Western Society of Weed Science

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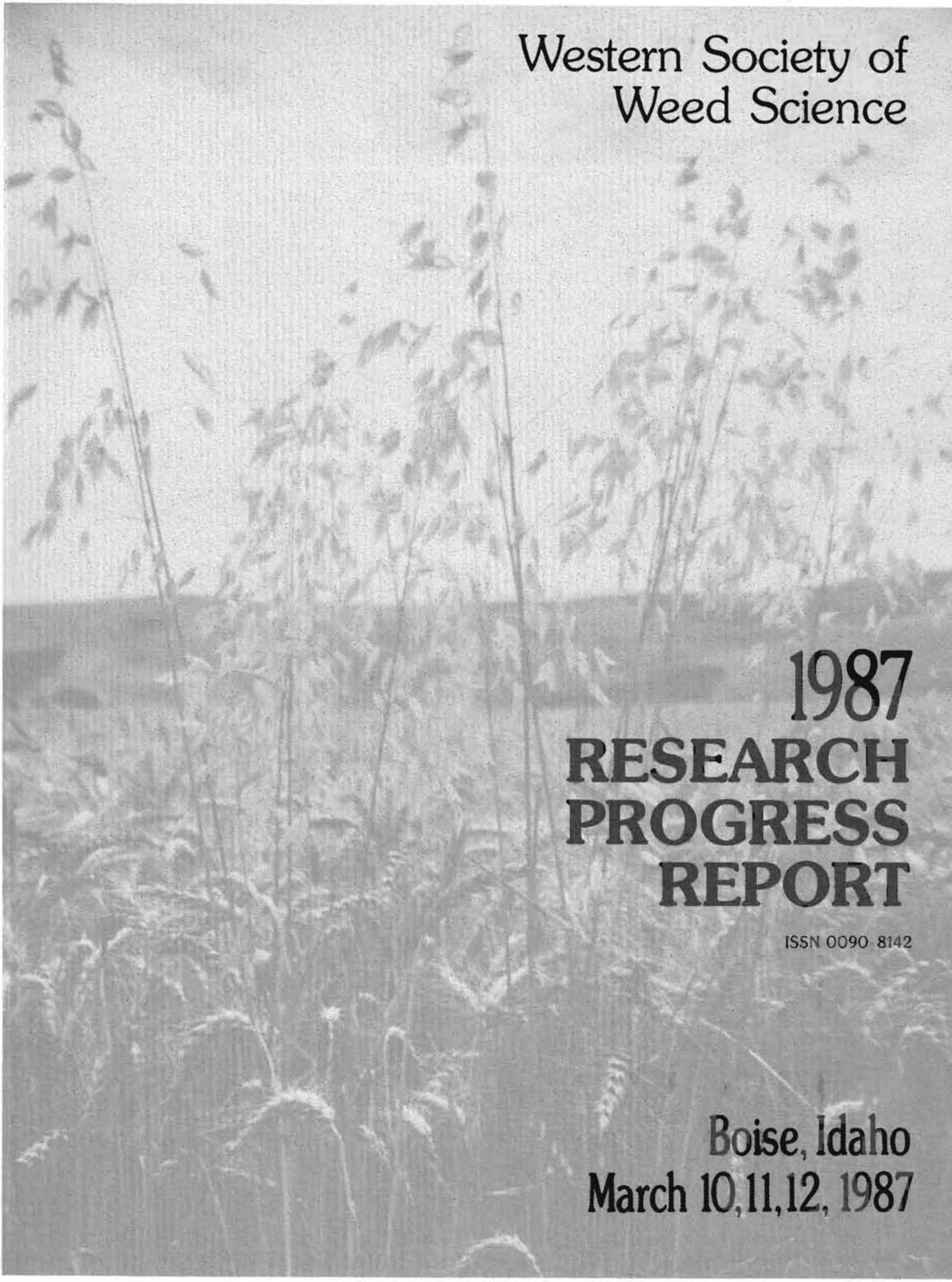

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FOREWORD

The Western Society of Weed Science (WSWS) 1987 Research Progress Report is a compilation of brief reports and recent investigations by weed scientists in the Western united States. 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 In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION.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 1987 Western Society of Weed Science Research Progress Report is prepared by photoreproduction of 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 the project reports and some index work was the responsibility of the seven (7) project chairmen. Final responsibility for compiling the report and developing the indices belongs to the research section chairman.

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

Bart A. Brinkman
Chairman, Research Section
Western Society of Weed Science
1987

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PROJECT 1.

PERENNIAL HERBACEOUS WEEDS

Donn C. Thill - Project Chairman

Top growth control of field bindweed resulting from reduced rate herbicide applications. Vore, R.E. The objective of the study is to evaluate reduced rates of herbicides in established intermediate wheatgrass for field bindweed control.

Plots were established June 6, 1984. Field bindweed was in full bud to bloom initiation. Soil surface moisture was dry down to 0.25 inch with a moist subsurface. Intermediate wheatgrass was in excellent condition, 10 to 12 inches tall. Herbicides were applied with a 6-nozzle knapsack sprayer equipped with TeeJet HSS8004 nozzles operated at 40 psi. Herbicides were applied full coverage in 40 gallons of water per acre. Plots were 9 by 30 ft in a randomized complete block design with 3 replications. Plots were intended to be re-treated in 1985 but were not due to drought.

Plots were visually evaluated July 17, 1985. All treatments reduced the field bindweed infestation 53 to 88%. The picloram and picloram/2,4-D combination treatments were less effective than the dicamba and 2,4-D treatments, one year after application. Field bindweed control improved as herbicide application rate increased except for the picloram/2,4-D combinations. At the time of evaluation the bindweed in the check was in full bloom; little or no flowering was found in treated areas.

Plots were again visually evaluated July 8, 1986. Percent control of field bindweed declined in all treated areas from the 1985 evaluation. Control ranged from 47 to 77%, two years after treatment. Dicamba at 2.0 lb ai/A provided 77% control and 2,4-D at 2.0 lb ai/A provided 70% control. Control declined in all treatment areas with the picloram/2,4-D combinations allowing the greatest reinfestation of field bindweed, two years after application.

Top growth control of field bindweed resulting from reduced rate herbicide applications

Treatment[1]	Rate lb ai/A	Percent Control[2] 1985	1986
dicamba	1.0	77	53
dicamba	2.0	88	77
2,4-D	1.5	73	57
2,4-D	2.0	78	70
picloram	0.25	53	53
picloram	0.5	62	53
picloram/2,4-D	0.25 + 0.25	65	50
picloram/2,4-D	0.25 + 0.5	65	47
Check	---	--	--

[1]Herbicides applied June 6, 1984.
[2]Visual evaluations July 17, 1985 and July 8, 1986.

Wild garlic control. Spinney, R.L., A.P. Appleby, and B.D. Brewster.

Wild garlic is difficult to control in winter wheat. This trial was conducted in a non-crop situation at Corvallis, Oregon to evaluate the effectiveness of DPX M6316. The experiment was a randomized complete block design with three replications. Plots were 2.5 m wide by 6.0 m long. Spray volume was 234 l/ha delivered at 138 kPa pressure through 8002 flat fan nozzles arranged in a double-overlap pattern. Herbicides were applied on March 3, 1986, and a visual evaluation was made on April 7, 1986.

DPX M6316 was effective in controlling wild garlic although not all plants were dead when the site had to be abandoned (see table). DPX M6316 did not adequately control bristly hawksbeard. The standard herbicide treatment, 2,4-D plus dicamba, did not control wild garlic but did control bristly hawksbeard. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Wild garlic and bristly hawskbeard control at Corvallis, Oregon

Herbicide	Rate	Wild garlic control	Bristly hawksbeard control
	(kg/ha)	(%)	
DPX M6316	0.017	83	60
DPX M6316	0.034	90	70
2,4-D + dicamba	0.84 + 0.14	53	93
Check	0	0	0

[1]Surfactant X-77 added at 0.25% v/v

Response of meadow hawkweed to sulfonylurea and pyridine herbicides. Miller, T. W., L. Lass, R.H. Callihan and D.C. Thill. The purpose of this experiment was to determine the effects of six different herbicides at three rates on established meadow hawkweed (*Hieracium pratense* Tausch.) in pasture. The experiment was initiated on June 19, 1986 at Fernwood, Idaho. Plots measured 10 by 25 ft, with four replications of a completely randomized block design. Treatments consisted of single applications of chlorsulfuron, sulfometuron-methyl, metsulfuron-methyl, DPX-L5300 (each at 0, 0.5, 1, and 2 oz ai/A), picloram (0, 0.2, 0.4, and 0.6 lb ae/A) and clopyralid (0, 0.25, 0.5, and 1 lb ae/A). Treatments were applied in 23 gal/A water carrier with flat fan 8002 nozzles at 40 psi, from a CO_2 pressurized backpack sprayer operated at 3 mph. The air temperature at the time of treatment was 66 F and the relative humidity was 55%. The soil type is a Helmer silt loam, the soil temperature at 6 inches was 59 F. There was 50% cloud cover and dew was present.

Plots were evaluated for first-year results by estimating percent chlorosis of treated meadow hawkweed on July 17, 1986 to determine herbicide efficacy. Picloram at 0.4 and 0.6 lb ae/A (93 to 100%) and clopyralid at all rates (80 to 100%) caused extensive chlorosis ($p > 0.0001$). Additionally, metsulfuron caused moderate chlorosis at 1 and 2 oz ai/A (71 to 66%). Chlorsulfuron, sulfometuron, and DPX-L5300 caused chlorosis, but the effect was erratic and not outstanding. Results may have been significantly affected by an unusually dry summer. Results of this study can not be considered complete or definitive until data are gathered on plant responses in subsequent growing seasons. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Meadow hawkweed response to sulfonylurea and pyridine herbicides.

Herbicide	Rate	Chlorosis[1]
	(ai or ae/A)	(%)
chlorsulfuron	0.0 oz	0.0 f
	0.5 oz	7.5 f
	1.0 oz	32.5 cde
	2.0 oz	20.0 def
sulfometuron	0.0 oz	0.0 f
	0.5 oz	7.5 f
	1.0 oz	10.0 f
	2.0 oz	13.75 ef
picloram	0.0 lb	0.0 f
	0.2 lb	42.5 c
	0.4 lb	92.5 a
	0.6 lb	100.0 a
clopyralid	0.0 lb	0.0 f
	0.25 lb	80.0 ab
	0.5 lb	80.0 ab
	1.0 lb	100.0 a
metsulfuron	0.0 oz	0.0 f
	0.5 oz	40.0 cd
	1.0 oz	71.25 b
	2.0 oz	66.25 b
DPX-L5300	0.0 oz	0.0 f
	0.5 oz	15.0 ef
	1.0 oz	15.0 ef
	2.0 oz	17.5 ef

[1] Estimated percent chlorosis as compared to controls (no effect= 0%).
Means having a common letter are not significantly different at the 5% level of significance (LSD = 21; r^2 = 0.89, C.V. = 43%).

Field horsetail and catchweed bedstraw control in fallow. Prather, T. S., R. H. Callihan, and D. C. Thill. Field horsetail (*Equisetum arvense* L.) is an increasing problem in moist drainages of Palouse farmland. Control is difficult because of its massive root system. Several herbicides will remove above ground biomass but they do not prevent resprouting. Efficacy data are needed to find herbicides that control field horsetail for more than one season. Data were also taken for catchweed bedstraw (*Galium aparine* L.) because it was the other major weed on the site. The experiment was located near Genesse, Idaho. Herbicides were applied in October, 1985 after above ground vegetation was cut and removed with a rototiller set at the soil surface. Plot size was 10 by 30 ft with four replications in a randomized complete block design. Herbicides were applied with a CO_2 pressurized backpack sprayer set at 40 psi and 23 gal/A using 8002 flat fan nozzles. Visual evaluations of foliar cover were made July 17 and August 28, 1986. No catchweed bedstraw data were taken on August 28.

The first evaluations showed a reduction of field horsetail cover when treated with chlorsulfuron (0.047 and 0.094 lb ai/A) and dichlobenil by 93, 76, and 42%, respectively. Chlorsulfuron (0.047 and 0.094 lb ai/A) completely controlled catchweed bedstraw. These two treatments controlled catchweed bedstraw better than dichlobenil, DPX-F5384-81 (0.05 lb ai/A), aminotriazole (9.0 lb ai/A), and metsulfuron (0.02 lb ai/A). There was no control of field horsetail on August 28. The field horsetail in the chlorsulfuron (0.094 lb ai/A) treatment was shorter and lighter green in color but no difference in cover compared to the check was detectable. Based on these data, a fall soil application of these herbicides, is not adequate for season long control. Even at high rates of the most active compound, chlorsulfuron, the field horsetail plants had recovered. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Efficacy of foliar applied herbicides in the control of field horsetail and catchweed bedstraw

Herbicide	Rate	Foliar Cover[1] F. horsetail		C. bedstraw
	(lb ai/A)	----------------- (%)	-------------	
		July 17	Aug 28	July 17
chlorsulfuron	0.020	83bc	100a	7ab
chlorsulfuron	0.047	24a	100a	0a
chlorsulfuron	0.094	7a	100a	0a
dichlobenil	4.000	58b	100a	44bc
metsulfuron	0.020	100c	100a	42bc
metsulfuron	0.047	94c	100a	24ab
metsulfuron	0.094	85c	100a	10ab
DPX-F5384-81	0.050	91c	100a	68cd
DPX-F5384-81	1.000	100c	100a	32abc
DPX-F5384-81	2.000	95c	100a	10ab
aminotriazole	9.000	95c	100a	44bc
check	----	100c	100a	100d

[1] Foliar cover expressed as percent of check.
Numbers followed by the same letter are not significantly different at the 0.05 level using Fisher's LSD.

Spotted Knapweed control in pasture. Lass, L., R.H. Callihan, T. Miller, T. Miller, D.C. Thill. The objective of this experiment was to determine the effects of six different herbicides at three rates on established spotted knapweed (*Centaurea maculosa* Lam.) in pasture.

The experiment was established at Farragut State Park west of Athol, Idaho on June 9, 1986. Plots measured 10 by 40 ft, with four replications in a randomized complete block design. The treatments consisted of single applications of metsulfuron (0.0, 0.5, 1.0, 2.0 oz ai/A), DPX-L5300 (0.0, 0.5, 1.0, 2.0 oz ai./A), clopyralid (0.0, 0.25, 0.5, 1.0 oz ai./A), chlorsulfuron (0.0, 0.5, 1.0, 2.0 oz ai/A), sulfometuron (0.0, 0.5, 1.0, 2.0 oz ai./A), and picloram (0.0, 0.5, 1.0, 2.0 lbs ai/A).

Treatments were applied in 23 gal/A water carrier, with teejet 8002 nozzles at 43 psi., from a backpack sprayer operated at 3 MPH. Date of application was June 9, 1986. The air temperature at the time of the first treatment was 83 F, soil temperature was 70 F and the relative humidity was 46%. The sky was 80% cloudy and no dew was present. Visual estimates of biomass was recorded July 17, 1986 and Octber 22, 1986.

All treatments reduced the biomass of spotted knapweed (Table 1). Clopyralid and picloram reduced the total biomass (95-100%) during summer growth ($p = 0.0001$). In the fall, new seedling growth and regrowth from biennial roots was eliminated by all clopyralid treatments (100%) at the 0.001 level and all rates of picloram (99 to 100%).

Seed production, (numbers of receptacle heads) was reduced by all herbicides. Clopyralid, sulfometuron, and picloram eliminated seed production ($P = 0.001$). Metsulfuron and DPX-L5300 reduced seed head production by 97 to 99% ($P = 0.001$).

A high correlation was found between summer biomass and rates of clopyralid ($r = -.69$) and picloram ($r = -.70$) (Table 1). The high correlation coefficient (r) for the control of fall regrowth and rates for clopyralid (-.79) and picloram (-.75) suggests a linear response.

Reduction of spotted knapweed summer biomass by clopyralid and picloram in the first year was significant and striking. Lower rates of picloram (0.5 lb/A) and clopyralid (0.25 lb/A) when applied early provided excellent current season control. Control of summer growth by the lowest rate (0.25 lb/A) of clopyralid was approximately equivalent to that resulting from 2 lb/A picloram. All rates of clopyralid and picloram blocked seed production by preventing seed head formation. Fall regrowth from seeds and taproots failed to appear in the clopyralid treatments and in the higher rates of picloram.

Although metsulfuron, DPX-L5300, and sulfometuron resulted in only growth suppression, seed production was significantly reduced.

Since spotted knapweed is a biennial, these current-season results should not be considered definitive criteria; the subsequent season's data will be more meaningful.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Spotted Knapweed Control in Pasture.

Herbicide	Rate		Biomass[1] Summer 7/86		Biomass[2] Fall 10/86		Seed[3] Heads 10/86
	(ai/A)		(%)[4]		(%)[4]		(%)[4]
Metsulfuron	0.0 oz	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Ally)	0.5 oz	(r)=-.34	62a	(r)=-.59	90a	(r)=-.68	1.25b
	1.0 oz		72a		100a		2.75b
	2.0 oz		70a		77.5a		1b
DPX-L5300	0.0 oz	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Express)	0.5 oz	(r)=-.63	67a	(r)=-.35	92.5a	(r)=-.69	2.5b
	1.0 oz		70a		95.5a		0.5b
	2.0 oz		65a		91.5a		0.5b
Chlorsulfuron	0.0 oz	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Glean)	0.5 oz	(r)=-.40	87.5a	(r)=-.41	87.5a	(r)=-.45	58a
	1.0 oz		81.5a		81.5a		65a
	2.0 oz		86.5a		73.7a		54a
Clopyralid	0.0 lb	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Lontrel)	0.3 lb	(r)=-.69	1.75b	(r)=-.68	0b	(r)=-.68	0b
	0.5 lb		0.5b		0b		0b
	1.0 lb		0b		0b		0b
Sulfometuron	0.0 oz	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Oust)	0.5 oz	(r)=-.62	57.5a	(r)=-.47	80a	(r)=-.68	0b
	1.0 oz		52.5a		89a		1b
	2.0 oz		50a		74a		0b
Picloram	0.0 lb	(P)=0.001	100a	(P)=0.001	100a	(P)=0.001	100a
(Tordon)	0.5 lb	(r)=-.70	5b	(r)=-.68	0.5b	(r)=-.68	0b
	1.0 lb		2.5b		0b		0b
	2.0 lb		1.25b		0b		0b

[1]Estimated biomass, expressed a percent of control.
[2]The fall biomass estimation was based on new seedling growth or regrowth from perennial roots.
[3]Current years production.
[4]Any two means having a common letter are not significantly different at the 5% level of significance, using Protected Scheffe's Test.

A comparison of herbicide treatments on the control of purple nutsedge. A. F. Lourens and A. H. Lange. On August 9, 1986 five tubers of purple nutsedge were planted 1-inch deep in 6-inch pots of field soil and sprayed with four herbicides at two rates using 8004 LP nozzles at 30 psi. Each treatment was replicated five times. On August 23 a second batch was planted and sprayed with four more treatments. All pots were moved outside on August 30.

The stand and vigor were rated twice; at two weeks and one month after treatment. The number of shoots per pot surviving at the end of summer were counted after being moved back into the greenhouse two weeks before counting because of the cool night temperatures of mid-October.

The amount of control with most herbicides is probably better than would be expected in the field, but the relative control seemed to be similar to what has been observed in field application with a number of the older herbicides.

Metolachlor gave excellent early control as it does in the field and then control began to break as seen in the last reading. Terbacil gave excellent control in the first half but poor in the second half of the experiment. No explanation is available.

RE 40885 was outstanding in both parts of this study and needs to be evaluated further in the field and in horticultural crops. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

A comparison of preemergence herbicides for the control of purple nutsedge.

Herbicide	Lb/A	Average[1/] Nutsedge Stand and Vigor 2 wks	Nutsedge Control 4 wks	Nutsedge Control 6 wks	No. of green Shoots/pot 11/1/86
Metolachlor	3	0.0	10.0	9.2	2.6
Metolachlor	6	0.0	10.0	9.8	1.8
Diuron+Terbacil	0.8+0.8	7.8	9.6	10.0	0.0
Diuron+Terbacil	1.6+1.6	7.0	9.6	9.8	0.0
Terbacil	1.6	4.8	8.8	9.6	0.0
Terbacil	3.2	5.6	9.4	10.0	0.0
RE 40885	2	8.9	9.4	9.8	0.0
RE 40885	4	9.0	9.8	10.0	0.0
Check	-	9.8	0.6	0.0	12.0
Diuron+Terbacil	1+1	4.6	9.4	9.8	0.0
Terbacil	2	9.0	2.2	1.6	6.8
Metolachlor	2	0.2	8.6	6.2	1.6
RE 40885	2	1.6	9.8	10.0	0.0
Norflurazon	2	2.4	9.4	9.6	0.2
Norflurazon	4	2.0	9.2	9.8	0.0
Fluorchloridone	2	5.2	7.8	6.8	2.8
Fluorchloridone	4	4.0	8.0	5.2	1.8
Check	-	10.0	0.8	0.2	5.6

1/ Average of 5 replications where 0 = no effect or no stand and 10 = best stand of nutsedge or best control, i.e., no nutsedge visible at soil surface.

The first set of treatments (8) were applied 8/9/86 and the second set on 8/23/86. The second batch was moved from inside the greenhouse to full sun one week after treatment. The first was moved out three weeks treatment.

Spring or fall applied granular picloram and dicamba for leafy spurge control in North Dakota. Lym, Rodney G. and Calvin G. Messersmith. Granular and liquid formulations of picloram and dicamba were compared for leafy spurge control in two experiments established in 1980 on June 25 and September 3 near Valley City. Eight experiments to compare picloram 2% and 10%G formulations were established on September 14, 1982 and June 10, 1983 near Sheldon, September 9, 1982, June 21, 1983, and June 13 and September 11, 1984 near Dickinson, and June 14 and September 18, 1984 in the Sheyenne National Grasslands. Blank pellets were included in the experiments conducted at Sheldon so the number of pellets applied per plot was similar to improve uniformity of distribution of the picloram 10%G formulation. All experiments were in a randomized complete block design with four replications and 10 by 30 ft plots. The granules were applied uniformly by hand, while the liquid formulations were applied with a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. Evaluations were based on percent stand reduction compared to the control. A significant interaction between site and treatments occurred, so experimental sites will be discussed individually.

Leafy spurge control with picloram and dicamba was better from fall than spring applied treatments at Valley City, especially when evaluated 24 to 60 months after treatment (Table 1). The control averaged across all treatments after 24, 48, and 60 months was 54, 22, and 13% for spring applications and 78, 62, and 26% for fall applications, respectively. Fall applied dicamba at 8 lb/A and picloram at 2 lb/A as liquids provided similar control after 5 years, but control with granular picloram was better than with granular dicamba. Dicamba and picloram applied in the spring of 1980, generally did not give satisfactory leafy spurge control by 1982 and 1983, respectively. The exception was picloram at 2 lb/A which provided satisfactory control until 1984. Only fall applied picloram 2%G at 1.5 and 2 lb/A provided satisfactory leafy spurge control after 48 months at 83 and 86%, respectively, but no treatment provided satisfactory control 60 months after application.

Picloram 2%G and 10%G at equal rates generally provided similar leafy spurge control at both Sheldon and Dickinson (Table 2). Fall applications of picloram 2%G and 10%G at all application rates, except 2.0 lb/A, provided better leafy spurge control after 9 months than spring applications after 3 months. This difference could be due to insufficient moisture to completely disperse the granules following the June application, because the treatments generally were similar 12 and 24 months after application. Leafy spurge control in 1985 at Sheldon was similar to control in 1984. However, the treatments at Dickinson did not provide satisfactory leafy spurge control in 1985, so specific evaluations were not taken. The soil at Sheldon is very sandy compared to the mostly clay soil at Dickinson which may have allowed deeper picloram movement in the soil profile and thus better long-term leafy spurge root control at Sheldon than Dickinson.

Leafy spurge control with picloram at 1 and 2 lb/A was similar for the 2%G and 10%G when blanks were added, but was much worse with 10%G than 2%G pellets without blanks (Table 2). The picloram 2%G and 10%G pellets were similar in size and 80% fewer pellets per acre are applied with picloram 10%G than with 2%G. Thus, uniform distribution with hand-held application equipment was difficult which probably accounted for the decreased control. Visible grass injury was negligible with either picloram formulation. In general, leafy spurge control with picloram at 2 lb/A declined more rapidly when the liquid (2S) formulation was used compared to 2%G or 10%G.

Similar experiments were begun in 1984 using a new formulation of picloram 10%G with smaller pellets which resulted in more pellets per square foot than the previous 10%G formulation at similar rates. Picloram 2%G and 10%G gave similar leafy spurge control at all application rates except 0.5 lb/A (Table 3). Blanks were not mixed with the new 10%G formulation, but a uniform distribution still was obtained. Control was much lower at Dickinson than at Sheyenne which again probably was due to deeper picloram movement in the sandy soil at Sheyenne than in the clay soil at Dickinson. Unlike previous experiments, spring application of picloram granules provided better leafy spurge control than fall applications when evaluated 12 months after treatment. Fall precipitation was below normal and the soil was very dry until late October in 1984. The dry soil conditions after application apparently caused poor long-term control despite adequate moisture in 1985.

Granular and liquid formulations of dicamba and picloram generally provided similar control at comparable rates. Picloram 2%G and 10%G provided similar leafy spurge control either when blanks were included with the 10%G pellets or when the number of 10%G pellets per square foot was increased by use of a smaller pellet. Generally spring and fall treatment provided similar long-term control except when application was made during very dry conditions. Picloram granules provided better long-term control in sandy compared to clay soils. (Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table 1. Spring and fall applied granular picloram and dicamba for leafy spurge control at Valley City, ND.

		Application and evaluation date																		
		Spring treatment (25 June 1980)									Fall treatment (3 Sept 1980)									
Herbicide	Rate	6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84	6-85	6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84	6-85	8-85
	(lb/A)	(% control)																		
Picloram 2%G	1.0	97	80	53	25	44	22	10	8	3	95	86	84	55	76	52	51	52	18	10
Picloram 2%G	1.5	98	89	87	22	77	38	29	26	11	99	100	100	96	98	97	87	83	59	48
Picloram 2%G	2.0	99	98	90	53	85	72	56	62	28	100	100	99	100	100	98	93	86	68	63
Dicamba 5%G	4.0	74	55	9	3	4	0	4	0	0	94	74	43	31	31	29	18	20	17	9
Dicamba 5%G	6.0	82	54	25	3	16	5	4	3	1	96	99	89	58	55	55	41	40	22	6
Dicamba 5%G	8.0	91	75	45	19	29	6	5	6	0	99	100	98	83	84	78	66	67	39	20
Picloram 2S	2.0	100	99	98	90	94	79	64	71	54	100	100	100	100	98	94	79	78	50	28
Dicamba 4S	8.0	94	74	28	12	42	13	7	5	4	99	99	100	97	92	83	69	72	47	33
LSD (0.05)		9	14	21	17	20	11	11	12	20	3	10	22	29	24	24	29	23	26	23

Table 2. Leafy spurge control using picloram 2%G and 10%G of similar size.

Picloram formulation	Rate	Evaluation date									
		1983		1984		1985		1983		1984	
		June	Aug	June	Aug	June	Aug	June	Aug	June	Aug
	(lb/A)	(% control)									
Applied Fall 1982		Sheldon						Dickinson			
2%G+blanks	0.5	66	26	8	21	11	16	38	5	18	5
2%G+blanks	1.0	86	41	29	33	31	18	69	15	42	13
2%G+blanks	1.5	87	67	48	48	47	24	90	37	71	51
2%G	2.0	99	76	80	66	71	44	96	53	79	64
10%G+blanks	0.5	39	11	3	31	0	0	34	9	19	0
10%G+blanks	1.0	83	60	52	56	39	30	84	21	45	36
10%G+blanks	1.5	81	60	43	58	54	38	88	35	55	47
10%G+blanks	2.0	87	63	77	56	65	45	89	40	75	64
10%G	1.0	53	26	11	13	18	13	--	--	--	--
10%G	2.0	89	61	45	45	52	57	--	--	--	--
Liquid (2S)	2.0	94	67	55	44	30	35	94	42	60	41
LSD (0.05)		16	30	19	23	24	25	18	28	30	33
Applied Spring 1983											
2%G+blanks	0.5	--	28	27	10	21	8	--	38	28	12
2%G+blanks	1.0	--	38	58	13	55	14	--	57	53	43
2%G+blanks	1.5	--	86	95	36	92	50	--	62	83	60
2%G	2.0	--	97	94	69	93	62	--	76	89	65
10%G+blanks	0.5	--	26	11	6	18	4	--	25	20	2
10%G+blanks	1.0	--	54	61	16	52	28	--	32	42	23
10%G+blanks	1.5	--	74	70	26	58	35	--	78	75	56
10%G+blanks	2.0	--	92	92	56	92	56	--	63	76	70
Liquid (2S)	2.0	--	93	79	39	76	57	--	96	94	51
LSD (0.05)			22	14	14	23	15	--	23	19	29

Table 3. Leafy spurge control using picloram 2%G, 10%G, and 2S as spring or fall applied treatment.

