	1.12	1.68

Table 2. Effects of herbicide rate on fresh weight and tiller density of winter wheat under stress from take-all disease -- Apr 23.

Ground oat inoculum (Kg/ha)	Herbicide rate (X standard)								Mean of inoculum rate	
	Check		0.5		1.0		1.5			
	WT[1]	DN[2]	WT	DN	WT	DN	WT	DN	WT	DN
0	160	38	163	39	144	37	141	39	152	38
45	148	36	156	38	153	40	146	38	151	38
90	143	34	150	38	161	42	138	39	148	38
Mean of herb. rate	150	36	157	38	153	40	142	39		

[1]Fresh weight (g)/0.3 m row; inoculum x rate interaction significant at the 5% level; LSD, 5%, for rate means at the same inoculum level, 14.5; LSD, 5%, for inoculum means at the same or different rates, 19.4

[2]Tillers/0.3 m row; inoculum x rate interaction significant at the 5% level; LSD, 5%, for rate means at the same inoculum level, 3.6; LSD, 5%, for inoculum means at same or different rates, 4.1.

Table 3. Effects of individual herbicides on tiller density in winter wheat -- Apr 23.

Herbicide	Tiller number per 0.3 m of row[1]				Mean of herbicide[2]
	Rate (X standard field rate)				
	0	0.5X	1.0X	1.5X	
diclofop-methyl	35	38	39	36	37
dinoseb	35	37	40	38	37
mecoprop	38	38	37	37	38
difenzoquat	37	39	44	45	41
Mean of rate[3]	36	38	40	39	

[1]Herbicide x rate interaction significant at the 8% level; LSD, 5%, for herbicide means at the same or different rate, 4.2

[2]Herbicide main effects significant at 0.5% level; LSD, 1%, for herbicide means, 2.8.

[3]Rate main effects significant at 1% level; LSD, 5%, for rate means, 2.1.

Table 4. Effect of herbicide rate on incidence of whiteheads in winter wheat with take-all disease -- Jul 3.

Ground oat inoculum (Kg/ha)	Whiteheads as percent of total grain heads per plot[1] Herbicide rate (X standard)				Mean of inoculum rate
	Check	0.5X	1.0X	1.5X	
0	0	0	0	0	0
45	25	17	14	12	17
90	41	34	23	23	30
Mean of herb. rate	22	17	12	12	

[1]Inoculum x rate interaction significant at 1% level; LSD, 1%, for rate means at same inoculum level, 6.7; LSD, 1%, for inoculum means at the same or different rates, 11.1.

Evaluation of herbicides for wild oat control in winter wheat. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at Big Horn, Wyoming, May 22 or June 8, 1984 to wild oat in the 1 to 3-leaf stage or 3 to 5-leaf stage; respectively, to evaluate their efficacy for wild oat control in winter wheat. The winter wheat had 2 to 3 more leaves than the wild oat when the treatments were applied. 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 delivering 10 gpa at 40 psi. The soil was classified as a loam (24% sand, 25% silt, 41% clay) with 2.6% organic matter and a 7.8 pH.

Weed control and crop injury evaluations were made July 10, 1984. Wild oat infestations were moderate, field pennycress infestations heavy and prickly lettuce infestations light. None of the herbicide treatments injured winter wheat. Plots were not harvested for yield because of an erratic stand of winter wheat. Wild oat control with AC-222,293 was better at the 1 to 3-leaf stage than at the 3 to 5-leaf stage regardless of herbicide rate and was not influenced by the addition of 2,4-D, bromoxynil or EH-541. Wild oat control with barban was increased 24 to 30% by the addition of diclofop or difenzoquat to the spray mixture. Wild oat control with diclofop at 0.75 lb ai/A at the 1 to 3-leaf stage was 16% greater than with 1.0 lb ai/A at the 3 to 5-leaf stage. Wild oat control with difenzoquat was over 90% at both stages of application. Field pennycress control with AC-222,293 was good at both stages of application. Prickly lettuce control was good with treatments containing 2,4-D or bromoxynil applied at the 1 to 3-leaf stage. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1298.)

Wild oat control in winter wheat

Treatment[1]	Rate lb ai/A	Percent Control[2] Wioa	Fipc	Prlt	Wheat[2] Injury %
1 to 3-leaf					
AC-222,293 + X-77	0.38	99	100	0	0
AC-222,293 + X-77	0.5	100	100	0	0
AC-222,293 + X-77	0.62	99	100	0	0
AC-222,293 + 2,4-D + X-77	0.5 + 0.5	100	100	100	0
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	100	100	97	0
AC-222,293 + EH-541 + X-77	0.38 + 0.12	100	100	50	0
barban	0.38	68	0	0	0
diclofop	0.75	94	0	0	0
difenzoquat	1.0	97	0	0	0
barban + difenzoquat	0.38 + 0.25	98	0	0	0
barban + difenzoquat	0.38 + 0.5	95	0	0	0
barban + diclofop	0.38 + 0.25	95	0	0	0
barban + diclopfop	0.38 + 0.5	92	0	0	0
barban + acifluorfen	0.38 + 0.12	49	97	65	0
diclofop + bromoxynil	0.75 + 0.25	97	100	83	0
diclofop + bromoxynil + acifluorfen	0.75 + 0.25 + 0.06	98	100	90	0
diclofop + bromoxynil + acifluorfen	0.75 + 0.25 + 0.12	96	100	92	0
3 to 5-leaf					
AC-222,293 + X-77	0.38	71	93	0	0
AC-222,293 + X-77	0.5	70	93	0	0
AC-222,293	0.62	72	90	0	0
AC-222,293 + 2,4-D + X-77	0.5 + 0.5	80	85	73	0
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	77	93	48	0
diclofop	1.0	78	0	0	0
difenzoquat	1.0	92	0	0	0
Check	---	0	0	0	0

[1]Treatments applied to 1 to 3-leaf wild oat May 22 and 3 to 5-leaf wild oat June 10, 1984. X-77 = 0.25% v/v and 2,4-D = butoxyethyl ester.
[2]Weed control and winter wheat injury evaluated visually July 10, 1984.

Evaluation of herbicides for broadleaf weed control in winter wheat. Miller, S. D. and H. P. Alley. A series of postemergence herbicide treatments were applied at Chugwater, Wyoming, May 11, 1984 to evaluate their efficacy for broadleaf weed control in winter wheat (var. Buckskin). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (70% sand, 18% silt, 12% clay) with 1.2% organic matter and a 7.3 pH. The winter wheat was in the 4 to 5-leaf stage (4 to 6 tillers), wild buckwheat in the 2 to 3-leaf stage (½ to 1 in. height) and tansy mustard in the rosette stage (1 to 2 in. height) at time of treatment.

Weed control and crop damage evaluations were made on June 20 and plots harvested for yield August 3, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Tansy mustard and wild buckwheat populations in the untreated check were light averaging 2.8 and 3.5 plants/ft^2, respectively. Only slight wheat injury was observed with several treatments and non reduced wheat yields compared to the untreated check. Tansy mustard control was 80% or greater with all treatments except chlorsulfuron at 0.016 lb/A, bromoxynil at 0.18 and 0.25 lb/A or Dowco 290 at 0.125 lb/A and wild buckwheat control 80% or greater with all treatments except PPG-1013 at 0.01 lb/A, metribuzin at 0.25 lb/A or 2,4-D at 0.5 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1301.)

Broadleaf weed control in winter wheat

Treatment[1]	Rate lb ai/A	Weed Control[2]		Wheat[2]	
		Tamu	Wibw	Injury %	Yield bu/A
chlorsulfuron + metribuzin + X-77	0.008 + 0.125	89	97	3	28
chlorsulfuron + metribuzin + X-77	0.016 + 0.25	89	94	6	32
chlorsulfuron + X-77	0.016	75	91	0	33
chlorsulfuron + X-77	0.03	91	98	0	30
DPX-M6316 + X-77	0.004	81	80	0	30
DPX-M6316 + X-77	0.008	81	89	0	29
DPX-M6316 + X-77	0.016	81	97	0	29
DPX-M6316 + X-77	0.03	83	94	0	31
DPX-M6316 + X-77	0.06	93	100	0	29
PPC-1013	0.01	81	21	0	30
PPC-1013	0.02	81	98	0	24
PPC-1013	0.04	89	98	3	28
bromoxynil	0.18	74	100	0	30
bromoxynil	0.25	79	97	0	30
bromoxynil	0.38	83	97	0	33
bromoxynil + MCPA	0.25 + 0.25	86	100	0	29
bromoxynil + metribuzin	0.25 + 0.125	91	100	0	32
bromoxynil + metribuzin	0.25 + 0.25	100	100	0	29
bromoxynil + metribuzin	0.38 + 0.125	100	100	10	26
bromoxynil + metribuzin	0.38 + 0.25	96	100	8	25
bromoxynil + chlorsulfuron + X-77	0.18 + 0.005	97	100	0	26
bromoxynil + chlorsulfuron + X-77	0.18 + 0.001	100	100	0	29
bromoxynil + acifluorfen	0.25 + 0.06	96	97	0	29
bromoxynil + aciflurofen	0.25 + 0.12	100	100	2	26
Dowco 290 (M-3972)	0.125	74	94	0	30
Dowco 290 (M-3972)	0.16	85	100	0	29
Dowco 290 + 2,4-D (M-3785)	0.125 + 0.5	100	100	0	28
dicamba + MCPA	0.125 + 0.25	100	97	0	29
dicamba + chlorsulfuron	0.125 + 0.008	100	93	0	27
dicamba + chlrosulfuron	0.125 + 0.016	100	97	5	28
dicamba + metribuzin	0.125 + 0.125	100	94	3	29
dicamba + metribuzin	0.125 + 0.25	100	97	6	25
metribuzin	0.25	83	77	0	29
2,4-D	0.5	81	54	0	25
Check	---	--	--	0	26

[1]Treatments applied May 11, 1984. X-77 = 0.25% v/v, 2,4-D = dimethylamine and MCPA = dimethylamine.

[2]Weed control and wheat injury evaluations June 20 and harvest August 3, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft quadrats per replication.

Evaluation of herbicides for broadleaf weed control in spring wheat. Miller, S. D. and H. P. Alley. Research plots were established on May 24, 1984 at the Torrington Research and Extension Center to evaluate individual and/or herbicide combinations for broadleaf weed control in spring wheat (var. Oslo). 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 unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (85% sand, 8% silt, 7% clay) with 1.8% organic matter and a 7.7 pH. The spring wheat was in good condition, 3 to 4-leaves and common lambsquarters 3/4 to 1 in., wild buckwheat 1 to 1½ in., tumble mustard 3 to 4 in., and hairy nightshade ½ to 1 in. at time of treatment.

Weed control and crop damage evaluations were made on June 14, 1984. Weed control evaluations were determined by counting two 6 in. by 5 ft quadrats per replication. Common lambsquarters and hairy nightshade infestations were heavy, 19.3 and 14.1 plants/ft^2; respectively, redroot pigweed infestations moderate 4.9 plants/ft^2 and wild buckwheat, tumble mustard and kochia infestations light 1.3, 0.3 and 1.5 plants/ft^2, respectively, in the untreated check. None of the herbicide treatments injured wheat. Broad spectrum broadleaf weed control was excellent with bromoxynil-MCPA or acifluorofen combinations and good with dicamba-MCPA or bromoxynil treatments. DPX-M6316 required rates of 0.03 to 0.06 lb/A to give similar broadleaf weed control as chlorsulfuron at 0.008 lb/A. The addition of 2,4-D to Dowco 290 improved broadleaf weed control compared to Dowco 290 alone. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1302.)

Broadleaf weed control in spring wheat

Treatment[1]	Rate lb ai/A	Wheat[2] Injury %	Weed Control[2] Colq	Hans	Rrpw	Wibw	Tamu	Kocz
			- - - - - -	- - - -	%	- - - -	- - - -	- - - -
chlorsulfuron + X-77	0.008	0	86	0	98	62	100	79
DPX-M6316 + X-77	0.004	0	0	0	47	36	100	16
DPX-M6316 + X-77	0.008	0	0	0	84	42	100	74
DPX-M6316 + X-77	0.016	0	48	0	97	91	100	58
DPX-M6316 + X-77	0.03	0	77	0	95	84	100	69
DPX-M6316 + X-77	0.06	0	80	0	97	100	100	92
PPG-1013	0.01	0	32	0	98	30	100	40
Dowco 290 (M-3972)	0.125	0	67	94	62	100	62	0
Dowco 290 (M-3972)	0.16	0	74	99	68	100	75	60
Dowco 290 + 2,4-D (M-3785)	0.125 + 0.5	0	78	96	70	100	100	35
bromoxynil + MCPA est.	0.25 + 0.25	0	99	99	96	100	100	100
bromoxynil	0.25	0	99	98	85	100	100	100
bromoxynil + acifluorfen	0.25 + 0.06	0	100	97	95	100	100	100
bromoxynil + acifluorfen	0.25 + 0.12	2	100	98	95	100	100	100
EH-540	0.44	0	86	96	72	100	100	84
EH-541	0.37	0	76	76	52	91	100	91
EH-763	0.48	0	71	83	52	68	100	91
EH-786	0.48	0	63	92	42	91	100	95
2,4-D	0.48	0	49	80	60	50	100	91
MCPA	0.48	0	62	80	42	40	75	84
dicamba + MCPA	0.125 + 0.25	0	91	99	82	100	100	95
Check	---	0	---	---	---	---	---	---

[1]Treatments applied May 24, 1984. X-77 = 0.25% v/v, 2,4-D = dimethylamine, MCPA est = butoxyethyl ester and MCPA = dimethylamine.
[2]Weed control and wheat injury evaluations June 14, 1984. Weed control evaluations determined by counting two 6 in. by 5 ft quadrats per replication.

Tolerance of twenty-one wheat cultivars to AC 222,293. Mitich, L.W. and N.L. Smith. Thirteen wheat varieties were planted in each of two locations. The trial at the UC Davis Experimental Farm was planted January 24, 1984, and the herbicide applied to 3 to 4 leaf wheat (1-2 tillers) on March 8. The second experiment planted on April 12, 1984, at the Tulelake Field Station with the herbicide applied to wheat in the 3- to 4-leaf stage (3-4 tillers) on May 22, 1984. AC 222,293 at 0.75 and 1.5 lb lb/A was applied using a CO_2 backpack sprayer calibrated to deliver 20 gpa volume. Surfactant (X-77) was included at 0.25% v/v. A split-plot design was used with herbicide treatments as the main plot and wheat varieties as the sub-plot. Four replications were used. No wild oats were present at either location. However, at the Davis site common knotweed became a competitor late in the growing season.

Visual evaluation of wheat injury was made approximately 4 weeks following herbicide application. All varieties exhibited excellent tolerance to AC 222,293 at the 0.38 lb/A rate. At the 0.75 lb/A rate slight injury was noted on cultivar Klassic and moderate injury on cultivar WB 881. Injury symptoms were rolled leaves and uneven growth.

Plots were harvested for grain yield. There was no significant yield reduction from either rate of AC 222,293 when compared to the control. (University of California Cooperative Extension, Davis, CA 95616)

Table 1: Wheat tolerance to AC 222,293
Tulelake 1984

	Control			AC 222,293 at 0.38 lb/A			AC 222,293 at 0.75 lb/A		
Variety	Injury[1]	Yield	Analysis[2]	Injury[1]	Yield	Analysis[2]	Injury[1]	Yield	Analysis[2]
Anza	0	6967	B-J	0	6919	B-I	0	6616	F-J
Fieldwin	0	7527	A-F	0	8011	A-C	0	7845	A-D
Fielder	0	7939	A-D	0	7802	A-F	0	8010	A-C
Lark	0.8	5799	J	0.5	6072	I-J	0.5	6287	G-J
Twin	0	6819	C-J	0	6233	H-J	0	6731	D-J
WB 803	0	8106	A-B	0	7782	A-F	0	7729	A-F
Yolo	0	7282	A-I	0	6844	C-J	0.3	7487	A-G
906 R	0	6906	B-J	0	6802	C-J	0	6757	D-J
TL-74-30	0	8405	A	0.3	7924	A-D	0.5	7928	A-D
Yecora Rojo	0	6983	B-J	0	6925	B-J	0	7027	B-I
Modoc	0	7736	A-F	0	7302	A-H	0	7531	A-F
TL 75-409	0	7838	A-E	0	7326	A-H	0	7853	A-D
Shasta	0.8	7053	B-I	0.5	6296	G-J	0.8	6629	E-J

Figures are average of 4 replications.