Picloram formulation	Rate	Evaluation date 1984 Aug	1985 June	1985 Aug	1986 June	1986 Aug	1984 Aug	1985 June	1985 Sept
	(lb/A)	(% control)							
Applied Spring 1984		Sheyenne					Dickinson		
2%G	0.5	83	89	53	56	34	0	0	0
2%G	1.0	96	99	83	79	54	38	48	8
2%G	1.5	96	100	97	95	91	43	62	13
2%G	2.0	98	100	98	98	94	83	88	53
10%G	0.5	64	75	19	4	4	3	0	4
10%G	1.0	95	99	84	86	82	31	43	23
10%G	1.5	97	99	94	93	86	56	45	16
10%G	2.0	97	99	94	94	86	72	56	31
Liquid (2S)	2.0	98	100	99	98	94	98	80	28
LSD (0.05)		8	10	16	17	24	23	24	21
Applied Fall 1984									
2%G	0.5	--	94	57	76	7	--	71	16
2%G	1.0	--	100	91	91	74	--	85	39
2%G	1.5	--	100	96	98	83	--	97	56
2%G	2.0	--	100	97	97	86	--	98	81
10%G	0.5	--	82	42	43	6	--	46	15
10%G	1.0	--	96	81	66	52	--	79	36
10%G	1.5	--	99	91	89	81	--	91	45
10%G	2.0	--	99	91	96	73	--	95	68
Liquid (2S)	2.0	--	100	99	97	88	--	99	47
LSD (0.05)		--	6	16	14	26	--	9	17

Leafy spurge control with various picolinic acid herbicides. Lym, Rodney G. and Calvin G. Messersmith. Picloram is the main herbicide used for leafy spurge control. Picloram is often applied at 1 to 2 lb/A for long-term control or at 0.25 to 0.5 lb/A as an annual treatment. The use of picloram, especially near open water or in areas with high water tables has been criticized because of its high water solubility, potential to leach into groundwater and high phytotoxicity. The purpose of these experiments was to compare several picolinic acid herbicides both alone and in combination with 2,4-D or picloram for leafy spurge control.

The experiments were established near Hunter, ND on June 3, 1985. Leafy spurge was 18 to 24 inches tall and beginning seed set. Plots were 10 by 30 ft in a randomized complete block design with four replications. Herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The weather was partly cloudy and 64 F with 60% relative humidity and the soil temperature at 2 inches was 64 F. Evaluations were based on a visual estimate of percent stand reduction as compared to the control.

The first experiment compared clopyralid, fluroxypyr and triclopyr alone and in various combinations to picloram for leafy spurge control. Clopyralid alone did not control leafy spurge and tended to reduce control when combined with picloram compared to picloram alone (Table 1). Picloram at 1 lb/A averaged 93 and 81% control compared to 77 and 43% control when combined with clopyralid at 1 lb/A 12 and 14 months after application, respectively. Fluroxypyr and triclopyr provided moderate leafy spurge control the season of application. Control decreased when fluroxypyr or triclopyr were combined with clopyralid and when triclopyr was combined with 2,4-D. Picloram at 1 and 2 lb/A gave 81 and 95% leafy spurge control, respectively, 15 months following application. No other treatment provided satisfactory leafy spurge control at the 15-month evaluation.

Previous research at North Dakota State University has shown that picloram at 0.25 to 0.5 lb/A plus 2,4-D at 1 lb/A provides increased control of leafy spurge compared to picloram alone at similar rates. The second experiment was designed to determine whether a similar enhancement of leafy spurge could be obtained by adding 1 lb/A of 2,4-D to low application rates of clopyralid, fluroxypyr, triclopyr, and dicamba. No treatment provided satisfactory leafy spurge control by August 1985 (Table 2).

Picloram alone or with 2,4-D provided better leafy spurge control than other picolinic acid herbicides or dicamba. Previous research has shown that picloram uptake and translocation are not increased when applied with 2,4-D. Metabolism studies are in progress to determine why this combination treatment provides synergistic leafy spurge control. Whatever the mechanism, it apparently does not function with other picolinic acid herbicides or dicamba. (Published with approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table 1. Leafy spurge control with various picolinic acid herbicides.

Treatment	Rate	Evaluation date 21 Aug 1985	29 May 1986	18 Aug 1986
	(lb/A)	(% control)		
Triclopyr	4	28	28	5
Triclopyr	8	55	42	20
Triclopyr+clopyralid	2+2	6	5	4
Triclopyr+clopyralid	3+3	1	12	18
Triclopyr+2,4-D	0.5+1	3	0	0
Triclopyr+2,4-D	1+2	9	15	5
Picloram	0.5	75	23	9
Picloram	1	93	93	81
Picloram	2	100	97	95
Picloram+clopyralid	0.25+0.25	41	23	21
Picloram+clopyralid	0.5+0.5	61	33	11
Picloram+clopyralid	1+1	95	77	43
Clopyralid	2	6	3	5
Clopyralid	4	0	0	0
Clopyralid+fluroxypyr	0.5+0.5	14	4	1
Clopyralid+fluroxypyr	1+1	29	13	4
Clopyralid+fluroxypyr	2+2	14	3	0
Fluroxypyr	1	40	15	21
Fluroxypyr	2	22	0	0
Fluroxypyr	4	64	33	2
LSD (0.05)		25	27	27

Table 2. Leafy spurge control with 2,4-D combined with various auxin herbicides.

Treatment	Rate	Evaluation date 21 August 1985	29 May 1986
	(lb/A)	(% control)	
Triclopyr+2,4-D	0.5+1	13	2
Triclopyr+2,4-D	1+1	1	2
Clopyralid+2,4-D	0.5+1	0	1
Clopyralid+2,4-D	1+1	0	0
Fluroxypyr+2,4-D	0.5+1	0	1
Fluroxypyr+2,4-D	1+1	0	6
Triclopyr+clopyralid	0.5+0.5	0	0
Dicamba+2,4-D	0.5+1	0	4
Dicamba+2,4-D	1+1	11	2
LSD (0.05)		5	5

Leafy spurge control with low rate annual picloram and 2,4-D combination treatments. Lym, Rodney G. and Calvin G. Messersmith. Previous research at North Dakota State University has shown that annual treatments of picloram + 2,4-D for 3 to 5 years will give leafy spurge control similar to expensive high rate picloram treatments. Picloram + 2,4-D at 0.25 + 1 lb/A generally gives 20 to 30% better leafy spurge control than picloram at 0.25 lb/A alone, but the benefit of a herbicide combination declines as the picloram or 2,4-D rate increases. Picloram + 2,4-D at 0.5 + 1 lb/A tends to give only 5 to 10% better control than picloram at 0.5 lb/A alone. The purpose of this experiment was to evaluate long-term leafy spurge control from annual treatments of picloram + 2,4-D amine at relatively low application rates.

The experiment was established at four locations in North Dakota. Spring treatments were applied on June 13, 18 and 19, 1984 at Dickinson, Hunter, and Valley City, respectively, and the fall treatments were applied on September 5 and 18, 1984 at Valley City and the Sheyenne National Grasslands near McLeod, respectively. The soil was a loamy fine sand at Dickinson, a silty clay loam at Hunter, Sheldon and the Sheyenne National Grasslands, and a loam at Valley City. Dickinson, located in western North Dakota, generally receives much less precipitation than the other two sites located in eastern North Dakota. The spring and fall treatments were applied annually in June or September 1984 and 1985. The herbicides were applied with a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications except at Hunter which had 8 by 25 ft plots and 3 replications. Evaluations were based on a visual estimate of percent stand reduction as compared to the control.

The results from the Dickinson location were different than the other sites and will be discussed separately. Picloram at 0.12, 0.25, 0.38, and 0.5 lb/A provided 2, 28, 63 and 67% leafy spurge control, respectively, as a spring applied treatment at Hunter and Valley City but only 0, 1, 6, and 27% control, respectively, as a fall applied treatment at Sheyenne and Valley City when evaluated 24 months following initial application (Table). The addition of 2,4-D to picloram tended to increase leafy spurge control slightly from spring but not fall applied treatments. The slight increase in control was similar regardless of 2,4-D rate. The increased leafy spurge control obtained when 2,4-D was applied with picloram as a spring treatment was not found when similar treatments were fall applied. Leafy spurge generally begins regrowth in mid to late-July following a fall application and had become reestablished by the following fall. However, spring applied treatments generally maintained control all season and regrowth was typically 0 to 3 inches tall when a killing frost occurred. This limited growth may predispose the plants to winter kill and allow gradually increased control.

The reason for poor control at Dickinson compared to the other locations is not known. A similar experiment begun in 1981 at the same location has resulted in annually increased leafy spurge control. This location has received above average precipitation for the last 24 months and the leafy spurge may be growing more vigorously than previously.

This experiment must be continued for several years to determine whether the presently used picloram at 0.25 to 0.5 lb/A + 2,4-D at 1 lb/A treatment is the most cost effective application rate for an annual leafy spurge control program or whether the picloram and/or 2,4-D rate can be reduced and still maintain acceptable control. (Published with approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table. Leafy spurge control from annual picloram or picloram plus 2,4-D amine treatments spring or fall applied at four locations in North Dakota.

		Application time/location/1986 evaluation date											
		Spring							Fall				
		Hunter		Dickinson		Valley City			Sheyenne		Valley City		
Treatment	Rate	May 29	Aug 18	June 10	Sept 16	June 3	Aug 20	Mean[a]	May 30	Aug 24	June 3	Aug 20	Mean[b]
	(lb/A)	(% control)											
Picloram	0.12	4	7	0	18	0	39	2	42	0	3	0	0
Picloram	0.25	14	37	0	28	39	88	28	67	0	25	1	1
Picloram	0.38	68	80	10	29	60	90	63	74	9	56	3	6
Picloram	0.5	67	88	19	16	67	90	67	89	16	92	38	27
Picloram+2,4-D	0.12+0.12	3	12	3	31	51	41	30	72	0	32	8	4
Picloram+2,4-D	0.12+0.25	2	13	1	18	6	56	4	62	8	12	0	4
Picloram+2,4-D	0.12+0.5	0	7	5	35	17	65	10	67	2	7	0	1
Picloram+2,4-D	0.25+0.12	23	87	3	21	28	89	26	70	5	19	1	3
Picloram+2,4-D	0.25+0.25	11	68	11	45	26	54	21	64	0	18	1	1
Picloram+2,4-D	0.25+0.5	22	75	8	35	35	68	29	58	2	35	6	4
Picloram+2,4-D	0.38+0.12	46	85	6	23	54	80	50	81	15	56	11	13
Picloram+2,4-D	0.38+0.25	82	96	10	34	61	84	70	75	6	48	3	4
Picloram+2,4-D	0.38+0.5	42	87	18	34	78	88	63	89	18	64	3	10
Picloram+2,4-D	0.5+0.12	85	95	6	61	89	90	87	78	15	75	8	11
Picloram+2,4-D	0.5+0.25	84	96	15	36	67	96	74	93	22	89	18	20
Picloram+2,4-D	0.5+0.5	70	92	11	30	89	95	80	94	18	81	15	17
Picloram+2,4-D	0.25+1.0	15	53	16	23	69	90	46	92	12	63	6	9
LSD (0.05)		20	19	11	NS	37	29	23	28	NS	31	15	11

[a] Average control at Hunter and Valley City 24 months following the original 1984 treatment date.
[b] Average control 24 months following the original 1984 treatment date.

Leafy spurge control with resulting forage production from several herbicide treatments. Lym, Rodney G. and Calvin 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 lb/A, picloram + 2,4-D at 0.25 + 1 lb/A, picloram at 2 lb/A, and dicamba at 8 lb/A and were applied in August 1983 or June 1984 as fall or spring treatments. The 2,4-D at 2 lb/A and picloram plus 2,4-D treatments were applied annually while the picloram alone and dicamba treatments were reapplied when leafy spurge control declined to 70% or less. Thus, picloram at 2 lb/A was reapplied at Valley City in August 1985 and at Dickinson in June and August 1986. Dicamba at 8 lb/A was reapplied in June 1985 and 1986 at both locations as spring treatments and at Dickinson in September 1985 and at both locations in 1986 as a fall treatment. 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, 1985, and 1986. 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 ae, dicamba = $11.75/lb ai, picloram = $40.00/lb ai, and application = $2.05/A. The cost of treatments applied in Fall 1986 is not subtracted from the net return.

Most treatments have resulted in an economic loss at Dickinson despite excellent leafy spurge control from several treatments. This site generally receives 8 to 10 inches less precipitation annually than the Valley City location. Total forage production averaged after 3 years across all treatments was 2315 lb/A at Dickinson and 4018 lb/A at Valley City (Table). Leafy spurge control from 2,4-D at 2 lb/A was not satisfactory from spring or fall applications at either site. However, it did provide short term control resulting in an economic gain at Valley City of $31/A and $2/A and at Dickinson of $8/A and $15/A as spring and fall applied treatments, respectively. Leafy spurge control with picloram + 2,4-D at 0.25 + 1 lb/A averaged over both locations was 67% as a spring applied treatment which was an increase from 44% control in 1985. Above average precipitation was received at both locations in 1986 allowing vigorous leafy spurge regrowth. The stems were only 3 to 5 inches tall but numerous in August 1986. Leafy spurge control was poor with picloram + 2,4-D at 0.25 + 1 lb/A fall applied, but average forage production of 2989 lb/A was only slightly less than the spring average of 3484 lb/A.

Picloram at 2 lb/A spring applied provided 94% leafy spurge control at Valley City and 53% control at Dickinson 36 months after application (Table). Dicamba generally gave good leafy spurge control as a fall but not as a spring applied treatment. All treatments have reduced leafy spurge production compared to the control except the fall application of 2,4-D at 2 lb/A at Valley City. (Published with approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table. Leafy spurge control, forage production and estimated net return from several herbicide treatments at two sites in North Dakota.

Original treatment date: Herbicide	Rate	Re-treatment time: Herbicide	Rate	Year	Cost	Control: June	Control: Aug	Yield[a]: Forage	Yield[a]: Leafy spurge	Utilization	Total net return[b]
	(lb/A)		(lb/A)		($/A)	---(%)---		--(lb/A)---		(AUD)	($/A)
						Valley City					
Spring 1984		Spring									
2,4-D	2	2,4-D	2[c]	84-86	18	0	24	3266	2475	82	31
Picloram + 2,4-D	0.25 +1	Picloram + 2,4-D	0.25[c] +1	84-86	42	31	74	4188	1480	105	21
Picloram	2	...	...	...	82	94	86	4401	1266	110	-16
Dicamba	8	Dicamba	8[d]	85,86	288	30	97	3868	1509	97	-230
Fall 1983		Fall									
2,4-D	2	2,4-D	2[c]	84-86	18	0	0	2580	3220	65	21
Picloram + 2,4-D	0.25 +1	Picloram + 2,4-D	0.25 +1[c]	84-86	42	37	8	3950	2120	99	17
Picloram	2	Picloram	2[d]	85	164	98	94	5227	256	131	-85
Dicamba	8	Dicamba	8[d]	86	192	84	58	4662	660	117	-122
		Control						3814	3738	0	
LSD (0.05)						17	18	770	587		
						Dickinson					
Spring 1984		Spring									
2,4-D	2	2,4-D	2[c]	84-86	18	0	18	1767	293	44	8
Picloram + 2,4-D	0.25 +1	Picloram + 2,4-D	0.25 +1[c]	84-86	42	35	59	2779	105	69	-1
Picloram	2	Picloram	2[d]	86	164	53	96	2759	84	69	-123
Dicamba	8	Dicamba	8[d]	85,86	288	38	72	1960	136	49	-259
Fall 1983		Fall									
2,4-D	2	2,4-D	2[b]	84-86	18	0	4	2176	646	55	15
Picloram + 2,4-D	0.25 +1	Picloram + 2,4-D	0.25 +1[c]	84-86	42	14	3	2027	856	51	-12
Picloram	2	Picloram	2[d]	86	164	71	35	2714	35	68	-41
Dicamba	8	Dicamba	8[d]	85,86	288	96	42	2334	54	58	-157
		Control				0	0	1907	1348	0	
LSD (0.05)						13	23	613	283		

[a] Total production of 1984, 1985 and 1986 harvest.
[b] Total net return for 1984, 1985 and 1986. Fall 1986 treatment cost is not subtracted from net return.
[c] Annual retreatment.
[d] Applied when control declines to less than 70%.

Leafy Spurge control in pasture. Lass, L., R.H. Callihan, T.W. Miller, D.C. Thill. The purpose of this experiment was to determine the effects of three rates of six different herbicides on established leafy spurge (Euphorbia esula L.) in pasture.

The experiment was established in dense leafy spurge in a non-grazed pasture east of Rathdrum, Idaho on June 9, 1986. The soil type was Avonvulle gravely silt loam. Plots measured 10 by 20 ft, with four replications in a randomized complete block design. The treatments consisted of single applications of DPX-L5300 (0.0, 0.5, 1.0, 2.0 oz ai /a), clopyralid (0.0, 0.25, 0.5, 1.0 lb ai/a), sulfometuron (0.0 0.5, 1.0, 2.0 oz ai/a), picloram (0.0, 0.5, 1.0, 2.0 lb ai/a), fosamine-ammonium (0.0, 0.5, 1.0, 2.0 lb ai/a) and combinations of metsulfuron and chlorsulfuron (0.0 + 0.0, 0.3 + 0.3, 0.5 + 0.5, and 1.0 + 1.0 oz ai/a).

Treatments were applied in 23 gpa water carrier, with teejet 8002 nozzles at 43 psi., from a backpack sprayer operated at 3 MPH. The air temperature at the time of the first treatment was 59 F, soil surface temperature was 42 F, and the relative humidity 46%. The sky was 80% cloudy and no dew was present.

Leafy spurge summer growth was significantly reduced by picloram (77 to 92%; p=.0001) (Table 1), the only herbicide that provided more than 50% control. Some regrowth occured in picloram plots in September (5 to 10 plants).

Sulfometuron at the 2.0 oz ai/a rate, appeared to suppress summer growth although statistically not verifiable.

A high negative correlation was found between the summer biomass and the rates of sulfometuron (r=-.73) and picloram (r=-.77)(Table 1). These correlations suggests a linear response to increasing rate.

Since leafy spurge is a rhizomatous perennial, these current-seasons results should not be considered definitive criteria; the subsequent season's data will be more meaningful. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Leafy Spurge Control in Pasture.

Herbicide	Rate		% Biomass[1] Summer 7/17/86
	(ai./A)		(%)[2]
metsulfuron + chlorsulfuron	0.0 oz	(P) = 0.001	100a
	.3+.3 oz	(r) = -.21	98a
	.5+.5 oz		98a
	1+1 oz		98a
DPX-L5300	0.0 oz	(P) = 0.001	100a
	0.5 oz	(r) = -.38	100a
	1.0 oz		105a
	2.0 oz		92a
fosamine-ammonium	0.0 lb	(P) = 0.001	100a
	0.5 lb	(r) = -.05	83a
	1.0 lb		80a
	2.0 lb		95a
clopyralid	0.0 lb	(P) = 0.001	100a
	0.3 lb	(r) = -.39	100a
	0.5 lb		99a
	1.0 lb		96a
sulfometuron	0.0 oz	(P) = 0.001	100a
	0.5 oz	(r) = -.73	91a
	1.0 oz		87a
	2.0 oz		67a
picloram	0.0 lb	(P) = 0.001	100a
	0.5 lb	(r) = -.77	23b
	1.0 lb		6b
	2.0 lb		2b

1. Estimated biomass, expresed as a percent of the untreated control.
2. Any two means having a common letter are not significantly different at the 5% level of significance., using Protected Scheffe's Test.

Common Tansy control in pasture. Lass, L., R.H. Callihan T. Miller, and D.C. Thill. The purpose of this experiment was to determine the effects of four different herbicides at three rates on established common tansy (Tanacetum vulgare L.) in pasture.

The experiment was initiated at Farragut State Park, west of Athol, Idaho on June 9, 1986. Plots measured 10 by 20 ft, with four replications in a split plot design. The treatments consisted of single applications of metsulfuron (0.0, 0.5, 1.0, 2.0 oz ai/a), DPX-L5300 (0.0, 0.5, 1.0, 2.0 oz ai/a), clopyralid (0.0, 0.5, 1.0 lb ai/a and 1.0 + glyphosate at 0.5 lbs ai/a), and picloram (0.0, 0.5, 1.0, 2.0 lbs/a).

Treatments were applied in 23 gpa water carrier, with teejet 8002 nozzles at 40 psi., from a backpack sprayer operated at 3 MPH. The date of application was June 9, 1986. The air temperature was 59 F, soil surface temperature was 55 F, and the relative humidity 42%. The sky was 80% cloudy and no dew was present. Visual estimates of tansy biomass were recorded July 17, 1986 and October 22, 1986

Only metsulfuron significantly reduced the total biomass (88 to 92%) of common tansy during summer growth ($p = .0001$ Table 1). In the fall, new seedling growth and regrowth from perennial rhizomes were significantly reduced by all metsulfuron treatments (96 to 100%; $p = 0.001$). Both picloram (2 lb/a) and clopyralid (1 lb/a) reduced fall regrowth of seedlings and rhizomes.

High negative correlations were found between summer total biomass and rates of metsulfuron ($r = -0.71$) and picloram ($r = -0.79$)(Table 1). High negative correlations also were found between fall biomass and rates of metsulfuron ($r = -0.70$), clopyralid ($r = -0.79$) and picloram ($r = -0.75$). These correlations suggest a linear response to rate of the herbicide.

Reduction of summer biomass and fall regrowth of common tansy in the first year was significant and striking. It appears that early season application of metsulfuron (0.5 to 1.0 oz./a) will provide adequate current season control, which is nearly equivalent to control from from 2.0 lb./a picloram or from 1.0 lb./a clopyralid. Although, DPX-L5300 resulted in growth suppression, the rate response was not as consistent as in the case of the other herbicides in the study.

Since common tansy is a rhizomatous perennial, these current seasonal results should not be considered definitive; the subsequent season's data will be more meaningful.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Common Tansy control in pasture.

Herbicide	Rate	Biomass[1] 7/17/86		Biomass[2] 10/22/86	
	(ai/A)		(%)[3]		(%)[3]
metsulfuron	0.0 oz	(P) = 0.001	100a	(P) = 0.001	100a
(Ally)	0.5 oz	(r) = -0.71	12b	(r) = -0.7	4b
	1.0 oz		6b		0b
	2.0 oz		6b		0b
DPX-L5300	0.0 oz	(P) = 0.001	100a	(P) = 0.001	100a
(Express)	0.5 oz	(r) = 0.5	70a	(r) = -0.46	18a
	1.0 oz		65a		9b
	2.0 oz		55a		23a
clopyralid	0.0 lb	(P) = 0.001	100a	(P) = 0.001	100a
(Lontrel)	0.5 lb	(r) = -0.58	60a	(r) = -0.79	30a
	1.0 lb		57a		8b
clopyralid+ glyphosate (Roundup)	1.0 lb + 0.5 lb		60a		1b
picloram	0.0 lb	(P) = 0.001	100a	(P) = 0.001	100a
(Tordon)	0.5 lb	(r) = -0.79	60a	(r) = -0.75	20a
	1.0 lb		52a		12a
	2.0 lbs		40a		0b

[1]Estimated biomass, expressed as percent of control.
[2]The biomass was regrowth from perennial rhizomes.
[3]Any two means having a common letter are not significantly different at the 5% level of significance using Protected Scheffe's Test.

Canada thistle control in a non-grazed Colorado Pasture. Beck, K.G. An experiment was established in a non-grazed pasture at Platteville, CO to evaluate Canada thistle (CIRAR) control longevity with single season spring and fall herbicide applications. The design was a randomized complete block with four replications. Spring applications included picloram, clopyralid, dicamba, chlorsulfuron, and 2,4-D (Table 1). Applications of 2,4-D in the spring were followed by fall treatments of dicamba and chlorsulfuron. All treatments were applied with a CO_2 pressurized bicycle sprayer using 11003 flat fan nozzles calibrated to deliver 23 gpa at 30 psi. Other application data are presented in Table 2. Plot size was 10 by 30 ft.

Visual evaluations were taken on July 23 and October 8, 1986, approximately six weeks and four months after spring applications, respectively. The October 8 evaluation was three weeks after fall applicatons. Picloram (0.75 lb ai/A) provided the greatest control six weeks after spring treatments and chlorsulfuron (0.047 lb ai/A) the lowest (Table 1). At the fall evaluation, spring applications of picloram (0.75 lb ai/A) provided the greatest control of Canada thistle and spring applications of dicamba (1.0 lb ai/A) the lowest. Phytoxicity to grasses was not evident at either evaluation date (data not shown).

Herbicide treatments will be evaluated again in 1987 and 1988 for control longevity of single season applications. (Weed Research Laboratory, Colorado State University, Ft. Collins, CO 80523).

Table 1. Canada thistle control with spring and fall herbicide applications.

Treatment	Rate	Timing	CIRAR	
	(lb ai/A)		Jul 23, 1986	Oct 8, 1986
			-------(% Control)--------	
picloram	0.50	spring	97	99
picloram	0.75	spring	96	100
clopyralid	0.125	spring	69	69
clopyralid	0.25	spring	84	88
clopyralid	0.50	spring	91	89
dicamba	1.0	spring	79	29
dicamba	2.0	spring	86	66
chlorsulfuron	0.047	spring	74	79
2,4-D amine	2.0	spring	84	
+ dicamba	2.0	fall		99
2,4-D amine	2.0	spring	84	
+ chlorsulfuron	0.023	fall		75
2,4-D amine	2.0	spring	90	
+ chlorsulfuron	0.047	fall		81
LSD (0.05)			22	23

Table 2. Application data for Canada thistle control in a non-grazed Colorado pasture.

Environmental data		
Application dates	Jun 13, 1986	Sep 19, 1986
Application time	12:00 p	1:30 p
Air temperature, F	75	72
Cloud cover, %	95	10
Relative humidity, %	64	62
Wind speed/direction, MPH	2/NE	4/S
Soil temperature (2 in), F	61	46

Weed data

Application date	Species	Growth Stage	Height	Density
			(in)	(plt/ft^2)
Jun 13	CIRAR	bolting	10 to 15	12 to 15
Sep 19	CIRAR	rosette	2 to 7	12 to 15

Canada thistle control in non-crop areas. Rydrych, D.J. Canada thistle (*Circium arvense* L. Scop) is the number one perennial weed problem in many areas of the Pacific Northwest. A timing trial was established in the spring of 1986 at Adams, Oregon to test the efficiency of XRM 4757 (clopyralid + 2,4-D) on Canada thistle. Plots were 10 by 30 feet and replicated twice using a randomized block design. XRM 4757 was applied at .50 and 1.00 lb ai/A in a volume of 20 GPA at 30 PSI when Canada thistle was in the 12-inch and bud stage. Canada thistle populations averaged 3/ft^2. Evaluations were obtained on August 22, 1986 and September 22, 1986 and the results are recorded in the table.

XRM 4757 was only partially effective (60 percent) when applied to Canada thistle in the 12-inch rosette stage. Control was excellent when XRM 4757 was applied in the bud stage. A 40 percent regrowth of Canada thistle was observed on the last evaluation where XRM 4757 was applied on young Canada thistle foliage (12-inch stage). XRM 4757 is very effective on Canada thistle when applied at the proper growth stage. (Oregon State University, CBARC, Pendleton, OR 97801)

Canada thistle control using XRM 4757 at two growth stages at Adams, Oregon--1986

Treatments1/	Rate (lb/A)	Appl. date	Growth stage	% Canada thistle control R1	R2	Avg.
XRM 4757	.50	5/23	12-ins	50	70	60
XRM 4757	1.00	5/23	12-ins	55	65	60
XRM 4757	.50	6/23	bud	99	99	99
XRM 4757	1.00	6/23	bud	99	99	99
control	----	----	---	0	0	0

1/ Treated postemergence on May 23, 1986 (12-inch rosette) and June 23, 1986 (bud stage).

PROJECT 2.

HERBACEOUS WEEDS OF RANGE AND FOREST

Celestine Lacey - Project Chairman

New weed species and potential weed problems in Idaho. Old, R. R., F. E. Northam, R. H. Callihan, and D. C. Thill. Several species of plants not previously reported in Idaho were observed during 1986. They are new introductions to the state and possess the potential to become weed problems. Also recorded were extensions of the ranges of several species that have been present in Idaho for several years and appear to be expanding their infestations. The following list separates the plants into three groups: (1) those not previously reported for Pacific Northwest; (2) those not previously documented for Idaho, although present in the Pacific Northwest (Hitchcock and Cronquist, Flora of the Pacific Northwest, 1973); (3) those previously reported in Idaho, wherein the known range of the species has been expanded due to 1986 field observations. Citations in the following lists give the scientific name, Weed Science Society of America code (if available), common name, family name and sighting locations.

Group I: Species not previously reported for Idaho, nor listed in Flora of the Pacific Northwest.

1. Asclepias incarnata L. (ASCIN) swamp milkweed; Asclepiadaceae; low lying areas, Sweet, Gem Co., Id.

2. Euphorbia dentata Michx. Euphorbiaceae; on road shoulders Slate Creek, Idaho Co., Id.

3. Tamarisk gallica L. (TAAGA) French tamarisk; Tamaricaceae; alkaline flats south of Mountain Home, Elmore Co., Id.

4. Verbascum virgatum Stokes (VESVI) purplestamen mullein; extensive in rangeland, Incom, Bannock, Co., Id.

Group II: Species not previously documented for Idaho, although currently listed in Flora of the Pacific Northwest

1. Aira caryophylla L. (AIRCA) silver hairgrass; Gramineae; rangeland East Hope, Bonner Co. and Rose Lake, Kootenai Co., Id.

2. Aristida oligantha Michx. (ARKOL) prairie three awn; Gramineae; roadshoulders, Lucille, Idaho Co., Id.

3. Carduus pycnocephalus L. (CRUPY) Italian thistle; Compositae; extensive in Idaho Co., Id.

4. Cerastium dubium L. doubtful chickweed; Caryophyllaceae; widespread Payette River Valley, Emmett, Gem Co., Id.

5. Eremocarpus setigerus (Hook.) Benth. (ERMSE) turkey mullein; Euphorbiaceae; dry hills south of Montour, Gem Co., Id.

Group III. Species previously reported in Idaho; new county records.

1. Apera interrupta (L.) Beauv. interrupted windgrass; Gramineae; extensive in Idaho Panhandle, new sighting extreme southwest corner of Owyhee Co., Id.

2. Bryonia alba L. (BYOAL) white bryony; Cucurbitaceae; extensive in Latah and Nez Perce Co., new sighting; Fish Haven, Bear Lake Co. and Idaho Falls, Bonneville Co., Id.

3. Chaenorrhinum minus (L.) Lange (CHNMI) dwarf snapdragon; Scrophulariaceae; First record 1985 Boundary Co.; new sighting roadshoulders near Culdesac, Nez Perce Co.

4. Cynodon dactylon (L.) Pers. (CYNDA) Bermudagrass; Gramineae; previously reported as a waif, new established populations in Ahsaka in Clearwater Co., Boise in Ada Co., Emmett in Gem Co. and Smiths Ferry, Valley Co., Id.

5. Echium vulgare L. (EHIVU) blueweed; Boraginaceae. Previously known in Idaho Co., new sighting; roadsides north of Wallace, Shoshone Co., Id.

6. Eragrostis barrelieri Daveau. (ERABA) mediterranean lovegrass; Gramineae; First record in Pacific Northwest was Moscow, Latah Co., in 1984, new sightings at Boise, Ada Co., Emmett, Gem Co. and Whitebird, Idaho Co. Collected three consecutive years in Moscow (1984-86).

7. Eragrostis orcuttiana Vasey; Orcutt's lovegrass; Gramineae; Previously reported only in Canyon Co. New sightings in Emmett, Gem Co., Tamarack, Adams Co. and Whitebird, Idaho Co., Id.

8. Lythrum salicaria L. (LYTSA) purple lythrum; Lythraceae; Common in southwestern Idaho, this report near Plummer, Benewah Co. Id.

9. Mirabilis nyctaginea (Michx.) Macmill. (MIBNY) wild four o'clock; Nyctaginaceae; Previously known only from Bonner Co. new sighting Culdesac, Nez Perce Co., Id.

10. Sorghum halepense (L.) Pers. (SORHA) johnsongrass; Gramineae; previous reports indicate species does not persist, established plants collected south of Kendrick, Nez Perce Co., Lucille, Idaho Co. and Gooding, Gooding Co., Id.

11. Trifolium arvense L. (TRFAR) rabbitfoot clover; Leguminosae; first record 1985 near Kooskia, Idaho Co.; new sightings at Coeur d'Alene, Kootenai and East Hope, Bonner Co. Common throughout Kootenai and Bonner Co., Id.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

New weed species and potential weed problems in Idaho. Old, R. R., F. E. Northam, R. H. Callihan, and D. C. Thill. Several species of plants not previously reported in Idaho were observed during 1986. They are new introductions to the state and possess the potential to become weed problems. Also recorded were extensions of the ranges of several species that have been present in Idaho for several years and appear to be expanding their infestations. The following list separates the plants into three groups: (1) those not previously reported for Pacific Northwest; (2) those not previously documented for Idaho, although present in the Pacific Northwest (Hitchcock and Cronquist, Flora of the Pacific Northwest, 1973); (3) those previously reported in Idaho, wherein the known range of the species has been expanded due to 1986 field observations. Citations in the following lists give the scientific name, Weed Science Society of America code (if available), common name, family name and sighting locations.

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(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Washington State University weed identification. Old, R.R. and D.G. Swan. The following list of plants was submitted to the Extension Weed Scientist for identification during the 1986 season. The information compiled from these submissions is used to form an historic data base on new invading species, range extensions, and current problems.

Genus	Species	Family	County	Date
Agropyron	repens	Gramineae	Adams	4/ 5
Agropyron	repens	Gramineae	Walla Walla	7/ 8
Anchusa	officinalis	Boraginaceae	Spokane	6/ 4
Andropogon	gerardi	Gramineae	Whitman	9/26
Apera	interrupta	Gramineae	Lincoln	6/20
Apocynum	androsaemifolium	Apocynaceae	Benton	7/ 8
Apocynum	androsaemifolium	Apocynaceae	Asotin	10/17
Arabis	glabra	Cruciferae	Stevens	8/18
Artemisia	annua	Compositae	Douglas	8/ 8
Artemisia	biennis	Compositae	Douglas	9/23
Artemisia	biennis	Compositae	Spokane	9/23
Artemisia	ludoviciana	Compositae	Adams	10/17
Asclepias	speciosa	Asclepiadaceae	Adams	10/ 6
Asclepias	Verticillata	Asclepiadaceae	Asotin	10/17
Atriplex	argentea	Chenopodiaceae	Adams	10/ 6
Atriplex	argentea	Chenopodiaceae	Klickitat	10/17
Barbarea	orthoceras	Cruciferae	Whitman	5/23
Barbarea	vulgaris	Cruciferae	Kittitas	5/16
Berteroa	incana	Cruciferae	Ferry	7/29
Bidens	frondosa	Compositae	Asotin	10/17
Brassica	campestris	Cruciferae	Whitman	4/28
Brassica	nigra	Cruciferae	Garfield	8/ 8
Brassica	nigra	Cruciferae	Asotin	9/16
Bromus	tectorum	Gramineae	Adams	4/ 5
Bryonia	alba	Cucurbitaceae	Whitman	6/16
Campanula	rapunculoides	Campanulaceae	Ferry	6/ 9
Carduus	acanthoides	Compositae	Spokane	6/20
Carthamnus	tinctoria	Compositae	Adams	8/ 8
Centaurea	diffusa	Compositae	Whitman	6/20
Centaurea	jacea	Compositae	Cowlitz	6/26
Centaurea	maculosa	Compositae	Thurston	11/10
Centaurea	pratensis	Compositae	Cowlitz	9/16
Centaurea	repens	Compositae	Adams	6/20
Cerastium	siculum	Caryophyllaceae	Columbia	4/28
Chenopodium	botrys	Chenopodiaceae	Stevens	8/ 8
Chenopodium	botrys	Chenopodiaceae	Ferry	9/23
Chenopodium	leptophyllum	Chenopodiaceae	Adams	5/23
Chrysanthemum	parthenium	Compositae	Adams	9/ 1
Cicuta	douglasii	Umbelliferae	Yakima	9/26
Crepis	acuminata	Compositae	Adams	6/20
Cynodon	dactylon	Gramineae	Benton	5/12
Cynoglossum	officinale	Boraginaceae	Columbia	5/ 6

Genus	Species	Family	County	Date
Cynoglossum	officinale	Boraginaceae	Walla Walla	11/ 8
Cyperus	aristatus	Cyperaceae	Benton	9/17
Datura	stramonium	Solanaceae	Asotin	11/19
Descurainia	sophia	Cruciferae	Pend Oreille	8/ 8
Descurainia	sophia	Cruciferae	Adams	4/ 5
Dicentra	formosa	Fumariaceae	Snohomish	3/17
Digitaria	ischaemum	Gramineae	Lincoln	9/16
Distichlis	spicata	Gramineae	Yakima	9/23
Elymus	canadensis	Gramineae	Asotin	11/19
Elymus	glaucus	Gramineae	Whitman	7/ 8
Epilobium	angustifolium	Onagraceae	Clark	7/ 8
Epilobium	minutum	Onagraceae	Stevens	6/20
Eragrostis	pectinacea	Gramineae	Whitman	9/16
Euclidium	syriacum	Cruciferae	Adams	6/ 9
Euphorbia	cyparissias	Euphorbiaceae	Spokane	6/ 4
Euphorbia	esula	Euphorbiaceae	Spokane	6/ 4
Euphorbia	myrsinites	Euphorbiaceae	Pend Oreille	6/ 4
Euphorbia	peplus	Euphorbiaceae	Cowlitz	9/17
Galium	boreale	Rubiaceae	Whitman	5/ 3
Geum	macrophyllum	Rosaceae	Walla Walla	4/ 9
Geum	triflorum	Rosaceae	Columbia	5/ 6
Gilia	minutiflora	Polemoniaceae	Adams	8/ 8
Glechoma	hederacea	Labiatae	Snohomish	9/ 1
Glechoma	hederacea	Labiatae	Ferry	9/ 1
Gnaphalium	microcephalum	Compositae	Lincoln	10/26
Grindelia	squarossa	Compositae	Adams	7/28
Gutierezzia	sarothrae	Compositae	Grant	10/ 6
Hemizonia	pungens	Compositae	Douglas	10/ 6
Hordeum	leporinum	Gramineae	Adams	3/17
Hydrophyllum	capitatum	Hydrophyllaceae	Pend Oreille	5/ 6
Hypericum	perforatum	Hypericaceae	Ferry	6/ 9
Iva	axillaris	Compositae	Adams	10/17
Iva	xanthifolia	Compositae	Kittitas	9/ 1
Juncus	bufonius	Juncaceae	Wahkiakum	7/20
Juncus	ensifolius	Juncaceae	Cowlitz	10/29
Kochia	scoparia	Chenopodiaceae	Kittitas	4/ 9
Kochia	scoparia	Chenopodiaceae	Yakima	9/16
Lactuca	pulchella	Compositae	Garfield	8/ 8
Lactuca	serriola	Compositae	Adams	4/ 5
Lemna	minor	Lemnaceae	Clallam	1/30
Lepidium	virginicum	Cruciferae	Ferry	6/ 9
Lepyrodiclis	holosteoides	Caryophyllaceae	Whitman	6/16
Lithophragme	parviflora	Saxifragaceae	Spokane	4/18
Lolium	multiflorum	Gramineae	Wahkiakum	7/20
Lomatium	grayi	Umbelliferae	Pend Oreille	4/ 5
Lonicera	involucrata	Caprifoliaceae	Stevens	7/ 8
Lotus	pursliana	Leguminosae	Pend Oreille	8/ 8
Lychnis	alba	Caryophyllaceae	Whitman	7/28
Lypodesmia	juncea	Compositae	Klickitat	6/20

Genus	Species	Family	County	Date
Machaeranthera	canescens	Compositae	Adams	7/20
Machaeranthera	canescens	Compositae	Adams	5/ 6
Machaeranthera	canescens	Compositae	Adams	7/28
Madia	glomerata	Compositae	Columbia	8/ 8
Madia	glomerata	Compositae	Cowlitz	10/ 6
Malva	neglecta	Malvaceae	Adams	6/16
Mentzelia	albicaulis	Loasaceae	Grant	8/18
Mentzelia	laevicaulis	Loasaceae	Whitman	8/ 8
Mimulus	guttatus	Scrophulariaceae	Stevens	6/20
Muhlenbergia	richardsonia	Gramineae	Adams	9/10
Myosotis	micrantha	Boraginaceae	Pend Oreille	5/ 6
Navarretia	intertexta	Polemoniaceae	Whitman	9/23
Navarretia	intertexta	Polemoniaceae	Cowlitz	9/ 1
Nicotiana	attenuata	Solanaceae	Whitman	8/ 8
Oemleria	cerasiformis	Rosaceae	Clark	6/16
Oenothera	strigosa	Onagraceae	Klickitat	10/17
Onopordum	acanthium	Compositae	Adams	7/ 8
Orithogalum	umbellatum	Liliaceae	Whitman	4/ 9
Panicum	miliaceum	Gramineae	Yakima	9/ 1
Panicum	occidentale	Gramineae	Asotin	11/19
Parentucellia	viscosa	Scrophulariaceae	Cowlitz	7/ 8
Perideridea	gairdneri	Umbelliferae	Adams	7/20
Poa	annua	Gramineae	Walla Walla	6/ 5
Poa	annua	Gramineae	Adams	4/ 5
Poa	bulbosa	Gramineae	Garfield	4/18
Polygonum	cuspidatum	Polygonaceae	Douglas	7/28
Portulaca	oleracea	Portulacaceae	Cowlitz	9/ 1
Portulaca	oleracea	Portulacaceae	Wahkiakum	9/16
Potentilla	recta	Rosaceae	Adams	6/20
Pucinellia	lemonii	Gramineae	Adams	10/29
Ranunculus	testiculatus	Ranunculaceae	Ferry	5/23
Raphanus	raphanastrum	Cruciferae	Ferry	9/ 1
Rumex	persicarioides	Polygonaceae	Douglas	8/ 8
Rumex	acetosella	Polygonaceae	Benton	4/ 5
Sanguisorba	occidentalis	Rosaceae	Whitman	10/17
Sanguisorba	occidentalis	Rosaceae	Spokane	6/18
Saponaria	officinalis	Caryophyllaceae	Ferry	9/19
Scirpus	maritimus	Juncaceae	Yakima	6/20
Secale	cereale	Gramineae	Walla Walla	6/ 9
Senecio	vulgaris	Compositae	Adams	4/ 5
Solanum	nigrum	Solanaceae	Cowlitz	10/29
Solanum	rostratum	Solanaceae	Cowlitz	10/29
Solanum	rostratum	Solanaceae	Garfield	9/ 1
Solanum	rostratum	Solanaceae	Clark	7/28
Solanum	sarrachoides	Solanaceae	Lincoln	7/ 8
Solanum	triflorum	Solanaceae	Spokane	6/18
Spartina	pectinata	Gramineae	Asotin	11/19
Spergularia	rubra	Caryophyllaceae	Douglas	8/ 8
Stephanomeria	tenuifolia	Compositae	Walla Walla	7/20

Genus	Species	Family	County	Date
Stephanomeria	tenuifolia	Compositae	Adams	10/ 6
Stephanomeria	tenuifolia	Compositae	Adams	7/20
Stipa	comata	Gramineae	Whitman	6/ 4
Symphytum	asperum	Boraginaceae	Spokane	6/20
Tragopogon	pratensis	Compositae	Adams	4/ 5
Veronica	anagalis-aquatica	Scrophulariaceae	Stevens	6/20
Vicia	villosa	Leguminosae	Adams	6/26
Vulpia	myuros	Gramineae	Walla Walla	6/20
Zygophyllum	fabago	Zygophyllaceae	Adams	9/16

Fifteen specimens which were identified only to genus are not included here.
(Washington State University Cooperative Extension, Pullman, WA 99164)

University of Idaho weed identification. Old, R. R., R. H. Callihan, F. E. Northam, and D. C. Thill. In 1985 the Cooperative Extension Service of the University of Idaho began a statewide weed identification program. Identification forms (see 1985 W.S.W.S. Research Progress Report) were mailed to all County Extension personnel and County Weed Supervisors throughout the state. Information gathered through this program is used to create a historical data base as well as detect first records and extension of range. The following species were submitted for identification in 1986:

Date	County	Identification
8/14/86	Gem	Abronia mellifera, Nyctaginaceae
7/2/86	Nez Perce	Agropyron repens, Gramineae
9/17/86	Twin Falls	Agrostis tenuis, Gramineae
5/23/86	Butte	Alyssum alyssoides, Cruciferae
9/17/86	Blaine	Ambrosia tomentosa, Compositae
5/7/86	Idaho	Antennaria neglecta, Compositae
8/18/86	Idaho	Apera interrupta, Gramineae
5/14/86	Kootenai	Arnica cordifolia, Compositae
7/19/86	Idaho	Arrhenatherum elatius, Gramineae
9/3/86	Kootenai	Artemisia absinthium, Compositae
4/3/86	Kootenai	Artemisia absinthium, Compositae
8/27/86	Caldwell	Artemisia biennis, Compositae
3/17/86	Boundary	Artemisia biennis, Compositae
6/30/86	Bannock	Artemisia ludoviciana, Compositae
7/24/86	Gem	Asclepias incarnata, Asclepiadaceae
8/8/86	Lewis	Asclepias speciosa, Asclepiadaceae
9/25/86	Idaho	Asclepias fascicularis, Asclepiadaceae
5/27/86	Cassia	Asperugo procumbens, Boraginaceae
4/4/86	Ada	Asperugo procumbens, Boraginaceae
6/30/86	Minidoka	Atriplex spinosa, Chenopodiaceae
7/2/86	Caribou	Barbarea orthoceras, Cruciferae
4/25/86	Lincoln	Barbarea orthoceras, Cruciferae
4/10/86	Boundary	Berteroa incana, Cruciferae
5/30/86	Butte	Brassica campestris, Cruciferae
7/17/86	Kootenai	Brassica nigra, Cruciferae
6/30/86	Canyon	Bromus mollis, Gramineae
8/21/86	Latah	Bryonia alba, Cucurbitaceae
6/13/86	Nez Perce	Bryonia alba, Cucurbitaceae
5/23/86	Butte	Camelina microcarpa, Cruciferae
5/28/86	Twin Falls	Campanula rapunculoides, Campanulaceae
4/1/86	Clearwater	Cardaria draba, Cruciferae
7/3/86	Idaho	Carduus acanthoides, Compositae
10/1/86	Minidoka	Carduus nutans, Compositae
7/15/86	Idaho	Carduus pycnocephala, Compositae
3/7/86	Washington	Cenchrus longispinus, Gramineae
8/14/86	Gem	Centaurea cyanus, Compositae
8/27/86	Ada	Centaurea montana, Compositae
9/9/86	Bear Lake	Centaurea repens, Compositae
6/20/86	Payette	Centaurea repens, Compositae
4/9/86	Gem	Cerastium dubium, Caryophyllaceae
5/12/86	Gem	Cerastium dubium, Caryophyllaceae
5/27/86	Idaho	Cerastium vulgatum, Caryophyllaceae
6/13/86	Blaine	Chorispora tenella, Cruciferae

Date	County	Identification
5/20/86	Gem	Cirsium canovirens, Compositae
8/6/86	Idaho	Cirsium vulgare, Compositae
9/10/86	Lincoln	Cleome lutea, Capparidaceae
9/10/86	Lincoln	Cleome serrulata, Capparidaceae
8/14/86	Ada	Conium maculatum, Umbelliferae
11/7/86	Clark	Convolvulus arvensis, Convolvulaceae
7/28/86	Lincoln	Conyza canadensis, Compositae
6/6/86	Idaho	Cowania stansburiana, Rosaceae
6/13/86	Blaine	Crepis acuminata, Compositae
9/23/86	Lincoln	Cryptantha fendleri, Boraginaceae
10/27/86	Ada	Cynodon dactylon, Gramineae
5/23/86	Butte	Descurania sophia, Cruciferae
3/7/86	Clearwater	Dicanthelium oligosanthes, Gramineae
8/20/86	Idaho	Eleocharis ovata, Cyperaceae
10/9/86	Boundary	Elymus giganteus, Gramineae
9/17/86	Kootenai	Epilobium angustifolium, Onagraceae
6/30/86	Bannock	Eriogonum heracleoides, Polygonaceae
4/21/86	Idaho	Erysimum asperum, Cruciferae
11/6/86	Teton	Euphorbia cyparissias, Euphorbiaceae
4/4/86	Idaho	Euphorbia esula, Euphorbiaceae
5/6/86	Nez Perce	Euphorbia myrsinites, Euphorbiaceae
10/30/86	Nez Perce	Festuca arundinacea, Gramineae
7/19/86	Ada	Festuca arundinacea, Gramineae
5/27/86	Idaho	Geranium pusillum, Geraniaceae
9/16/86	Boundary	Gnaphalium palustre, Compositae
9/17/86	Kootenai	Grindelia squarrosa, Compositae
4/29/86	Lewis	Hydrophyllum capitatum, Hydrophyllaceae
6/13/86	Gem	Hyoscyamus niger, Solanaceae
5/15/86	Canyon	Hypericum perforatum, Hypericaceae
8/4/86	Ada	Iva xanthifolia Compositae
8/29/86	Benewah	Lactuca serriola, Compositae
6/6/86	Minidoka	Lappula echinata, Boraginaceae
5/7/86	Washington	Lepidium campestre, Cruciferae
7/24/86	Gem	Linaria vulgaris, Scrophulariaceae
8/19/86	Kootenai	Linaria vulgaris, Scrophulariaceae
4/29/86	Gem	Linum perenne, Linaceae
4/26/86	Payette	Lomatium dissectum, Umbelliferae
5/5/86	Twin Falls	Lomatium nudicaule, Umbelliferae
4/21/86	Idaho	Lomatium triternatum, Umbelliferae
4/30/86	Minidoka	Lomatium triternatum, Umbelliferae
9/2/86	Ada	Lychnis coronaria, Caryophyllaceae
8/14/86	Minidoka	Machaeranthera canescens, Compositae
8/27/86	Ada	Machaeranthera canescens, Compositae
7/17/86	Kootenai	Madia glomerata, Compositae
6/11/86	Gem	Medicago lupulina, Leguminosae
9/17/86	Ada	Mimulus cusickii, Scrophulariaceae
9/11/86	Butte	Muhlenbergia asperifolia, Gramineae
6/5/86	Kootenai	Myosotis micrantha, Boraginaceae
8/4/86	Clearwater	Navarretia intertexta, Polemoniaceae
9/22/86	Bannock	Osmorhiza chilensis, Umbelliferae
7/11/86	Ada	Paeonia brownii, Paeoniaceae
8/8/86	Nez Perce	Parietaria pennsylvanica, Urticaceae

Date	County	Identification
6/19/86	Nez Perce	Parietaria pennsylvanica, Urticaceae
5/8/86	Butte	Pastinaca sativa, Umbelliferae
6/10/86	Idaho	Phacelia heterophylla, Hydrophyllaceae
5/23/86	Butte	Phlox hoodii, Polemoniaceae
9/15/86	Washington	Poa annua, Gramineae
3/28/86	Canyon	Poa annua, Gramineae
5/9/86	Lewis	Poa annua, Gramineae
4/29/86	Gem	Polygonum coccineum, Polygonaceae
7/28/86	Kootenai	Polygonum persicaria, Polygonaceae
5/30/86	Butte	Potentilla anserina, Rosaceae
6/25/86	Nez Perce	Potentilla recta, Rosaceae
7/10/86	Benewah	Potentilla recta, Rosaceae
5/20/86	Nez Perce	Potentilla recta, Rosaceae
4/4/86	Nez Perce	Ranunculus repens, Ranunculaceae
3/17/86	Twin Falls	Ranunculus sceleratus, Ranunculaceae
6/14/86	Ada	Rorippa nasturtium-aquaticum, Cruciferae
4/4/86	Washington	Rumex acetosella, Polygonaceae
7/2/86	Minidoka	Sambucus racemosa, Caprifoliaceae
5/3/86	Gem	Sanguisorba minor, Rosaceae
6/5/86	Kootenai	Sanguisorba occidentalis, Rosaceae
9/17/86	Kootenai	Sanguisorba occidentalis, Rosaceae
9/10/86	Lincoln	Saponaria officinalis, Caryopyllaceae
5/21/86	Washington	Sclerochloa dura, Gramineae
5/30/86	Ada	Secale cereale, Gramineae
5/23/86	Camas	Senecio integerrimus, Compositae
1/6/86	Butte	Setaria viridis, Gramineae
6/5/86	Boundary	Silene cucubalus, Caryophyllaceae
6/30/86	Butte	Sitanian hystrix, Gramineae
8/14/86	Gem	Solanum dulcamara, Solanaceae
7/24/86	Payette	Solanum rostratum, Solanaceae
7/28/86	Kootenai	Solanum rostratum, Solanaceae
6/13/86	Gem	Solanum triflorum, Solanaceae
8/4/86	Ada	Sorbaria sorbifolia, Rosaceae
5/1/86	Ada	Sorbus acuparia, Rosaceae
5/23/86	Nez Perce	Spergularia rubra, Caryophyllaceae
5/21/86	Washington	Stanleya confertifolia, Cruciferae
8/29/86	Benewah	Tragopogon dubius, Compositae
5/30/86	Lewis	Valerianella locusta, Valerianaceae
6/24/86	Idaho	Ventenata dubia, Gramineae
6/30/86	Gooding	Verbascum blattaria, Scrophulariaceae
7/24/86	Lincoln	Verbascum blattaria, Scrophulariaceae
8/8/86	Lewis	Verbascum blattaria, Scrophulariaceae
7/24/86	Gem	Verbena hastata, Verbenaceae
4/9/86	Nez Perce	Veronica biloba, Scrophulariaceae
6/6/86	Kootenai	Veronica hederafolia, Scrophulariaceae
5/1/86	Ada	Viburnum x burkwoodii, Caprifoliaceae

Six specimens which were identified only to genus and 517 specimens from non-Extension sources are not included. This year's identifications represent an increase over 1985 in both Extension Service (300%) and non-Extension Service (680%) usage of the program. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

The distribution, biology, and proposed eradication of matgrass in Idaho. Callihan, R. H., R. R. Old, F. E. Northam, T. M. Miller, and T. S. Prather and D.C Thill A 1986 survey showed that matgrass (_Nardus stricta_ L.) infests approximately 20 acres within about 60 acres of mountain meadow pasture along the Potlatch River and Feather Creek east of Bovill (Lat. 46^{o} 46' 49", Long. 116^{o} 58' 46"). This is the only infestation of record in Idaho. _N. stricta_ an exotic European species found in montane pastures, is of low productivity and low palatability. This species has the potential to become an important pest in subhumid to humid cool-season permanent pastures, meadows, and ranges of the United States. Recorded observations of the area of the infestation progressed from 0.1 acre in 1960 to 20 acres in 1980, then to 60 acres in 1986, an average increase of 20% per year. The 1986, infestation consisted of a 20 acre main body, with 22 scattered disjunct plants in the adjacent 40 acres. In Europe, suppression on arable land has been obtained by use of dalapon and nitrogen fertilizers in conjunction with reseeding and light cultivation. In the Bovill area, the infestation has expanded into nonarable forest where intensive management is not possible.

An eradication effort begun in 1980 has consisted of annual spot treatment with glyphosate. Although not successful, this effort has reduced the expansion of the infestation in the area. It was recommended to the land managers that a revised, eradication effort be planned for over a 10-year period. Use of an IPM system to temporarily maintain a clover-dominated sward along with native dicotyledonous species, so as to enhance visibility of surviving matgrass plants, was recommended. The recommended project includes deferred grazing, mechanical removal of disjunct plants, herbicide (graminicide) treatment of 400 square foot spots around removal areas, and selective herbicide treatment of the 20 acre main body. Deferred grazing is expected to retard dissemination, and to enhance matgrass visibility by preferential grazing. Annual examinations by trained personnel are expected to facilitate decisions on areas requiring treatment each year. Seed longevity investigations should produce information needed to determine program longevity.

(Idaho Agricultural Experiment Station, Moscow ID 83843)

Relative tolerance of ponderosa pine bare root and container-grown stock to foliar hexazinone treatment. Callihan R.H., R.J. Boyd, L. Lass, and D.C. Thill. Seedling Ponderosa pine (Pinus ponderosa Doug.) are frequently planted as two-year-old bare root stock or as one-year-old container-grown stock. Container-grown ponderosa pine stock have succulent eophyll leaves with few fascicled metaphyll needles, while bare-root stock have mainly fascicled metaphyll needles. This suggests a liklihood of differential herbicide absorption and tolerance between the two types of tree stock. The objective of this experiment was to study the effects of hexazinone on the survival of two types of Ponderosa Pine nursery stock.

The hexazinone experiment was initiated south-east of Potlatch, Idaho in April, 1986 on a Hampson silt loam (sandy phase) in the flood plain of the Palouse River. Plots consisted of 25 trees planted at 10 foot intervals. Treatments were replicated four times in a randomized complete block design. The plots were pretreated with glyphosate at 2 lbs. ai./a on April 26 to reduce unwanted vegetation. The trees were planted 3 days later. The foliar treatment consisted of a single over-the-top application of hexazinone (2 lbs. ai/a) on a 4'x4' spot around each tree on May 20, 1986. Trees were examined for response October 14, 1986.

Hexazinone treated containerized trees had significantly lower survival (P=0.01) than either hexazinone-treated bare-root trees or non treated bare-root trees. There was a low level of discernible interaction between of the herbicide treatment with type of tree stock upon tree survival. The higher mean survival of control containerized plants (52%) than of hexazinone-treated containerized plants (34%) suggested that container-grown plant survival was inhibited, this difference was statistically significant at P = 0.10 level. The interaction between hexazinone treatment and tree stock upon stem malformations may have been related to the greater numbers of surviving trees in the controls.

Browsing of the terminal meristem by animals was twice as frequent on the bare-root trees when compared to container-grown trees. However container-grown stock had more crooks and bends in the stems.

Greater survival of bare-root seedlings over container-grown seedlings could not be attributed to a difference in tolerance to hexazinone.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Effects of hexazinone on bare-root and container-grown ponderosa pine stock

Parameters	Control		Sprayed	
	Bare root	Container	Bare root	Container
	(%) [1]	(%)	(%)	(%)
Surviving Trees	65a[2]	52ab	65a	34b
Leaves 0-10% chlorotic	22	17	32	9
Leaves 10-75% chlorotic	29	29	23	20
Leaves 75-100% chlorotic	14	6	10	5
Tree Stems Bent	0b	12a	1b	2b
Tree Crooked Stems	0b	14a	0b	1b
Needles Browsed	6a	4b	7a	1b
Meristem Browsed	13a	6b	13a	4b

[1]Percent of planted trees.
[2]Chi Square was used for comparison of frequencies.
Any two means within a parameter having a common letter are not significantly different at the 5% level of significance.

Tolerance of ponderosa pine to three graminicides. Callihan, R.H., L. Lass, T. Miller, and D.C. Thill. The objective of this experiment was to determine the effects of three grass herbicides on field-planted I/O containerized ponderosa pine (Pinus ponderosa Dougl.) seedlings.

The experiment was established at Potlatch, Idaho in April 1986. The soil type was a Klickson silt loam. Plants were planted April 18, 1986, spaced 10 feet apart. Treatment plots were single plants with 45 replications in a randomized complete block design. The treatments were applied to 5' by 5' feet centered over each tree on April 23, 1986. Treatments consisted of single applications of Assure at 1.25 oz. ai./a, fluazifop-butyl at 2.0 oz. ai./a, and sethoxydim at 2.5 oz. ai./a.