[1] 0 = No injury; 10 = Loss of stand (6-23-84).

[2] Means followed by the same letter are not significantly different at the 0.5% level.

Wheat tolerance to AC 222,293
UCD 1984

Table 2:

Variety	Control			AC 222,293 at 0.38 lb/A			AC 222,293 at 0.75 lb/A		
	Injury[1]	Yield	Analysis[2]	Injury[1]	Yield	Analysis[2]	Injury[1]	Yield	Analysis[2]
Inia	0.5	1655	H	1.0	1829	F-H	1.3	1750	G-H
Anza	0.8	2977	B-D	0.8	3084	B-C	1.0	3106	B-C
Yecora Rojo	0.5	2951	B-D	1.0	2907	B-D	1.0	3095	B-C
Shasta	0	2143	E-H	0.5	2047	F-H	1.0	2014	F-H
Phoenix	0.8	3047	B-D	1.0	3214	B	1.0	3212	B
Yolo	1.0	3136	B	0.5	3098	B-C	0.8	3418	B
Aldura	0	4466	A	0.3	4252	A	0.8	4148	A
Klassic	0.8	3111	B	0.8	3000	B-D	1.8	2926	B-D
Olso	1.0	3274	B	0.8	3168	B	1.0	3269	B
Yavaros	0.8	2798	B-E	1.0	3035	B-D	1.3	2978	B-D
WB 911	1.0	2437	C-F	0.5	2377	D-G	1.0	2826	B-D
WB 881	1.0	3231	B	0.8	3282	B	3.0	3001	B-D

Figures are average of 4 replications.

1 0 = No injury; 10 = Loss of stand (4-13-84).

2 Means followed by the same letter are not significantly different at the 0.50% level.

Weed control in wheat with postemergence herbicides. Mitich, L.W. and N.L. Smith. Wild oat is the major problem weed species in cereals grown in California. This experiment, conducted at the Tulelake Field Station, was designed to compare two new wild oat herbicides--AC 222,293 and CN 11-4649--with diclofop, difenzoquat and barban. In addition, tank mixes using lower rates of barban with either diclofop, difenzoquat or AC 222,293 were evaluated to determine if they would provide better weed control with less crop injury at a lower cost than using either herbicide alone. Combinations of a wild oat herbicide tank mixed with various broadleaf materials were evaluated for their effectiveness in controlling weeds and crop safety.

Wheat (Cultivar: Yecora Rojo) was drilled April 12, 1984, to a test site known to be heavily infested with wild oat. Soil type was peat with 9.5% OM and a pH of 7.5. The area was sprinkler irrigated. Wild oats were in the 3-leaf stage (1 to 3 tiller) May 22, when the herbicides were applied using a CO_2 backpack sprayer calibrated to deliver 20 gpa spray volume. Wheat was at the 3- to 4-leaf stage with 3 to 6 tillers. A randomized block design with 4 replications was used.

No wheat phytotoxicity was observed on June 23; however, chlorosis had been observed earlier on plots treated with R-40244. Weed control ratings were made July 8. Good wild oat control was obtained from AC 222,293 at 0.75 lb/A and CN 11-4946 at 1.0 lb/A. Tank mixing AC 222,293 with MCPA amine resulted in reduced wild oat activity. Fair to poor wild oat control was noted from diclofop, difenzoquat and barban. Tank mixes of low rates of barban with a reduced rate of either CN 11-4946, difenzoquat, diclofop or AC 222,293 resulted in unsatisfactory wild oat control. Mixtures containing bromoxynil gave excellent control of broadleaf species. (University of California Cooperative Extension, Davis, CA 95616)

Weed control in wheat with postemergence herbicides[1]

Herbicide	Rate lb/A	Phyto[2] 6/23/84	Control 8/8/84 Wild oat	Control 8/8/84 Broadlead	Yield lb/A 9/6/84	Analysis[3]
Diclofop	1	0	3.8	0	4659	A-D
Difenzoquat	1	0	6.0	0	4439	A-D
Barban	0.38	0	6.3	2.5	5130	A-B
AC 222,293	0.25	0	6.0	5.0	5250	A-B
AC 222,293	0.38	0	7.3	5.0	4381	A-D
AC 222,293	0.75	0	9.3	0	4885	A-D
CN 11-4946	0.25	0	6.3	0	4645	A-D
CN 11-4946	0.38	0	8.3	0	4821	A-D
CN 11-4946	0.50	0	8.0	0	4377	A-D
CN 11-4946	1.0	0	9.3	0	4958	A-D
CN 11-4946 + Barban	0.13 + 0.25	0	5.8	0	4751	A-D
CN 11-4946 + Barban	0.25 + 0.25	0	5.8	0	4479	A-D
Barban + Difenzoquat	0.25 + 0.25	0	5.8	2.5	4904	A-D
Barban + Difenzoquat	0.25 + 0.5	0	6.3	0	4918	A-D
Barban + Diclofop	0.25 + 0.25	0	5.8	0	5122	A-B
Barban + Diclofop	0.25 + 0.5	0	5.5	2.5	4483	A-D
Barban + AC 222,293	0.25 + 0.25	0	5.8	5.0	4659	A-D
Barban + MCPA	0.25 + 0.75	0	2.8	2.5	3755	C-D
Barban + Bromoxynil	0.25 + 0.38	0	2.8	10.0	4052	B-D
Barban + Difenzoquat + Bromoxynil	0.25 + 0.5 + 0.38	0	5.5	10.0	4674	A-D
Barban + Diclofop + Bromoxynil	0.25 + 0.5 + 0.38	0	6.3	10.0	4918	A-D
AC 222,293 + MCPA	0.25 + 0.75	0	1.5	7.5	3628	D
AC 222,293 + MCPA	0.75 + 0.75	0	8.3	2.5	5064	A-C
AC 222,293 + Bromoxynil + MCPA	0.25 + 0.38 + 0.38	0	6.5	10.0	4122	B-D
AC 222,293 + Bromoxynil + MCPA	0.75 + 0.38 + 0.38	0	9.1	10.0	4512	A-D
AC 222,293 + Bromoxynil	0.25 + 0.5	0	6.0	10.0	4661	A-D
AC 222,293 + Bromoxynil	0.75 + 0.5	0	8.5	10.0	5236	A-B
R-40244 + Diclofop	0.5 + 1.0	0	8.5	10.0	5580	A
R-40244 + Diclofop	1.0 + 1.0	0	7.5	7.5	4491	A-D
Control	-	0	1.3	0	3989	B-D

[1] All data is average of 4 replications.
[2] 0 = No phytotoxicity or control; 10 = Complete control.
[3] Means followed by the same letter are not significantly different at the 0.5% level.

Effect of nitrogen fertilizer rate and chlorsulfuron timing on winter wheat yield. Morishita, D.W., B.G. Schaat, D.C. Thill, and R.H. Callihan. A cooperative study was conducted with The McGregor Company to determine the effect of nitrogen rate and timing of chlorsufluron (75 DF) application (0.25 oz/A) on the yield of winter wheat (var. Stephens). Experimental design of this study was a randomized complete block with a 4 by 5 factorial arrangement of treatments. Plots were 8 by 40 ft and all treatments were replicated four times. Fall postemergence herbicide applications were made November 17, 1983, at the 2 to 3 leaf stage of crop growth. Environmental conditions were air and soil temperature (2 in depth) 50 F, relative humidity 69%, and cloud cover 75%. Early spring and late spring postemergence herbicide applications were made March 7 and April, 1984, respectively. Environmental conditions at the respective dates were as follows; air temperature 52 and 56 F, soil temprature at the 2 in depth 49 and 60 F, relative humidity 48 and 88%, and cloud cover 80 and 95%. Soil type at the study site was a silt loam with 2.5% organic matter and soil pH of 5.7. Residual nitrogen content measured down to 3 ft was approximately 150 lb N/A. The crop was harvested July 27, 1984, with a small plot combine.

No fertilizer rate by time of application interaction occurred in the analysis of variance. Therefore, only the main effects will be discussed. Due to the high residual nitrogen content, crop yield decreased with increasing fertilizer rate. Weed density (purple mustard) was less than one plant/yd^2. Grain yields among herbicide treatments were not different when compared to the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Nitrogen rate by chlorsulfuron time of application

Nitrogen rate (lb/A)	Yield (bu/A)
0	119
40	117
80	102
120	98
100/20	91
$LSD_{(0.05)}$	8
Time of application	
check	104
fall post (11/17/83)	110
early spring (3/7/84)	99
late spring (4/3/84)	109
$LSD_{(0.05)}$	7

Broadleaf and grassy weed control in no tillage winter wheat. Morishita, D.W., D.C. Thill, and R.H. Callihan. The control of broadleaf and grassy weeds in no tillage winter wheat (var. Stephens) with several herbicides was studied. The experiment was established as a randomized complete block design near Potlatch, Idaho in the fall of 1983. Plots were 10 by 25 ft and each treatment had four replications. Soil type at this site was a silt loam containing 2.6% organic matter, and had a pH and CEC of 7.7 and 19.9 meq/100 g soil, respectively. All herbicide treatments were applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa. Preemergence surface applications were made October 18, 1983. Environmental conditions were as follows; air temperature 60 F, soil temperature at 2 in 56 F, relative humidity 48%, and cloud cover 80%. Early spring postemergence treatments were applied April 13, 1984, at the 1 to 4 leaf stage of downy brome (BROTE). Environmental conditions at the time of these applications were air temperature 54 F, soil temperature at 2 in 58 F, relative humidity 60%, and clear skies. Late spring postemergence treatments were applied May 22, 1984, when the adventitious roots of the crop were 2 in long. Environmental conditions for the final applications were air temperature 54 F, soil temperature at 2 in 64 F, relative humidity 66%, and 100% cloud cover. Evaluations for weed control and crop injury were taken June 7, 1984. The crop was harvested August 20, 1984, with a small plot combine.

Crop damage was not visible in any herbicide treatment. Preemergence surface and postemergence applications of chlorsulfuron at 0.25 oz/A and all tank mixtures of ethyl metribuzin (SMY-1500) + metribuzin applied postemergence except the 0.50 + 0.13 lb/A rate resulted in 95% or greater control of tumble mustard (SYSAL), shepherdspurse (CAPBP), and coast fiddleneck (AMSIN). Best control (86% or greater) of downy brome, windgrass (APEIN), and smooth brome (BROIN) was observed with preemergence surface applications of diclofop alone or in combination with chlorsulfuron and postemergence applications of ethyl metribuzin at 1.5 lb/A and the tank mixture of ethyl metribuzin + metribuzin at 1.0 + 0.19 lb/A. Highest yields were obtained with both rates of the diclofop + chlorsulfuron tank mixture, ethyl metribuzin at 1.5 lb/A applied preemergence surface, and the postemergence applications of ethyl metribuzin at 1.5 lb/A and tank mixutres of ethyl metribuzin + metribuzin at 0.75 + 0.13 and 1.0 + 0.19 lb/A. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Formulations of herbicides used

Herbicide	Formulation
alachlor	4 EC
chlorsulfuron	75 DF
diclofop	3 EC
ethyl metribuzin	75 DF
metribuzin	75 DF
terbutryn	80 WP

Weed control and yield of no tillage winter wheat

Treatment	Rate	Appl date	Crop injury	Weed control SYSAL	CAPBP	AMSIN	BROTE	APEIN	BROIN	Yield
	(lb ai/A)		-------	-------	-------	(%)	-------	-------	-------	(bu/A)
check	-	-	-	-	-	-	-	-	-	26
alachlor	0.75	10/18	0	73	10	1	73	3	24	35
alachlor	1.0	10/18	0	70	21	0	40	0	10	41
chlorsulfuron	0.25oz	10/18	0	100	99	100	38	0	9	55
diclofop + alachlor	0.50 + 0.50	10/18	0	0	0	0	83	84	89	45
diclofop + alachlor	0.50 + 0.75	10/18	0	45	0	0	75	71	75	37
diclofop	1.0	10/18	0	31	0	0	91	96	98	42
diclofop	1.25	10/18	1	68	6	25	98	99	99	45
diclofop + chlorsulfuron	1.0 + 0.25oz	10/18	1	98	88	100	86	91	92	72
diclofop + chlorsulfuron	1.25 + 0.25oz	10/18	0	96	85	100	88	93	91	65
SMY-1500	0.50	10/18	0	94	96	36	48	0	18	40
SMY-1500	0.75	10/18	0	98	98	10	39	0	18	58
SMY-1500	1.0	10/18	0	75	95	33	39	0	60	60
SMY-1500	1.5	10/18	0	100	100	20	71	26	63	65
chlorsulfuron[1]	0.25oz	4/13	4	100	100	100	26	0	0	41
metribuzin	0.13	4/13	3	90	30	100	44	0	30	32
metribuzin	0.19	4/13	1	50	10	63	40	0	13	44
metribuzin	0.38	5/22	1	57	20	75	43	0	18	28
metribuzin + terbutryn	0.38 + 0.75	5/22	3	62	49	100	69	15	43	40
SMY-1500	0.50	4/13	1	93	69	100	24	0	24	41
SMY-1500	0.75	4/13	0	99	69	100	44	3	30	48
SMY-1500	1.0	4/13	1	80	78	99	58	26	36	60
SMY-1500	1.50	4/13	0	99	100	100	86	89	95	64
SMY-1500 + metribuzin	0.50 + 0.13	4/13	0	99	63	98	26	15	21	46
SMY-1500 + metribuzin	0.50 + 0.19	4/13	1	98	96	100	68	61	88	56
SMY-1500 + metribuzin	0.75 + 0.13	4/13	0	98	98	100	83	76	91	64
SMY-1500 + metribuzin	0.75 + 0.19	4/13	4	100	100	100	89	79	93	48
SMY-1500 + metribuzin	1.0 + 0.13	4/13	0	95	100	100	69	90	93	59
SMY-1500 + metribuzin	1.0 + 0.19	4/13	3	100	100	100	92	88	95	62
LSD(0.05)			NS	39	30	28	43	19	34	19

[1]0.5% v/v nonionic surfactant

Effects of tillage system and herbicide on broadleaf weed control in winter wheat. Morishita, D.W., D.C. Thill, and R.H. Callihan. A study was conducted for the second year to measure the effectiveness of postemergence herbicides used for broadleaf weed control in winter wheat (var. Hyslop) grown in three tillage systems; conventional tillage, minimum tillage, and no tillage. The experiment was established near Lewiston, Idaho in the fall of 1983. The experimental design for this study was a split plot randomized complete block with four replications. The main effect plots, tillage systems, were 40 by 100 ft and the subplots, herbicide treatment, were 10 by 40 ft. Fertilizer and seeding rates were identical in all tillage systems. The crop in the conventional and minimum tillage treatments was planted October 12, 1983. The no tillage treatment was planted November 18, 1983. Soil type at the study site was a silt loam with a pH of 4.7, CEC 26.6 meq/100 g soil, and 4.7% organic matter content. Environmental conditions for the April 14, 1984, early postemergence applications were air temperature 73 F, soil temperature at the 2 in depth 66 F, relative humidity 48%, and 5% cloud cover. Postemergence applications made on May 4, had the following environmental conditions; air temperature 50 F, soil temperature at the 2 in depth 52 F, relative humidity 60%, and 80% cloud cover. Late postemergence treatments were applied May 21, 1984. Environmental conditions at this time were air temperature 54 F, soil temperature at the 2 in depth 65 F, relative humidity 54%, and cloud cover 40%. Herbicides were applied at 20 gpa with either a CO_2 pressurized backpack or bicycle sprayer. Evaluations for weed control and crop injury were taken June 22, 1984. The crop was harvested August 8, 1984, with a small plot combine.