Treatments were applied in 23 gal/a water carrier, with teejet 8002 nozzles at 43 psi., from a backpack sprayer operated at 3 MPH. The air temperature at the time of the first treatment was 50 F, soil temperature was 50 F and the relative humidity was 65%. The sky was clear and no dew was present. Tree survival was evaluated October 30, 1986. Tree injury was measured as % living needles within 3 " of the apical meristem.

Tree survival did not decline with the application of sethoxydim, fluazifop-butyl, or Assure (Table 1). Using chi square, the frequency of the observed non-living trees were statistically the same as the check values. Tree injury did not increase with the application of fluazifop-butyl, sethoxydim, or Assure (Table 1).

All treatments decreased the competition of the grass around the trees, but did not totally remove grass competition. Where grass competition was reduced, broadleaf weeds were released.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Tolerance of Ponderosa Pine to Selected Grass Herbicides.

Treatment	Rate ai/A	Injury[1]	Dead Trees[2]
	(oz)	(%)	(%)
Check	0.0	97	40
Assure	1.25	97	29
Fluazifop-butyl	2.0	95	33
Sethoxydim	2.5	90	31

[1]Estimate of living needles in the top 3 inches of whorl.
[2]Chi Square was used for comparision of frequencies of survival.

Sequential applications of herbicides for control of common crupina. Zamora, D. L. and D. C. Thill. An experiment was established near Nezperce, Idaho to determine the efficacy of sequential applications of clopyralid on common crupina control. Picloram, dicamba and triclopyr herbicides were included as standards. The applications were made with a CO_2 pressurized backpack sprayer, calibrated to deliver 10 gpa at 40 psi and 3 mph. The application and edaphic data are in Table 1. The sequential applications were made on October 29, 1985 and April 8, 1986. Common crupina control after the first application was visually evaluated on March 4, 1986. Plants were counted and clipped at the soil surface from 3.2 ft^2 quadrats on June 5. The clipped plants were oven-dried at 100 F for 48 h prior to weighing. The experiment was designed as a randomized complete block with four replications. Plots were 10 by 25 ft.

Common crupina was controlled best (97%) by picloram at the early evaluation; however, control by clopyralid tank mixed with 2,4-D was comparable. All other treatments inadequately controlled common crupina. By June 6, plots treated with dicamba and triclopyr + 2,4-D had plant densities slightly higher than picloram and clopyralid treated plots, but not significantly different. Biomass in plots treated with picloram or clopyralid was zero. The sequential applications of clopyralid mixed with 2,4-D, clopyralid alone, picloram or triclopyr + 2,4-D (0.5 + 1.0 lb ai/a) completely controlled common crupina. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 1. Application and soil data

Date applied	10/29/85	4/8/86
Method of application	----- broadcast ----	
Growth stage of Crupina	rosette	bolted
Air temperature (F)	52	64
Soil temperature (F) @ 2 in	47	54
Relative humidity (%)	65	56
Cloud cover (%)	15	0
Wind Speed (mph)	4	4
Soil type	----- clay loam -----	
Organic matter (%)	------- 4.66 --------	
pH	------- 6.6 ---------	
CEC (meq/100 g soil)	------ 31.2 ---------	

Table 2. Effect of sequential applications of herbicides on control, density and biomass of common crupina

Treatment	Rate[1]	Control[2]	Density[3]	Biomass
	(lb ai/a)	(%)	(#/ft^2)	(lb/a)
picloram	0.25	97	0.0	0
dicamba	0.5	57	1.2	67
triclopyr	0.5	40	15.4	168
triclopyr	0.25	55	20.2	240
triclopyr + 2,4-D amine	0.5 + 1.0	65	0.0	0
triclopyr + 2,4-D amine	0.25 + 1.0	53	1.4	156
clopyralid	0.19	43	0	0
clopyralid	0.38	55	0	0
clopyralid + 2,4-D amine	0.09 + 0.38	78	0	0
clopyralid + 2,4-D amine	0.13 + 0.5	86	0	0
clopyralid + 2,4-D amine	0.09 + 0.5	74	0	0
clopyralid + 2,4-D amine	0.13 + 0.38	87	0	0
handweeded check	-	-	0.3	4
unweeded check	-	-	75.0	138
$LSD_{(0.05)}$		23	6.4	20

[1]Single application rates.
[2]Visually evaluated on March 4, 1986 before the second herbicide application.
[3]Density and biomass were measured on June 5, 1986.

Preemergence herbicides for control of common crupina. Zamora, D. L. and D. C. Thill. A greenhouse experiment was conducted to screen selected, preemergence herbicides for control of common crupina. This type of herbicide is needed as part of an eradication program on common crupina. Preemergence herbicides can be used to treat small infestations of common crupina that have already dispersed achenes, but have not germinated. Two gallon plastic, disposable pots were partially filled with a 40% sand - 60% silt loam mixture and 50 common crupina achenes were placed on the surface of each pot. A mixture of 243 g (air dry weight) of the same potting soil and one of the preemergence herbicides was used to cover the 50 achenes. Emergence was recorded after nine days and oven dry weight was determined (43 C for 48 h) for all remaining plants in each pot after 36 days.

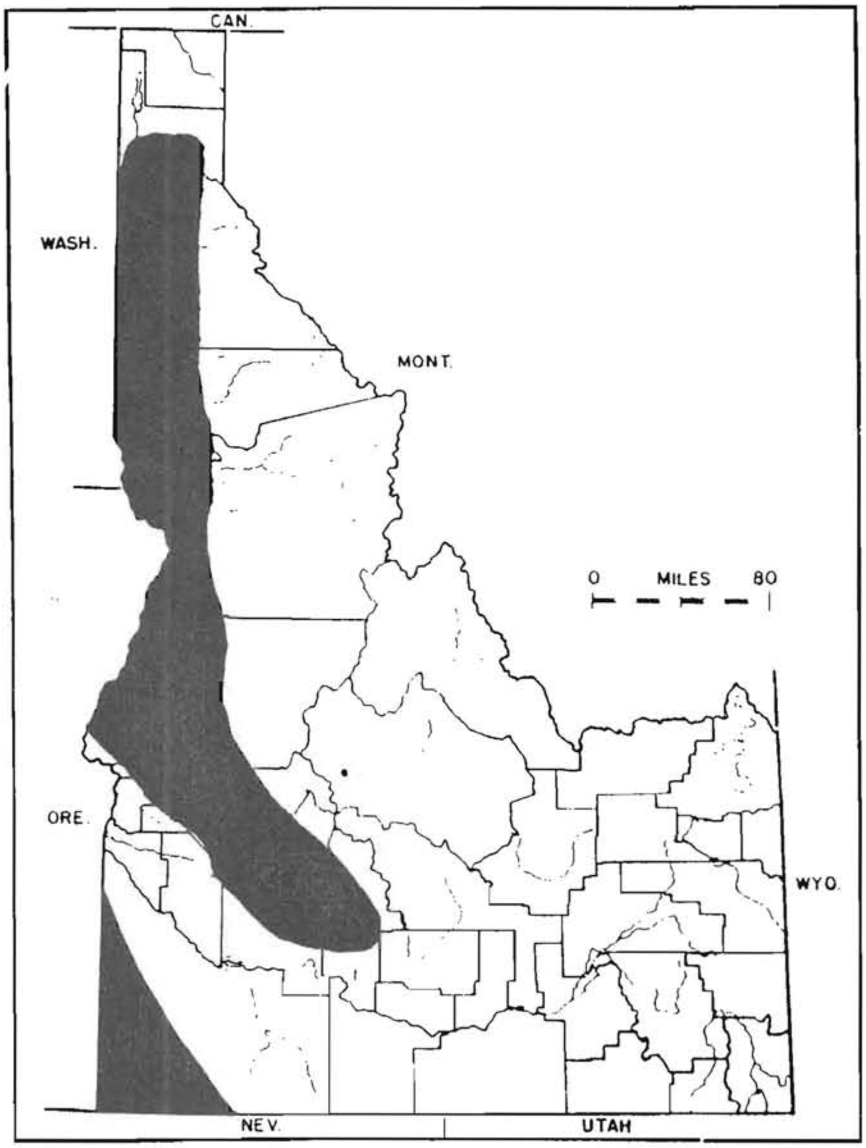
Selection of the best preemergence herbicide must be based on its effect on both emergence and dry weight, because some can effectively decrease emergence but not biomass. For example, common crupina emergence was least in pots treated with dicamba at 2.2 kg ai/ha but the biomass of the remaining plants was higher than plants treated with other herbicides. In contrast, emergence of common crupina was high (80% of the check) when atrazine was applied at 10 kg ai/ha, but the plants also had the lowest biomass of all treatments. Dicamba, atrazine and tebuthiuron were selected for further screening trials in the field. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effect of preemergence herbicides on emergence of common crupina six days after planting and dry weight 36 days after planting

Treatment	Formulation	Rate	Emergence	Dry weight
		(kg ai/ha)	(% of check)	(mg/pot)
atrazine	80W	4.5	63	219
atrazine	80W	10.0	80	15
dicamba	10G	1.1	47	273
dicamba	10G	2.2	17	236
tebuthiuron	6G[1]	0.7	87	1072
tebuthiuron	6G	1.3	61	582
tebuthiuron	5G	0.7	87	1025
tebuthiuron	5G	1.3	93	454
tebuthiuron	80W	0.7	66	133
tebuthiuron	80W	1.3	86	67
chlorsulfuron	75DF	0.009	94	1302
chlorsulfuron	75DF	0.018	78	534
metsulfuron	60DF	0.009	64	566
metsulfuron	60DF	0.018	49	535
$LSD_{(0.05)}$			30	389

[1]Tebuthiuron 6G is 2% tebuthiuron + 4% trifluralin.

Distribution of Ventenata dubia in Idaho. Old, R. R. and R. H. Callihan. In the fall of 1986 a survey to ascertain the range of Ventenata dubia (Leers) Coss. et Dur. in Idaho was conducted. The survey was undertaken in the fall due to the high degree of visibility of Ventenata at this time of year. Over 8,000 miles were driven and over 15,000 records were collected. Ventenata was found to occur primarily along the western border of the state. V. dubia was not found in Boundary Co. or the Boise Valley (see figure). (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)



Shaded areas denote the current range of V. dubia in Idaho

Evaluation of herbicides for sand sagebrush (*Artemisia filifolia* Torr.) control. Ferrell, M.A. and T.D. Whitson. Sand sagebrush is not palatable to livestock, and usually increases with grazing pressure. It is mainly a problem in the southern and southeastern parts of the state where it frequently occupies extensive acreages. This experiment was established to compare various herbicides for the control of sand sagebrush.

Plots were established July 6, 1983, near Torrington, Wyoming, on a mature and uniform stand of sand sagebrush. The sand sagebrush was 12 to 18 inches in height and in excellent condition with a good understory of grass 4 to 6 inches in height. Liquid formulations were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier. Weather conditions were as follows: air temperature 97 F, relative humidity 15%, wind S at 5 mph, clear sky, and a soil temperature of 114 F at 1 inch. Soil was a loamy sand (81% sand, 13% silt and 6% clay) with 1.4% organic matter and 7.8 pH. Plots were 9 by 30 ft. arranged in a randomized complete block design with three replications.

Visual estimates of sand sagebrush control and grass damage made July 24, 1986, three years after treatment, show that 2.0 lb ai/A of EH-737 (mixture of 2,4-D, MCPP and dicamba) maintained 100% control with no grass damage. Triclopyr also maintained 83 and 100% control at the 4.0 and 8.0 lb ai/A rate, respectively. NC 28858 is maintaining effective control of sand sagebrush but cannot be considered an effective treatment because of its continued phytotoxicity to the associated grass. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1462.)

Sand sagebrush control

Treatment[1]	Rate ai/A	Percent control[2] 1984	1985	1986	Observations 1986
benazolin 50FL	1.0	0	0	0	
benazolin 50FL	2.0	3	0	0	
triclopyr 4E	4.0	93	86	83	
triclopyr 4E	8.0	96	99	100	
benazolin/triclopyr	0.5 + 4.0	78	80	75	
benazloin/triclopyr	0.5 + 8.0	92	92	94	
benazolin/picloram	0.25 + 0.25	16	18	10	
benazolin/picloram	0.5 + 0.5	30	23	23	
picloram (K salt)	0.25	0	7	10	
picloram (K salt)	0.5	16	20	10	
picloram (K salt)	1.0	47	28	28	
benazolin/2,4,5-T	0.25 + 0.25	30	20	13	
benazolin/2,4,5-T	0.5 + 0.5	58	63	67	
2,4,5-T (ester)	1.0	60	51	48	
2,4,5-T (ester)	2.0	85	77	73	
*NC 28858 50WP	1.0	87	82	78	67% grass reduction
*NC 28858 50WP	2.0	93	95	90	93% grass reduction
*NC 28858 50WP	4.0	90	98	95	97% grass reduction
EH-737	2.0	100	100	100	
LSD (0.05) =		21	27	27	
CV =		23	31	32	

[1] Treatments applied July 6, 1983
[2] Visual control evaluations July 12, 1984, August 15, 1985 and July 24, 1986
*Agral 90 added at 1.0% v/v

Control of gray rabbitbrush (*Chrysothamnus nauseosus*, (Pallos) Britt., Douglas rabbitbrush (*Chrysothamnus viscidiflorus* (Hook.) Nutt. and big sagebrush (*Artemisia tridentata* Nutt.) on rangeland. Whitson, T.D. and M.A. Ferrell. Gray and Douglas rabbitbrush and big sagebrush growing in association are common in many rangeland areas in Wyoming. Even though big sagebrush control is possible with several herbicides none have effectively controlled big sagebrush and rabbitbrush in a single application. Ten herbicides and herbicide combinations were applied August 14, 1985 to a mixed stand of rabbitbrush and big sagebrush near Bosler, Wyoming. Plots were 9 by 30 ft. in size, arranged in a randomized complete block design with four replications. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a sandy loam (70% sand, 17% silt and 13% clay) with 2.2% organic matter and 7.4 pH. Soil moisture was depleted during application. Rabbitbrush species were in the early flower stage while big sagebrush was in the early bud stage. Western wheatgrass and prairie junegrass were 8 to 12 inches tall and in active growth. Temperatures were: air 60 F, soil surface 90 F, 1 inch 82 F, 2 inch 70 F, 4 inch 62 F with a relative humidity of 58% and wind speed of 3 mph. Evaluations were made July 6, 1986.

At this application time no treatments provided adequate control of either big sagebrush or rabbitbrush species. The most effective treatment on both species was triclopyr + 2,4-D LVE applied at 1.5 + 3.0 lb ai/A, respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1452.)

Control of rabbitbrush spp and big sagebrush
in rangeland with various herbicides

Herbicide	Rate lb ai/A	% rabbitbrush control[1]	% big sagebrush control[1]
triclopyr + 2,4-D LVE	1.0 + 2.0	5	54
triclopyr + 2,4-D LVE	1.5 + 3.0	44	68
triclopyr	1.0	0	13
triclopyr	2.0	0	23
picloram + clopyralid	0.125 + 0.125	0	9
picloram + clopyralid	0.25 + 0.25	13	29
picloram	0.25	0	5
picloram	0.5	10	10
fluroxypyr	1.0	0	48
2,4-D LVE	2.0	0	60
check	---	0	0

[1]LSD rabbitbrush 16%, sagebrush 24%; CV rabbitbrush 160%, sagebrush 46%

Plant response in a mat forb and grass community to chemical herbicides. Whitson T.D., M.A. Ferrell and A.D. Hulett. A series of herbicides were applied April 7, 1986 to a mat forb rangeland community to determine the effects of various treatments on the competitive forbs within a perennial grassland high elevation range. Plots were 9 by 30 ft. with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. Weather information: air temp. 50 F, soil surface 45 F, 1 inch 46 F, 2 inch 46 F and 4 inch 45 F; relative humidity was 70%, wind speeds 2 to 3 mph NW. The soil was a sandy loam (75% sand, 18% silt and 7% clay) with 2.4% organic matter and 7.8 pH.

The rangeland mat forb community consisted of tufted cryptantha (*Cryptantha caespitosa*) CRYCA, northern cryptantha (*Cryptantha celosiodes*) CRYCE, stemless goldenweed (*Haplopappus acaulis*) HAPAC, broom snakeweed (*Gutierrezia sarothrae*) GUESA, fringed sagewort (*Artemisia frigida*) ARTFR, cushion wild buckwheat (*Eriogonum ovilifolium*) ERIOV, hooker sandwort (*Arenaria hookerii*) AREHO, spoonleaf milkvetch (*Astragalus spatulatus*) ASTSP, Douglas rabbitbrush (*Chrysothamnus viscidiflorus*) CYTVI, nuttail goldenweed (*Haplopappus nuttalli*) HAPNU, Hoods phlox (*Phlox hoodii*) PHLHO. Evaluations were made August 26, 1986.

Picloram applied at 0.5 and 1.0 lbs ai/A controlled a broad-spectrum of species. Picloram provided 97% or greater control of eight of the eleven mat forbs at 0.5 lb ai/A and a 100% control of all mat forbs at 1.0 lb ai/A. Clopyralid controlled three species and dicamba two of the eleven species in the experiment.

Perennial grasses appeared to be damaged from both application rates of atrazine, the 0.5 and 0.75 lb ai/A application rate of tebuthiuron and the 0.5 lb ai/A application rate of metribuzin. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1456.)

Mat forb control with a series of herbicide treatments

Herbicide	lb ai/A	% Control by species											% perennial grass damage
		ASTSP	PHLHO	HAPAC	ARTFR	GUTSA	CHRVI	AREHO	ERIOV	HAPNU	CRYCA	CRYCE	
dicamba	0.5	100	07	0	100	---*	0	0	---	---	0	---	0
dicamba	1.0	100	03	25	---	---	0	0	0	---	0	0	0
2,4-D Amine	1.0	10	26	16	0	0	0	0	---	0	---	0	0
2,4-D Amine	2.0	20	23	38	0	0	0	0	---	---	0	---	0
2,4-D LVE	1.0	7	33	0	0	0	0	0	---	---	0	---	0
2,4-D LVE	2.0	66	93	43	0	0	0	0	---	---	---	0	
triclopyr	0.5	20	0	0	0	0	0	0	0	---	0	---	0
triclopyr	1.0	88	35	0	0	0	0	---	0	---	0	0	0
metsulfuron	0.3 oz/A	97	63	40	0	0	0	90	0	0	0	0	0
metsulfuron	0.6 oz/A	100	67	40	0	0	0	50	---	0	---	---	0
clopyralid	0.5	100	10	30	100	---	0	0	0	---	0	0	0
clopyralid	1.0	100	0	100	100	---	---	0	---	---	0	0	0
fluroxypyr	0.5	07	0	0	0	0	0	16	0	0	0	0	0
fluroxypyr	1.0	53	7	0	0	---	0	100	0	0	0	0	0
picloram	0.25	100	75	70	0	---	---	25	100	100	100	100	0
picloram	0.5	100	100	97	100	---	0	0	100	100	100	100	0
picloram	1.0	100	100	100	100	100	100	100	100	100	100	100	0
2,4-D LVE + triclopyr	0.5 + 0.25	77	85	13	0	0	0	0	0	---	---	0	0
2,4-D LVE + triclopyr	1.0 + 0.5	97	70	75	0	---	0	0	---	---	---	---	0
dicamba + 2,4-DA	0.25 + 0.75	97	10	70	0	0	0	0	0	---	0	0	0
dicamba + 2,4-DA	0.5 + 1.5	100	65	92	0	---	---	50	---	---	---	---	0
paraquat	0.25	0	10	15	0	0	0	0	---	0	0	0	0
paraquat	0.5	28	7	60	0	0	0	17	0	0	33	0	0
atrazine	1.0	16	25	0	0	0	0	0	0	0	0	0	25
atrazine	2.0	37	90	0	0	0	0	0	0	0	0	0	50
tebuthiuron 80W	0.25	10	80	0	80	0	0	0	---	---	0	0	0
tebuthiuron 80W	0.5	52	100	0	16	0	0	0	---	0	0	0	07
tebuthiuron 80W	0.75	73	97	0	0	0	0	0	---	---	0	0	70
metribuzin	0.25	0	0	0	0	0	0	---	---	0	0	0	0
metribuzin	0.5	0	45	0	0	0	0	0	0	---	0	0	30
check	---	0	0	0	0	0	0	0	0	0	0	0	0

*(---) species populations were low, therefore not evaluated in treatment

Evaluation of herbicide treatments for Dalmatian toadflax (*Linaria genistifolia* spp. dalmatica (L.) Maire & Petitmengin) control. Ferrell, M.A. and T.D. Whitson. Dalmatian toadflax is native to Europe and was introduced into the U.S. as an ornamental. It has since escaped the flower garden and has become a serious problem along roadsides and in rangelands. It is difficult to control due to its extensive and deep root system. This experiment was established to evaluate various herbicides on the control of Dalmatian toadflax.

Plots were established June 17, 1985 to a stand of Dalmatian toadflax in a rangeland setting. The toadflax was 6 to 18 inches tall and in the bud to full bloom stage-of-growth. Perennial grasses 4 to 6 inches tall were present as an understory. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water. Weather conditions were as follows: air temperature 68 F, relative humidity 42%, wind NW at 2 mph, sky partly cloudy, and a soil temperature 88 F at 1 inch. Soil was a clay loam (52% sand, 17% silt and 31% clay) with 4.5% organic matter and 6.8 pH. Plots were 9 by 30 ft. and arranged in a randomized complete block design with three replications.

Visual evaluations made one year after treatment show picloram to be effective on Dalmatian toadflax. Dalmatian toadflax control was similar with picloram in combination with fluroxypyr. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1464 .)

Dalmatian toadflax shoot control

Treatment[1]	Rate lb ai/A	Percent[2] control
triclopyr + 2,4-D amine	1.0 + 2.0	0
triclopyr + 2,4-D amine	1.5 + 3.0	0
triclopyr	2.0	0
triclopyr	3.0	0
fluroxypyr	2.0	0
fluroxypyr	3.0	0
triclopyr + fluroxypyr	1.0 + 1.0	0
triclopyr + fluroxypyr	1.5 + 1.5	0
picloram + fluroxypyr	1.0 + 1.0	96
picloram + fluroxypyr	1.5 + 1.5	99
picloram	2.0	99
LSD (0.05) =		3
CV =		7

[1]Treatments applied June 17, 1985
[2]Visual evaluations June 29, 1986

Herbicide control evaluations on western snowberry. Ferrell, M.A. and T.D. Whitson. Western snowberry is a deciduous, native shrub 1 to 3 ft. tall, that increases by offshoots from rootstalks. Although considered a fair forage for cattle and sheep, western snowberry forms dense stands crowding out more desirable forage. Chemical control of western snowberry has not been successful with current herbicides. This study was established to evaluate various formulations of herbicides for its control.

Plots were established May 30, 1985 on a dense stand of western snowberry 6 to 20 inches tall. With a perennial grass understory 4 to 6 inches high. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water using 8004 nozzles. Granular formulations were applied by hand. Soil was dry on the surface with the subsoil being moderate in moisture. Weather conditions were as follows: air temperature 55 F, relative humidity 72%, wind S at 5 mph, sky cloudy, and a soil temperature of 55 F at 1 inch. Soil was a loam (25% sand, 49% silt and 26% clay) with 4.2% organic matter and 5.9 pH. Plots were 9 by 20 ft. arranged in a randomized complete design with three replications.

Visual evaluations taken June 24, 1986, one year following treatment, show 2,4-DLVE applied at 2.0 lb ai/A to be providing 70% control. None of the other herbicides used in this study show promise for controlling western snowberry at the rates evaluated. 1466.)

Western snowberry control

Treatment[1]	Rate lb ai/A	Percent[2] control
triclopyr 4EC	1.0	0
triclopyr 4EC	2.0	0
fluroxypyr 1.67EC	2.0	0
fluroxypyr 1.67EC	3.0	0
fluroxypyr + triclopyr	1.0 + 1.0	0
fluroxypyr + triclopyr	1.5 + 1.5	0
tebuthiuron 20P	0.25	0
tebuthiuron 20P	0.5	0
tebuthiuron 20P	0.75	0
tebuthiuron 20P	1.0	0
2,4-D LVE	2.0	70

[1]Treatments applied May 30, 1985
[2]Visual control evaluations June 24, 1986

Evaluation of herbicide treatments on common tansy (*Tanacetum vulgare* L.). Ferrell, M.A. and T.D. Whitson. Tansy is a perennial herb native to the Old World and now well established throughout most of the U.S. An escape from flower gardens and hedge plantings in Wyoming it is becoming a serious problem along ditchbanks, fencerows, and roadsides in Sheridan and Teton counties where it is moving into range and pasture lands. Two separate studies were established at the same location to evaluate various herbicides for the control of tansy.

Plots were established July 31, 1984 and June 13, 1985, 5 miles east of Sheridan, Wyoming on a dense stand of tansy in a pasture setting. The tansy was in the prebud to full bloom stage-of-growth and 2 to 4.5 feet in height for the 1984 study and in the prebud stage-of-growth and 10 to 18 inches tall for the 1985 study. Perennial grasses 12 to 24 inches tall made up the understory. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water carrier using 8004 nozzles.

Weather conditions for the 1984 study were as follows: air temperature 74 F, relative humidity 69%, wind calm, sky partly cloudy, and soil temperature at 1 inch was 73 F. The soil was a loam (47% sand, 40% silt and 13% clay) with 4.0% organic matter and 7.4 pH. Weather conditions for the 1985 study were as follows: air temperature 78 F, relative humidity 30%, wind W at 4 mph, sky partly cloudy, and soil temperature at 1 inch was 83 F. The soil was a clay loam (24% sand, 43% silt and 33% clay) with 4.1% organic matter and 7.0 pH. Plots for both studies were 9 by 20 feet arranged in a randomized complete block design with three replications. Visual evaluations made July 23, 1986, two years after treatment for the 1984 study, show none of the XRM formulations to be effective in controlling tansy at the applied rates. The only treatments maintaining control are DPX-T6376 at 0.125 lb ai/A with 98% shoot control and dicamba + picloram at 1.0 + 0.5 and 2.0 + 0.5 lb ai/A, showing 98 and 97% shoot control respectively (Table 1). Visual evaluations made July 23, 1986, one year after treatment for the 1985 study, show none of the formulations, with the exception of picloram applied at 1.0 lb ai/A, to be effective in controlling tansy (Table 2). (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1465.)

Table 1 Tansy shoot control

Treatment[1]	Rate lb ai/A	Percent control, Date evaluated 6/13/85	Percent control, Date evaluated 7/23/86
XRM 4715 (triclopyr + 2,4-D LVE)	1.0 + 2.0	0	0
triclopyr	1.0	0	0
triclopyr	2.0	0	0
XRM 4757 (clopyralid + 2,4-D amine)	0.25 + 1.0	0	0
XRM 4757 (clopyralid + 2,4-D amine)	0.38 + 1.5	0	0
XRM 4703 (clopyralid + picloram)	0.25 + 0.25	17	0
clopyralid	0.5	0	0
picloram	0.5	85	33
picloram + 2,4-D amine	0.25 + 1.0	67	17
picloram + 2,4-D amine	0.38 + 1.5	75	17
dicamba + X-77	1.0	0	0
dicamba + X-77	2.0	13	0
chlorsulfuron + X-77	0.0625	33	17
chlorsulfuron + X-77	0.125	85	17
metsulfuron + X-77	0.0625	87	78
metsulfuron + X-77	0.125	100	98
dicamba + picloram + X-77	1.0 + 0.25	55	27
dicamba + picloram + X-77	1.0 + 0.5	94	98
dicamba + picloram + X-77	2.0 + 0.25	62	60
dicamba + picloram + X-77	2.0 + 0.5	95	97
LSD (0.05) =		24	29
CV =		34	64

[1]Treatments applied July 31, 1984, X-77 applied at 0.25% v/v

Table 2 Tansy shoot control

Treatement[1]	Rate lb ai/A	Percent[2] control
triclopyr + 2,4-D amine	1.0 + 2.0	0
triclopyr + 2,4-D amine	1.5 + 3.0	0
triclopyr	2.0	0
triclopyr	3.0	0
fluroxypyr	2.0	0
fluroxypyr	3.0	0
triclopyr + fluroxypyr	1.0 + 1.0	0
triclopyr + fluroxypyr	1.5 + 1.5	0
picloram	1.0	97
LSD (0.05)=		3
CV =		19

[1]Treatments applied June 13, 1985
[2]Visual evaluations July 23, 1986

Evaluation of herbicide treatments for greasewood control. Ferrell, M.A. and T.D. Whitson. Greasewood is a native deciduous shrub and is prevalant 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 in livestock 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 inches tall. Pasture grasses 6 to 24 inches high were present as an understory. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water using 8004 nozzles. Granular formulations were applied with a hand operated centrifugal granular applicator. Soil moisture was dry to 2 inches and moderate at 6 inches. Weather conditions were as follows: air temperature 82 F, relative humidity 42%, sky partly cloudy, and a soil temperature of 103 F at 1 inch. Plots were 9 by 30 ft. arranged in a randomized complete block design with two replications.

This study has been evaluated twice since it was established in 1983. The first evaluation was July 17, 1984 and the second August 21, 1986. There has been a considerable reduction in control since the study was evaluated in 1984. However, triclopyr + benazolin combinations at 4.0 + 0.5 lb ai/A and 8.0 + 0.5 lb ai/A are maintaining 88 and 83 percent control respectively, three years after herbicide application. All other herbicide applications have not maintained satisfactory control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1467.)