Highest crop injury was observed in the minimum tillage chlorsulfuron + terbutryn and the no tillage 2,4-D treatment, however this was not reflected in crop yield. The 2,4-D treatment resulted in the highest (100%) and most consistent control of flixweed (DESSO) while several other herbicide treatments provided good to excellent flixweed control across all tillage systems. A herbicide treatment by tillage system interaction occurred in the analysis of variance. This was observed in the metribuzin + bromoxynil and metribuzin + dicamba treatments across the tillage systems. However, flixweed control was unacceptable in all tillage systems of those treatments. No herbicide treatment by tillage system interaction occurred in the yield. Instead, yield differences were observed among tillage systems and among herbicide treatments as main effects. Crop yield of the conventional tillage system was 46 and 58% greater than the yields of the minimum and no tillage systems, respectively. The yield difference between the conventional and no tillage systems may be accounted for in the later planting date of the no tillage treatment. Highest yields among herbicide treatments were observed in the 2,4-D, bromoxynil + MCPA, and chlorsulfuron + terbutryn treatments. All other herbicide treatments yielded greater than the check, except metribuzin + bromoxynil. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Herbicide formulations of herbicides used

Treatment	Formulation
bromoxynil	4 EC
bromoxynil + MCPA	3 EC
chlorsulfuron	75 DF
dicamba	4 WS
diuron	80 WP
MCPA	4 EC
metribuzin	75 DF
terbutryn	80 WP
2,4-D	4 EC

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

Treatment	Rate	Tillage system	Date Applied	Crop injury	DESSO control	Yield	
	(lb ai/A)			---------%--------		(bu/A)	
bromoxynil +	0.25 +	CT[2]	4/14	0	96	57	$\bar{X}$[3]
diuron	0.60	MT	4/14	0	79	53	47
		NT	5/4	0	85	30	
bromoxynil +	0.50	CT	4/14	0	100	80	
MCPA		MT	4/14	0	94	43	50
		NT	5/4	0	81	28	
chlorsulfuron +	0.13 oz +	CT	4/14	0	100	76	
bromoxynil[1]	0.25	MT	4/14	0	99	42	50
		NT	5/4	0	88	32	
chlorsulfuron +	0.13 oz +	CT	5/4	3	77	65	
terbutryn[1]	0.60	MT	5/4	15	70	41	46
		NT	5/21	0	68	31	
dicamba +	0.13 +	CT	4/14	0	98	77	
bromoxynil +	0.25	MT	4/14	0	92	33	47
MCPA		NT	5/4	0	79	31	
metribuzin +	0.38 +	CT	5/4	0	25	48	
bromoxynil	0.38	MT	5/4	0	0	16	30
		NT	5/21	1	38	25	
metribuzin +	0.25 +	CT	5/4	0	49	49	
dicamba	0.13	MT	5/4	0	26	24	33
		NT	5/21	0	60	27	
terbutryn +	0.75 +	CT	5/4	0	71	59	
MCPA	0.25	MT	5/4	0	61	33	37
		NT	5/21	4	68	18	
2,4-D	1.0	CT	4/14	3	100	75	
		MT	4/14	0	100	45	54
		NT	5/4	5	100	41	
check	-	CT	-	-	-	38	
		MT	-	-	-	12	21
		NT	-	-	-	12	
LSD (0.05)				3	21	NS	9

[1]0.5% v/v nonionic surfactant
[2]CT=conventional tillage, MT=minimum tillage, NT=no tillage
[3]X=effect of herbicide across tillage sytem

Wild oat control in irrigated spring wheat. Morishita, D.W., D.C. Thill, and R.H. Callihan. An experiment was established in spring wheat (var. 906R) near Idaho Falls to evaluate the efficacy of several herbicides applied alone and in combination for the control of wild oat (AVEFA). The experimental design was a randomized complete block with four replications and plots were 10 by 25 ft. Soil type at the study site was a silt loam with a pH of 7.9 and organic matter content and CEC of 1.4% and 16.2 meq/100 g soil, respectively. All herbicide treatments were applied June 13, 1984, at the 1 to 5 leaf stage of wild oat growth. Environmental conditions at the time of application were air temperature 59 F, soil temperature at the 2 in depth 54 F, relative humidity 82%, and cloud cover 95%. A CO_2 pressurized bicycle sprayer calibrated to deliver 10 and 20 gpa was used for herbicide application. Visual evaluations for wild oat control and crop injury were taken July 18, 1984. The crop was harvested August 27, 1984, with a small plot combine. Due to the heavy infestation of wild oat, yields for the crop and wild oat were determined from plot subsamples. Wild oat yields are based on nondehisced wild oat seed.

Crop injuries of 11% or greater were observed in the difenzoquat + bromoxynil, AC222,293 + DPX-M6316 , and AC222,293 + fluorchloridone. Those treatments resulting in the highest wild oat control, generally had the highest yields. As expected, the broadleaf herbicides applied alone, as well as the check had the highest wild oat yields. All but five herbicide treatments yielded higher than the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Formulations of herbicides used

Herbicide	Formulation
AC222,293	2.5 EC
barban	2 EC
bromoxynil	4 EC
diclofop	3 EC
difenzoquat	2 WS
DPX-M6316	75 DF
fluorchloridone	2 EC

Wild oat control and yield in spring wheat

Treatment	Rate	Crop injury	AVEFA control	Crop yield	AVEFA yield
	(lb ai/A)	-----(%)----		(bu/A)	(lb/A)
check	-	-	-	7	2387
barban + bromoxynil	0.38 + 0.50	0	30	27	1378
barban + DPX-M6316[1]	0.38 + 0.75	0	33	34	1292
barban + fluorchloridone	0.38 + 0.25	6	40	21	1277
difenzoquat + bromoxynil[1]	1.0 + 0.50	13	51	40	1094
barban + bromoxynil	0.25 + 0.50	0	13	25	1619
barban	0.38	0	46	31	884
AC222,293[1]	0.63	5	98	61	311
AC222,293 + bromoxynil[1]	0.63 + 0.50	4	93	58	185
AC222,293 + DPX-M6316[1]	0.63 + 0.75	13	95	55	276
AC222,293 + fluorchloridone[1]	0.63 + 0.25	11	78	46	654
diclofop	1.0	0	90	65	417
diclofop + bromoxynil	1.0 + 0.50	0	75	43	858
diclofop + DPX-M6316[1]	1.0 + 0.75	3	84	55	491
diclofop + fluorchloridone	1.0 + 0.25	3	64	54	500
difenzoquat[1]	1.0 + 0.50	3	96	63	567
bromoxynil	0.50	0	0	18	1137
DPX-M6316[1]	0.75 + 0.50	0	0	21	1542
fluorchloridone	0.25	0	1	22	1224
LSD (0.05)		9	25	19	460

[1]0.5% v/v surfactant

<u>Effect of varying rates of nitrogen and seeding rates on wild oat competition in dryland wheat.</u> Munier, D.J., L.W. Mitich and S.D. Wright. A trial was established in Tulare County very near the Kern County line to evaluate the effects of nitrogen, phorphorous, seeding rate and difenzoquat (a wild oat herbicide) on yield, bushel weight and percentage of yellow berry and protein in dryland wheat (variety 'Yecora Rojo'). A soil analysis showed the phosphorous content to be 5 ppm. The wheat was planted on December 8, 1983, at 65 lb/A except in the seeding rate plots. The plots were 24 by 500 ft. in a randomized complete block design and were replicated four times. The wheat was harvested on June 22 and the yield determined.

Table 1. The effect of nitrogen and phosporus on yield and quality

Nitrogen lb/A	Phosphorus lb/A	Yield lb/A	% Yellow berry	% Protein	Bu wt (lb/bu)	Wild oat/ft.^{2}
66	80	3074	9	11.2	63.0	0
57	40	2928	15	10.5	63.5	6.2
38	40	2759	36	9.1	63.5	6.3
0	0	2130	80	8.1	63.5	8.4
0	40	2141	88	8.1	63.5	5.2
LSD ˉ0.5						

The addition of the nitrogen and phosphorus fertilizers increased the yield, lowered the percent of yellow berry and increased the percent protein compared to the checks. Since the level of phosphate in the test site was low (5 ppm), the increased yield was probably due to both fertilizers and not nitrogen alone. At the highest rates of N and P_2O_5, protein increased over 3 percentage points, yellow berry decreased from 80 to 9% and the yield increased 940 pounds/A compared to the checks. The growing season was very dry, consequently the probability of increased production from increased input was much lower than would be expected during a normal or wet year.

Table 2. The effect of various seeding rates

Seeding rate lb/A	Yield lb/A	% Yellow berry	% Protein	Bu wt (lb/bu)	Wild oat/ft.^{2}
90	2953	56	8.7	63.5	4.8
65	2759	36	9.1	63.5	6.3
40	2650	39	9.1	63.0	9.2
LSD .05	291	16	0.6	NS	

There was a significant yield increase between the 40 and 90 lb/A seeding rates. The higher seeding rates resulted in few wild oat plants per sq. ft.

Table 3. The effect on wild oat control

Nitrogen lb/A	Phosphorus lb/A	Yield lb/A	% Yellow berry	% Protein	Bu wt (lb/A)	Wild oat/ft.^{2}
0	0	2130	80	8.1	63.5	8.4
0	0	2275	77	8.1	64.0	0
38	40	2759	36	9.1	63.5	6.3
38	40	2868	41	9.0	64.0	0
57	40	2928	15	10.5	63.5	6.2
57	40	2928	10	11.0	63.0	0
All N rates	All P rates	2603	44	9.2	63.5	6.9
All N rates	All P rates	2690	43	9.3	63.5	0
$LSD_{.05}$		291	16	0.6	NS	-

Difenzoquat applied at 0.75 lb/A when wild oat was in the 4- to 5-leaf gave 100% control of the weed. However, there was substantial visible crop injury for several weeks following the herbicide application. Since there was no crop yield response, the decreased wild oat competition may have been offset by the herbicide injury. (University of California Cooperative Extension, Bakersfield, CA 93303, Visalia, CA 93291 and Davis, CA 95616)

Ethyl metribuzin for downy brome control in small wheat. Rydrych, D.J. In 1984, postemergence applications of ethyl metribuzin were successful in controlling downy brome (cheatgrass) in 1- to 3-leaf winter wheat. The experiments were established in the fall of 1983 in Umatilla County, Oregon, on Ritzville silt loam soil. Plots were 1.8 m by 6 m and replicated three times in a randomized block design. Ethyl metribuzin was applied at .56 and 1.2 kg/ha with a compressed air sprayer in a volume of 187 l/ha and was compared with regular metribuzin at .13 and .28 kg/ha.

Wheat crop tolerance was measured by visual evaluation in June and plots were sampled for grain yield in July, 1984. None of the ethyl metribuzin treatments resulted in a significant reduction in wheat stand even though chemical treatments were applied on very small wheat. Regular metribuzin caused significant yield reduction. Downy brome control was excellent using ethyl metribuzin at 1.12 kg/ha. This compound may have a significant safety advantage over regular metribuzin for use in winter wheat. (Oregon State University, CBARC, Pendleton, OR 97801)

Ethyl metribuzin for downy brome control in small winter wheat in Eastern Oregon

Herbicide[1/]	Rate (kg/ha)	Downy brome control (%)	Winter wheat[2/] yield (kg/ha)
metribuzin	.13	99	2860 b
metribuzin	.28	100	2600 b
ethyl metribuzin	.56	99	3160 a
ethyl metribuzin	1.12	100	3180 a
weeded control	-	100	3680 a
control	-	0	2020 f

1/ Means containing the same letter are not significantly different using the DMR test.

2/ Yields are average of three locations.

Wild oat and broadleaf weed control in winter wheat. Schaat, B. G., D. C. Thill, and R. H. Callihan. On April 21, 1984, an experiment was initiated at Genesee, Idaho to study the effects of various herbicide treatments on wild oat and broadleaf weeds in winter wheat (var. Stephens). Plots measured 10 by 25 ft 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 10 and 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 3.7% organic matter, pH 5.5, and CEC of 26.4 meq/100 g soil. Postemergence applications were made at the two leaf and four to five leaf stage of wild oat growth. Climatological data at the time of application on April 21 and May 17 were, air temperature 57 and 48F, soil surface temperature 66 and 54F, soil temperature at 2 in 68 and 57F, and relative humidity 54 and 64%, respectively. Early evaluation of crop injury and wild oat (AVEFA), mayweed (ANTCO), ivyleaf speedwell (VERHE), shepherdspurse (CAPBP), flixweed (DESSO), and prickly lettuce (LACSE) control was made June 13 and late evaluation of crop injury and wild oat and mayweed control was made July 2. The plots were harvested August 12, 1984, with a small plot combine.

Wild oat and all broadleaf weeds were controlled (88% or greater) best with applications of DPX-M6316 + AC222293, barban + chlorsulfuron, and AC222293 + chlorsulfuron. In general, all broadleaf herbicides effectively controlled (96% or greater) shepherdspurse, flixweed, and prickly lettuce. Mayweed was effectively controlled (91% or greater) by all broadleaf herbicides with the exception of 2,4-DLVE and AC222293 + 2,4-DLVE early in the season, and fluorchloridone either alone or in tank mix combination. Ivyleaf speedwell was best controlled (90% or greater) with applications of DPX-M6316, DPX-M6316 + barban, DPX-M6316 + AC222293, chlorsulfuron, either alone or in tank mix combination, fluorchloridone, and fluorchloridone + barban. Tank mixtures of DPX-M6316 + AC222293 and fluorchloridone + diclofop resulted in grain yields greater than the check. Because wild oat was the dominant weed species, grain yields were also greater than the check with applications of diclofop and AC222293 at both rates, whereas grain yield was lower than the check with bromoxynil + chlorsulfuron which gave excellent control of the most prevalent broadleaf weed species. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Wild oat and broadleaf weed control in winter wheat at Genesee, Idaho