Greasewood control

Treatment[1]	Rate lb ai/A	Percent[2] control 1984	Percent[2] control 1986	Percent grass reduction 1984	Percent grass reduction 1986
benazolin 50FL	1.0	3	0	0	0
benazolin 50FL	2.0	10	0	0	0
triclopyr 4EC	4.0	87	55	55	0
triclopyr 4EC	8.0	90	50	0	0
benazolin/triclopyr	0.5 + 4.0	92	88	0	0
benazolin/triclopyr	0.5 + 8.0	86	83	15	0
benazolin/picloram	0.25 + 0.25	55	0	0	0
benazolin/picloram	0.5 + 0.5	62	0	0	0
picloram (K salt)	0.25	60	20	0	0
picloram (k salt)	0.5	80	15	0	0
picloram (k salt)	1.0	77	65	0	0
benazolin/2,4,5-T	0.25 + 0.25	27	0	0	0
benazolin/2,4,5-T	0.5 + 0.5	22	0	0	0
2,4,5-T ester	2.0	52	0	0	0
*NC 28858 50WP	1.0	7	0	0	0
*NC 28858 50WP	2.0	52	18	35	20
*NC 28858 50WP	4.0	92	60	95	85
EH-737 4EC	2.0	45	0	0	0
tebuthiuron 20P	0.25	5	0	0	0
tebuthiuron 20P	0.5	7	25	0	0
tebuthiuron 20P	1.0	42	60	10	20
LSD (0.05) =			30		
CV =			56		

[1]Treatments applied August 15, 1983
[2]Visual control evaluation July 17, 1984 and August 21, 1986
*Agral 90 added at 1.0% v/v

Evaluation of herbicide treatments for control of hoary cress. Ferrell, M.A. and T.D. Whitson. Hoary cress is a perennial introduced from Europe. It is common throughout Wyoming and is a highly competitive plant difficult to control because the root system develops to several feet. This experiment was established to study the effectiveness of various herbicides on the control of hoary cress.

Treatments were applied June 8, 1984 with a 6-nozzle knapsack spray unit delivering 40 gpa water using 8004 nozzles. Soil moisture was low. Grasses in the area were 2 to 6 inches tall and in fair condition. Hoary cress was 4 to 10 inches tall and in the bud to full flower stage-of-growth. Plots were 9 by 30 ft. arranged in a randomized complete block design with three replications. Weather conditions were as follows: air temperature 55 F, relative humidity 38%, wind NW at 5 mph, sky cloudy, and a soil temperature of 59 F at 1 inch F.

Visual control estimates were made on June 10, 1985 and on August 5, 1986. There has been a reduction of hoary cress control since the 1985 evaluations. Two years after treatments were applied chlorsulfuron at 0.25 lb ai/A is the only treatment that is maintaining satisfactory control at 90%. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1468.)

Hoary cress control

Treatment[1]	Rate lb ai/A	Percent control[2] Date evaluated 6/10/84	8/5/86
XRM 4715			
(triclopyr + 2,4-D amine)	1.0 + 2.0	30	10
triclopyr	1.0	27	27
triclopyr	2.0	17	3
chlorsulfuron + X-77	0.0625	81	62
chlorsulfuron + X-77	0.125	91	70
chlorsulfuron + X-77	0.25	97	90
2,4-D amine	4.0	40	30
2,4-D amine	6.0	47	33
LSD (0.05) =		33	42
CV =		19	24

[1]X-77 applied at 0.25% v/v
[2]Visual control evaluations August 21, 1986

Evaluation of triclopyr for big sagebrush control. Ferrell, M.A. and T.D. Whitson. Triclopyr was applied both spring and late summer to a dense stand of big sagebrush to determine rate and time of application.

Spring treatments were applied June 11, 1985 and late summer treatments applied August 29, 1985. The big sagebrush was 18 inches high, however, due to lack of moisture in 1985 the sagebrush was not in an optimum stage-of-growth for spring treatment. Treatments were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water using 8004 nozzles. Plots were 9 by 30 ft. arranged in a randomized complete block design with three replications.

Visual estimates of big sagebrush control were made July 7, 1986. Control of big sagebrush with triclopyr was poor for both spring and late summer applications. Also, there was no difference in control between the spring and late summer applications. As a comparison for control 2,4-D LVE at 2.0 lb ai/A was also applied during the spring, however, control was less than satisfactory at 67%. Lack of adequate moisture to induce active growth of the sagebrush was probably responsible for the lack of control with 2,4-D. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1469 .)

Big sagebrush control

Treatment	Rate lb ai/A	Time of application	Percent[1] control
triclopyr	0.5	June 11, 1985	15
triclopyr	1.0	June 11, 1985	37
2,4-D LVE + X-77 (0.5% v/v)	2.0	June 11, 1985	67
triclopyr	0.5	August 29, 1985	13
triclopyr	1.0	August 29, 1985	30
LSD (0.05) =			21
CV =			26

[1]Visual control evaluations July 7, 1986

Evaluation of curlycup gumweed control with spring vs fall herbicide applications. Ferrell, M.A. and T.D. Whitson. Curlycup gumweed is a warm season, biennial native forb found in waste areas, along roadways, and disturbed rangelands. It is an invader with little forage value. This experiment was established to evaluate the effectiveness of late summer and spring herbicide applications for the control of curlycup gumweed.

The study was established August 8, 1985, when the curlycup gumweed was in full flower and 4 to 6 inches in height and was repeated June 18, 1986, when the curlycup gumweed was in the prebud stage-of-growth. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water. Plots were 9 by 30 ft. arranged in a randomized complete block design with four replications. The soil was a sandy loam (73% sand, 10% silt and 17% clay) with 1.2% organic matter and 7.1 pH.

Visual estimates of curlycup gumweed control were made August 21, 1986. There was considerable difference in control based on time of application. The June 1986 application gave better control than did the August 1985 application. DPXT6376 at 0.0438 lb ai/A, 2,4-D amine at 3.0 lb ai/A, dicamba + 2,4-D amine at 0.5 lb ai/A + 1.5 lb ai/A, DPXT6376 at 0.0109 plus dicamba at 0.5 lb ai/A, and DPXT6376 at 0.0109 plus 2,4-D LVE at 0.5 lb ai/A all gave 95% or better control when applied in June of 1986, whereas all treatments applied in August of 1985 gave less than 90% control, when evaluated one year after application. DPXT6376 gave the best control at both application timings, giving 99% control when applied in June 1986 and 87% control when applied in August 1985. The data indicate that spring applications, of the herbicides evaluated, provided better control of curlycup gumweed than late summer applications. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1470.)

Curlycup gumweed control

Treatment	Rate lb ai/A	Percent control[1] Date applied 8/14/85	6/18/86
Dowco 290	0.25	76	60
Dowco 290	0.50	70	89
fluroxypyr	0.25	0	0
fluroxypyr	1.00	0	0
DPXT6376	0.0109	76	90
DPXT6376	0.0438	87	99
dicamba	0.50	71	86
2,4-D LVE	1.50	71	93
MCPA amine	3.0	68	90
2,4-D amine	3.0	79	96
triclopyr	0.75	40	55
picloram	0.25	66	81
dicamba + 2,4-D amine	0.50 + 1.50	78	96
triclopyr + 2,4-D LVE	0.25 + 0.50	65	88
DPXT6376 + bromoxynil	0.0109 + 0.50	79	92
DPXT6376 + 2,4-D LVE	0.0109 + 0.50	81	95
LSD (0.05) =		16	10
CV =		18	9

[1]Visual control evaluations August 21, 1986

Evaluation of 2,4-D LVE as a treatment prior to light rates of picloram for leafy spurge shoot control. Ferrell, M.A. and T.D. Whitson. As costs of controlling leafy spurge (*Euphorbia esula* L.) increase new methods of treatment are being evaluated to decrease costs and improve control. This experiment was established to evaluate the use of 2,4-D LVE as a setup treatment prior to the application of light rates of picloram.

Plots were established June 4, 1985 in a dense stand of leafy spurge 12 to 18 inches tall in the bud to full bloom stage-of-growth. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water. There was an understory of perennial grasses 4 to 6 inches tall. Soil moisture was very low and the plots were located on an irrigated slope. Weather conditions were as follows: air temperature 76 F, relative humidity 34%, wind N at 5 mph, sky partly cloudy, and a soil temperature of 108 F at 1 inch. Soil was a sandy loam (72% sand, 15% silt and 13% clay) with 1.3% organic matter and 7.6 pH. Setup treatments with 2,4-D LVE were applied 17 days prior to application of 0.25 and 0.5 lb ai/A picloram. Plots were 9 by 30 ft. arranged in a randomized complete design with three replications.

Visual ratings of leafy spurge shoot control made June 4, 1986, showed 2,4-D setup treatments and 2,4-D/picloram combinations to be ineffective in increasing the activity of picloram for the control of leafy spurge. Combinations of picloram + clopyralid were also ineffective. Picloram applied alone at 2.0 lb ai/A resulted in the most effective control at 77%, which is about 20% less than the control normally observed for this rate, one year after application. The reduced control may have resulted from picloram leaching due to irrigation. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1472.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent[2] control
*2,4-D LVE + picloram	0.125 + 0.25	0
*2,4-D LVE + picloram	0.25 + 0.25	0
*2,4-D LVE + picloram	0.125 + 0.5	0
*2,4-D LVE + picloram	0.25 + 0.5	0
2,4-D LVE + picloram	0.125 + 0.25	0
2,4-D LVE + picloram	0.25 + 0.25	0
2,4-D LVE + picloram	0.125 + 0.5	0
2,4-D LVE + picloram	0.25 + 0.5	0
picloram + clopyralid	0.125 + 0.125	0
picloram + clopyralid	0.25 + 0.25	0
picloram + clopyralid	0.375 + 0.375	0
picloram	0.25	0
picloram	0.5	0
picloram	0.75	50
picloram	2.0	77

[1]Treatments applied June 4, 1985
[2]Visual evaluations June 4, 1986
*Plots treated with 2,4-D LVE 17 days prior to treatment with picloram

Evaluation of spring vs. fall original/retreatment herbicide combinations affecting leafy spurge live shoot regrowth. Ferrell, M.A. and T.D. Whitson. This field study located near Lander, Wyo. was established for accumulation of original/retreatment and fall vs. spring application data on leafy spurge. Six successive years of data have been collected since the study was established in the spring of 1980.

Original spring and fall treatments were made May 23, and September 14, 1980. Liquid formulations were applied with a 21.5 ft. boom, 13 nozzle truck mounted spray unit equipped with Teejet HSS8004 nozzles delivering 25 gpa water carrier. The granular formulations were applied with a hand operated centrifugal granular spreader. Plot size for the original treatments was 21.5 ft. by 258 ft. with one replication.

Retreatments were applied across the original treatments creating a split-block design and were made May 29 and September 12, 1981, May 24 and September 17, 1982, May 29 and September 15, 1983, May 31 and September 18, 1984, and May 22 and September 10, 1985. Retreatment plots were 21.5 ft. by 21.5 ft. with two replications. The retreatments were 2,4-D amine at 2.0 lb ai/A, dicamba at 2.0 lb ai/A, picloram at 0.5 and 1.0 lb ai/A, 2,4-D amine (spring and fall applied) at 2.0 lb ai/A, and an untreated check. 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 inches in height during the spring retreatments and was mature and had shed most of it's seed when fall retreatments were made. Retreatments were applied with the truck-mounted sprayer used to apply the original treatments. The soil at this study site 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. However, irrigation was not uniform in the study area. There was poor grass cover on May, 1980 when plots were established. By September, 1981 grass was 20 to 24 inches in height and still green in treatment areas. Good grass cover has been maintained in treatment areas from 1982 through 1986.

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 six year period. There appears to be little difference in the effectiveness of the original treatments whether spring or fall applied. However, better shoot control has been maintained in the original treatments where picloram was applied regardless of rate or formulation. The reduction in shoot control is also apparent since the retreatments of picloram were terminated with the 1981 application. The 2,4-D amine retreatment applied both in the spring and fall (S & F) was more effective than only the one yearly treatment applied either in the spring or fall. Retreatment areas have maintained better shoot control than single treatment applications. When picloram 1.0 lb ai/A was used as a retreatment on previously treated picloram areas in the spring study no advantage was found. This is probably due to leaching of the picloram out of the shallow soil in this area. There is also considerable variation in percent leafy spurge shoot control between other treatments and rates of application which may also indicate variation in soil and leaching of the herbicide out of the shallow soil profile. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1471.)

Leafy spurge shoot control

Percent shoot control[2]

Retreatment lb ai/A[2]

Original[1] lb ai/A		dicamba 4L 2.0					picloram (K salt)					2,4-D amine (S & F)					check						picloram (K salt)					2,4-D amine				
							0.5					2.0											1.0					2.0				
		'82	'83	'84	'85	'86	'82	'83	'84	'85	'86	'82	'83	'84	'85	'86	'81	'82	'83	'84	'85	'86	'82	'83	'84	'85	'86	'82	'83	'84	'85	'86
(Spring)																																
dicamba 4L	6.0	94	85	89	87	80	100	91	85	91	74	88	95	93	96	94	92	64	29	60	56	20	100	99	96	83	69	80	70	69	78	58
dicamba 4L	8.0	88	90	89	85	75	100	95	95	94	83	99	100	100	100	98	95	81	34	26	41	10	99	82	75	66	69	90	78	63	91	68
dicamba 5G	6.0	89	69	81	83	75	100	95	80	92	55	87	98	97	97	90	92	73	86	34	44	0	100	100	87	58	68	99	97	83	90	73
dicamba 5G	8.0	92	78	92	93	85	100	94	93	96	86	100	99	94	97	94	95	89	75	32	41	0	100	89	79	81	73	93	94	94	96	87
picloram (K salt)	1.0	97	74	93	96	80	100	97	85	89	74	99	100	96	95	94	96	98	80	84	80	48	100	77	92	59	30	100	96	89	95	89
picloram (K salt)	2.0	100	79	96	93	90	100	100	96	96	79	100	100	100	100	98	99	100	91	88	81	60	100	75	67	66	38	100	94	99	99	94
picloram (2% beads)	1.0	98	67	93	86	72	100	68	85	82	50	93	84	88	94	87	93	79	95	74	71	48	100	81	18	18	0	100	89	89	98	89
picloram (2% beads)	2.0	100	69	89	90	70	100	77	86	88	55	100	88	97	99	92	95	100	93	78	83	58	100	24	15	0	0	100	95	95	98	90
check	---	92	91	89	89	78	100	83	56	81	40	93	54	50	93	85	0	0	0	0	0	0	100	100	99	98	83	55	33	14	46	35
shoots/sq ft																	20	18	17	11	12											
(Fall)																																
dicamba 4L	6.0	76	81	75	78	31	100	94	81	76	20	90	99	92	97	97	70	57	61	40	51	0	100	93	83	81	56	82	70	55	84	38
dicamba 4L	8.0	87	88	80	93	53	100	92	86	77	23	90	95	87	98	96	83	44	50	44	42	5	100	95	83	94	66	89	68	67	85	30
dicamba 5G	6.0	99	81	91	91	65	100	90	81	73	25	97	98	98	99	91	89	52	39	17	52	5	100	97	90	98	83	98	79	95	95	79
dicamba 5G	8.0	99	93	92	97	73	100	93	87	89	48	98	98	97	98	90	93	85	61	30	57	5	100	100	99	99	89	97	84	71	85	33
picloram (K salt)	1.0	99	87	89	95	54	100	92	83	91	43	99	99	99	99	98	95	90	81	64	73	13	100	99	95	96	80	96	74	56	86	45
picloram (K salt)	2.0	100	96	97	99	90	100	97	93	94	63	100	100	100	99	99	99	99	93	79	79	58	100	100	100	99	92	99	93	92	94	58
picloram (2% beads)	1.0	100	91	98	96	90	100	96	83	86	53	100	100	99	98	95	99	100	96	88	88	30	100	97	89	87	58	100	86	96	95	79
picloram (2% beads)	2.0	100	86	95	99	90	100	86	73	81	48	100	100	100	99	98	99	100	94	88	82	23	100	91	66	84	38	100	85	95	86	65
check	---	70	67	69	75	40	100	85	82	84	40	23	57	72	86	48	0	0	0	0	0	0	100	97	82	89	50	0	31	31	51	15
shoots/sq ft																	19	24	23	15	20											

[1] Original treatments made May 23 and Sept. 14, 1980; retreatments made May 29 and Sept. 12, 1981; May 24 and Sept. 17, 1982; May 29 and Sept. 15, 1983; May 31 and Sept. 18, 1984; and May 22 and Sept. 10, 1985. 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; May 30, 1984 and May 21, 1985. S & F = Spring and Fall.

Herbicide control evaluations on Great Plains yucca. Ferrell, M.A. and T.D. Whitson. Great Plains yucca is a native, perennial, evergreen plant common on dry, sandy, gravelly soils throughout Wyoming. Young plants and flowers are sometimes eaten by cattle and sheep, however, it competes with desirable grasses for moisture. Since the cancellation of 2,4,5-T and 2,4,5-TP by the environmental protection agency there have been no effective means for chemical control. This experiment was established to evaluate various herbicides for the control of Great Plains yucca.

Plots were established in rangeland May 20, 1985 on a stand of Great Plains yucca 6 to 14 inches tall. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water. Weather conditions were as follows: air temperature 75 F, relative humidity 16%, wind E at 5 mph, sky clear, and a soil temperature 78 F at 1 inch. Plots were 9 by 30 ft. arranged in a randomized complete block design with three replications.

Visual estimates of Great Plains yucca control made July 8, 1986 revealed none of the herbicides to be effective at the evaluated rates. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1463.)

Great Plains yucca control

Treatment[1]	Rate lb ai/A	Percent[2] control
triclopyr	2.0	0
triclopyr	3.0	0
fluroxypyr	2.0	0
fluroxypyr	3.0	0
triclopyr + fluroxypyr	1.0 + 1.0	0
triclopyr + fluroxypyr	1.5 + 1.5	0
metsulfuron	0.031	0
chlorsulfuron	0.031	0
sulfometuron	0.031	0
tebuthiuron 20P	0.5	0
picloram	0.5	0

[1]Treatments applied May 20, 1985
[2]Visual evaluations July 8, 1986

Broom snakeweed (*Gutierrezia sarothrae*) control with various herbicides. Whitson, T.D. and M.A. Ferrell. In the western U.S. both sheep and cattle have been poisoned in large numbers from eating broom snakeweed. Most losses occur in cattle as abortion. The plant is most toxic during leaf formation when other feed is scarce.

A study was established near McFadden, Wyoming to control broom snakeweed (*Gutierrezia sarothrae* [Pursh] Britt. and Rusby [GUESA]) on established Fairway crested wheatgrass pasture. Plots were 9 by 30 ft. in size with four replications. The herbicides were applied August 1, 1985, when broom snakeweed was in the early bloom stage. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a sandy loam (75% sand, 18% silt and 7% clay) with 2.4% organic matter and 7.8 pH. Temperatures at the time of application were: air 78 F, soil surface 89 F, 1 inch 86 F, 2 inch 76 F, and 4 inch 72 F. The relative humidity was 30% with an average wind speed of 3 mph. Growing conditions were good with good subsoil moisture. Evaluations were conducted August 5, 1986.

Excellent control of broom snakeweed was obtained with all treatments applied except 2,4-D LVE at 2.0 lb ai/A and triclopyr applied at 1.0 lb ai/A. No perennial grass damage occurred in any of the treated areas. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1454.)

Broom snakeweed control with various herbicides

Herbicide	Rate lb ai/A	% GUESA control[1]	% perennial grass damage
triclopyr + 2,4-D LVE	1.0 + 2.0	100	0
triclopyr + 2,4-D LVE	1.5 + 3.0	100	0
triclopyr	1.0	82	0
triclopyr	2.0	99	0
picloram + clopyralid	0.125 + 0.125	99	0
picloram + clopyralid	0.25 + 0.25	100	0
picloram	0.25	99	0
picloram	0.5	100	0
fluroxypyr	1.0	98	0
2,4-D LVE	2.0	60	0
check	---	0	0

[1] LSD (0.05) = 17.6%, CV = 14.3%

Big sagebrush (*Artemisia tridentata* Nutt.) control and perennial grass production four years following herbicide treatments. Whitson, T.D. and M.A. Ferrell. Big sagebrush occupies 34 million acres of Wyoming rangeland. Even though 2,4-D has been used for control since the early 1950's, it is considered inconsistent in control by many Wyoming ranchers. This experiment was established June 10, 1982 to compare new herbicides to 2,4-D for sagebrush control and resulting perennial grass production. The study was located in Fremont County, Wyoming on a sandy loam soil containing 70% sand, 22% silt, 8% clay, 0.8% organic matter and 6.5 pH. The plots were 9 by 30 ft. and were replicated three times in a randomized complete block design. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi and a centrifugal granular applicator. At the time of application, soil moisture levels were low, grasses ranged in height from 2 to 4 inches, sagebrush height ranged from 8 to 16 inches and was fully leafed, air temperature was 60° F with 56% relative humidity, wind was 2 to 3 mph NW, soil temperatures were: surface 76° F, 1 inch 68° F, 2 inch 56° F, and 4 inch 55° F.

The treatments were selectively clipped by grass species July 29, 1986, four years after application of herbicides. Those treatments were selected from previous years' perennial grass production and those currently being marketed or having market potential.

The following treatments applied at listed rates were found to be highly productive compared to the untreated area but not statistically different from each other: 2,4-D LVE (2.0 lb ai/A), tebuthiuron 20 p (0.125, 0.25, 0.5, 0.75 lb ai/A), and PPG 1259 (1.0 lb ai/A). Perennial grasses were thinned with bare soil being present in areas receiving tebuthiuron treatments of 0.5 lb ai/A and above. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1453.)

Evaluation and comparison of herbicide formulations for control of big sagebrush and resulting forage production, Griffin Brothers Ranch, Fremont County, 1986

		Percent control[2]				Air dry forage[2] lb/A			
Herbicide[1]	Rate lb ai/A	1983	1984	1985	1986	1983	1984	1985	1986[3]
DPX-T 6376 70% WP + X-77	0.031	54	33	30	20	526	310	164	-----
DPX-T 6376 70% WP + X-77	0.062	86	67	63	40	628	406	182	-----
DPX-T 6376 70% WP + X-77	0.125	87	68	58	57	530	348	164	-----
DPX-T 6376 70% WP + X-77	0.5	100	100	100	98	586	368	164	-----
DPX-T 6206 70% WP + X-77	0.031	68	58	47	42	494	282	100	-----
DPX-T 6206 70% WP + X-77	0.062	68	53	55	27	748	479	208	-----
DPX-T 6206 70% WP + X-77	0.125	91	88	75	63	564	609	150	-----
DPX-T 6206 70% WP + X-77	0.5	98	95	93	88	504	865	222	-----
PPG 1259 F1	1.0	100	100	100	100	532	631	192	867abc
PPG 1259 F1	2.0	100	100	100	100	102	404	186	-----
PPG 1259 F1	4.0	100	100	100	100	94	203	154	-----
Dicamba 4DMA	1.0	0	7	0	3	344	224	62	-----
Dicamba 4DMA	2.0	38	30	5	10	432	276	114	-----
2,4-D ester	1.0	63	55	50	35	506	300	164	815 bc
2,4-D ester	2.0	98	97	97	95	564	470	166	1198a
2,4,5-T ester	1.0	93	90	90	77	436	281	176	-----
2,4,5-T ester	2.0	98	95	90	92	802	574	210	-----
tebuthiuron 20P	0.125	35	47	40	22	418	291	146	1067ab
tebuthiuron 20P	0.25	75	85	87	82	406	471	124	847abc
tebuthiuron 20P	0.5	92	93	87	87	210	368	174	1050 bc
tebuthiuron 20P	0.75	99	99	99	97	132	126	100	991abc
tebuthiuron 20P	1.0	99	99	99	98	120	139	186	692 c
UC 77179	0.5	91	83	88	73	126	385	162	-----
UC 77179	1.0	100	100	100	100	352	107	120	-----
UC 77179	2.0	100	100	100	100	0	0	46	-----
UC 77179	4.0	100	100	100	100	0	0	0	-----
UC 77179	6.0	100	100	100	100	0	0	0	-----
Garlon 4E	0.25	38	18	40	30	604	342	88	-----
Garlon 4E	0.5	96	93	90	77	622	476	190	731 bc
Garlon 4E	1.0	94	93	90	87	762	406	188	823 bc
Garlon 4E/2,4-D	0.5 + 1.0	89	80	83	72	356	211	208	-----
Dowco 290 (Lontrel)	0.25	8	5	0	0	476	476	102	-----
Dowco 290 (Lontrel)	0.5	33	27	17	13	506	438	132	-----
Dowco 290 (Lontrel)	1.0	43	27	17	8	442	312	106	-----
Check	---	---	---	---	0	304	176	62	344 d

[1]Herbicide treatments applied June 10, 1982
[2]Visual control evaluations May 23, 1983, May 31, 1984, July 22, 1985 and July 29, 1986; production measurements July 19, 1983, July 24, 1984, July 22, 1985 and July 29, 1986 production from 2.5 ft diameter quadrat per replication
[3]1986 treatments were selcted for clipping from previous years based on their % sagebrush control, production and market availability; those selected were clipped by perennial grass species

Poverty sumpweed (*Iva axillaris* Pursh) control with various herbicides. Whitson, T.D. and M.A. Ferrell. A series of herbicides were applied August 1, 1985 to determine their effects on poverty sumpweed. Plots were 9 by 60 ft. in size with one replication. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a sandy loam (75% sand, 18% silt, 7% clay) with 2.4% organic matter and 7.8 pH. Weather information: air temp. 78 F, soil surface 87 F, 1 inch 87 F, 2 inch 87 F, 4 inch 81 F, relative humidity 33% and wind speed 0 to 5 mph SSE. Poverty sumpweed was in full bloom at the time of application. Evaluations were conducted August 5, 1986.

Poverty sumpweed control was 100% with treatments of picloram + Dowco 290 1.0 + 1.0 lb ai/A, picloram 1.0 lb ai/A, Dowco 433 1.0 lb ai/A and 90% with an application of 2.0 lb ai/A 2,4-D LVE. No treatment had detrimental effects on perennial grasses in the study. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1451 .)

Herbicide	Rate lb ai/A	% poverty sumpweed control	% perennial grass damage
triclopyr	1.0	0	0
picloram + clopyralid	1.0 + 1.0	100	0
picloram	1.0	100	0
fluroxypyr	1.0	100	0
2,4-D LVE	2.0	90	0
check	---	0	0

Herbicide control evaluations on plains pricklypear (*Opuntia polyacantha* Haw). Whitson, T.D. and M.A. Ferrell. Infestations of plains pricklypear are not highly competitive with perennial rangeland grasses for moisture. The primary problem they cause is that of poor forage utilization by livestock in areas they occupy. This study was established June 3, 1983 to compare pricklypear control using three picloram formulations, clopyralid and triclopyr. Herbicides were applied to a mature stand of prickly pear in full bloom, perennial grasses were 2 to 4 inches in height during application. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a clay loam (36% sand, 37% silt and 27% clay) with 1.8% organic matter and 7.9 pH. Weather information: air temp. 60 F, soil surface 70 F, 1 inch 66 F, 2 inch 60 F, 4 inch 58 F with relative humidity 75 and wind speed 3 mph NW.

Liquid formulations of picloram 2 EC provided excellent control of plains pricklypear three years following application at the 1.0 and 2.0 lb ai/A rates. The picloram 2% granular formulation applied at the 0.5 lb ai/A rate provided 98% control while the 10% formulation at the 0.5 lb ai/A rate only provided 40% control. Triclopyr and clopyralid applications were ineffective on plains pricklypear even with application rates up to 1.0 lb ai/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1450.)

Herbicide	Rate lb ai/A	% plains pricklypear control[1]	% grass damage
triclopyr	0.25	13	0
triclopyr	0.5	15	0
triclopyr	1.0	0	0
clopyralid	0.25	3	0
clopyralid	0.5	0	0
clopyralid	1.0	0	0
picloram (2 EC)	1.0	97	0
picloram (2 EC)	2.0	100	0
picloram (2% GR)	0.25	67	0
picloram (2% GR)	0.5	98	0
picloram (10% GR)	0.25	27	0
picloram (10% GR)	0.5	40	0
check	---	0	0

[1]LSD (0.05) = 20.4, CV = 34.1

Purple starthistle (*Centaurea calcitrapa* L.) control within perennial grass species. Whitson, T.D., M.A. Ferrell and S.D. Miller. A series of herbicides were applied August 8, 1985 to regrowth of purple starthistle after a previous mowing. Plots were 9 by 25 ft. in size with four replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a sandy loam. Weather information: air temperature 80 F, soil surface 95 F, 1 inch 80 F, 2 inch 74 F, 4 inch 75 F with a relative humidity of 30% and winds NE at 2 to 3 mph. Treatments were picloram applied at 0.5 and 1.0 lb ai/A, clopyralid applied at 1.0 lb ai/A, fluroxypyr applied at 1.0 lb ai/A, 2,4-D LVE applied at 1.0 lb ai/A and dicamba applied at 1.0 lb ai/A. All provided 100% control of purple starthistle with no detrimental effects on perennial grass species present. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1455 .)

Purple starthistle control with various herbicide applications

Herbicide	Rate lb ai/A	% purple starthistle control[1]	% perennial grass damage
picloram	0.125	75	0
picloram	0.25	75	0
picloram	0.5	100	0
picloram	1.0	100	0
clopyralid	1.0	100	0
fluroxypyr	1.0	100	0
2,4-D LVE	1.0	100	0
dicamba	1.0	100	0
check	---	0	0

[1]LSD(0.05) = 27.2%, CV = 22.4

Comparisons of herbicides and herbicide combinations for control of Great Plains yucca (*Yucca glauca* Nutt. ex fraser). Whitson, T.D., J.W. Freeburn and M.A. Ferrell. Great Plains yucca competes with perennial rangeland grasses for sunlight and moisture and causes poor livestock utilization in areas which it occupies.