Treatment	Rate	Date applied	Crop injury		Weed control									Yield
					AVEFA		ANTCO		VERHE	CAPBP	DESSO	LACSE		
	(lb ai/A)		---(%)---											(bu/A)
			E	L	E	L	E	L	E	E	E	E		
check	-	-	-	-	-	-	-	-	-	-	-	-		75
barban + diclofop	0.38 0.50	4/21	10	6	91	90	2	0	21	30	11	55		81
barban + difenzoquat	0.38 0.50	4/21	8	0	90	91	2	0	10	30	25	5		87
DPX-M6316	0.75oz	4/21	0	0	0	5	100	100	91	100	100	100		65
DPX-M6316 + diclofop	0.75oz 1.0	4/21	2	0	80	85	100	100	82	100	100	100		92
DPX-M6316 + barban	0.75oz 0.38	4/21	14	6	82	74	100	100	99	100	100	100		89
DPX-M6316 + difenzoquat	0.75oz 1.0	5/16	5	0	81	76	91	100	64	96	100	98		81
DPX-M6316 + AC222293	0.75oz 0.63	4/21	2	5	94	91	100	100	96	100	100	100		104
diclofop	1.0	4/21	2	0	100	89	0	0	8	30	52	50		100
chlorsulfuron	0.25oz	4/21	0	0	0	0	100	100	100	100	100	100		73
diclofop + chlorsulfuron	1.0 0.25oz	4/21	0	0	82	91	98	99	94	100	100	100		92
difenzoquat	1.0	5/16	0	5	72	82	0	21	5	60	31	75		82
difenzoquat + chlorsulfuron	1.0 0.25oz	5/16	0	0	79	61	95	96	71	100	100	100		91
barban	0.38	4/21	11	2	94	89	0	0	19	5	30	0		80
barban + chlorsulfuron	0.38 0.25oz	4/21	8	8	91	88	100	100	96	100	100	100		83
AC222293	0.38	4/21	0	0	95	90	5	2	19	99	99	31		99
AC222293	0.63	4/21	0	2	96	91	5	0	40	100	100	50		96
AC222293 + chlorsulfuron	0.63 0.25oz	4/21	4	0	92	94	100	100	100	100	100	100		85
AC222293 + 2,4-DLVE	0.63 0.75	5/16	10	2	86	81	50	96	61	100	100	100		78
2,4-DLVE	0.75	5/16	0	0	18	15	71	98	61	100	100	100		78
fluorchloridone	0.50	4/21	0	0	21	21	89	75	94	100	100	78		79
fluorchloridone + diclofop	0.25 1.0	4/21	0	0	86	88	34	29	79	100	100	100		97
fluorchloridone + barban	0.25 0.38	4/21	8	5	75	59	20	2	90	100	100	100		75
fluorchloridone + AC222293	0.25 0.38	5/16	2	0	85	70	42	50	45	100	100	100		82
diclofop + bromoxynil	1.0 0.38	4/21	0	0	85	89	98	100	70	100	100	100		76
diclofop + bromoxynil + chlorsulfuron	1.0 0.25 0.13oz	4/21	0	2	84	85	96	100	25	100	100	100		87
bromoxynil + chlorsulfuron	0.25 0.13	4/21	2	0	0	0	100	100	52	100	100	100		54
bromoxynil MCPA	0.38	4/21	0	0	0	0	100	100	78	100	100	100		69
$LSD_{(0.05)}$			8	5	16	20	21	25	44	26	26	35		20

All DPX-M6316, AC222293 tank mix combinations, and chlorsulfuron treatments included 0.5% v/v nonionic surfactant.
E=early evaluation, L=late evaluation

Broadleaf weed control in winter wheat. Schaat, B. G., D. C. Thill, and R. H. Callihan. On November 15, 1983, an experiment was initiated near Culdesac, Idaho to study the effects of various herbicide treatments on the control of broadleaf weeds in winter wheat (var. Stephens). Plots were 10 by 25 ft 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 7.4% organic matter, pH 5.6, and CEC of 26.2 meq/100 g soil. Climatological data and stage of crop growth for applications of all treatment dates are given in the following table:

Date of application	11/15/83	3/23/84	4/16/84
Type of application	Post	Post	Post
Air temp(F)	46	54	57
Soil surface temp(F)	48	54	62
Soil temp @ 2 in(F)	50	58	64
Relative humidity(%)	72	95	85
Cloud cover(%)	0	0	85
Stage of crop growth	1-2lf	2-3lf/ 2-3til	2-3lf/ tillered

Early evaluation of crop injury and control of catchweed bedstraw (GALAP), mayweed (ANTCO), corn gromwell (LITAR), field pennycress (THLAR), henbit (LAMAM), common speedwell (VEROF), and wild buckwheat (POLCO) was made May 22, 1984, and late evaluation of catchweed bedstraw and mayweed control was made June 15, 1984. The plots were harvested August 16, 1984, with a small plot combine.

No differences occurred for crop injury among treatments. Fall applications of chlorsulfuron at 0.25 oz/A, chlorsulfuron + dicamba at 0.25 oz/A + 0.13 lb/A, and fluorchloridone + chlorsulfuron at 0.38 lb/A + 0.13 oz/A resulted in excellent (89% or greater) control of all broadleaf weeds present. Applications of metribuzin + dicamba, chlorsulfuron at 0.25 oz/A, metribuzin + chlorsulfuron, and chlorsulfuron + bromoxynil applied in early spring and applications of metribuzin + bromoxynil and terbutryn + MCPA + dicamba applied in late spring also gave excellent (94% or greater) control of all broadleaf weeds. No differences in grain yield were observed when treatments were compared to the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in winter wheat at Culdesac, Idaho

Treatment	Rate	Date applied	Crop injury	Weed control GALAP		ANTCO		LITAR	THLAR	LAMAM	VEROF	POLCO	Yield
	(lb ai/A)		(%)										(bu/A)
			E	E	L	E	L	E	E	E	E	E	
check	-	-	-	-	-	-	-	-	-	-	-	-	77
metribuzin	0.19	3/23	0	76	30	88	64	80	100	100	100	91	79
metribuzin + dicamba	0.19 0.13	3/23	0	96	99	98	100	100	100	100	100	98	77
metribuzin + MCPA	0.19 0.25	3/23	6	18	5	70	78	100	100	100	100	82	79
metribuzin + MCPA	0.19 0.38	3/23	2	48	34	76	34	100	100	100	100	66	81
metribuzin + terbutryn	0.19 0.80	3/23	0	44	100	99	100	100	100	100	100	96	80
metribuzin + chlorsulfuron	0.19 0.25oz	3/23	2	100	100	100	100	100	100	100	100	99	87
chlorsulfuron	0.25oz	11/15	2	100	99	91	92	100	100	100	100	100	81
chlorsulfuron	0.25oz	3/23	2	100	99	100	100	100	100	100	100	100	81
chlorsulfuron + dicamba	0.13oz 0.06	11/15	0	100	99	59	79	40	100	100	100	100	70
chlorsulfuron + dicamba	0.25oz 0.13	11/15	0	100	99	94	90	100	100	100	100	96	88
chlorsulfuron + dicamba	0.13oz 0.06	3/23	0	80	99	99	94	68	100	100	94	100	80
chlorsulfuron + dicamba	0.25oz 0.13	3/23	5	100	94	100	95	70	100	100	100	100	78
chlorsulfuron + bromoxynil	0.13oz 0.25	3/23	0	99	100	100	100	100	100	98	94	100	86
metribuzin	0.25	4/16	4	38	6	80	81	72	100	100	99	98	83
metribuzin	0.38	4/16	0	30	25	95	100	82	100	100	100	99	88
diuron + bromoxynil	0.60 0.25	3/23	0	100	100	95	91	96	100	100	68	96	82
terbutryn + MCPA	1.00 0.38	4/16	0	100	52	100	100	100	100	95	100	100	91
terbutryn + MCPA	1.25 0.25	4/16	2	91	50	100	82	100	100	99	95	100	86
metribuzin + bromoxynil	0.38 0.38	4/16	0	98	100	99	100	100	100	100	100	100	85
terbutryn + bromxynil MCPA	0.60 0.38	4/16	8	100	100	100	96	95	100	100	85	100	68
terbutryn + MCPA + dicamba	0.60 0.25 0.13	4/16	2	100	100	98	100	100	100	96	100	100	81
DPX-M6316	0.50oz	3/23	0	94	91	98	99	100	100	79	100	94	79
2,4-D(LVE)	0.75	4/16	2	89	75	64	52	88	100	61	99	100	75
bromoxynil MCPA	0.38	3/23	4	80	70	51	34	80	100	88	54	71	87
chlorsulfuron + bromoxynil	0.13oz 0.25	11/15	0	100	100	82	79	100	100	100	100	98	86
fluorchloridone+ chlorsulfuron	0.38 0.13oz	11/15	0	100	100	89	96	100	100	100	100	100	85
fluorchloridone	0.38	11/15	0	76	60	64	71	100	100	100	99	95	86
chlorsulfuron	0.13oz	11/15	0	80	100	72	96	95	100	100	100	100	79
$LSD_{(0.05)}$			6	35	37	25	32	26	-	15	16	21	17

All chlorsulfuron and DPX-M6316 treatments included 0.5% v/v nonionic surfactant.
E=early evaluation, L=late evaluation

Broadleaf weed control in winter wheat. Schaat, B. G., D. C. Thill, and R. H. Callihan. An experiment was initiated near Waha, Idaho on October 27, 1983, to study the effects of various herbicide treatments on the control of broadleaf weeds in winter wheat (var. Weston). Plots were 10 by 25 ft 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 5.2% organic matter, pH 5.6, and CEC of 29.0 meq/100 g soil. Climatological data at the time of application for all treatment dates are given in the following table:

Date of application	10/27/83	11/29/83	3/20/84
Type of application	PES	Post	Post
Air temp(F)	64	36	61
Soil surface temp(F)	62	38	64
Soil temp @ 2 in(F)	62	39	66
Relative humidity(%)	52	68	72
Cloud cover(%)	o	70	80
Stage of crop growth	-	1-2lf	3-4lf/

Evaluation for control of catchweed bedstraw (GALAP), prickly lettuce (LACSE), California hedge-parsley (CAUMI), tansy mustard (SSYAL), and field pennycress (THLAR) was made May 18, 1984. Plots were not harvested because of excessive lodging.

Catchweed bedstraw and all other broadleaf weeds were controlled (90% or greater) best with applications of DPX-M6316 + chlorsulfuron at 0.75 + 0.08 oz/A, DPX-M6316 + metsulfuron at 0.50 + 0.04 oz/A, and chlorsulfuron + dicamba. No other treatments adequately controlled catchweed bedstraw. In addition, prickly lettuce was also effectively controlled (92% or greater) with applications of fluorchloridone applied early or late fall at 0.75 lb/A, PPG-1013 at 0.40 lb/A and 0.03/0.02 lb/A split application, and all DPX-M6316 tank mix combinations except with bromoxynil. California hedge-parsley was also effectively controlled (94% or greater) with applications of all DPX-M6316 treatments alone or in tank mix combination and PPG-1013 at 0.40 lb/A. Tansy mustard and field pennycress were effectively controlled by most treatments. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in winter wheat at Waha, Idaho.

Treatment	Rate	Date Applied	Weed Control GALAP	LACSE	CAUMI	SSYAL	THLAR
	(lb ai/A)		-----	-----	(%)	-----	-----
fluorchloridone	0.38	10/27	12	71	22	100	100
fluorchloridone	0.50	10/27	44	76	32	96	100
fluorchloridone	0.75	10/27	29	96	28	78	100
fluorchloridone	0.38	11/29	32	79	45	100	100
fluorchloridone	0.50	11/29	44	78	22	100	100
fluorchloridone	0.75	11/29	70	99	61	100	100
DPX-M6316	0.13 oz	3/20	48	40	95	87	100
DPX-M6316	0.25 oz	3/20	70	84	100	90	97
DPX-M6316	0.33 oz	3/20	60	59	100	99	100
DPX-M6316	0.50 oz	3/20	58	89	100	100	100
DPX-M6316	0.75 oz	3/20	68	75	100	100	100
DPX-M6316	1.00 oz	3/20	40	88	100	100	100
DPX-M6316	2.00 oz	3/20	82	80	100	100	100
DPX-M6316 +	0.50 oz	3/20	58	94	100	100	100
chlorsulfuron	0.04 oz						
DPX-M6316 +	0.75 oz	3/20	81	95	100	100	100
chlorsulfuron	0.04 oz						
DPX-M6316 +	0.50 oz	3/20	70	96	100	99	100
chlorsulfuron	0.08 oz						
DPX-M6316 +	0.75 oz	3/20	90	99	100	98	100
chlorsulfuron	0.08 oz						
DPX-M6316 +	0.50 oz	3/20	90	100	100	99	100
metsulfuron	0.04 oz						
DPX-M6316 +	0.75 oz	3/20	81	100	100	99	100
metsulfuron	0.04 oz						
DPX-M6316 +	0.50 oz	3/20	48	100	100	100	100
metsulfuron	0.08 oz						
DPX-M6316 +	0.75 oz	3/20	65	100	99	98	100
metsulfuron	0.08 oz						
DPX-M6316 +	0.50 oz	3/20	38	72	99	98	100
bromoxynil	0.13						
PPG1013	0.10	10/27	62	68	70	80	100
PPG1013	0.20	10/27	50	75	55	99	100
PPG1013	0.40	10/27	69	98	94	100	100
PPG1013/	0.03	11/29	80	92	40	89	100
PPG1013	0.02	3/20					
PPG1013	0.06	11/29	10	38	49	96	95
chlorsulfuron +	0.25 oz	3/20	92	100	100	100	100
dicamba	0.13						
$LSD_{(0.05)}$			38	29	27	14	NS

All DPX-M6316 and chlorsulfuron treatments included 0.5% v/v nonionic surfactant.

Effects of dinoseb on foliar diseases in winter wheat. Valverde, B.E., A.P. Appleby, and R. M. Geddens. There are several reports in the literature that some herbicides can affect the severity of foliar diseases in various crops. The present investigation was undertaken to study the effects of dinoseb alone and in combination with other pesticides on foliar diseases in winter wheat.

Two experiments were established at Hyslop Research Farm, Corvallis, Oregon, in 1983-1984. The first experiment consisted of a split-plot arrangement with sowing dates as main plots and dinoseb application dates as subplots. Yamhill winter wheat was planted at 100 kg/ha on 18 cm rows on September 14 and October 4. Diuron (1.8 kg/ha) was applied to all the 3 m by 6 m plots to eliminate possible differential effects of dinoseb on weed control. Dinoseb was applied once at 1.7 kg/ha at the following wheat growth stages: 1 leaf, 2 to 3 leaves, 5 leaves (1 to 2 tillers), 4 tillers, 1 node, 3 nodes, and early boot. An untreated control was included for each seeding date. The main foliar diseases present were Septoria tritici and strip rust, Puccinia striiformis. No differentiation between them was made for evaluation purposes and assessments were based on the percentage of foliar tissue that was infected. Plots were harvested on August 4, 1984 with a small-plot combine. An average yield increase of 29 % ,from 2551 kg/ha to 3295 kg/ha, was obtained by delaying the seeding date. Late planted wheat was less severely infected with foliar disease. No consistent effect of dinoseb timing on yield or disease attack, however, was found. Lodging was most severe in the early planting and was primarily due to eyespot, caused by Pseudocercosporella herpotrichoides.

The second experiment consisted of a split-plot arrangement with dinoseb (1.7 kg/ha) treatments as main plots and supplemental pesticides as subplots. Yamhill winter wheat was planted as above on October 4. Main plot treatments included a nontreated check, and dinoseb applied on November 21 and December 16. The supplemental pesticide treatments were: preplant fumigation with methyl bromide at 50 g/m^2, phorate (Thimet) at 2.25 kg a.i./ha preplant incorporated, benomyl (Benlate) at 1.12 kg a.i./ha applied on February 29, and two applications of CGA-64250 (Tilt) at 0.12 kg a.i./ha each at flag leaf emergence and heading. The same disease complex occurred in this experiment. Plots were harvested on July 31, 1984 with a small-plot combine.

Dinoseb slightly increased the yield, especially when applied in mid December (see table). The highest yield was obtained when dinoseb was sprayed in December and CGA-64250 was applied as a supplemental fungicide treatment. This combined treatment substantially reduced the foliar disease infection. Dinoseb alone slightly reduced the severity of disease symptoms, mainly when it was sprayed in December. The most severe foliar symptoms were observed in plots treated with methyl bromide. Lodging was also significantly increased by methyl bromide. This was due to overgrowth of the treated plants and an increased attack of eyespot (data not shown). More detailed studies on dinoseb timing and its interaction with foliar diseases are currently in progress. (Crop Sci. Dept., Oregon State Univ., Corvallis, OR 97331)

Effect of dinoseb and supplemental pesticides on yield, foliar diseases, and lodging of Yamhill winter wheat.