With the loss from the marketplace of silvex and 2,4,5-T, it has become very difficult to control yucca. These experiments were conducted to determine if other herbicides were available for its control. The first experiment compared dicamba at various rates and picloram. The second experiment was conducted as a screening trial comparing various herbicides for control of yucca. The first experiment was replicated four times with plots 9 by 30 ft., the second experiment was applied as single replications 9 by 120 ft. Both experiments were applied May 28, 1986 when the yucca was in the early bud stage, plants were actively growing and moisture conditions were good at the time of application. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil in the first experiment was a sandy loam (80% sand, 7% silt and 13% clay) with 1.5% organic matter and 6.9 pH. The second experiment was on a clay loam soil (80% sand, 9% silt and 11% clay) with 1.1% organic matter and 7.6 pH. Visual evaluations were made August 5, 1986. Weather information: air temp. 58 F, soil surface 60 F, 1 inch 65 F, 2 inch 65 F and 4 inch 65 F with relative humidity 90% and wind 5 to 10 mph NE.

Three months after application of the herbicides, no effects were shown with any herbicide in either experiment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1457.)

Table 1 Comparative applications of dicamba and picloram for control of Great Plains yucca

Herbicide[1]	Rate lb ai/A	% yucca control	% perennial grass damage
dicamba	0.5	0	0
dicamba	1.0	0	0
dicamba	2.0	0	0
dicamba + 2,4-D LVE	0.5 + 0.125	0	0
dicamba + 2,4-D LVE	0.5 + 0.25	0	0
dicamba + 2,4-D LVE	0.5 + 0.5	0	0
dicamba + 2,4-D LVE	1.0 + 0.125	0	0
dicamba + 2,4-D LVE	1.0 + 0.25	0	0
dicamba + 2,4-D LVE	1.0 + 0.5	0	0
picloram	0.5	0	0
check	---	0	0

[1]All treatments were applied with 1 gal Herbimax/Acre

Table 2 A screening study to determine efficacy of various herbicides for control of Great Plains yucca

Herbicide	Rate lb ai/A	% yucca control	% perennial grass damage
picloram	2.0	0	0
2,4-D LVE	4.0	0	0
fluroxypyr	1.0	0	0
dicamba	2.0	0	0
clopyralid	2.0	0	0
triclopyr	2.0	0	0
triclopyr + 2,4-D LVE	1.0 + 2.0	0	0
check	---------	0	0

Showy milkweed (*Asclepias speciosa* Torr.) control with various herbicides. Whitson, T.D., M.L. Schwope and M.A. Ferrell. Showy milkweed, a latex bearing perennial with seed carried by a pappus, is increasing in pastures and hay meadows in Wyoming. A trial was established on an irrigated grass pasture near Lovell, Wyoming on June 11, 1986 to determine what the effect of various herbicides were on showy milkweed and perennial grasses. Plots were 9 by 30 ft. in size arranged in a randomized complete block design with four replications. The herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 45 psi. The soil was a clay loam (44% sand, 28% silt and 28% clay) with 2.5% organic matter and 7.5 pH. Soil moisture and crop conditions were good during application. Weather information: air temp. 85 F, soil surface 95 F, 1 inch 92 F, 2 inch 90 F, 4 inch 85 F with relative humidity 36% and wind speeds 3 to 5 mph N. The showy milkweed was actively growing and in the bud stage at the time of application. Evaluations were made September 2, 1986.

Perennial grasses were not damaged in any treated area with the exception of sulfometuron at 2.0 oz. ai/A which suppressed grasses 50%. Evaluations made three months after application of herbicides indicated that picloram 2 EC controlled 92 and 99% of the showy milkweed when applied at 1.0 and 2.0 lb ai/A. Other treatments providing more than 70% control of showy milkweed included: dicamba (8.0 lb ai/A), fluroxypyr (1.0 lb ai/A, and sulfometuron (2.0 oz ai/A). Evaluations will be continued for four years to determine long-term effects of the herbicides on showy milkweed. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1458.)

Showy milkweed control with various herbicides

Herbicide	Rate lb ai/A	% showy milkweed control
dicamba	4.0	55
dicamba	8.0	86
2,4-D LVE	4.0	58
2,4-D LVE	8.0	19
triclopyr	1.0	60
triclopyr	4.0	40
clopyralid	1.0	29
clopyralid	2.0	35
fluroxypyr	0.5	68
fluroxypyr	1.0	75
picloram 2 EC	1.0	92
picloram 2 EC	2.0	99
sulfometuron	1.0 oz/A	63
sulfometuron	2.0 oz/A	80
fosamine ammonium	1.0	0
check	---	0

Rangeland perennial grass species production at Bosler, Wyoming, six years after tebuthiuron treatments. Whitson, T.D., M.A. Ferrell and H.P. Alley. Tebuthiuron 10 and 20% pelleted formulations were applied in the spring and fall to evaluate their efficacy for big sagebrush control in rangeland. The experiment was established on May 29, 1980 and September 16, 1980, on a Boyle sandy loam soil (60.6% sand, 24.2% silt and 15.8% clay) with 1.7% organic matter and 6.9 pH. Weather information, both locations: air temperature 76 F, soil surface 104 F, 1 inch 104 F, 2 inch 102 F, 4 inch 94 F; the relative humidity was 44% with wind speeds 0 to 1 mph SW. Treatment areas 49 m^2 were arranged in a randomized complete block design with three replications. The study was fenced to prevent grazing. The herbicides were applied with a centrifugal granular applicator. Perennial grass yields were determined by clipping individual species from five, one-half m^2 quadrats per treatment in 1986. Sagebrush was fully leaved at the time of application.

In 1986, study areas receiving 0.25, 0.5, 0.75, and 1.0 lb ai/A tebuthiuron attained control of 71, 90, 94, and 98 percent, respectively, and produced yields 2.84, 3.57, 2.81, and 2.57 times that of the untreated check, respectively. The 0.5 lb ai/A application rate tebuthiuron did not produce as high a percentage of sagebrush control as did the 0.75 and 1.0 lb ai/A applications but produced maximum forage yields. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1459.)

Evaluation of spring and fall applications of tebuthiuron 10 p and 20 p formulations for big sagebrush control and forage production

Tebuthiuron pelleted formulation	Application rate lb ai/A	Application time	Percent sagebrush control 1985	Percent sagebrush control 1986[1]	1985 Ag sm[3]	1985 other[2]	1985 total	1986 Ag sm	1986 other	1986 total
					Lbs oven dry forage production per acre year					
10%	0.25	5/29/80	93	72	827	105	932	715	91	806
10%	0.5	5/29/80	98	88	651	123	774	898	87	985
10%	0.75	5/29/80	98	94	610	14	624	716	56	772
10%	1.0	5/29/80	99	97	566	30	596	694	0	694
20%	0.25	5/29/80	87	55	535	83	618	529	98	627
20%	0.5	5/29/80	96	88	509	111	620	815	41	856
20%	0.75	5/29/80	95	90	557	51	608	695	2	697
20%	1.0	5/29/80	96	96	477	59	536	587	12	599
check	---	-------	0	0	246	0	99	202	68	270
10%	0.25	9/16/80	92	80	602	54	656	647	60	707
10%	0.5	9/16/80	98	91	628	48	676	793	56	849
10%	0.75	9/16/80	99	98	747	29	776	791	18	809
10%	1.0	9/16/80	100	100	436	34	470	769	0	769
20%	0.25	9/16/80	88	78	443	97	540	600	124	724
20%	0.5	9/16/80	98	94	555	65	620	816	92	909
20%	0.75	9/16/80	100	95	643	69	712	500	58	558
20%	1.0	9/16/80	100	98	592	15	607	483	45	528
check	---	-------	0	0	231	106	337	144	90	234

[1] 1986 % control LSD spring treatments 16.7, fall treatments 6.5; cv spring 12.7, fall 4.6

[2] Other species included (*Koeleria pyramidata*) and (*Poa sandbergii*)

[3] Ag sm - (*Agropyron smithii* Rydb.)

Great plains yucca control in Colorado rangeland. Beck, K.G. An experiment was established near Akron, CO to evaluate the control of Great Plains yucca (UCCGC) on rangeland. The design was a randomized complete block with four replications. Herbicides were applied on Jul 8, Aug 14, and Oct 28, 1986. The Jul 8 treatments included dicamba, picloram, dicamba plus 2,4-D LV, and dicamba plus picloram. Each herbicide treatment was applied with one of two surfactants, Herbimax (Loveland Industries, Loveland, CO) or Cidekick (JLB International Chemical Inc., Vero Beach, Fl) at 0.05% v/v (Table 2). On Jul 8, one dicamba and one picloram treatment did not include surfactant. On Aug 14 and Oct 28, only picloram and dicamba were applied with and without Herbimax surfactant. All treatments were applied with a CO_2 pressurized backpack sprayer using 11003 flat fan nozzles calibrated to deliver 29 gpa at 30 psi. Other application data are presented in Table 1. Plot size was 15 by 50 feet.

Visual evaluations of control were taken on Aug 28 and Nov 17, 1986. No control of yucca (Table 2) or damage to rangeland grasses (data not shown) was observed at either date. The experiment will be evaluated again in 1987 for yucca control. (Weed Research Laboratory, Colorado State University, Ft. Collins, CO 80523).

Table 1. Application information for Yucca control in Colorado rangeland with different herbicide and surfactant combinations.

Environmental data			
Application dates	Jul 8	Aug 14	Oct 28
Application time	2:00 p	2:00 p	4:00 p
Air temperature, F	81	81	55
Cloud cover, %	10	0	0
Relative humidity, %	60	60	60
Wind speed/direction, MPH	0	-	0
Soil temperature (2 in), F	68	68	39

Weed data

Application Date	Species	Growth Stage	Height (ft)	Density (plt/yd^2)
Jul 8	UCCGC	pods present	2 to 3	0.5 to 1
Aug 14	UCCGC	vegetative	2 to 3	0.5 to 1
Oct 28	UCCGC	vegetative	2 to 3	0.5 to 1

Table 2. Yucca control in Colorado rangeland with different herbicide and surfactant combinations.

Herbicide	Rate (lb ai/A)	Surfactant	Timing	UCCGC Eval 1[1]	Eval 2
				---(% Control)----	
dicamba	1.0	Herbimax[2]	Jul 8	0	0
dicamba	2.0	Herbimax	Jul 8	0	0
dicamba	1.0	Cidekick	Jul 8	0	0
dicamba	2.0	Cidekick	Jul 8	0	0
dicamba	2.0	none	Jul 8	0	0
dicamba + 2,4-D LV	1.0 +3.0	Herbimax	Jul 8	0	0
dicamba + 2,4-D LV	1.0 +3.0	Cidekick	Jul 8	0	0
dicamba + picloram	0.5 +0.25	Herbimax	Jul 8	0	0
dicamba + picloram	0.5 +0.5	Herbimax	Jul 8	0	0
dicamba + picloram	0.5 +0.25	Cidekick	Jul 8	0	0
dicamba + picloram	0.5 +0.5	Cidekick	Jul 8	0	0
picloram	0.5	Herbimax	Jul 8	0	0
picloram	0.5	Cidekick	Jul 8	0	0
picloram	1.0	Herbimax	Jul 8	0	0
picloram	1.0	Cidekick	Jul 8	0	0
picloram	1.0	none	Jul 8	0	0
dicamba	2.0	none	Aug 14	0	0
dicamba	2.0	Herbimax	Aug 14	0	0
picloram	1.0	none	Aug 14	0	0
picloram	1.0	Herbimax	Aug 14	0	0
dicamba	2.0	none	Oct 28	-	0
dicamba	2.0	Herbimax	Oct 28	-	0
picloram	1.0	none	Oct 28	-	0
picloram	1.0	Herbimax	Oct 28	-	0

[1]Evaluations 1 and 2 taken Aug 28 and Nov 17, 1986, respectively
[2]Surfactants applied at 0.05% v/v

Control of seedling deerbrush ceanothus on a forest plantation site with a paper groundcover mat compared to two soil-active herbicides. McHenry[1], W.B. B.L. Willoughby[2], D.R. Anderson[4], N.L. Smith[1] and R. Standiford[3]. This study was initiated to assess the efficacy of a paper product (HortoPaper) compared to atrazine and hexazinone for the control of seedling deerbrush ceanothus.

The site, located on Soper-Wheeler Company forest land, had been clearcut in 1982 and mechanically prepared for planting with a tractor-mounted brush rake, and slash-burned in 1983. The soil was sampled at two locations in each of the 4 replications and analytically characterized as follows: pH 5.5, 7.3% organic matter, 35% clay, 36% silt and 29% sand. Ten 2-0 seedlings each of ponderosa pine, douglas fir, and white fir were planted on a 10 ft. by 10 ft. spacing within and between rows February 1984.

Treatments, applied May 30, 1984, consisted of 4 ft. by 4 ft. paper, atrazine 4 lb ai/A, hexazinone 2 lb ai/A, and untreated controls. Both herbicides were applied to a 4 ft. by 4 ft. area centered on the seedling conifers to provide comparable potential control to the paper mats, and as a continuous broadcast strip treatment. A CO_2 kapsack sprayer was employed. The paper mats (processed peat moss and reclaimed paper) were placed by slipping each sheet over the planted conifer seedlings through pre-punched, star-shaped cuts in the center of the mats. Soil was placed around the paper edges to hold them flush to the ground. The statistical plan was a randomized complete block design.

Deerbrush ceanothus seedlings were emerging and ranged phenologically from the cotyledeon stage to heights of from 1 to 3 in. Initial post-treatment rainfall through June 1984 was 6.1 in.; total precipitation from initiation of the study to the evaluation date, November 19, 1985, was 57.6 in.

Parameter data included quadrant counts of suriving deerbrush ceanothus seedlings, in a 4 ft. by 4 ft. quadrant centered on 5 of each of the 3 conifer species per replication, conifer heights and survival of 10 trees, and paper mat integrity.

Results: Paper mats provided significally comparable reduction of seedling deerbrush ceanothus to atrazine applied to a 4 ft. by 4 ft. zone and to hexazinone applied either broadcast or to 4 ft. by 4 ft. zones. Although the paper mats had not fully survived intact at 20 months (73% average ground cover) following installations, an apparent "smothering" effect persisted.

Ponderosa pine seedling growth was statistically higher at the 5% level where hexazinone was employed compared to the remaining treatments. Treatment effects on growth were not significantly separable with douglas fir or white fir. Ponderosa pine survival was not significantly different across all treatment effects.

Survival of both douglas fir and white fir was significantly decreased when treated with the hexazinone 4 ft. by 4 ft. compared to the same herbicide employed at the same rate applied broadcast. This suggests that application to the restricted zone may have been responsible, although considerable care in application was used. The fact that survival for both conifer species with paper mats (4 ft.square) was significantly higher discounts inadequate relief from competition as the source of lower survival. (University of California Cooperative Extension, [1]Davis, [2]Oroville CA, [3]Berkeley CA; [4]Soper-Wheeler Co., Strawberry Valley, CA)

Seedling deerbrush ceanothus control and conifer
growth survival with paper mats and herbicides

Treatment	Weed control		Tree height (in.)			Tree survival (percent)		
	Plants/ 16 sq. ft.	Percent control	Pond. pine	Douglas fir	White fir	Pond. pine	Douglas fir	White fir
paper mats	0.5 C	94.1	15.5 B	17.3 A	13.0 A	87.5 A	90.0 B	70.0 B
atrazine 4 lb. 4 ft. x 4 ft.	4.1 B	56.1	18.3 AB	17.0 A	14.1 A	100.0 A	92.5 B	65.0 B
atrazine 4 lb. 10 ft. (broadcast)	1.7 C	77.6	18.6 AB	18.4 A	12.4 A	95.5 A	87.5 AB	75.0 B
hexazinone 2 lb. 4 ft. x 4 ft.	0.3 C	95.5	19.1 A	20.1 A	13.8 A	100.0 A	72.5 A	25.0 A
hexazinone 2 lb. 10 ft. (broadcast)	0.8 C	90.0	19.7 A	19.7 A	14.1 A	100.0 A	97.5 B	60.0 B
Control	7.6 A	0%	15.9 B	16.8 A	14.4 A	97.5 A	87.5 AB	47.5 B

Values with different letters are significantly different at the 5% level.

PROJECT 3.

UNDESIRABLE WOODY PLANTS

Diane E. White - Project Chairman

Eucalyptus stump and basal treatment. Cudney, D. W., W. B. McHenry and C. L. Elmore. *Eucalyptus camaldulensis* is a vigorous tree species which has been used in ornamental plantings and for fire wood production in California. This species resprouts vigorously after cutting. This is a desirable characteristic where regrowth is desired for fuel production. When removal is desired in the landscape or for site preparation, resprouting is not desirable. Control of resprouting through the use of a basal herbicide treatment prior to cutting or a cut surface herbicide treatment after cutting could be helpful.

A trial was conducted at the University of California Moreno Experimental Farm fifteen miles southeast of Riverside, California. The eucalyptus at the site were five years old, 30 centimeters in diameter, and were planted 120 centimeters apart. The site had and continued to receive regular irrigation to prevent tree stress. The soil texture was a sandy clay loam with less than one percent organic matter. The trees were cut using a chain saw on October 22, 1985. Immediately after cutting the exposed stumps were treated with the various herbicides. The commercially available formulation of each herbicide was diluted with distilled water to make a one-third herbicide, two-thirds water solution. The cut surface of each stump was completely soaked with herbicide solution utilizing a laboratory wash bottle. Uncut trees were left on each side of each cut tree to see if treating an adjacent stump would affect nearby standing trees later. Basal treatments utilizing a three percent herbicide solution in diesel oil were made in a similar fashion. In the case of basal treatments a 45 centimeter band of the trunk near the soil line was soaked with the diesel-herbicide mixture. Four replications were made in a completely randomized experimental design. Evaluation took place ten months later on July 2, 1986.

The 2,4-D water soluble amine, fosamine ammonium, glyphosate, dicamba, triclopyr ester, and triclopyr amine stump treatments were all effective in controlling resprouting. Stumps which had been cut, but not treated, had vigorously resprouted eight months after treatment with resprouts averaging 300 centimeters in length (Table 1). The basal treatments were not effective in killing uncut eucalyptus (Table 2). There was no effect noted on any of the trees adjacent to either the stump-treated or the basal-treated trees. (University of California Cooperative Extension, Riverside, CA 92521)

Table 1. Eucalyptus stump treatment

Treatment Type*	Herbicide	Est. Growth (cm)
Stump	2,4-D water sol. amine	7.50
Stump	fosamine ammonium	-0-
Stump	glyphosate	15.00
Stump	dicamba	-0-
Stump	triclopyr ester	-0-
Untreated stump		300.50
LSD .05		77.00

* Average of four replications

Table 2. Eucalyptus stump basal treatment

Treatment Type*	Herbicide	Toxicity Rating1/ lbs ai/A
Basal	2,4-D oil sol. amine	-0-
Basal	triclopyr ester	-0-
Basal	triclopyr amine	-0-
Untreated Base		-0-

*Average of four replications
1/ toxicity rating: 0 = no effect
10 = all trees dead

PROJECT 4.

WEEDS IN HORTICULTURE CROPS

Lee Darlington - Project Chairman

Evaluation of preemergent herbicides in nursery container ornamentals Elmore, C. L. and D. J. Boquist. Six different ornamental shrubbery species were transplanted into containers and used with phytotoxicity of 11 preemergent herbicides. Four randomized complete block plots were arranged with 3 plants per species. Herbicides were applied March 5, 1986, and August 15, 1986, with a CO_2 pressure sprayer or a granular shaker can. Containers were sprinkler irrigated immediately after treatment. Soil was an organic nursery mix.

Phytotoxicity evaluations were made one month after each treatment. Vigor ratings were made before treatments and as a final evaluation. Prunings were made in August and evaluated for dry weight comparison.

All of the ornamental species under evaluation exhibited tolerance to the commercial formulations of oxyfluorfen + oryzalin (Rout), oxyfluorfen + pendimethalin (Scotts' OH II), oryzalin, oxadiazon, pendimethalin (Pre M) and prodiamine. A comparison of pruning weights however, indicates some differences in growth. Oxyfluorfen and lactofen varied significantly in degree of damage between species, with *Juniper chinensis* showing the greatest degree of tolerance to both. (University of California Cooperative Extension, Davis 95616)

Ratings of Preemergent Herbicides on Container Ornamentals

Herbicide	lb ai/A Rate	Juniper chinensis			Abelia x grandiflora			Berberis thunbergii			Euonymous fortunei			Euonymous fortunei 'colorata'			Spirea x vanhouttei		
		Phyto	Vigor	Wts	Phyto	Vigor	Wts	Phyto	Vigor	Wts	Phyto	Vigor	Wts	Phyto	Vigor	Wts	Phyto	Vigor	Wts
oxyfluorfen + oryzalin	2+1	1	10	16.3	1	9	25.0	1	10	21.3	1	10	7.9	1	10	30.4	1	9	13.4
oxyfluorfen + pendimethalin	2+1	1	10	12.8	1	10	24.4	1	10	26.3	1	10	7.6	1	10	34.1	1	9	18.0
oryzalin	4	1	10	15.7	2	8	13.4	1	8	17.0	1	10	8.1	1	10	31.3	1	8	24.7
oxyfluorfen	1	1	10	15.9	2	10	15.3	1	10	22.0	5	4	3.8	2	8	21.5	1	8	11.1
oxadiazon (50WP)	4	1	10	18.0	2	9	31.7	1	10	22.5	1	10	8.0	1	10	33.3	1	10	22.3
pendimethalin (60WP)	4	1	10	16.2	1	9	18.0	1	10	18.2	1	10	8.9	2	10	36.7	1	9	21.2
EL 107	1	1	10	17.7	1	8	27.5	1	10	18.7	3	6	5.4	3	6	22.1	1	9	27.4
EL 107 + oryzalin	1	1	10	17.5	1	9	14.0	1	10	16.4	5	5	5.3	2	9	21.3	1	7	12.3
prodiamine	3.0	1	10	17.9	1	10	29.8	1	9	14.8	1	10	11.2	1	9	39.9	1	8	17.0
lactofen	1.0	1	10	17.2	1	10	19.3	3	8	11.9	9	4	2.4	2	9	14.7	2	9	19.6
lactofen	2.0	1	10	15.2	3	9	10.9	4	5	11.9	10	1	0	3	5	12.7	4	6	16.7
Control	-	1	10	17.6	1	10	39.4	1	10	17.9	1	10	6.7	1	10	37.1	1	10	29

Phytotoxicity
1-3 acceptable
4-10 unacceptable phytotoxicity

Vigor
10 - very vigorous
7-10 acceptable vigor
0 - dead plants

Wts(g)
dry pruning wts

Preemergence herbicides on ornamental ground covers. Elmore, C.L. and D.J. Boquist. Transplants of ornamental ground covers were treated June 16, 1986, within one week of planting, with 16 preemergent herbicide treatments to evaluate phytotoxicity, vigor and spread. The experiment was arranged in a randomized complete block design with 4 replications and 6 plots per species per plot. The pendimethalin, oxadiazon, and oryzalin plots were hoed to remove of germinating weeds before treatment ; this is reflected in the barnyardgrass and weeding time data. All other plots remained unhoed. Herbicides were applied with a CO_2 pressure sprayer or granular shaker can and followed by sprinkler irrigation. Soil was as a Yolo sandy loam.

Plots were evaluated for weed control and phytotoxicity 1 month after treatment and again after 3 months. The oryzalin treatment gave excellent weed control without injury with the exception of *Potentilla verna*. *P. verna* was not injured with low rates of pendimethalin and the granular formulation of oxadiazon. Unfortunately, weed control under these treatments was only fair. Some marginal increased selectivity of oxadiazon is apparent with the granular compared to the wettable powder formulation, however, there is a significant reduction in weed control. Oxadiazon + bifenox did not give significant injury to any species except *P. verna*. Prodiamine did not cause phytotoxicity to any ground cover species. Lactofen granules injured *Hypericum calycinum* but did not signifcantly injure other species. (University of California Cooperative Extension, Davis, CA 95616)

Ground cover susceptibility, weed control and weeding costs from preemergence herbicides

Treatment	Rate lb/A	*Carpobrotus edule* P 6/30	*Carpobrotus edule* V 11/11	*Potentilla verna* P 6/30	*Potentilla verna* V 11/11	*Myoporum parviflorum* P 6/30	*Myoporum parviflorum* V 11/11	*Gazania splendens* P 6/30	*Gazania splendens* V 11/11	*Hedera helix* P 6/30	*Hedera helix* V 11/11	*Hypericum calycinum* P 6/30	*Hypericum calycinum* V 11/11	*osteospermum fruticosum* P 6/30	*osteospermum fruticosum* V 11/11	*Arctotheca calendula* P 6/30	*Arctotheca calendula* V 11/11	Weed Population BYG	Weed Population AB	Weed Population CW	Hand Weeding Time HRS/A
pendimethalin	2	2	5	2	6	2	7	1	7	1	6	2	5	1	7	2	7	9.0	9.0	10.0	147.5
(4EC)	4	2	7	2	8	1	8	2	8	1	8	2	8	2	9	4	7	9.5	9.0	8.5	46.2
	8	3	7	4	5	3	7	2	8	3	5	4	7	2	5	5	5	10.0	9.0	9.5	14.3
oxadiazon	2	2	7	2	4	1	7	2	8	2	5	2	6	1	8	1	8	9.5	5.0	6.0	126.5
(4G)	4	3	6	3	6	2	8	2	9	3	5	2	8	1	7	2	9	9.8	7.0	6.0	92.4
oxadiazon	2	2	7	3	8	1	8	2	9	1	9	3	8	2	8	2	9	10.0	7.0	6.5	49.5
(50WP)	4	3	5	5	5	1	9	2	9	3	6	1	9	2	9	3	6	10.0	9.0	4.5	1.1
oxadiazon +	2+3	2	5	3	7	1	7	2	8	2	7	1	5	1	9	1	9	8.8	7.0	7.0	191.4
bifenox	4+6	2	7	4	7	1	8	1	9	2	8	2	8	1	8	3	7	9.5	8.5	8.0	78.1
prodiamine	2	2	6	3	5	1	6	1	8	2	7	3	6	1	9	3	7	5.2	9.0	9.0	117.7
	4	2	5	2	4	2	7	2	9	2	8	2	9	1	8	3	7	4.8	9.0	10.0	97.9
methazole	2	2	3	6	3	2	5	5	4	3	4	3	6	4	6	7	3	9.8	2.0	9.0	247.5
	4	4	3	6	1	3	6	6	5	4	3	4	5	7	4	9	2	9.8	2.0	9.0	116.5
lactofen	.5	2	5	3	6	2	5	2	7	3	4	4	5	2	7	3	7	9.2	4.0	8.0	178.2
oxyfluorfen + oryzalin (Rout)	2+1	2	7	6	6	1	9	3	9	1	8	2	9	2	7	4	6	10.0	9.0	8.5	25.1
oryzalin	4	2	7	4	5	1	8	1	9	3	8	2	9	1	9	1	9	8.0	10.0	10.0	35.2
control	-	2	5	2	4	1	5	1	6	2	5	3	6	1	6	1	7	1.0	1.0	1.0	308.0

Phytotoxicity
1-3 acceptable
4-10 unacceptable phytotoxicity

Vigor
10=very vigorous
7-10 acceptable vigor
0-dead plants

Barnyardgrass(BYG) *Echinochloa crus-galli* (L.)Beauv.
Annual Bluegrass(AB) *Poa Annua* L.
Chickweed (CW) *Stellaria media* (L.)Vill.

1 = no control
10=complete control

The effect of bentazon on the control of yellow nutsedge in trees and vines. Lange, A. H., R. Oliver and K. F. Lange. A major problem in drip irrigated trees and vines is the excessive growth of nutsedge in the wet zone of each emitter. Some control of annual weeds can be expected with a good preemergence weed control program, but most preemergence herbicides are ineffective on nutsedge. Besides competing for water and nutrients, and possible allelotropic growth effects on trees the foliage of the nutsedge obscures the emitter so that growers cannot see if it is delivering a normal flow. The objective of this study was to evaluate postemergence control of yellow nutsedge in young drip irrigated trees and vines.

Test 1

A heavy stand of yellow nutsedge was divided into 2½ X 9 ft. plots and sprayed with different herbicides combinations on April 21 and again May 15, 1986. The air temperature was 85-90°F during the first treatment. Bentazon was applied in 25 gal/A using one 8002 L.P. at 10 psi. The control was rated April 4 through June 3, 1986.

The bentazon gave commercial control of yellow nutsedge at 1.5 to 2 lb/A. The control was improved by adding MSMA particularly at the 1 month reading. MSMA started out slow, but continued to improve where as bentazon, being a contact herbicide, tended to recover at about 1 month, but the results improved after the second application.

Table 1. The effect of bentazon on the control of yellow nutsedge.

Herbicide treatment	Lb/A	4/28/86	Average[1/] control on 5/8/86	5/26/86	6/3/86
Bentazon+$(NH_4)_2SO_4$[2/]	1.0	5.0	2.0	6.5	6.8
Bentazon+Oil Conc.[3/]	1.0	5.0	3.8	5.5	5.0
Bentazon+Oil Conc.	1.5	6.8	4.2	7.2	7.8
Bentazon+Oil Conc.	2.0	7.0	5.2	7.2	7.2
Bentazon+Oil Conc.+MSMA	2.0+2.0	7.5	6.8	9.0	8.2
MSMA+Surfactant[4/]	2.0	3.0	5.2	6.5	7.2
Check		0.0	0.0	1.0	1.8

1/ Average control on 4 replications when 0 = no effect and 10 = no line top growth.
2/ $(NH_4)_2SO_4$ (Ammonium sulfate) was added @ 2.5 lb/A.
3/ Oil concentrate was added @ 1 qt/A.
4/ The surfactant was X-77 added @ 1%.