Pesticide treatment	Rate (Kg a.i./ha)	Grain yield (Kg/ha)	Infected foliar tissue (%)[1]	Lodging (%)[2]
No dinoseb	--			
methyl bromide	50 g/m^2	1745 de[3]	19.8 f	62.5 c
phorate	2.25	2922 bcd	12.3 bc	6.2 a
benomyl	1.12	2852 bcde	19.2 ef	2.3 a
CGA-64250 (twice)	0.12	3031 bc	17.8 def	10.3 a
Control	--	3114 bc	13.5 bcd	9.7 a
dinoseb (mid-Nov.)	1.70			
methyl bromide	50 g/m^2	1598 cde	15.7 cdef	62.5 c
phorate	2.25	2342 bcd	15.7 cdef	3.2 a
benomyl	1.12	2884 bcd	13.5 bc	4.0 a
CGA-64250 (twice)	0.12	3228 b	12.5 bc	3.2 a
Control (dinoseb alone)	--	3368 b	12.3 bc	2.3 a
dinoseb (mid-Dec.)	1.70			
methyl bromide	50 g/m^2	1885 cde	14.8 bcde	58.3 c
phorate	2.25	3298 b	11.8 bc	13.7 a
benomyl	1.12	3260 b	14.0 bcd	7.2 a
CGA-64250 (twice)	0.12	4642 a	6.5 a	32.7 b
Control (dinoseb alone)	--	3846 b	11.5 b	7.2 a

[1]Evaluated on May 17, 1984.

[2]Evaluated on June 29, 1984

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

Wild oat control in California dryland wheat. Wright, S.D., L.W. Mitich, and R.S. Neilson. AC 222,293 was evaluated in Tulare County for wild oat control, crop injury, crop yield and bushel weights. Various rates of the herbicide and surfactant and various volumes of water were compared. Difenzoquat was included as a standard herbicide. Plots were 6 by 30 ft. with three replications arranged in a randomized complete block. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 30 gpa on January 1, 1984. Wild oat was in the 1- to 5-leaf stage with the majority of plants in the 3- to 4-leaf stage at time of treatment and Yecora Rojo wheat was in the early tillering stage. Evaluations were made on May 25, 1984, and yields taken on May 30.

Yields were higher in all herbicide treated plots than the check although the differences were not significant between any of the treatments, and there were no significant differences in bushel weights. Difenzoquat caused early injury; however, the yield was not affected. AC 222,293 gave good control at 0.37 lb/A with 0.5% surfactant added. This herbicide also was effective at 0.25 lb/A when the higher rates of surfactant and larger volumes of water were applied. (University of California Cooperative Extension, Visalia, CA 93291)

Wild oat control in dryland wheat, Tulare County

Treatment	Rate (lb/A)	Surfactant (%)	H_2O gpa	Wild oat control[1]	Wheat injury[1]	Wheat yield lb/A	Test weight lb/bu
AC 222,293	0.25	.25	10	7.0	0	3024	64.0
AC 222,293	0.37	.25	10	6.0	0	3229	64.0
AC 222,293	0.50	.25	10	8.8	0	2580	63.0
AC 222,293	0.25	.25	20	5.8	0	3152	62.7
AC 222,293	0.37	.25	20	6.7	0	2805	63.0
AC 222,293	0.50	.25	20	8.3	0	2988	62.7
AC 222,293	0.25	.50	10	6.5	0	2952	64.0
AC 222,293	0.37	.50	10	8.2	0	3246	63.7
AC 222,293	0.50	.50	10	7.3	0	2845	63.3
AC 222,293	0.25	.50	20	8.5	0	2749	63.7
AC 222,293	0.37	.50	20	9.2	0	3057	62.3
AC 222,293	0.50	.50	20	8.5	0	2781	62.0
Difenzoquat	0.75	---	10	8.8	3	3362	63.0
Check[2]	---	---	---	0	0	2521	63.0
LSD .05						N.S.	N.S.
CV %						19.5	2.2

[1] Based on a scale where 0 = no control or injury and 10 = dead plants.

[2] Check had 4.2 wild oat plants per sq. ft.

The influence of temperature and soil moisture on injury to wheat by diclofop-methyl. Yenne, S. P. and D. C. Thill. A greenhouse experiment was conducted to determine the effect of post-application temperature and soil moisture on winter wheat (var. Stephens) tolerance to diclofop-methyl. Three wheat caryopses were planted on January 16, 1984, 5 cm deep, in 15 cm diameter pots filled with a greenhouse soil mix. Caryposes were allowed to germinate and grow to the 2 leaf stage under normal soil moisture conditions (50 to 60% of field capacity) and temperatures (19 to 24 C). On January 27 the wheat was transferred to a greenhouse (temperature range 3.3 to 9.0 C) for 22 days of vernalization. Pots were moved back into the greenhouse on (19 to 24 C) February 17 and thinned to two plants per pot. Establishment of soil moisture regimes began at this time. Pots were weighed every two days, and water was added to maintain soil moisture at 60 and 100% of field capacity. Diclofop-methyl was applied on Febuary 27 at 0, 1.2, and 2.8 kg/ha when the wheat was in the 2 to 3 tiller stage. One hour after herbicide application, pots were placed in the appropriate growth chamber. The cold temperature regime was -3.9 C (12 hours, dark) followed by 8.9 C (12 hours, light). The warm temperature regime was 4.4 C (12 hours, dark) followed by 10 C (12 hours, light). The plants were exposed to the test temperatures and moisture levels for six days following application, then returned to the greenhouse conditions (same as those previously mentioned). After nine days under greenhouse conditions, shoots were harvested and dry weights (65 C for 48 hours) determined.

There were no interactions among herbicide rates, temperatures and moistures. When summed across temperature regimes and herbicide rates, plant biomass was 6% less in the 60% field capacity moisture treatment compared to 100% field capacity. Plant dry weight was increased with the 1.4 kg/ha rate of diclofop-methyl when compared to the 0 and 2.8 kg/ha rates except at -3.9/8.9 C and 60% field capacity. The 2.8 kg/ha rate resulted in plant dry weights that were not different from the untreated check under all moisture and temperature combinations. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

The influence of diclofop-methyl and post-application temperature and moisture on winter wheat, dry matter production.

Rate (kg /ha)	Temperature (C)	Moisture (% field capacity)	Dry Weight (mg/pot)[1]
0	-3.9/8.9	60%	893.4a[2]
1.4			875.1a
2.8			994.9ab
0	4.4/10.0	60%	943.1a
1.4			1129.6d
2.8			937.2a
0	-3.9/8.9	100%	944.9ab
1.4			1046.4c
2.8			790.2a
0	4.4/10.0	100%	1093.1c
1.4			1224.0e
2.8			1046.3c

[1]Per two plants.
[2]Means followed by the same letter are not significantly different at the 5% level of probability according to Fisher's Protected LSD.

Broadleaf weed control in winter wheat. Yenne, S. P., D. C. Thill, and R. H. Callihan. A field experiment was conducted to evaluate annual broadleaf weed control in winter wheat (var. Stephens) with spring applied herbicides. All treatments were applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 3 mph and 40 psi. Herbicide applications were made April 28, May 16, and May 21, 1984. Application data is reported in Table 1. Wild oat was controlled throughout the plot area with 1.0 lb/A of difenzoquat. The experiment was a randomized complete block design with four replications. Mayweed (ANTCO), catchweed bedstraw (GALAP), and henbit (LAMAN) control were evaluated on July 7, and yields were taken with a small plot combine on August 14, 1984.

All weed species were effectively controlled (90% or greater) by bromoxynil (2 EC); terbutryn + bromoxynil, MCPA or bromoxynil-MCPA (0.25 lb/A); dicamba + chlorsulfuron or DPX-6316; XRM-3785 (0.47 lb/A); and XRM-3972 + bromoxynil, terbutryn, or DPX-6316 (Table 2). The only treatment that reduced the grain yield was the terbutryn + DPX-6316 (Table 2). (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 1. Application data for broadleaf weed control in winter wheat at Genesse, Idaho

Date applied	4/28	5/16	5/21
Method of Application	broadcast	broadcast	broadcast
Air temp (F)	40	58	74
Soil temp @ 2" (F)	44	57	64
Relative humidity (%)	60	64	50
Cloud cover (%)	80	60	60
Wind (mph)	0-2	5-7	3-5
Dew present	no	yes	no
Soil surface	moist	moist	dry
Volume of carrier (gpa)	20	20	20
Nozzle size	8002	8002	8002
Boom pressure (psi)	40	40	40
Textural class	silt loam		

Table 2. Weed control in winter wheat with spring applied herbicides.

Treatment	Rate	Time of application	Weed control ANTCO	GALAP	LAMAN	Yield
	lb(ai)/A		---% of check----			(bu/A)
check	0.00					86
EH-736	0.48	5/16	64	66	90	83
EH-763	0.48	5/16	48	63	85	83
EH-786	0.24	5/16	50	80	85	88
EH-541	0.36	5/16	49	85	88	76
bromoxynil (HB4)	0.38	4/28	89	92	95	85
bromoxynil (ME4)	0.38	4/28	70	88	88	85
bromoxynil (2.0EC)	0.38	4/28	93	95	95	85
XRM-3972	0.09	5/16	90	91	70	76
XRM-3972	0.13	5/16	91	90	85	88
XRM-3785	0.47	5/16	94	94	93	80
XRM-3785	0.63	5/16	94	89	93	74
terbutryn + MCPA-amine	0.80 + 0.38	5/16	95	95	97	72
terbutryn + bromoxynil	0.80 + 0.25	5/16	94	94	95	73
terbutryn + BROMMCPA[1]	0.80 + 0.25	5/16	95	90	95	70
terbutryn + BROMMCPA	0.80 + 0.13	5/16	86	91	95	76
BROMMCPA	0.38	4/28	76	91	95	77
terbutryn + DPX-M6316[2] + X-77[3]	0.80 + 0.75 0.50	5/16	84	93	93	61
dicamba + chlorsulfuron[2] + X-77	0.13 + 0.25 0.50	4/28	94	93	95	79
dicamba + chlorsulfuron[2] + X-77	0.13 + 0.13 0.50	4/28	94	93	95	77
dicamba + DPX-M6316[2] + X-77	0.13 + 0.75 0.50	4/28	95	95	95	69
XRM3785 + terbutryn	0.47 + 0.80	5/16	94	89	95	66
XRM3785 + bromoxynil	0.47 + 0.25	5/16	95	91	88	72
XRM3972 + bromoxynil	0.09 + 0.25	5/16	94	91	93	69
XRM3972 + terbutryn	0.09 + 0.80	5/16	95	91	95	69
XRM3972 + Na-MCPA	0.09 + 0.25	5/16	91	91	85	71
XRM3972 + DPX-M6316[2] + X-77	0.09 + 0.75 0.50	5/16	95	95	95	79
MCPA ester	0.24	5/21	45	79	90	82
chlorsulfuron[2] + X-77	0.25 + 0.50	4/28	73	84	95	67
check	0.00					84
LSD (.05)			24	21	21	20

[1]BROMMCPA - (3 + 3) bromoxynil + MCPA
[2]oz(ai)/A
[3]% v/v

Postemergence barnyardgrass and yellow foxtail control versus various irrigation regimes. R. F. Norris, R. A. Lardelli and E. Wenslaff. This experiment was established on the U.C. Davis Experimental Farm to evaluate several new experimental herbicides on barnyardgrass and yellow foxtail in relation to time of irrigation.

Several herbicides (see table for chemicals and rates tested) were applied to a multi-weed screening trial. Weeds were drill-seeded with both species on the top of each 30 inch center bed. All plots were irrigated 8 days prior to and 7 days, after spraying. Additional irrigation dates, which are coded A, B, C, and D, followed, as indicated in the table. At spraying, the grasses were at the following growth stage: barnyardgrass, A (3-6 inches), B, C, D (2-5 inches), yellow foxtail, A (2-4 inches), B, C, D (1-3 inches).

The herbicides were applied on July 13, 1984, using a CO_2 backpack handsprayer, set at 30 psi with 8002E nozzles and delivering 40 gal/A. Plot size was 2 beds by 8 ft; each herbicide treatment was replicated four times for each of the four irrigation regimes using a complete block split plot design. Visual evaluations of grass injury were made on July 20, and August 1, 1984. Biomass data were obtained on August 29, 1984. The harvest operation was accomplished by clipping two 1-meter samples from each plot; the fresh biomass was weighed and recorded.

The data from this experiment demonstrated clearly the variability of grass control by all herbicides, due to differences in soil moisture. Maximum grass control (for both species) was observed in the plot irrigated on the treatment day. In plots receiving water three days prior or after spraying, grass control was significantly reduced for most herbicides at the 0.15 lb/A rate of application. The decreased activity of these herbicides due to low soil moisture was overcome by increased rates of application. SC-1084, at the lowest rate applied, showed very little activity for grass control regardless of various moisture in the soil. However, an increase in rate provided good control with the irrigation immediately after application. (Botany Department, University of California, Davis, CA 95616.)

Table 1: Postemergence barnyardgrass and yellow foxtail control vs irrigation regime.

Treatment	Rate (lb/A)	Irrigation Regimes[1/]	Weed Control[2/] Barnyardgrass 7/20	Weed Control[2/] Barnyardgrass 8/1	Weed Control[2/] Yellow Foxtail 7/20	Weed Control[2/] Yellow Foxtail 8/1	Harvest Data[3/] 8/29
			(%)	(%)	(%)	(%)	Fresh wt/grams
Sethoxydim + pace oil	0.15 + 1 qt.	A	60	63	55	65	1197
	0.15 + 1 qt.	B	79	95	76	98	117
	0.15 + 1 qt.	C	64	68	64	65	938
	0.15 + 1 qt.	D	70	88	68	85	256
Sethoxydim + pace oil	0.30 + 1 qt.	A	68	88	64	85	209
	0.30 + 1 qt.	B	93	100	90	100	11
	0.30 + 1 qt.	C	68	95	68	90	373
	0.30 + 1 qt.	D	65	95	65	95	215
Sethoxydim + pace oil	0.60 + 1 qt.	A	75	99	78	99	0
	0.60 + 1 qt.	B	100	100	100	100	0
	0.60 + 1 qt.	C	80	100	78	100	0
	0.60 + 1 qt.	D	75	100	73	100	0
Fluazifop-butyl + pace oil	0.15 + 1 qt.	A	53	40	50	43	1439
	0.15 + 1 qt.	B	79	100	79	95	82
	0.15 + 1 qt.	C	64	55	59	48	1523
	0.15 + 1 qt.	D	55	58	55	58	1148
Fluazifop-butyl + pace oil	0.30 + 1 qt.	A	65	88	63	73	515
	0.30 + 1 qt.	B	93	100	88	100	20
	0.30 + 1 qt.	C	65	88	63	73	568
	0.30 + 1 qt.	D	60	83	58	83	129
Fluazifop-butyl + pace oil	0.60 + 1 qt.	A	70	95	68	90	76
	0.60 + 1 qt.	B	98	100	98	100	0
	0.60 + 1 qt.	C	65	96	65	95	60
	0.60 + 1 qt.	D	68	93	68	85	106

1/ Irrigation regime, A = irrigated 3 days prior to spraying, B = irrigated immediately after spraying, C = irrigated 3 days after spraying, D = no extra irrigation.

2/ Average of 4 replications where 0 = no grass control and 100 = complete control.

3/ Harvest; two 1-meter samples from each plot, approximately 80% barnyardgrass and 20% yellow foxtail.

Table 1: Continued.