Test 2

A heavy yellow nutsedge infestation growing in the wet zones of emitters in young apples and grapes (3 replications) were sprayed on June 6 and again on July 8, 1986. Using three 8002 L.P. at 10 psi the herbicide applications were made in 25 gal/A of water.

The control was good especially where the dead nutsedge was replaced with bermuda and crabgrass. The MSMA plots in the apples regrew with nutsedge. The plots in the grapes regrew with crabgrass and bermudagrass probably holding down yellow nutsedge regrowth.

Table 2. The effect of bentazon on the control of yellow nutsedge.

		Average[1/] control of yellow nutsedge				
		Apples			Grapes	
Herbicide treatment	Lb/A	Wet spot 6/26	Out-side 6/26	Wet spot 8/26	Wet spot 6/26	Wet spot[2/] 8/26
Bentazon+$(NH_4)_2SO_4$	1.0	3.8	4.0	6.5	3.3	8.3
Bentazon only	1.0	3.5	4.0	9.2	2.3	7.3
Bentazon+Oil Conc.	1.0	4.0	4.8	5.2	5.0	8.7
Bentazon+Oil Conc.	1.5	3.5	6.2	7.8	4.3	10.0
Bentazon+Oil Conc.	2.0	4.3	3.8	5.0	6.0	10.0
MSMA+Surfactant	4.0	7.2	8.8	0.0	9.0	8.3
Check		0.0	0.0	-	0.3	0.0

1/ Average of 3 replications where 0 = no effect and 10 = complete weed control.
2/ Heavy regrowth of bermudagrass, crabgrass and cupgrass.

While bentazon did not eliminate yellow nutsedge at the lower rates and wasn't as active as MSMA, it did give considerable short term control with no apparent injury to young trees or vines. Since the weedy spots were one to three feet from the base of the trees and vines little or no spray contacted the crop foliage or tunk. Spraying of the trunks and foliage of young trees or vines with a series of rates is needed in order to establish the margins of safe use. There is also the necessary residue work for registration if bentazon is an selective as it appears to be. (Herbicide Research Institute, 9400 S. Lac Jac, Reedley, CA 93654.)

Johnsongrass control with Cycloxydim (BAS 51702). Lange, A. H., K. F. Lange and G. R. Oliver. Selective postemergence herbicides for the control of johnsongrass have recognized advantages in young trees and vines. Some of the first to be registered are somewhat less effective on undisturbed bermudagrass and johnsongrass growing on untilled berms in perennial crops. The objective of these field trials was to evaluate cycloxydim for selective johnsongrass control in young nectarine trees.

The results of summer applications in 1985 showed considerably better control than sethoxydim. A rate of cycloxydim approaching 1 LB/A appeared better than lower rates.

Table 1.

Herbicides	Lb/A	Average Control 1/ 10/28/85	Average Control 1/ 4/19/86	Tree Vigor 2/ 9/23/86
Cycloxydim + O.C.3/	0.1	1.0	1.8	8.2
Cycloxydim + O.C.3/	0.2	3.3	5.0	8.2
Cycloxydim + O.C.3/	0.3	3.0	3.8	8.0
Cycloxydim + O.C.3/	0.4	5.0	5.2	7.5
Cycloxydim + O.C.3/	1.0	7.8	8.0	7.8
Cycloxydim + O.C.3/	0.2+(0.1)	4.0	3.8	9.2
Cycloxydim + O.C.3/	0.2+(0.2)	6.2	5.8	8.2
Sethoxydim + X-77	1.0	0.2	0.2	8.5
Check	-	0.0	0.2	6.5

1/ Average of 4 replications where 0 = no effect and 10 = complete control.
2/ Average of 4 replications where 0 = no growth of tree and 10 = most vigorous tree growth.
3/ O.C. = non phytotoxic oil conc. @ 1%

1986 Test 1 (Table 2)

The work was conducted on a heavy infestation of undisturbed johnsongrass in a young Mayglo nectarine orchard in 2nd leaf growth under furrow irrigation. The air temperature was 86-90F°. The herbicides were applied in 25 gpa of water with a 8002 LP nozzle at 10 psi on 4/19/86 and 7/2/86. The plots were 3.3 feet by 20 feet covering two spaces between 3 trees.

The results with cycloxydim were again spectacular when evaluated 2 months after treatment. The low rates however, did not hold. The highest rate gave commercial control for four months, i.e., through the summer season. The single high rate consistently gave the best control in both the 1985 and 1986 trials. For season long johnsongrass control it appears that cycloxydim is many times better than sethoxydim but will require close to 1 lb/A to do a good job.

Table 2.

Herbicides	Lb/A	Average Johnsongrass Control 1/ 4/28/86	5/10/86	8/16/86	8/16/86
Cycloxydim + O.C.2/	0.2+0.2	2.2	4.2	6.8	2.0
Cycloxydim + O.C.2/	0.4	5.8	6.0	7.0	8.2
Cycloxydim + O.C.2/	0.4+0.4	5.8	7.0	8.8	4.5
Cycloxydim + O.C.2/	0.8	3.8	5.5	9.2	6.0
Sethoxydim + O.C	0.8	2.8	4.8	4.5	0.8
Check (paraquat)	1.0	7.2	5.5	1.2	0.2
Check	-	0.0	0.0	0.0	0.0

1/ Average of 4 replications where 0 = no effect and 10 = complete kill of johnsongrass as expressed by top growth or the regrowth.

2/ O.C. = non phytotoxic oil concentrate @ 1 qt/A

1986 Test 2 (Table 3)

Large flowering johnsongrass (5-6' tall) was sprayed with three 8002 L.P. nozzles at 10 psi, angled to spray the sides of the johnsongrass on 5/25/86 and 6/27/86 for treatments "A" and "C".

Again, with this later application, the single higher treatment was more effective than the split treatment.

More work should be done at 1-2 lb/A with these new herbicides because they are much better than sethoxydim or sethoxydim plus glyphosate. They also appeared to be very safe on young trees. (Herbicide Research Institute, 9400 S. Lac Jac, Reedley, CA 93654, and BASF, Fresno, CA).

Table 3.

Herbicides	Lb/A	Average Johnsongrass Control 1/ 6/17/86	8/16/86	9/28/86
Cycloxydim + O.C.	0.4+0.4	4.8	7.5	6.8
Cycloxydim + O.C.	0.8	6.2	8.5	8.8
Sethoxydim + O.C.	0.8	4.5	2.0	3.5
Sethoxydim+Glyphosate	0.4+0.4	6.5	4.8	5.2
Check (Paraquat)	0.1	4.8	0.0	3.5
Check	-	0.0	0.0	0.0

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

The effect of BAS 514 on the control of flaxleaved fleabane and marestail. A. H. Lange, K. F. Lange and G. R. Oliver. Some of the weeds most frequently missed by preemergence herbicides used in trees and vines are marestail, flaxleaved fleabane and cudweed. The obective of this work is to evaluatre BAS 514 for the control of flaxleaved fleabane and marestail. A young orchard row of peaches known to be heavily infested with these weed species was treated March 8, 1986 during a rain (young Early O'Henry peach tree plots) using 50 gpa of water. The soil is a Delhi Loamy sand with 0.1% organic matter. Three 8004 L.P. nozzles at 15 psi were used with contant CO2 pressure. Pace was added at 1% to each solution. The plots were sprinker irrigated twice in order to increase the chance of injury to the young peach trees and so that the plot area beyond the drip "spot" could also be evaluated.

Table 1. Control of annual weed in young Early O'Henry peach trees under drip irrigation.

		Average Control1/			
		Overall plot area outside wet spot	--In wet spot -- New weeds only	Spotted spurge	Average2/ Tree Vigor
Herbicides	Lb/A	6/17/86	6/17/86	6/17/86	8/26/86
BAS 514	1/4	7.5	9.0	4.2	8.2
BAS 514	1/2	8.5	9.0	6.8	9.0
Check		4.0	2.8	4.0	8.2

		In wet spot			
Herbicides	Lb/A	Flaxleaved fleabane	Spotted Spurge	Black Nightshade	Crab-grass
		8/8/86	8/8/86	8/8/86	8/8/86
BAS 514	1/4	7.5	0.0	10.0	3.8
BAS 514	1/2	10.0	2.2	10.0	7.5
Check		1.2	1.2	7.5	9.0

		Outside wet spot				
Herbicides	Lb/A	Flaxleaved fleabane	Spotted Spurge	Black Nightshade	Crab-grass	General
		8/8/86	8/8/86	8/8/86	8/8/86	9/26/86
BAS 514	1/4	8.5	7.5	10.0	7.5	6.5
BAS 514	1/2	9.5	5.0	10.0	9.0	7.9
Check		2.0	1.2	10.0	1.8	3.6

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

2/ Average where 0 = tree dead and 10 = most vigorous growth.

A moderate stand of marestail, flaxleaved fleabane and willow herb was sprayed April 22, 1986 with herbicides in 25 gpa of water using 3-8002 L.P. nozzles at 10-15 psi in young plums and nectarine trees growing on a berm with furrow irrigation. Bright sun with 90° temperatures prevailed during treatment.

The results showed many formidable effects on the weeds early with a somewhat slow killing phase ont the large older weeds (rapid kill of the young 2-5" weed occurred). BAS 51 was weak on willow herb, but seemed to do well on a few other species.

Flaxleaved fleabane seemed less affected than marestail, however, control of both increased with time. (Herbicide Research Institute, 9400 S. Lac Jac, Reedley, CA 93654, and BASF, Fresno, CA).

Table 2. Postemergence control of annual weeds in young trees.

		Average Control1/					
		5/1/86		5/10/86		9/23/86	
Herbicides	Lb/A	MT	FLF	MT	FLF	MT& FLF	Other Weeds2/
BAS 514	0.125	4.2	0.0	6.0	2.8	6.0	4.2
BAS 514	0.25	5.0	0.0	5.2	2.5	8.0	8.2
BAS 514	0.50	6.2	0.0	6.5	3.0	10.0	7.8
BAS 514+OC3/	0.25+1 qt	6.8	2.5	7.2	5.7	10.0	8.2
BAS 514+2,4-D LVE	0.5+0.5	6.8	3.0	7.5	6.0	10.0	8.8
Glyphosate+F. surfactant4/	0.5	7.2	4.0	8.5	6.0	9.5	8.8
Check	-	0.0	0.0	0.2	0.0	2.2	3.0

(MT = Marestail; FLF = Flaxleaved fleabane)

		Average 1/ 7/5/86				
					Control	
		Vigor			Mares-	Crab-
Herbicides	Lb/A	Plum	Peach	Ave.	tail	grass
BAS 514	0.125	9.5	9.0	9.3	6.0	5.5
BAS 514	0.25	8.5	10.0	9.3	7.5	7.5
BAS 514	0.50	10.0	9.5	9.5	9.8	5.2
BAS 514+OC3/	0.25+1 qt	10.0	8.0	9.0	10.0	9.8
BAS 514+2,4-D LVE	0.5+0.5	10.0	9.0	9.5	10.0	3.8
Glyphosate+F. surfactant	0.5	10.0	10.0	10.0	8.8	9.0
Check	-	9.5	9.0	9.3	3.2	7.0

1/ Average of 4 replications where 0 = no growth or effect and 10 = most vigorou tree or perfect control, i.e., no weeds.
2/ Other weeds: willow herb, pigweed, lambsquarters and crabgrass.
3/ OC = nonphytotoxic oil concentrate plus surfactant.
4/ Surfactant F was Frigate by Diamond Shamrock Chem. Co.

The effect of preemergence herbicide combinations on the control of difficult compositae. Edson, W. D. and A. H. Lange. Several annual weeds in the Compositae family are on the increase in California orchards. These weeds show considerable tolerance for all of the new orchard herbicides particularly those chemically related to trifluralin. The object of this study was to compare several registered, or soon to be registered, herbicide combinations for the control of marestail, flaxleaved fleabane and cudweed in a ten year-old almond orchard under complete nontillage. The soil is a Hanford fine sandy loam (organic matter 0.5%, sand 52%, silt 36%, and clay 12%).

On March 18, 1985 plots 3.3 x 16 feet were layed out and sprayed. All standing weeds were burned down with 1/2 Lb/A of paraquat plus 1% oil concentrate. The weather was cool with some sprinkling during application. Rain measuring 0.7 inch was received eight days after herbicide application. The plots were flood irrigated beginning in May through the summer as needed.

The results showed a definite advantage to including simazine with other orchard herbicides in order to control these Compositae weeds. In the long term terbutryne plots seemed to have as good control as the simazine plots. Norflurazon and fluorchloridone were weaker than simazine.

Where the soil, culture and varieties will permit simazine needs to be included for overall good weed control in orchards where Compositae weeds can be a problem. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

A comparison of preemergence herbicide combinations for weed control in an almond orchard (425-73-501-146-1-85).

		Average Weed Control[1/]			
		Cudweed	Marestail & Flaxleaved Fleabane	General	MT, FLF & Cudweed
Herbicides	Lb/A	--------- 3 months		---------	10 months
Simazine+Oryzalin	2+6	10.0	9.7	6.7	7.3
Simazine+Prodiamine	2+6	10.0	9.0	6.3	6.0
Simazine+Pendimethalin	2+6	10.0	10.0	8.0	8.7
Simazine+Fluorchloridone	2+4	10.0	10.0	6.3	8.7
Simazine+Norflurazon	2+4	10.0	10.0	8.3	9.0
Simazine+Oxyfluorfen	2+2	10.0	9.7	7.3	8.3
Terbutryne+Oryzalin	4+6	10.0	6.0	4.3	7.0
Norflurazon+Oryzalin	4+6	7.7	8.3	6.7	5.7
Norflurazon+Prodiamine	4+6	9.0	6.3	6.7	3.7
Norflurazon+Pendimethalin	4+6	8.7	8.3	4.7	6.0
Fluorchloridone+Oryzalin	4+6	10.0	8.0	7.0	6.0
Fluorchloridone+Prodiamine	4+6	10.0	7.0	6.7	5.0
Fluorchloridone+Pendimethalin	4+6	10.0	8.3	7.3	5.0
Oryzalin	6	7.0	2.7	5.0	2.3
Pendimethalin	6	10.0	3.3	4.0	0.0
Check	-	3.3	4.3	2.3	0.0

[1/] Average of 3 replications where 0 = no control and 10 = complete weed control. Treated 3/18/85. Evaluated 6/24/85 and 1/1/86. Rain measuring 0.7 inch was received 8 days after herbicide application.

The effect of metham on the growth of almond and peach seedlings. A. F. Lourens and A. H. Lange. One year-old Mission almond seedlings growing in 46 oz. cans of a Delhi loamy sand and nemaguard peach seedlings planted July 23 in pots of washed river sand were treated August 26 with metham diluted in sufficient water to saturate the soil in 6-inch pots. The subsequent growth was rated on September 9, September 18, September 24, October 13 and November 1, 1986.

The effect of metham on one year-old almonds in soil was less than newly planted peach seedlings. Injury appeared to start near 40 ppm for the peach seedlings and somewhat higher for the older almond seedlings. The uniformity of the peach seedlings warranted the taking of more data. The visual symptoms were minimal at 40 ppm, but the height and weight began to decline at 40 ppm. At 5 to 20 ppm there was no indication of a loss in growth of peaches.

Since nematodes and other micro-organisms have been reported to be killed in the range of 5-10 ppm and less, the possibility of selectivity is apparent. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of metham drenches on the growth of almond and peach seedlings (425-73-506-100-7-86).

		Average[1/]									
		Almond					Peach				
		Phyto		Vigor			Phyto	Vigor		Regrowth	
Herbicide	ppm	9/8	9/24	9/9	9/18	9/24	9/8	9/9	9/18	10/3	11/1
Metham	5	0.2	0.6	9.8	9.2	9.8	0.0	9.8	9.2	6.0	8.6
Metham	10	0.4	0.6	9.8	9.2	9.6	0.0	9.8	9.2	8.8	9.4
Metham	20	0.2	0.8	10.0	9.2	10.0	0.2	10.0	9.6	8.6	9.0
Metham	40	0.8	1.0	9.2	7.8	9.4	0.2	9.4	8.6	6.6	8.0
Metham	60	-	-	-	-	-	1.8	7.8	6.0	7.8	7.0
Metham	80	2.4	2.2	7.0	3.6	5.0	2.4	8.0	5.4	1.6	1.2
Metham	100	-	-	-	-	-	2.4	8.0	4.0	0.2	0.0
Metham	160	2.4	4.0	6.6	3.6	4.4	6.0	7.6	1.6	0.0	0.0
Check	-	0.0	0.4	9.6	8.8	9.6	0.2	10.0	9.4	7.8	8.6

Herbicide	ppm	Phyto to[1/] peach	Peach height in cm	Peach Fresh top weight gm	Fresh Top Weight of regrowth gm
		9/24	9/24	9/24	
Metham	5	0.0	52.2	11.7	2.5
Metham	10	0.0	51.4	11.5	2.9
Metham	20	0.2	50.2	12.1	2.9
Metham	40	0.4	44.0	8.6	2.3
Metham	60	1.6	37.6	6.3	2.1
Metham	80	4.0	36.0	5.0	0.1
Metham	100	5.0	35.6	5.2	0.0
Metham	160	9.4	35.2	2.7	0.0
Check	-	0.0	48.4	12.8	2.9

[1/] Average of 5 replications where 0 = no phytotoxicity symptoms, no growth or regrowth and 10 = most phytotoxic reaction, most vigorous growth or regrowth.

The effect of soil applied growth regulators on the growth of peach seedlings and purple nutsedge. A. F. Lourens and A. H. Lange. In a 1981 herbicide screening trial EL 500 gave excellent control of yellow nutsedge as well as a dwarfing effect on most species of tree fruit. In 1983 these findings were repeated. In addition, PP 333 was found to give similar results. The nutsedge control was somewhat less as was the dwarfing effect on trees.

In a recent greenhouse study 6 to 8 inch nemaguard seedlings growing in 6 inch plastic pots of washed river sand with five tubers of purple nutsedge per pot were treated with three growth regulators on August 9 and again on August 16, 1986. The pots were also treated monthly with half-strength Hoaglands nutrient solution. The growth regulators were applied diluted in sufficient water to completely wet the sand at three concentrations, i.e., 0.25, 1 and 4 ppm.

The effect on peaches and nutsedge was rated August 23 and September 4, 1986. Tree height and fresh top weight of the peach and nutsedge growth was also made on September 4. The regrowth from the stump was weighed and the number of nutsedge tubers were counted and weighed fresh on November 19, 1986.

Both the growth regulator and the competition from nutsedge reduced peach seedling growth. Of the three growth regulators XE 1019 appeared most active on top growth of purple nutsedge but was similar on the rhizome roots and tubers. It seemed also to reduce vigor of regrowth of peach more than the other two growth regulators but not the fresh weight of top regrowth and roots. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of soil applied growth regulators on nemaguard and peach seedling and purple nutsedge growth (425-73-502-100-5-86).

		Average[1]							
		Peaches				Nutsedge			
Treatment	ppm	Vigor of regrowth	Height in cm 8/23	Fresh top weight[2] wt. in gm 9/4	Wt. of stump regrowth & roots[3] 11/20	Vigor 8/23	Fresh top wt.[2] in gms. 9/4	Fresh top wt.[2] in gms. 10/2	Wt. regrowth rhizomes & roots[3] 11/20
PP 333	0.25	4.8	28.6	4.1	14.4	8.2	6.3	4.4	43.2
PP 333	1.0	2.0	26.6	3.5	11.0	7.6	6.5	5.1	53.2
PP 333	4.0	2.2	26.8	3.7	11.3	3.0	3.8	3.7	44.7
EL 500	0.25	3.8	28.2	3.7	11.4	8.6	6.8	4.4	67.1
EL 500	1.0	2.4	27.6	3.6	10.6	7.8	6.0	4.7	71.1
EL 500	4.0	1.2	27.0	3.5	11.0	3.0	3.2	2.7	46.5
XE 1019	0.25	2.6	29.8	4.4	13.1	6.8	3.2	4.0	60.0
XE 1019	1.0	1.0	28.0	3.9	13.1	6.6	4.3	3.3	60.3
XE 1019	4.0	1.0	28.4	3.8	10.3	3.6	2.8	2.1	45.0
Check (w/nutsedge)		5.2	28.0	4.2	13.7	9.8	6.1	4.0	59.2
Check (w/o nutsedge)		9.8	30.6	6.0	27.2	-	-	-	-

1/ Average of 5 relications where 0 = no growth and 10 = best growth.
2/ Fresh weight of tops in gms taken 9/4/86.
3/ Weight of stump regrowth foliage and roots taken 11/20/86 in gms.

The effect of 15 preemergence herbicides spring applied at elevated rates on 8 species of trees and vines. A. H. Lange and K. F. Lange. Seven species of trees and two young grapevines were planted into plots of prepared Hanford fine sandy loam soil at the UC Kearney Agricultural Center (Block 37) on April 6, 1986. In order to compare high rates of these preemergence herbicides on April 19 herbicides were applied in 10 x 20 foot plots containing all 8 species. On April 21 the plots were sprinkler irrigated with 1 A" of water.

A phytotoxicity rating was made June 13. Weed control ratings were also made on June 13 and again on October 12. Vigor ratings were recorded on October 12.

The results showed considerable symptoms at these rather high rates designed to produce symptoms without killing the trees. However, the rates proved to be somewhat low for most herbicides. By the middle of summer the trees had grown out of most of the symptoms and the effects of weed competition were causing more growth inhibition than the chemicals.

Herbicides showing excessive injury on most species included bromacil, dicamba, tebuthiuron, and sulfonate. Those herbicides showing intermediate injury were simazine, diuron, methazole, terbutryne, and norflurazon. Those showing no symptoms included oryzalin, oxyfluorfen, metolachlor, dichlobenil, and napropamide.

The final readings showed Eucalyptus to be one of the most sensitive species. Bromacil, dichlobenil, tebuthiuron, and sulfonate all killed these trees. Pears and grapes were also quite susceptible to bromacil. French prune and olives also seemed to be sensitive to tebuthiuron. Dicamba seemed to be hard on all species but some of the poor growth was due to a heavy grass infestation that established itself in the dicamba plots due to the excellent broadleaf weed control.

Although considerable symptoms were present in the simazine, diuron, terbutryne and norflurazon plots, none of the species showed vegetative growth effects. All were better than the unweeded check and were for the most part as good as the best growth in the napropamide, oryzalin and metolachlor plots.

While this field trial was designed to study phytotoxicity symptoms and not measure growth effects, it did produce some interesting observations. This work should be repeated with more replications before definite conclusions can be drawn. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. The effect of 15 preemergence herbicides on the growth of two annual crops and the control of five weed species (425-73-100-1-86).

		Average Phyto 1/		Average Weed Control 1/				
Herbicides	Lb/A	Corn	Soybeans	Barnyardgrass Cupgrass 2/	Jungle-rice	Puncture-vine	Pigweed	Nutsedge
Simazine	2	0.0	7.0	6.0	5.3	8.3	10.0	10.0
Bromacil	2	9.3	10.0	9.7	10.0	10.0	10.0	10.0
Diuron	2	2.3	5.0	7.7	8.0	9.3	9.5	10.0
Norflurazon	4	8.0	4.0	8.3	7.0	9.0	5.5	10.0
Terbutryne	8	1.0	5.0	9.7	10.0	9.7	10.0	10.0
Dichlobenil	8	0.3	10.0	8.7	10.0	9.0	9.5	10.0
Methazole	2	0.0	0.0	1.3	0.0	3.3	7.0	10.0
Oxyfluorfen	4	1.0	0.0	8.3	7.3	8.7	9.5	0.0
Oryzalin	16	4.0	2.0	9.7	10.0	5.7	5.5	2.5
Napropamide	16	7.7	4.0	9.7	8.7	4.3	8.0	10.0
Metolachlor	16	4.0	7.0	9.7	10.0	7.0	10.0	10.0
EPTC	16	4.7	9.5	8.0	9.7	6.3	10.0	10.0
Dicamba	1	4.3	10.0	0.0	1.7	10.0	8.8	10.0
Tebuthiuron	1/2	1.3	9.0	7.3	7.3	9.7	10.0	10.0
Sulfonate	1/8	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Check		3.0	0.0	0.0	1.7	1.0	1.5	0.0

1/ Average of 3 replications where 0 = no phyto or no weed control and 10 = crop killed growth or complete weed control. Applied 4/19/86. Rated 6/13/86.

2/ A mixed population; too difficult to rate separately.

Table 2. The effect of 15 preemergence herbicides on the growth of 8 woody species and the residual control of annual weeds (425-73-501-100-1-86).

		Average Vigor 1/									
Herbicides	Lb/A	Halford Nemag	Lovell Peach	W.N. Pear	Granny Apple	Flame Grape	Thompson Grape	French Prune	Manzinella Olive	Red Gum Eucalyptus	Weed Control
Simazine	2	8.0	7.3	8.3	8.5	7.3	7.7	8.0	8.0	6.7	2.7
Bromacil	2	10.0	9.5	4.7	7.0	1.3	0.7	8.0	8.0	0.0	2.0
Diuron	2	8.5	8.7	7.3	8.7	8.3	6.0	10.0	7.0	6.0	5.0
Norflurazon	4	7.3	8.7	7.7	8.5	9.3	8.5	9.0	9.0	9.5	5.7
Terbutryne	8	8.0	8.3	6.7	8.7	7.3	7.3	7.0	7.0	8.7	6.0
Dichlobenil	8	8.0	8.0	6.3	7.5	8.3	8.3	9.0	8.0	8.5	6.3
Methazole	2	5.0	6.0	6.0	8.5	5.3	5.0	8.5	-	6.7	0.0
Oxyfluorfen	4	6.3	8.0	8.0	10.0	5.0	7.3	9.0	10.0	8.3	3.3
Oryzalin	16	8.0	9.0	7.5	8.5	6.0	6.7	9.0	7.0	9.0	5.7
Napropamide	16	7.7	7.7	8.5	8.0	6.7	7.0	7.0	6.0	8.0	7.0
Metolachlor	16	7.3	8.7	9.7	8.5	8.7	9.7	10.0	9.0	8.3	7.3
EPTC	16	7.0	6.7	6.7	8.3	4.7	4.7	8.0	6.0	4.7	1.7
Dicamba	1	5.0	4.7	5.7	6.0	3.3	5.0	6.5	6.0	0.0	0.0
Tebuthiuron	1/2	6.3	6.0	5.3	6.0	5.0	4.7	0.6	3.3	0.0	4.0
Sulfonate	1/8	8.3	8.0	6.0	8.0	8.7	7.3	9.5	10.0	0.0	8.0
Check		5.0	5.7	7.0	6.7	5.3	5.3	6.5	4.0	6.3	0.0

1/ Average of 2 to 3 replications. Weed competition masked the effects of the herbicides in some instances. Vigor was rated as 10 = is most vigorous and 0 = dead. Rated 10/12/86. Weeds were mostly annual grasses where 0 = no control and 10 = no weeds.

The effect of preemergence herbicides on young nemaguard peach seedlings in sand nutrient-fed culture. A. F. Lourens and A. H. Lange. The older herbicides were tested in earlier sand-nutrient culture greenhouse trials on several tree species including peaches. In this earlier greenhouse work 1-5 ppm showed considerable phytotoxicity. Terbutryne was safer on trees than simazine. Trifluralin showed no apparent injury.

The results from this year's work showed the expected phytotoxicity at 1-3 ppm. The phytotoxicity from simazine was somewhat less in the first rating than previously noted. In this year's work by one month the simazine and terbacil treated plants were recovering whereas the diuron and norflurazon treated trees showed little or no recovery. This was particularly evident in the later regrowth readings.

Although many of the herbicides showed little growth reduction in the original foliage, the injury was much more apparent in the regrowth from the roots and one inch cutback stump. Almost all the herbicides showed some injury at the high rates of 9 and 18 ppm. Even the regrowth from napropamide showed some growth reduction in the 6 to 18 ppm treatments. The growth reduction in the dinitro analine herbicides was very apparent in the regrowth from the root systems. Compared to the untreated checks most of the herbicides used in orchards showed some growth reduction at the 6 to 18 ppm which of course is a very high concentration in the root zone which probably never occurs in orchard soil.

Terbutryne has always been safer in California field trials than simazine, diuron or terbacil. In this greenhouse nutrient sand culture experiment terbutryne was more phytotoxic than simazine or terbacil but safer than diuron.

Of the dinitro analine herbicides oryzalin was by far the most phytotoxic. The other related herbicides were not as safe as trifluralin. None have shown injury to trees in the field even at very high rates. Norflurazon, like oryzalin, showed considerably more phytotoxicity in this pot study than occurs in the field except in extremely sandy low organic matter soils.

Both alachlor and metolachlor showed some slight phytotoxicity at 3 to 9 ppm observing the regrowth whereas nothing showed in the original top (weight) growth. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. A comparison of preemergence herbicides on young nemaguard peach seedlings in sand (nutrient fed) culture.