Treatment	Rate	Irrigation Regimes[1/]	Weed Control[2/] Barnyardgrass 7/20	Barnyardgrass 8/1	Yellow Foxtail 7/20	Yellow Foxtail 8/1	Harvest Data[3/] 8/29
	(lb/A)		---------- (%)	----------	----------	----------	Fresh wt/grams
DPX-Y6202 + pace oil	0.15 + 1 qt.	A	63	100	65	100	0
	0.15 + 1 qt.	B	95	93	93	98	0
	0.15 + 1 qt.	C	81	100	78	95	44
	0.15 + 1 qt.	D	70	100	68	100	0
DPX-Y6202 + pace oil	0.30 + 1 qt.	A	75	100	76	100	0
	0.30 + 1 qt.	B	100	98	99	98	39
	0.30 + 1 qt.	C	95	100	88	100	0
	0.30 + 1 qt.	D	69	100	66	100	0
DPX-Y6202 + pace oil	0.60 + 1 qt.	A	73	100	73	100	0
	0.60 + 1 qt.	B	100	100	100	98	0
	0.60 + 1 qt.	C	91	100	89	100	0
	0.60 + 1 qt.	D	74	100	71	100	0
Haloxyfop-methyl + pace oil	0.15 + 1 qt.	A	63	91	63	89	115
	0.15 + 1 qt.	B	93	100	88	98	79
	0.15 + 1 qt.	C	68	95	65	90	224
	0.15 + 1 qt.	D	60	93	58	85	283
Haloxyfop-methyl + pace oil	0.30 + 1 qt.	A	76	100	76	98	18
	0.30 + 1 qt.	B	100	100	95	100	0
	0.30 + 1 qt.	C	81	100	81	100	0
	0.30 + 1 qt.	D	65	98	65	100	34
Haloxyfop-methyl + pace oil	0.60 + 1 qt.	A	69	98	74	98	0
	0.60 + 1 qt.	B	100	100	98	100	0
	0.60 + 1 qt.	C	86	100	79	99	0
	0.60 + 1 qt.	D	63	100	63	100	0

1/ Irrigation regime, A = irrigated 3 days prior to spraying, B = irrigated immediately after spraying, C = irrigated 3 days after spraying, D = no extra irrigation.

2/ Average of 4 replications where 0 = no grass control and 100 = complete control.

3/ Harvest; two 1-meter samples from each plot, approximately 80% barnyardgrass and 20% yellow foxtail.

Table 1: Continued.

Treatment	Rate	Irrigation Regimes[1/]	Weed Control[2/] Barnyardgrass 7/20	Barnyardgrass 8/1	Yellow Foxtail 7/20	Yellow Foxtail 8/1	Harvest Data[3/] 8/29
	(lb/A)		(%)	(%)	(%)	(%)	Fresh wt/grams
HOE-33171 + pace oil	0.15 + 1 qt.	A	60	90	58	93	240
	0.15 + 1 qt.	B	90	98	90	99	56
	0.15 + 1 qt.	C	55	70	55	73	915
	0.15 + 1 qt.	D	55	58	50	55	1317
HOE-33171 + pace oil	0.30 + 1 qt.	A	63	95	50	89	1737
	0.30 + 1 qt.	B	90	100	78	93	1300
	0.30 + 1 qt.	C	54	75	40	85	1821
	0.30 + 1 qt.	D	75	95	65	90	1454
HOE-33171 + pace oil	0.60 + 1 qt.	A	55	98	58	98	0
	0.60 + 1 qt.	B	93	98	93	98	59
	0.60 + 1 qt.	C	68	95	68	90	163
	0.60 + 1 qt.	D	60	88	60	78	675
Clopropoxydim + pace oil	0.15 + 1 qt.	A	55	70	46	88	/
	0.15 + 1 qt.	B	89	93	94	93	/
	0.15 + 1 qt.	C	65	93	60	68	/
	0.15 + 1 qt.	D	58	78	55	85	/
Clopropoxydim + pace oil	0.30 + 1 qt.	A	58	95	58	95	/
	0.30 + 1 qt.	B	78	96	78	96	/
	0.30 + 1 qt.	C	63	88	59	78	/
	0.30 + 1 qt.	D	60	90	60	90	/
Clopropoxydim + pace oil	0.60 + 1 qt.	A	73	98	70	98	/
	0.60 + 1 qt.	B	95	100	95	100	/
	0.60 + 1 qt.	C	68	100	68	100	/
	0.60 + 1 qt.	D	65	98	63	98	/

1/ Irrigation regime, A = irrigated 3 days prior to spraying, B = irrigated immediately after spraying, C = irrigated 3 days after spraying, D = no extra irrigation.

2/ Average of 4 replications where 0 = no grass control and 100 = complete control.

3/ Harvest; two 1-meter samples from each plot, approximately 80% barnyardgrass and 20% yellow foxtail.

Table 1: Continued.

Treatment	Rate (lb/A)	Irrigation Regimes[1]	Weed Control[2] Barnyardgrass 7/20 (%)	Barnyardgrass 8/1 (%)	Yellow Foxtail 7/20 (%)	Yellow Foxtail 8/1 (%)	Harvest Data[3] 8/29 Fresh wt/grams
SC-1084 + pace oil	0.15 + 1 qt.	A	23	8	23	12	2581
	0.15 + 1 qt.	B	43	28	43	40	2296
	0.15 + 1 qt.	C	12	15	12	15	2136
	0.15 + 1 qt.	D	38	25	38	20	2365
SC-1084 + pace oil	0.30 + 1 qt.	A	28	25	28	25	3012
	0.30 + 1 qt.	B	50	50	48	43	1460
	0.30 + 1 qt.	C	28	18	25	18	2636
	0.30 + 1 qt.	D	38	23	38	23	2990
SC-1084 + pace oil	0.60 + 1 qt.	A	53	73	48	53	1315
	0.60 + 1 qt.	B	73	93	73	80	273
	0.60 + 1 qt.	C	53	63	53	40	1751
	0.60 + 1 qt.	D	58	55	58	48	1146
Untreated check		A	0	0	0	0	3497
		B	0	0	0	0	3014
		C	0	0	0	0	3378
		D	15	5	5	5	3353
Untreated check		A	0	0	0	0	3341
		B	0	0	0	0	2485
		C	8	0	5	0	3892
		D	0	0	0	0	3293

1/ Irrigation regime, A = irrigated 3 days prior to spraying, B = irrigated immediately after spraying, C = irrigated 3 days after spraying, D = no extra irrigation.

2/ Average of 4 replications where 0 = no grass control and 100 = complete control.

3/ Harvest; two 1-meter samples from each plot, approximately 80% barnyardgrass and 20% yellow foxtail.

Control of seedling grasses with postemergence grass herbicides in western Oregon. Brewster, B.D. and A.P. Appleby. Nine postemergence grass herbicides were applied to 28 species of seedling grass on June 11, 1984 at Corvallis, Oregon. The trial design was a randomized complete block with three replications and 2.5 m by 12.5 m plots. Each plot contained a single row of each species which had been seeded on May 10, 1984. Herbicides were applied in a water carrier at a spray volume of 234 l/ha with a unicycle, compressed-air sprayer. The soil was a Woodburn silt loam. An oil concentrate was included in each treatment at 2.3 l/ha.

Visual evaluations of percent control were made on July 11, 1984. DPX Y6202, haloxyfop-methyl, and fluazifop-P-butyl were more effective on some species than were the other chemicals at equal rates. Corn appeared to be the most sensitive species to the herbicides as a group, while rattail fescue, red fescue, and annual bluegrass were resistant. Large differences in sensitivity among herbicides within a species sometimes were found. For instance, fenoxaprop-ethyl had no effect on cheat, but DPX Y6202 eliminated this species. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Control of seedling grasses with postemergence grass herbicides in western Oregon

Herbicide	Rate (Kg/ha)	Bermudagrass (2-3 L)[1]	Colonial bentgrass (3 L)	Kentucky bluegrass (3-4 L)	Witchgrass (2-3 L)	Annual bluegrass (1-2 T)[1]	Roughstalk bluegrass (1 T)	Large crabgrass (2-3 L)	Johnsongrass (3 L)	Barnyardgrass (2-4 L)	Sorghum (3-4 L)	Meadow foxtail (3-4 L)	Downy brome (1-2 T)	Cheat (4 L/1 T)	Field brome (1-2 T)	Soft brome (1-2 T)	Perennial ryegrass (3-4 L)	Italian ryegrass (3-4 T)	Tall fescue (4 L/1 T)	Rattail fescue (4-5 L)	Red fescue (3-4 L)	Barley (3-4 L/30-35 cm)	Wheat (3-4 T/25-30 cm)	Rye (5-6 T/15-20 cm)	Oats (3-4 T/20-25 cm)	Wild oats (3-4 T/20-25 cm)	Corn (4-5 L/12 cm)	Smooth brome (3-4 L)	Green foxtail (1-2 L)
		(% control)																											
sethoxydim	0.14	72	99	99	88	0	98	88	90	87	96	99	27	67	50	50	96	93	73	0	0	70	60	90	98	98	100	50	75
sethoxydim	0.28	77	100	99	98	7	99	95	90	88	99	100	87	93	87	95	99	96	87	0	0	92	98	100	100	100	100	93	82
sethoxydim	0.56	82	100	100	97	0	100	95	91	93	100	100	96	98	96	99	99	100	95	0	0	99	100	100	100	100	100	100	92
cloproxydim	0.14	78	100	99	95	0	98	92	85	93	80	100	88	99	85	98	99	100	88	0	0	98	100	100	100	100	100	88	82
cloproxydim	0.28	85	100	99	97	7	100	99	85	85	95	100	99	100	98	100	100	100	96	0	0	99	100	100	100	100	100	100	85
cloproxydim	0.56	88	99	99	98	23	99	99	88	99	99	100	99	100	100	100	100	100	99	0	0	100	100	100	100	100	100	99	96
SC 1084	0.14	77	88	80	91	0	40	78	95	85	99	77	57	72	40	62	40	33	17	0	0	83	93	43	50	83	100	83	70
SC 1084	0.28	100	100	97	100	0	88	99	99	93	99	96	99	99	82	88	70	37	23	0	0	98	100	93	99	100	100	100	90
SC 1084	0.56	100	100	99	100	3	99	100	100	100	100	97	99	100	95	97	92	87	70	0	0	100	100	100	100	100	100	100	99
diclofop-methyl	1.12	93	99	90	90	37	47	80	30	88	3	92	0	7	0	37	99	95	96	0	0	0	3	7	99	98	100	17	98
fenoxaprop-ethyl	0.14	90	7	98	94	0	98	98	91	90	99	60	0	0	0	0	30	13	20	0	0	90	43	47	100	98	100	0	82
fenoxaprop-ethyl	0.28	99	47	99	99	7	100	100	97	95	100	75	0	0	0	40	70	40	43	0	0	92	67	65	100	99	100	0	93
fluazifop-butyl	0.14	96	100	99	99	0	87	97	100	87	100	96	87	92	72	83	67	75	47	0	0	97	100	100	100	100	100	99	85
fluazifop-P-butyl	0.07	88	100	99	99	0	93	97	98	95	99	96	87	95	83	83	68	75	43	0	0	97	100	100	100	99	100	100	83
fluazifop-P-butyl	0.14	99	100	100	100	0	100	100	99	95	100	98	99	100	96	97	95	99	67	0	0	98	100	100	100	100	100	100	85
fluazifop-P-butyl	0.28	100	100	100	100	7	100	100	100	99	100	99	100	100	100	100	98	100	88	0	0	100	100	100	100	100	100	100	99
DPX Y6202	0.07	92	99	100	93	0	99	97	87	90	99	100	99	100	99	99	99	99	70	0	0	100	100	100	100	100	100	100	88
DPX Y6202	0.14	99	100	99	98	7	100	100	99	97	100	100	100	100	100	99	100	100	98	0	0	100	100	100	100	100	99	100	95
DPX Y6202	0.28	100	100	100	100	37	100	100	100	97	100	100	99	100	100	100	100	100	99	0	0	100	100	100	100	100	100	100	97
haloxyfop-methyl	0.07	99	99	99	97	17	95	97	100	95	100	100	92	99	90	97	95	87	53	0	0	100	100	100	100	99	100	100	93
haloxyfop-methyl	0.14	100	100	100	100	13	100	100	100	100	100	100	100	100	100	100	100	100	92	0	0	100	100	100	100	100	100	100	100
haloxyfop-methyl	0.28	96	100	99	100	63	100	100	100	100	100	100	100	100	100	100	100	100	98	0	0	100	100	100	100	100	100	100	100
Check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1]Growth stage at time of treatment: T = tiller, L = leaf

PROJECT 6.

AQUATIC, DITCHBANK, AND NONCROPLAND WEEDS

Carl Tennis - Project Chairman

Algicidal activity of three copper compounds on cladophora. Anderson, L.W.J. and N. Dechoretz. Laboratory studies were conducted to compare the algicidal activity of copper sulfate, Cutrine Plus® and Komeen® under different treatment conditions The concentrations of copper and the exposure times were varied. Assays for algicidal activity were conducted by placing 1 g (damp dried fresh weight) of algal material in 1 liter of water for 24 h. After the 24 h holding period the jars were treated with the algicide under the conditions prescribed by the type of experiment. After the algal samples were exposed to the copper compounds, half the sample was removed from the jar to determine the copper concentration of the plant and the remaining sample was transferred to fresh water for 7 days at which time change in biomass was determined on a dry weight basis.

Under these test conditions, the algicidal activity of copper sulfate and Cutrine Plus® was not significantly different. This was generally the result when the concentration was varied between 0.25 and 4.0 ppmw copper or the exposure period was varied between 1 and 24 h with the concentration constant. However, Komeen® was significantly less phytotoxic to *Cladophora* than either $CuSO_4$ or Cutrine Plus®. Based on the concentration of copper after treatment, the tolerance of *Cladophora* appears to be related to the reduced ability of *Cladophora* to absorb copper when it is applied as Komeen. (USDA/ARS, Aquatic Weed Control Research, University of California, Davis, CA. 95616).

Copper concentration and percent inhibition of growth of *Cladophora* after 24 hours exposure to three copper compounds at 0.5 ppmw.

Treatment	Copper Concentration ug/g[1]	Growth Inhibition %[2]
Control	50	-
$CuSO_4$	1660	80
Cutrine Plus©	1550	79
Komeen©	430	18

[1]Concentration determined after 24 hour exposure and expressed on dry weight basis.
[2]Inhibition determined after 7 days of growth.

Residues of glyphosate in water following application of Rodeo® to waterhyacinth in the Sacramento Delta. Anderson, L.W.J. Field studies were conducted to determine the residue level of glyphosate in water after an application of Rodeo® to waterhyacinth. Rodeo® was applied on June 30, 1983 via handgun as a 1.5% concentration with 0.5% X-77 surfacant. Two 0.4 ha plots were treated with a spray volume equivalent to 935 l/ha. One plot was in "open-water" and subject to tidal flow while the second "back-water" plot was located in a protected area and not subject to changes in tidal flow. Water samples were collected adjacent to the plot (4.8 - 6.1 m) and 91 m downstream at 0.5, 2, and 4 h posttreatment.

The highest concentration found was 0.06 ppm at 4 h post-treatment in the "backwater" site. The highest level in the "open-water" site was 0.04 ppm 0.5 h after application. Residues of aminoethylphosphoric acid; a primary breakdown product of glyphosphate, were not detected. These data suggest that application at or below 1.5% would not result in glyphosate residues in excess of 100 ppb. (USDA/ARS Aquatic Weed Control Research, University of California, Davis, California 95616).

Effect of various environmental conditions on the algicidal activity of copper sulfate and Cutrine Plus®. Anderson, L.W.J. and N. Dechoretz. Experiments were conducted to evaluate the effects of two algicides when applied under light and dark conditions at different temperature and pH. *Cladophora* was exposed to the algicides for 2 h at 1.0 or 4.0 ppmw copper under predetermined test conditions. At the end of the exposure period, half of the plant sample was removed for copper analysis by atomic absorption spectrophotometry and the remainder was placed in fresh water. Change in biomass was determined 7 days after treatment.

The activity of both compounds was similar under light and dark conditions. However, the initial pH of the treated water did influence the algicidal activity. Copper sulfate was more efficacious at pH 7.5 than at 8.5, while the reverse was true for Cutrine Plus®. The effect of water temperature on the activity of $CuSO_4$ and Cutrine Plus® was interesting. When the algal material was exposed to these compounds for 2 h at 12.8, 18.3, and 23.8 C at 4.0 ppmw the copper concentrations of the algal material were not significantly different. However, the inhibition of growth increased significantly with increasing temperature. (USDA/ARS, Aquatic Weed Control Research, University of California, Davis, CA 95616.

Copper concentration, dry weight, and percent growth inhibition of *Cladophora* after exposure to three copper compounds at pH 7.5 and 8.5.

Treatment[1]	Cu Concentration[2] ug/g		Dry Weight[3] (mg)		Growth Inhibition[3] %	
	7.5	8.5	7.5	8.5	7.5	8.5
Control	30	40	310	315	-	-
$CuSO_4$	2000	1470	192	225	100	69
Cutrine Plus®	1270	1380	228	212	65	79

[1]Chemicals added to produce a copper concentration of 1.0 ppmw.
[2]Copper concentration determined after 2 hour exposure.
[3]Dry weight and % growth inhibition determined two weeks aftter treatment.

Control of hydrilla after applications of glyphosate and sulfometuron under simulated drawdown conditions. Anderson, L.W.J. and N. Dechoretz. Containers of mature hydrilla were drained and treated with a 1% solution of glyphosate or sulfometuron at 0.05 and 0.10 kg/ha. The plants remained exposed to air for 4 and 8 hours and were then submersed for 4 weeks.

Dry weight of shoots and roots as well as the number of tubers produced, were reduced when hydrilla was exposed to air for 4 and 8 hours. Shoot and root biomass were further reduced when glyphosate was applied in combination with drawdown conditions. Applications of sulfometuron did not appear to increase the effect of drawdown on root and shoot biomass or on tuber production. However, combination of sulfometuron and drawdown significantly reduced the length of hydrilla in tanks for four weeks after the treatment. (USDA/ARS, Aquatic Weed Control Research, University of California, Davis, CA 95616).

Response of water stressed hydrilla to Rodeo® and Oust® four weeks after treatment.

	Hydrilla Rsponse (dry wt.)			
	Shoot length (cm)	Shoot D.W. (mg)	Root D.W. (mg)	Number of tuber produced
Control-submersed	54±5[1]	6277±1196	320± 93	6±
Control - 4H Drawdown	49± 8	1128± 224	152± 42	2± 1
Control 8H Drawdown	46± 8	772± 132	89± 12	1± 1
Rodeo + 4H Drawdown	33± 7	420± 150	93± 31	0.5± .5
Rodeo +8H Drawdown	32± 6	120± 60	53± 24	0.5± .5
Oust .05 kg/ha + 4H Drawdown	11± 3	230± 61	59± 9	3 ± 1
Oust .05 kg/ha +8H Drawdown	14± 1	208± 109	78± 13	2 ± 1
Oust .10 kg/ha + 4H Drawdown	14± 1	209± 46	109± 16	3 ± 1
Oust .10 kg/ha + 8H Drawdown	12± 2	126± 24	97± 21	2 ± 0

[1] Value represents mean ± standard error, 4 weeks posttreatment

Control of aquatic plants in an irrigation canal after drawdown applications of glyphosate and sulfometuron. Anderson, L.W.J. and N. Dechoretz. Field study was conducted to determine whether glyphosate or sulfometuron would provide season-long control of submersed aquatic weeds when applied to a dewatered irrigation canal. Six 100 m long plots were treated in an irrigation canal in Richvale, CA. Two of the plots were treated with sulfometuron at .05 kg/ha and two were treated with a 1% solution of glyposate. Both herbicides were applied with a spray volume of 1870 l/ha. The two remaining plots were left untreated. Core samples were removed from each plot before treatment, one hour and 14 days after treatment and returned to the laboratory. The core samples were placed in empty tanks for seven days. The tanks were then filled with water and left undisturbed for six weeks. After the six week growing period, the biomass (dry weight) of each species from each core was determined. During the irrigation season, the plots were inspected and notes on visual observation were recorded. At the end of the irrigation season, the plots were sampled to determine plant biomass and number of vegetative propagules produced.

Compared to the control plots, elodea was reduced in core samples removed after one hour, and after 14 days from the glyphosate treated plots. Glyphosate did not affect American pondweed growth from either set of cores samples. Sulfometuron inhibited the growth of American pondweed and elodea in cores removed 14 days after treatment.

Based on visual observations during the growing season, aquatic weed growth in glyphosate treated plots was not significantly different from weed growth in untreated plots. However, weed infestation in plots treated with sulfometuron was drastically reduced. Core and quadrat samples collected at the end of the growing season showed that biomass of American pondweed and elodea as well as propagule production in sulfometuron treated plots was significantly reduced. (USDA/ARS Aquatic Weed Control Research, University of California, Davis, CA 95616).

Regrowth of hydrilla from apical segments after exposure to three copper compounds. Anderson, L.W.J. and N. Dechoretz. Laboratory studies were conducted to compare the activity of $CuSO_4$, Cutrine Plus® and Komeen® on hydrilla and evaluate the effects of light and water quality on the activity of each compound. Assays for phytotoxicity were conducted by exposing eight 7.5 cm apical segments to the 3 herbicides under varying degrees of exposure time and copper concentrations. After the prescribed treatment, four segments were utilized for copper analysis and the other four were planted to determine the effects of the treatment on regrowth. To investigate the effect of light and dark conditions on copper activity, the plants were exposed to the three compounds for 2 h at 4.0 ppmw copper ion under light and dark conditions. Well water and 1% Hoagland's solution was used in the light versus dark study to evaluate the effects of water quality on copper activity.

Results of the variable exposure and concentration studies indicate higher concentrations of copper associated with hydrilla treated with Komeen® than treated with $CuSO_4$ or Cutrine Plus®. However, after 2 h exposure the concentration of copper associated with hydrilla treated with Komeen® was not significantly different than hydrilla treated with $CuSO_4$ or Cutrine Plus®. Regrowth from treated hydrilla segments was inhibited more by Komeen than by $CuSO_4$ or Cutrine Plus®.

The greater activity of Komeen® may be due to the manner in which copper is associated with hydrilla. A study was conducted to determine the effects of soaking treated hydrilla segments with 0.01N HNO_3 before and/or after 2 hour exposure to the three herbicides. Results of this study indicated copper applied as Komeen® is not removed as easily from hydrilla by the acid as copper applied as $CuSO_4$ or Cutrine Plus®. Whether this is associated with the location of the copper within the plant or with the manner of its binding, is not clear at this time. (USDA/ARS Aquatic Weed Control Research, University of California, Davis, CA95616).

Use of glyphosate for the control of waterhyacinth. Anderson, L.W.J. and N. Dechoretz. Field trials were conducted to determine the herbicidal activity of glyphosate on waterhyacinth. Duplicate plots (.02 ha) were treated with 0.5, 1.0 or 1.5% solution of glyphosate. Plants within 0.25 m^2 quadrats were collected from each plot before treatment and on 2, 4 and 8 weeks after treatment. Plant samples were used to determine effects on petiole length, root length and biomass (g/m^2 dry weight).

Petiole and root length of waterhyacinth were inhibited by 1.0 and 1.5% glyphosate 2 weeks after treatment. On a dry weight basis, 1.5% glyphosate was slightly more effective than the 1% solution. However, significant increase of biomass still occurred in all plots 8 weeks after treatment. This indicates early applications of glyphosate will be necessary to prevent the development of large infestations of waterhyacinth. Application of glyphosate to already established infestations will not result in a rapid decline in plant density. (USDA/ARS Aquatic Weed Control Research, University of California, Davis, CA 95616).

Petiole length, root length, and biomass of water hyacinth after applications of Rodeo.

Treatment (% spray solution)	Water hyacinth Response — Weeks after treatment: 2			4			8		
	Biomass (g/m^2)	Petiole length (cm)	Root length (cm)	Biomass (g/m^2)	Petiole length (cm)	Root length (cm)	Biomass (g/m^2)	Petiole length (cm)	Root length (cm)
Control	2089	49	36	2122	58	44	2305	64	46
0.5	1824	30	38	1707	34	35	1430	30	31
1.0	1729	34	20	1546	28	17	1027	20	12
1.5	1398	25	23	1198	22	13	717	17	10

Response of saltcedar to selected soil-applied herbicides. Shrader, T. This report is part of an overall ecosystems management effort designed to increase habitat diversity and resource value of dense homogeneous stands of saltcedar communities on flood plains. By successfully manipulating portions of these dense communities, the management goal of creating a mosaic of grass, forb, shrub, and tree areas can be implemented. Such diverse areas with patchiness and broad ecotones can increase resource value for wildlife, recreation aesthetics, and agricultural uses such as grazing.

Saltcedar is an introduced facultative phreatophye that has come to dominate moist (usually seasonally inundated), disturbed waterways (including agricultural drainage ditchbanks and flood plains) in the Southwest. It is a hardy species that can tolerate salt, short periods of inundation, fire, and is not controlled by native or presently introduced insects and pathogens. It reproduces readily via seed and sprouting. Root plowing is an effective control method, but on many flood plain sites, especially those of light soils, this method destroys tilth and leads to accelerated erosion. Such disturbed areas can be difficult and expensive to revegetate.

The control of saltcedar with environmentally acceptable herbicides could effect management goals and protect soil resources. Chemical applications on flood plains should be conducted judiciously, being designed to apply the minimum effective dosage, thereby minimizing exposure to the environment.

An area on the Rio Grande flood plain in Central New Mexico was selected in September 1980 to evaluate the effect of selected herbicides on saltcedar. The area was a saltcedar, honey mesquite, and saltgrass community having an average of 591 saltcedar plants per acre. Saltcedar plants were well established, most were probably at least 10 years and possibly as much as 20 years old. Seedling plants were not present as the site had not been inundated for 16 years. The boles of plants near ground level were prostrate due to annual mowing over the past 10 plus years. Mowing reduced the height of plants to about 18 inches. All plants selected for evaluation were mowed during the winter or early spring of 1981, 1982, and 1983. Annual growth, following mowing, by untreated plants was multistemmed and reached heights of 5.5 to 7 ft.

The area of chemical application was xeric, involving fine sandy loams of the Gila and Vinton series. For the period September 1980 through September 1983, 25 inches of precipitation were recorded at the application site. Of that total 3.07 inches were recorded during the September to December 1980 period, 6.26 inches in 1981, 8.85 inches in 1982, and 6.82 inches in the January to September 1983 period.

Dicamba, hexazinone, picloram, and tebuthiuron were applied to the soil. The 5 percent granule formulation of dicamba was broadcast at the rate of 10 lb ai/A and spot treated at 4 rounded tablespoons of material per 4 ft. of canopy diameter. The liquid concentrate (2 lb ai/gal) of hexazinone was spot applied at rates of 4, 8, 16, and 24 cc of commercial formulation per 2 ft. of canopy diameter. The 10 percent pellet formulation of picloram was broadcast at the rates of 2 and 4 lb ae/A. The 20 percent, 1/8 inch pellet of tebuthiuron was broadcast at the rates of 2 and 4 lb ai/A, while the 20 percent, 3/16 inch pellets were broadcast at 2 and 4 lb ai/A. The 1/8 inch, 40 percent pellets were broadcast at 2 and 4 lb ai/A. The 20 percent, 1/8 inch pellets were spot applied at 1 tablespoon of material per 3 ft. of canopy diameter. Canopy diameters were estimated at a height of approximately 1 ft. above the ground. Spot applications were placed within 3 ft. of the crown of treated plants. Each chemical treatment was applied to plots measuring 57 ft. by 64 ft. and replicated four times in a randomized complete block design. Plots were separated by 5 ft. wide borders.

The effect of the herbicides was evaluated in late September 1983, three years after the applications of dicamba, picloram, and tebuthiuron, and 11 and 18 months after the applications of hexazinone. The hexazinone results are preliminary while the results of the other herbicides should be indicative. Herbicidal efficacy was based on a visual evaluation and is summarized in the accompanying table on the basis of the percent of plants with complete top kill and the percentage of reduced plant growth compared to the growth of untreated plants. The roots of top killed plants were not inspected for necrosis.

The spot treatments of tebuthiuron and hexazinone and the 4 lb broadcast application of tebuthiuron were the most effective in terms of top kill. The individual plant treatment of tebuthiuron was the most effective at 70 percent top kill. With the exception of dicamba, all treatments restricted the natural regrowth of the species. The spot applications and the highest broadcast rates were the most effective in reducing the regrowth of treated plants. The one spot treatment of tebuthiuron and the application of hexazinone at 8 cc per 2 ft. of canopy diameter in 1981 were the most effective by reducing regrowth 89 and 84 percent, respectively. In effecting top kill and reducing overall regrowth, the 8 cc/2 ft. canopy diameter treatment of hexazinone applied in March 1981 was more effective than the other higher applications of the chemical. This probably reflected the amount of precipitation available for leaching of the chemical, considering that the other applications were made in October 1982. In effecting top kill, the 20 percent formulation of tebuthiuron was somewhat more effective than the 40 percent formulation, which might reflect the greater distribution of the smaller percentage material.
(US Bureau of Reclamation, Rio Grande Project, P.O. Drawer P, El Paso, Texas 79952)

The response of saltcedar to soil-applied herbicides

Herbicide	Application 1/ Rate	Date	Percent 2/ No growth	Reduced growth
Dicamba	10 lb	9/80	0	0
Dicamba	4 tbs/4 ft. di.	9/80	0	0
Hexazinone	8 cc/2 ft. di.	3/81	45	84
Hexazinone	8 cc/2 ft. di.	10/82	18	54
Hexazinone	16 cc/2 ft. di.	10/82	30	67
Hexazinone	4 cc/2 ft. di.	3/81+		
	24 cc/2 ft. di.	10/82	32	59
Picloram	2 lb	9/80	0	10
Picloram	4 lb	9/80	0	38
Tebuthiuron	2 lb	9/80	0	13
20%, 1/8 inch	4 lb	9/80	25	54
Tebuthiuron	2 lb	9/80	0	19
20%, 3/16 inch	4 lb	9/80	25	53
Tebuthiuron	2 lb	9/80	0	32
40%, 1/8 inch	4 lb	9/80	13	43
Tebuthiuron	1 tbs/3 ft. di.	9/80	70	89
Untreated Check			0	0

1/ Rates of application are expressed as pounds per acre, or number of tablespoons (tbs) or cubic centimeters (cc) per 2, 3, or 4 feet (ft.) of canopy diameter (di.). Dates are expressed as month/year.

2/ Evaluations were made in September 1983. No growth values are the percent of plants showing no growth (top kill) at time of evaluation. Growth reduction is the amount of plant growth reduction (top kill and stunted growth) compared to the normal growth of untreated check plants.

Evaluation of nine herbicides for non-selective weed control. McHenry, W.B. and N.L. Smith. A site on the Davis Campus was selected to evaluate several herbicides for nonselective (industrial) weed control. Amitrole, atrazine, chlorsulfuron, diuron, glyphosate, picloram, simazine (alone and tank mixed with amitrole) and sulfometuron methyl were applied December 16, 1983, to seedling (1 to 4 inches) chickweed, miners lettuce, yellow starthistle, common mustard, filaree, milk thistle and annual grasses. The test area contained a uniform but dormant stand of field bindweed. AC 252,925 was applied January 12, 1984. A CO_2 backpack sprayer calibrated for 20 gpa volume was used to apply the herbicides on 10 by 20 ft. plots. Three replications were employed in a randomized block design. Total vegetation control was evaluated May 17, 1984. Excellent control of annual weeds was observed with atrazine, simazine + amitrole and sulfometuron methyl. Picloram exhibited good control of the broadleaf species with the exception of mustard. Excellent control of the annual species and field bindweed was observed from all rates of AC 252,925. Amitrole and glyphosate gave poor control at this date due to weed germination after initial application. (University of California Cooperative Extension, Davis CA 95616)

Non-crop weed control

		Control[1] 5/17/84		
Herbicide	lb/A	Field bindweed	broadleaf	grass
Amitrole	2 lb.	0	4.0	2.7
Atrazine	4	2.3	9.9	9.0
Chlorsulfuron	1 oz.	0	8.3	4.3
Diuron	4 lb.	0	7.0	8.3
Glyphosate	1	0	2.3	7.7
Picloram	0.25	0	9.7	0
Simazine	4	0	7.3	6.3
Simazine + Amitrole	4 + 2	0	10.0	9.9
Sulfometuron methyl	5 oz.	0	10.0	10.0
AC 252,925	0.25 lb.	9.3	10.0	10.0
AC 252,925	0.5	9.7	10.0	10.0
AC 252,925	1	10.0	10.0	10.0
Control		0	4.7	0

(Average of 3 replications)

[1] Control: 0 = none; 10 = complete.

PROJECT 7.

CHEMICAL AND PHYSIOLOGICAL STUDIES

Dave Gealy - Project Chairman

Growth characteristics among jointed goatgrass populations in eastern Oregon. Gleichsner, J.A., D.J. Rydrych, and A.P. Appleby. This study was conducted to observe growth characteristics among populations of jointed goatgrass collected from five locations in eastern Oregon during July and August, 1983.

A field experiment using a randomized complete block design with four replications was established at the Columbia Basin Agricultural Research Center, Pendleton, Oregon. Jointed goatgrass spikelets from each population were hand-planted in 1.8 m by 3.7 m plots at the rate of 12 spikelets per 30.5 cm in 7.1-cm rows on October 12, 1983. Plots were treated in early March with bromoxynil + MCPA to control broadleaf weeds. Several hand-weedings were necessary to control downy brome.

Jointed goatgrass from the Condon location was significantly taller and produced fewer spikelets per head than the other locations. Spikelet yield and stand counts differed among populations, but this may have been due to spikelet quality differences at planting. No significant differences were observed for leaf and stem dry weight, heads per plant, heads per meter of row, spikelets per plant, and spikelets per meter of row.

These preliminary findings indicate that jointed goatgrass populations in eastern Oregon are genetically similar, thus control programs may not need to be site specific. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Jointed goatgrass population locations

Location in Oregon	Elevation (m)	Annual precipitation (mm)
1. Echo, Umatilla County	180	300-380
2. Pendleton, Umatilla County	450	500-580
3. Ione, Morrow County	650	300-350
4. Elgin, Union County	800	630-730
5. Condon, Gilliam County	860	350-460

Postharvest dormancy in jointed goatgrass. Gleichsner, J.A., D.J. Rydrych, and A.P. Appleby. Jointed goatgrass exhibits postharvest dormancy, a failure to germinate when placed under apparently favorable conditions of moisture, temperature, and light. This condition was examined to help understand the biology of this weed and to develop effective control strategies.

Germination studies were conducted at the Columbia Basin Agricultural Research Center, Pendleton, Oregon in 1983-84. Jointed goatgrass spikelets were collected from five locations in eastern Oregon and stored in the laboratory (23±2 C). Germination experiments were started soon after the collection date, and the spikelets were considered to be 0 months at that time. Germination responses were determined in constant darkness when the spikelets were 0, .5, 1, 2, 3, 4, and 12 months old. Four constant temperatures (7 C, 18 C, 29 C, and 38 C) and room temperature (23±2 C) were used.

Germination tests were performed in petri dishes on two sheets of filter paper moistened with distilled water; more water was added as needed during an experiment to keep the filter paper and spikelets moist. Tests consisted of four replications with 100 spikelets per replication. Spikelets were examined after 3 days and at 2-day intervals thereafter for 27 days. Spikelets were considered germinated when a single radicle was visible outside the spikelet. They were counted and removed from the petri dishes.

Freshly-harvested spikelets (0 months old) from all collection sites were predominantly dormant at high temperatures, but a small degree of germination occurred at the lower temperatures (7 C and 18 C). As storage time increased, spikelets after-ripened (lost their dormancy) and gained the ability to respond to a wider range of temperatures. At the same time, there was an increase in germination rate and percentage as the temperature was raised. No germination occurred at 38 C. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Jointed goatgrass collection sites

Site in Oregon	Collection date
1. Echo, Umatilla County	July 5, 1983
2. Ione, Morrow County	July 7, 1983
3. Pendleton, Umatilla County	July 13, 1983
4. Condon, Gilliam County	July 19, 1983
5. Elgin, Union County	August 2, 1983

Chlorsulfuron-herbicide mixture effect on nutrient uptake by durum wheat. Tanaka, D. L. and R. L. Anderson. The application of chlorsulfuron with diclofop, barban, and difenzoquat to durum wheat has been shown to result in large yield losses. To determine if the herbicides were affecting nutrient uptake, nitrogen and phosphorus contents of herbicide-treated wheat were measured at four growth stages: boot, heading, anthesis, and maturity. The herbicides were applied to durum wheat planted at Sidney, Montana, in a Williams loam soil. The durum at time of herbicide application was fully tillered.

Nitrogen content (Table 1) for the herbicide-treated wheat and the weed infested control was lower than the weed free control at anthesis. A reduced nitrogen supply at anthesis may have inhibited grain fill by reducing photosynthesis due to fewer chlorophyll molecules, or may have increased spikelet abortion. Yield component data indicated that the grain yield loss was caused by reduced kernel weight and number of kernels/spike. The higher nitrogen content at maturity indicated reduced photosynthetic activity and carbohydrate production for the herbicide-treated wheat during the grain-fill period. The phosphorus content data (Table 2) was erratic, without any clear trends. The data for nitrogen content indicated that weeds and herbicides reduced the efficiency of utilization of nitrogen by durum wheat. (USDA-ARS, Sidney, MT 59270 and Akron, CO 80720)

Table 1. Grain yield and nitrogen content of durum wheat at four growth stages when treated with chlorsulfuron-herbicide mixtures.

			Nitrogen Content				
		Grain	Foliage			Straw	Grain
Treatment	Rate	yield	Boot	Heading	Anthesis	Mature	Mature
	kg/ha		% of weed-free control				
Chlorsulfuron + diclofop	0.04+ 1.12	78	99	102	97	115	104
Chlorsulfuron + barban	0.04+ 0.42	78	97	101	94	115	104
Chlorsulfuron + difenzoquat	0.04+ 0.84	87	98	101	93	100	104
Control (weed infested)	0.0	76	93	97	89	107	105

Values for weed-free control were: grain yield: 2227 kg grain/ha; boot stage: 26.1 mg N/kg; heading stage: 21.1 mg N/kg; anthesis: 16.1 mg N/kg; straw at maturity: 5.9 mg N/kg; and grain at maturity: 26.0 mg N/kg.

Table 2. Grain yield and phosphorus content of durum wheat at four growth stages when treated with chlorsulfuron-herbicide mixtures.

			Phosphorus Content				
		Grain	Foliage			Straw	Grain
Treatment	Rate	yield	Boot	Heading	Anthesis	Mature	Mature
	kg/ha		% of weed-free control				
Chlorsulfuron + diclofop	0.04+ 1.12	78	94	100	102	103	104
Chlorsulfuron + barban	0.04+ 0.42	78	99	90	91	113	107
Chlorsulfuron + difenzoquat	0.04+ 0.84	87	94	97	98	107	98
Control (weed infested)	0.0	76	92	90	91	113	108

Values for weed-free control were: grain yield; 2227 kg grain/ha; boot stage; 3.2 mg P/kg; heading stage; 2.5 mg P/kg; anthesis: 1.8 mg P/kg; straw at maturity: 0.3 mg P/kg; and grain at maturity: 3.8 mg P/kg.

Interactions of chlorsulfuron with bromoxynil. Howard, S.W. and R.E. Whitesides. Combinations of chlorsulfuron with bromoxynil resulted in increased mayweed chamomile (*Anthemis cotula* L.) control in greenhouse and field experiments conducted over a 2 year period. In 1983 tank mixtures of chlorsulfuron at 3.0 g/ha with bromoxynil at 0.6 kg/ha resulted in greater control than when chlorsulfuron or bromoxynil were used alone. Control in 1984 from chlorsulfuron applied at 3.0, 1.5, and 0.8 g/ha combined with 0.6, 0.2, 0.08 and 0.03 kg/ha bromoxynil, in all possible combinations, were similar to 1983 results. Greenhouse studies using 7 rates of the two herbicides in a 7 x 7 factorial design were used to isolate combinations where the greatest increase in efficacy occured. Many of the combinations tested in the greenhouse resulted in better control of mayweed chamomile than the corresponding rates of the herbicides when used alone. Increased efficacy from the combination of low rates of chlorsulfuron and bromoxynil may permit the use of chlorsulfuron in cropping regions where soil persistence of higher rates would make use unacceptable. (Agronomy and Soils Dept., Washington State University, Pullman, 99164-6420)

1984 Field Study

Treatment	Rate/ha	Dry weight (grams)
Bromoxynil	0.03 kg	0.687
Bromoxynil	0.08 kg	0.391
Chlorsulfuron	0.8 g	0.304
Chlorsulfuron	1.5 g	0.082
Bromoxynil + chlorsulfuron	0.03 kg + 0.8 g	0.053
Bromoxynil + chlorsulfuron	0.03 kg + 1.5 g	0.060
Bromoxynil + chlorsulfuron	0.08 kg + 0.8 g	0.040
Bromoxynil + chlorsulfuron	0.08 kg + 1.5 g	0.048
Check		1.584

1984 Greenhouse Study

Treatment	Rate/ha	Dry weight (grams)
Bromoxynil	0.031 kg	0.353
Chlorsulfuron	0.003 g	0.440
Bromoxynil + chlorsulfuron	0.031 kg + 0.003 g	0.205
Chlorsulfuron	0.006 g	0.453
Bromoxynil + chlorsulfuron	0.031 kg + 0.006 g	0.251
Chlorsulfuron	0.013 g	0.340
Bromoxynil + chlorsulfuron	0.031 kg + 0.013 g	0.175
Chlorsulfuron	0.027 g	0.324
Bromoxynil + chlorsulfuron	0.031 kg + 0.027 g	0.143
Chlorsulfuron	0.054 g	0.287
Bromoxynil + chlorsulfuron	0.031 kg + 0.054 g	0.237
Chlorsulfuron	0.108 g	0.358
Bromoxynil + chlorsulfuron	0.031 kg + 0.108 g	0.137
Check		0.499

Soil persistence of dicamba, picloram, and chlorsulfuron as evaluated by a pea and lentil bioassay. Whitesides, R.E., and D.G. Swan. Control of annual and perennial broadleaf weeds in wheat with herbicides that persist in the soil is not always possible because of concern for the safety of rotational crops. In the Palouse Region of the Pacific Northwest use of dicamba, picloram, and chlorsulfuron in winter wheat is considered a potential hazard to peas and lentils growth the following season.

Peas (Alaska) and lentils (Chilean) were seeded into a Thatuna silt loam soil, organic matter 2.7% and pH 5.9, 7 and 19 months after application of dicamba, picloram, or chlorsulfuron. Initial herbicide treatments were applied in the fall of 1982 and visual evaluations and yield data were collected from peas and lentils in 1983 and 1984.

Crop injury was easily detectable from visual evaluations for all rates of picloram and chlorsulfuron during the 1983 cropping season. There was no visual damage on peas or lentils from the plots treated with dicamba. Dicamba did not reduce pea or lentil yield but picloram and chlorsulfuron caused a dramatic reduction in the yield of both crops. Lentils were more sensitive than peas. In 1984 no visible crop injury was evident; however, pea and lentil yield was reduced by picloram. Chlorsulfuron and dicamba did not affect pea or lentil yield. (Department of Agronomy and Soils, Washington State University, Pullman, WA 99164-6420)

Yield of Peas and Lentils When Seeded Into Herbicide Treated Soil

Treatment	Rate	1983 Yield lb/A[a]		1984 Yield lb/A[b]	
	lb/A	Peas	Lentils	Peas	Lentils
Dicamba	1.0	1892	591	1649	603
Dicamba	2.0	1725	732	1656	576
Dicamba	4.0	1713	612	1638	605
Picloram	0.016	189	192	1424	450
Picloram	0.024	82	56	1413	419
Picloram	0.125	0	0	1236	380
Chlorsulfuron	0.016	762	0	1725	599
Unweeded Check		1816	1010	1674	572

[a]Herbicides applied 7 months prior to seeding

[b]Herbicides applied 19 months prior to seeding

A lateral movement study of tebuthiuron in soil from a banding application. Schultz, T.W. and R.E. Whitesides. Field and greenhouse studies were established in 1982, 1983, and 1984 to examine the lateral movement of tebuthiuron in soil from a banding application. Field studies were conducted at two locations in Whitman County, Washington on silt loam soil. Applications of tebuthiuron at 4.5 kg ai/ha were made in November of 1982 and again in November of 1983. Plots consisted of band and broadcast applications, 2.5 cm by 12 m and 1.5 m by 12 m, respectively. Both types of applications were located on level ground as well as on a hillside. As indicated visually by injured plant species, the tebuthiuron moved laterally 1.2 m from the bands on the level areas and may have been the result of excess surface runoff. However, little movement was observed on the slopes. There was no apparent lateral movement from the broadcast applications on either the level or sloped areas. In the summer of 1984 soil samples from all treated areas were taken at 0, 30, 61, 91, and 122 cm away from the area of application and at 0-15, 15-30, and 30-61 cm depths at each sample point. The samples were potted and a bioassay conducted using barley as the assay species. Dry weights from the field samples were compared to growth response curves generated in the greenhouse. The majority of tebuthiuron after 18 months was still within a 46 cm radius from the area of application.

The greenhouse studies were conducted to observe the pattern of movement of tebuthiuron applied in bands. Plywood boxes (9 cm by 114 cm by 61 cm) were filled with a silt loam soil and moistened to field capacity. A 2.5 cm band of tebuthiuron at 4.5 kg ai/ha was applied across the 9 cm width of the boxes. After applying 24 cm of simulated rainfall, the boxes were laid on their side and barley was planted in a 2.5 cm grid network across the exposed soil surface. The pattern of tebuthiuron movement was rectangular, having leached approximately 30 cm in depth and 7 cm in width. Visual observations and dry weights of the barley from the boxes were compared to growth response curves to approximate tebuthiuron movement in the soil. Additional research is being conducted to determine if varying rates of rainfall change the pattern of movement. (Department of Agronomy and Soils, Washington State University, Pullman 99164-6420)

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HERBACEOUS WEED INDEX

(alphabetically by scientific name)

HERBACEOUS WEED INDEX (continued)

WOODY PLANT INDEX

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(Alphabetically by common name)

WOODY PLANT INDEX

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HERBICIDE INDEX

(by common name or code designation)

HERBICIDE INDEX (continued)

ABBREVIATIONS USED IN THIS REPORT

A	acre(s)
a.i.	active ingredient
a.e.	acid equivalent
aehg	acid equivalent/hundred gallons
bu	bushel(s)
C	degrees Centigrade
cm	centimeter(s)
cm^2	square centimeter
cwt	one hundred pounds
F	degrees Fahrenheit
fps	feet per second
ft^2	square feet
gal	gallon(s)
gpa	gallons per acre
gpm	gallons per minute
ha	hectare
hr	hour(s)
in	inch(es)
kg	kilogram(s)
kg/cm^2	kilograms per square centimeter
kg/ha	kilograms per hectare
l	liter(s)
lb	pound(s)
L/ha	liters per hectare
lb/A	pounds per acre
lb ai/A	pounds active ingredient per acre
m	meter(s)
min	minute(s)
ml	milliliter(s)
mph	miles per hour
oz	ounce(s)
pes	preemergence surface
ppb	parts per billion
ppi	preplant incorporated
ppm	parts per million
psi	pounds per square inch
pt	pint
rd	rod