Herbicides	ppm	Average 1/ Phyto	Length (cm)	Weight (g)	Herbicides	ppm	Average 1/ Phyto	Length (cm)	Weight (g)
Simazine	1	2.0	26.5	5.5	Trifluralin	1	2.0	24.0	6.5
Simazine	3	4.5	26.0	7.0	Trifluralin	3	3.0	19.5	5.5
Simazine	9	6.5	17.5	1.0	Trifluralin	9	4.0	21.5	7.0
Terbutryne	1	2.0	25.5	7.5	Pendimethalin	2	0.0	25.5	6.5
Terbutryne	3	3.5	22.0	5.5	Pendimethalin	6	1.0	23.0	7.5
Terbutryne	9	7.5	17.0	1.5	Pendimethalin	18	2.0	24.0	7.5
Diuron	1	6.0	14.0	4.5	Prodiamine	2	0.0	25.5	5.0
Diuron	3	7.5	12.5	2.0	Prodiamine	6	1.0	21.5	4.0
Diuron	9	5.0	11.0	3.5	Prodiamine	18	1.0	44.5	10.5
Terbacil	1	0.0	24.5	7.0	Oryzalin	2	0.5	17.0	5.0
Terbacil	3	0.4	26.0	5.0	Oryzalin	6	3.0	15.0	3.0
Terbacil	9	3.5	19.0	3.0	Oryzalin	18	4.0	12.5	6.0
PBA	1	2.5	19.5	8.0	Napropamide	2	0.0	25.0	7.0
PBA	3	4.0	17.0	4.0	Napropamide	6	0.0	25.0	6.5
PBA	9	8.5	14.5	0.5	Napropamide	18	0.2	20.5	3.5
Norflurazon	1	3.5	18.0	3.5	Alachlor	1	0.0	22.5	7.5
Norflurazon	3	5.5	16.5	4.5	Alachlor	3	1.0	21.5	6.0
Norflurazon	9	7.0	13.5	4.0	Alachlor	9	3.0	15.0	4.5
Oxadiazon	1	2.0	22.0	6.0	Metolachlor	1	1.0	24.5	7.5
Oxadiazon	3	1.5	23.5	7.5	Metolachlor	3	1.0	24.0	5.5
Oxadiazon	9	3.0	21.0	3.5	Metolachlor	9	4.0	20.0	4.0
Oxyfluorfen	1	2.0	22.0	6.5	Check		0.0	28.0	4.5
Oxyfluorfen	3	0.0	24.5	5.0	Check		0.0	24.0	7.0
Oxyfluorfen	9	0.0	23.5	8.5					

1/ Average of 5 replications where 0 = no phytotoxicity symptoms and 10 = complete kill of top growth. Trees cut off 6 cm above soil surface and weighed 9/4/86.

Table 2. A comparison of preemergence herbicides on regrowth vigor and weight of young nemaguard peach seedlings in sand (nutrient fed) culture.

Herbicides	ppm	Average 1/ Vigor	Weight 2/ (g)	Herbicides	ppm	Average 1/ Vigor	Weight 2/ (g)
Simazine	1	6.2	2.95	Trifluralin	1	5.8	2.24
Simazine	3	8.0	3.50	Trifluralin	3	6.6	2.22
Simazine	9	5.0	1.26	Trifluralin	9	0.6	0.00
Terbutryne	1	5.0	2.00	Pendimethalin	2	5.6	2.46
Terbutryne	3	5.2	1.52	Pendimethalin	6	4.2	1.20
Terbutryne	9	1.8	0.40	Pendimethalin	18	2.0	0.48
Diuron	1	1.0	0.08	Prodiamine	2	5.8	2.34
Diuron	3	4.2	1.38	Prodiamine	6	2.0	0.70
Diuron	9	0.0	0.00	Prodiamine	18	1.8	0.34
Terbacil	1	6.4	2.28	Oryzalin	2	2.0	0.34
Terbacil	3	4.6	1.40	Oryzalin	6	0.0	0.00
Terbacil	9	7.0	3.16	Oryzalin	18	0.0	0.00
PBA	1	3.2	0.98	Napropamide	2	6.6	3.48
PBA	3	5.8	1.42	Napropamide	6	3.4	0.94
PBA	9	0.0	0.00	Napropamide	18	4.6	0.90
Norflurazon	1	6.8	3.32	Alachlor	1	3.8	1.94
Norflurazon	3	1.2	0.15	Alachlor	3	4.2	1.08
Norflurazon	9	0.0	0.00	Alachlor	9	4.6	1.72
Oxadiazon	1	5.8	2.82	Metolachlor	1	6.2	3.28
Oxadiazon	3	1.8	0.74	Metolachlor	3	5.8	2.28
Oxadiazon	9	2.2	0.06	Metolachlor	9	5.0	1.94
Oxyfluorfen	1	6.0	2.96	Check		8.6	3.65
Oxyfluorfen	3	3.4	1.14	Check		7.6	3.50
Oxyfluorfen	9	3.0	0.56				

1/ Average of 5 replications where 0 = no phytoxic symptoms and 10 = tree totally dead. Applied 8/7 & 8/15/86. Evaluated 9/29/86.

2/ Trees cut off 6 cm above soil surface.

The effect of long term use of herbicides on an orchard soil. A. F. Lourens and A. H. Lange. Earlier work showed a beneficial growth effect of the long term use of simazine on orchard soil when taken into the greenhouse and planted with beans. When simazine treated soil was taken from a long term study at the end of the growing season and diluted out with soil from the untreated check plots (weedy) it was found that beans grew better in the previously (repeat) treated soil than in the diluted treated soil or the untreated check soil.

The present study used soil, Hanford fine sandy loam (organic matter 0.3%, sand 58%, silt 30%, and clay 12%) taken on July 22, 1986 from long term plots treated with simazine plus norflurazon (most recently treated December 4, 1985 from a seventeen year repeat-treatment (with simazine only) plots). The treated soil was thoroughtly mixed and diluted with various amounts of soil from the untreated check. The pots were seeded with snap beans and transplanted nemaguard peach seedlings on July 23, 1986. Each soil mix was replicated six times.

The effect of replanting into soil that had been treated for seventeen years with an added herbicide for one year indicated a loss in productivity compared to soil from a weedy plot. However, in this trial there appeared to be a beneficial effect up to 50% dilution with treated soil as in the earlier work. When the amount of soil approached 100% treated soil the residual activity of the norflurazon became sufficient to reduce the growth of peach whereas there appeared (based on the symptoms expression on peach foliage) to be a direct relationship with bean growth and the concentration of treated soil. The July sampling in this later work plus the addition of norflurazon for one year probably masked the "beneficial effects" of the long term use of simazine seen in earlier work at least at the higher percentages of treated soil. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of diluting simazine-norflurazon treated soil with untreated soil from weedy plots on bean and nemaguard peach.

Snap Bean Measurements

Percent herbicide treated soil	% Germination	Fresh Top Wt. (gm)	Average[1/] Bean Phyto	Bean Vigor	Grass Control	Broadleaf Control
0(weedy)	66	5.6	0.5	9.5	0.3	1.0
25	80	5.4	3.8	8.8	3.8	3.2
50	70	2.3	6.3	4.7	8.0	7.2
75	50	1.2	8.5	2.0	9.0	9.3
100	90	0.5	9.7	0.3	9.5	10.0

1/ Average of 4 replications where 0 = no phyto symptoms, no vigorous growth or no weed control and 10 = plant dead, most vigorous growth or complete control of weeds.

Peach Seedling Measurements

Percent herbicide treated soil	% increase in height	Average[1/] Final Height cm	No. of side shoots	Fresh wt. top Growth gm	Final Phyto	Vigor Regrowth	Fresh wt. of regrowth gm
0 (weedy)	110	38.8	6.5	5.9	0.0	9.2	6.6
25	135	39.2	8.7	8.0	0.0	9.0	7.3
50	111	33.7	13.7	7.3	0.2	7.8	8.7
75	101	25.7	13.5	6.9	1.3	5.0	5.6
100	78	22.8	16.7	7.9	2.8	5.0	5.0

1/ Average of six replications where 0 = no effect or no regrowth and 10 = killed or most vigorous regrowth.

The effect of the timing of a preplant soil drench of metham on the growth of Granny Smith apple and Halford peach tree replants. A. H. Lange and K. F. Lange. Growers often have to replant young nursery trees in established orchards. The roots of adjacent trees and perennial weeds often compete with the young orchard replants as well as act as a source of nematodes and other pathogens which affect early tree growth.

In earlier work metham gave excellent weed control as well as accelerated growth of tomatoes and other vegetable crops. The objective of this study was to evaluate metham for cleaning up planting sites for young trees in an established orchard.

On March 2, 1986 planting sites were treated with metham at 50 and 100 gallons per acre diluted in 2 and 4 A" of water. The solutions were metered into 15 inch diameter plastic pipe sections 18 inches long. These sections were pushed 6 inches into the prepared soil and filled with the diluted metham. At 3, 7 and 14 days after treatment dormant young 3/8 inch Granny Smith apples on MM 111 rootstock and 3/8 inch Halford peach on Nemaguard rootstock were planted and irrigated with in-line emitter drip irrigation as needed. On March 28 and May 30 the trees were rated for vigor. On October 14 the trees' height (cm) and diameter (mm) were measured.

The weed control in the treated areas was excellent until reinvasion from adjacent bermudagrass spots occurred. This late summer invasion did not appear to affect tree growth significantly. In other trials on johnsongrass the tree site was kept relatively clear of reinvasion due partially to the early weed control and the subsequent shade from large replants.

The growth response of young apple and peach trees was consistent. Both showed early reduced vigor when planted at 3 days with 100 gpa but less at 7 and 14 days. This early reduction in growth disappears in about one and a half months when both rates appeared more vigorous than the check. Although not statistically significant there was a trend for greater ultimate growth stimulation to occur when planting earlier than later, i.e. closer to treatment. This response to early planting also occurred in several vegetable crops and suggests a possible reinvasion of pathogens or a temporary inactivation or some temporary nutritional change which favored the crop. The increased vigor from the 3 day planting carried through in the height of the peach at 50 gpa but not the apple. Thus the growth from the 7 day planting after treatment seemed optimal. The diameters appeared to bare out the height differences for apple and to some extent with the peach. All treatments gave better growth than the untreated check trees. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. The effect of a preplant metham drench on the growth of replant apple trees.

Treatment	gal/A	Average Vigor[1/] 3/28/86 3	7	14	5/30/86 3	7	14
		------	days	-----	------	days	-----
Metham	50	8.1	8.5	6.8	8.6	9.2	8.6
Metham	100	5.2	7.4	7.4	8.2	9.0	8.6
Check	0	7.6			6.5		

Treatment	gal/A	Average Diameter (mm) 3	7	14	Height (cm) 3	7	14
		------	days	-----	------	days	-----
Metham	50	12.8	15.9	15.2	115	151	142
Metham	100	12.4	15.0	13.5	115	153	141
Check	0	12.2			100		

1/ Average of 8 replications where 0 = no growth and 10 = best growth. Treated 3/2/86. Planted 3/5, 3/9, and 3/16/86.

2/ Diameter of trunk just above the graft in mm taken on 10/14/86.

3/ Height of 2 longest leaders measured in cm on 10/14/86.

Table 2. The effect of a preplant metham drench on the growth of replant peach trees.

Treatment	gal/A	Average Vigor[1/] 3/28/86			5/30/86		
		3	7	14	3	7	14
		------ days -----			------ days -----		
Metham	50	6.8	8.2	6.2	8.4	8.2	8.1
Metham	100	5.1	7.0	7.0	8.4	8.2	8.1
Check	0	7.0			7.3		

Treatment	gal/A	Average Diameter (mm)			Height (cm)		
		3	7	14	3	7	14
		----- days ------			------ days -----		
Metham	50	19.8	20.4	19.4	164	153	153
Metham	100	20.8	22.1	21.4	155	171	171
Check	0	17.1			132		

1/ Average of 8 replications where 0 = no growth and 10 = best growth. Treated 3/2/86. Planted 3/5, 3/9, and 3/16/86.

2/ Diameter of trunk just above the graft in mm taken on 10/14/86.

3/ Height of 2 longest leaders measured in cm on 10/14/86. Averaged.

Sour cherry weed control with repeat preemergence soil-applied herbicides. Anderson, J.L., and M.G. Weeks. Utah's sour cherry orchards are generally planted on the foothills of the Wasatch mountains. Most of the soils in the orchard sites are well drained and low in organic matter. When weed control is achieved with soil applied herbicides in these soils, sour cherry trees occasionally show some foliar symptoms of phytotoxicity, and trees are difficult to harvest mechanically as fruit from injured trees are delayed in maturity. The use of herbicide combinations is being investigated both to increase the spectrum of weed control and to reduce rates of component herbicides below that required for weed control when applied singly.

Fall application of residual herbicides was made in an 8-year-old 'Montmorency' sour cherry orchard in South Willard, Utah on October 24, 1985. Plots treated in 1984 (see 1986 WSWS Research Progress Report, pp. 89-90) received the same treatments in 1985. This orchard has a low weed population due to a history of repeated cross cultivation within the orchard prior to plot establishment. Area between tree rows continues to be kept weed free by cultivation. The weed spectrum in the orchard consists primarily of annual weeds. Plots were 2x18 m containing 3 trees and were replicated 4 times. Treatments were applied with a CO_2 backpack sprayer with 8002 nozzles calibrated to deliver 300 L/ha at 40 psi. An exception was dichlobenil which was applied in granular form with a cyclone hand spreader. Plots were evaluated in May 1986 and again in October at the end of the growing season.

Kochia, downy brome and the spring mustards (blue mustard, shepherdspurse, tansy mustard and tumble mustard) were the predominant weeds in the orchard. Blue mustard, downy brome and shepherdspurse mature early and were not present at the time of the fall evaluation. As a result of this plus the shading of the plots by the orchard canopy, many plots contained fewer weeds in the fall than in the spring. Simazine (which did not control kochia), napropamide, terbacil and terbutryn plots had lower fall ratings than in the spring. Herbicide combinations generally provided better weed control than the component herbicides applied singly.

All plots listed in the table were retreated in October 1986 to determine the effects of retreatment. No cherry tree phytotoxicity has been observed to date. (Utah State Agricultural Experiment Station, Logan, Utah 84322-4820).

Effects of preemergent soil-applied herbicides on sour cherry orchard weed control

Treatment	Rate[1] (kg/ha)	Weed Control Ratings[2] May 20	Weed Control Ratings[2] Oct. 17	Uncontrolled Weeds[3]
dichlobenil	1.1	9.4 A	7.7 AB	KOHSC, BROTE, CAPBP, PRNCE
+ simazine	1.1			
dichlobenil	2.2	9.5 A	8.8 A	KOHSC, CAPBP
diuron	2.2	9.8 A	9.5 A	TAROF
fluorochloridone	2.2	9.9 A	10.0 A	
fluorochloridone	1.1	9.9 A	9.2 A	SASKR, PRNCE
+ simazine	1.1			
fluorochloridone	1.1	9.7 A	9.5 A	BROTE, PRNCE
+ napropamide	4.5			
fluorochloridone	1.1	9.9 A	9.5 A	
+ norflurazon	1.1			
fluorochloridone	1.1	9.5 A	8.3 A	HELAN, BROTE, COBTE, PRNCE
+ terbutryn	1.1			
napropamide	4.5	8.7 B	6.2 BC	CAPBP, SSYAL, DESPI, COBTE, TAROF
napropamide	4.5	9.3 A	7.5 AB	CAPBP, COBTE
+ simazine	1.1			
napropamide	4.5	9.9 A	8.5 A	
+ oxyfluorfen	2.2			
napropamide	4.5	9.9 A	9.7 A	TROPS
+ diuron	1.1			
norflurazon	2.2	9.5 A	9.0 A	COBTE
norflurazon	1.1	9.4 A	9.2 A	COBTE, CAPBP
+ oryzalin	2.2			
norflurazon	1.1	9.8 A	8.7 A	CAPBP, COBTE
+ simazine	1.1			
oryzalin	2.2	9.3 A	9.2 A	CAPBP, SSYAL, DESPI, PRNCE
oryzalin	2.2	9.8 A	9.7 A	TAROF, ARFMI, PRNCE
+ diuron	1.1			
oryzalin	2.2	10.0 A	10.0 A	
+ simazine	1.1			
oryzalin	2.2	9.9 A	9.0 A	DESPI
+ terbutryn	1.1			
oryzalin	2.2	9.8 A	9.7 A	ARFMI
+ oxyfluorfen	2.2			
oryzalin	2.2	9.9 A	10.0 A	COBTE
+ dichlobenil	1.1			
oryzalin	2.2	9.8 a	9.2 A	CAPBP, BROTE, TAROF, TROPS
+ terbacil	1.1			
oryzalin	2.2	9.7 A	9.5 A	BROTE, TAROF, TROPS, PRNCE
+ fluorochloridone	1.1			
oxyfluorfen	2.2	9.9 A	9.7 A	
oxyfluorfen	1.1	9.9 A	10.0 A	
+ fluorochloridone	1.1			
oxyfluorfen	1.1	9.9 A	9.2 A	
+ simazine	1.1			
simazine	2.2	8.3 B	3.0 D	KOHSC, CAPBP
terbacil	1.1	8.6 B	4.2 CD	KOHSC, CAPBP, SONOL, CHEAL horsemint
terbutryn	2.2	7.2 C	0.5 E	KOHSC, BROTE, SONOL, DESPI, SSYAL, horsemint
untreated	---	2.6 D	0.0 E	BROTE, CHEAL, CAPBP, SONOL, TROPS, KOHSE, SSSYAL, COBTE, DESPI

[1]treatments applied October 24, 1985

[2]plots rated 0-10; 10 = complete weed control; values represent the average of 4 replications; values in each column followed by a common letter are not significatnly different at Duncan's 5% level

[3]weed designations are from WSSA approved code list

Evaluation of herbicides for use in red raspberry production. Howard, S.W. and R.A. Norton. Some of the herbicides presently registered for use in red raspberries face losing registrations due to concerns of environmental safety, therefore, alternatives or replacements need to be investigated. Directed applications of asulam, clopyralid, oxyfluorfen, and prodiamine at two rates each, and napropamide (included as a standard) at one rate, were made to Willamette and Meeker red raspberries. Evaluations were taken on June 6 and October 6, 1986. There were no reductions in total yield or berry weight when compared to the napropamide plots. In addition, there were no visual observations of crop phytotoxicity from any of the treatments. Weed control was acceptable and season-long. This is attributed to good early-season control, coupled with the development of a vigorous crop canopy which prevented late-season weed growth. All treatments were more efficacious on early compared to later weed control evaluations. (Northwestern Washington Research and Extension Center, Washington State University, Mt. Vernon, WA 98273)

Evaluation of herbicides for use in red raspberry production

Treatment	Rate	Yield		Berry weight	
		Willamette	Meeker	Willamette	Meeker
	(kg/ha)	-----(g/plot)------		----(g/berry)-----	
weedy check		3924	4276	2.46	3.58
napropamide	4.48	3544	3838	2.67	3.45
clopyralid	0.22	3888	4299	2.79	3.41
clopyralid	0.45	3871	4028	2.85	3.60
prodiamine	2.24	3081	4054	3.28	3.64
prodiamine	4.48	3901	3566	2.90	3.75
oxyfluorfen	1.12	3750	3464	3.19	3.45
oxyfluorfen	2.24	2920	3692	2.50	3.23
asulam	2.24	3431	3555	3.05	2.97
asulam	4.48	3792	3895	2.98	3.75
LSD (0.05)		ns	ns	ns	ns

Effects of herbicides on broccoli: Collins R.L., V.F. Fischer and P.J. Kloft. Four herbicides were evaluated on broccoli in the north Willamette Valley near Gaston, Oregon, during the summer of 1986 for broadleaf weed control and crop tolerance.

On July 12, 1986, Cruiser variety broccoli was planted on a 15 inch row spacing on Wapato silty clay loam soil with 3.1% organic matter. The plot area was treated preplant incorporated with trifluralin at 0.75 lbs./A and metolachlor at 0.75 lbs. ai/A. On July 15, 1986, the following herbicides were applied preemergence to the soil on individual plots: BAS 514 at 0.25 and 0.5 lbs. ai/A; SD 95481 at 1.2 and 2.4 lbs. ai/A; diethatyl ethyl at 1.5 lbs. ai/A; DPX A7881 at 0.25, 0.5, and 1.0 lb./A. The plots were 6.5 ft. (one bed) by 10 ft. long and replicated four times in a randomized complete block design. The herbicides were applied in 41 gpa water with a CO_2 back pack sprayer and a boom with four 8002 nozzles spaced 20 inches apart at 40 PSI. Post-emergent applications were made on August 4, 1986 of BAS 514 at 0.5 and 1.0 lb./A; DPX A7881 at 0.5 and 1.0 lb. ai/A. The broccoli was 3 to 4 inches tall with 2 true leaves at the time of application of post-emergence herbicides.

Visual weed control ratings of four broadleaf weed species and crop tolerance were made on August 27, 1986. On October 1, 1986, ten heads were measured from each replicate giving the average head diameter in inches. The results are summarized in the table.

In the preemergence treatments, DPX A7881 at 1.0 lb. ai/A gave good weed control with some reduction in head size. DPX A7881 at 0.5 lb. ai/A gave acceptable weed control except for purslane, and better broccoli head size. Diethatyl ethyl appeared to have acceptable crop tolerance and only fair weed control. BAS 514 and SD 95481 had unacceptable crop tolerance. In the post-emergence treatments, BAS 514 had good crop tolerance but only fair weed control. DPX A7881 had unacceptable crop tolerance. (Collins Agricultural Consultants, Inc., Hillsboro, Oregon 97123)

1986
Effects of Herbicides on Broccoli
Gaston, Oregon

Treatment	Rate lb. A.I./A	Type Applic.	Visual Ratings 8/27/86[1/] Crop Injury	Pig Weed	Lambs Quarters	Shepards Purse	Purslane	10/1/86[2/] Average Head size
1 BAS 514 50W	0.5	Post	0.75	4.5	4.5	5.25	0	3.12
2 BAS 514 50W	1.0	Post	0.75	6.75	6.0	7.0	0.5	3.0
3 BAS 514 50W	0.25	Pre	0	4.75	8.75	3.25	4.0	1.75
4 BAS 514 50W	0.5	Pre	0.5	6.0	10.0	4.0	3.0	1.12
5 SD 95481 7EC	1.2	Pre	4.5	4.75	3.75	8.5	1.3	0.37
6 SD 95481 7EC	2.4	Pre	7.5	4.0	1.25	8.75	0	0
7 DPX A7881 75DF	0.5	Post	0.25	8.75	7.25	10.0	0.5	1.12
8 DPX A7881 75DF	1.0	Post	0.25	7.5	7.5	7.5	1.0	1.0
9 Diethatyl Ethyl 4E	1.5	Pre	0.25	5.25	8.25	9.0	4.25	2.87
10 DPX A7881 75DF	0.25	Pre	1.5	10.0	7.0	10.0	4.0	2.62
11 DPX A7881 75DF	0.5	Pre	1.75	10.0	7.5	9.75	4.75	2.87
12 DPX A7881 75DF	1.0	Pre	2.0	10.0	9.0	10.0	7.0	2.5
13 Check	-	-	0	0.5	0	0	0	3.25

1/ 0=no effect, 10=complete elimination

2/ First harvest cutting, average head size per 10 heads, in inches.

Annual grass control in spring planted carrots. Arnold, R.N., E.J. Gregory and D. Smeal. Research plots were established on April 17, 1986 to evaluate the efficacy of several new herbicides for control of barnyardgrass and green foxtail in spring planted carrots (var. Imperator 58). Soil type was a Kinnear very fine sandy loam with a pH of 7.9 and an organic matter content of less than 1%. Individual plots were 6 by 30 ft in size with four replications arranged in a randomized complete block design. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Preplant incorporated treatments were applied April 17 and immediately disc and spike-tooth harrowed to a depth of 2 to 4 in. Preemergence surface applied treatments were applied April 21, 1986. Postemergence treatments were applied June 12 with 1 qt COC per acre. Eight rows of carrots were planted 9 in apart on 72 in beds. Rows of barnyardgrass and green foxtail were planted between each carrot row at 1.0 lb/A using a cone seeder.

Visual evaluations of crop injury and weed control were made July 14, 1986. All treatments provided excellent control of barnyardgrass. Green foxtail control was excellent (100%) with all treatments except haloxyfop-methyl and fluazifop-P-butyl at 0.13 lb ai/A. All treatments resulted in substantial yield increases compared to the untreated check. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Annual grass evaluations in spring planted carrots, 1986

Treatment	Timing[1]	Rate lb ai/A	Crop Injury[2]	Weed Control[2] Bygr	Weed Control[2] Grft	Marketable Yield[3]
				----------%--------		----T/A----
fluorochloridone	PES	0.50	0	100	100	11.2
fluorochloridone	PES	1.00	0	100	100	10.9
sethoxydim	POST	0.14	0	100	100	12.0
sethoxydim	POST	0.28	0	100	100	12.5
haloxyfop-methyl	POST	0.13	0	100	87	12.4
haloxyfop-methyl	POST	0.25	0	100	100	13.0
fluazifop-P-butyl	POST	0.25	0	100	100	12.2
trifluralin	PPI	1.00	10	100	100	10.3
linuron	PES	1.00	12	100	100	9.7
fluazifop-P-butyl	POST	0.13	0	99	86	12.7
check			0	0	0	8.2
handweeded check			0	0	0	12.0

1. PES = preemergence surface: PPI = preplant incorporated: POST = postemergence.
2. Based on a visual scale from 0-100 where 0 = no control or crop injury and 100 = dead plants.
3. T/A = Tons per acre.

Broadleaf weed control in spring planted carrots. Arnold, R.N., E.J. Gregory and D.Smeal. Research plots were established on April 17, 1986 to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated (PPI) and preemergence surface (PES) in spring planted carrots (var. Imperator 58). Soil type was a Kinnear very fine sandy loam with a pH of 7.9 and an organic matter content of less than 1%. Individual plots were 6 by 30 ft in size with four replications arranged in a randomized complete block design. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Preplant incorporated treatments were applied April 17 and immediately disc and spike-tooth harrowed to a depth of 2 to 4 in. Preemergence surface applied treatments were applied April 21, 1986. Eight rows of carrots were planted 9 in apart on 72 in beds. Rows of Russian thistle, kochia and prostrate pigweed were planted between each carrot row at 1.0 lb/A using a cone seeder.

Visual evaluations of crop injury and weed control were made June 26, 1986. All treatments provided excellent control of prostrate pigweed. Kochia and Russian thistle control was good to excellent with all treatments except trifluralin and linuron at 0.5 lb ai/A. Carrot stand was reduced over 10% by linuron alone or in combination with fluorochloridone and by trifluralin at 1.5 lb ai/A. However, all treatments resulted in substantial yield increases compared to the untreated check. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Broadleaf evaluations in spring planted carrots, 1986

Treatment	Timing[1]	Rate lb ai/A	Crop Injury[2]	Weed Control[2]			Marketable Yield[3]
				Prpw	Kocz	Ruth	
				%			T/A
fluorochloridone	PES	0.50	0	100	100	98	10.3
fluorochloridone	PES	0.75	0	100	100	100	9.7
linuron	PES	1.00	67	100	90	80	2.7
trifluralin	PPI	1.50	40	100	99	93	5.5
linuron + fluorochloridone	PES	0.5 + 0.5	20	100	100	99	7.6
linuron + fluorochloridone	PES	1.0 + 0.5	66	100	100	99	2.6
trifluralin + fluorochloridone	PPI	1.0 + 0.5	9	100	100	99	6.6
fluorochloridone	PES	0.25	0	99	100	93	9.0
trifluralin	PPI	0.50	0	99	22	17	2.7
linuron	PES	0.50	18	89	63	52	4.4
check			0	0	0	0	1.5
handweeded check			0	100	100	100	9.5

1. PES = preemergence surface: PPI = preplant incorporated.
2. Based on a visual scale from 0-100 where 0 = no control or crop injury and 100 = dead plants.
3. T/A = Tons per acre.

Weed control in cabbage and carrots grown under floating row covers. Crabtree, G.D., M.T. Madrid, Jr. and N.S. Mansour. Work reported under this title in the 1986 Research Progress Report of WSWS was continued in the 1986 growing season. Cabbage planted into trifluralin (1.12 kg ai/ha) treated soil or sprayed postemergence to the weeds with N-TAC (187 L/ha, equal to 273 kg/ha of sulfuric acid) after transplanting and installing floating row covers (Reemay or Vispore) grew and produced yields comparable to cabbage in like-treated cabbage plots but without row covers. Trifluralin treated cabbage plots were comparable to hand-weeded plots in productivity although weed control was not complete in the herbicide treated plots. N-TAC injury to cabbage, with or without row covers, was apparent for a few weeks after the herbicide was applied and weed control was inadequate in all plots treated with this material.

Carrots treated early postemergence (2-leaf stage) with linuron (1.68 kg ai/ha) or a tank mix of linuron (1.12 kg ai/ha) and fluazifop (0.28 kg ai/ha) did not show injury from the herbicide and produced yields comparable to hand weeded checks whether or not row covers had been installed at planting time. Very small amounts of grass weed species were present in the trial and weed control was excellent with both herbicide treatments whether sprayed directly on the weeds or onto floating row covers over the crop and weeds. Uncovered plots were planted one week earlier than the carrots to be covered so that the herbicides could be applied at one time with the crop having about the same amount of growth.

A second trial with carrots was established to determine any interactive effects of water when linuron (1.12 kg ai/ha) was sprayed on floating row covers (Reemay and Agronet) over carrots and emerged weeds. No differences were found between treatments of (1) herbicide applied in 187 L/ha water and no further water for one week, (2) herbicide applied in 748 L/ha water and no further water for one week, (3) herbicide applied in 187 L/ha water followed immediately with 5 mm of sprinkler irrigation, and (4) herbicide applied in 187 L/ha water followed immediately with 20 mm of sprinkler irrigation. Weed control was excellent and without crop injury in all herbicide treated plots. (Department of Horticulture, Oregon State University, Corvallis, OR 97331-2911)

Yellow nutsedge control in vegetable crops with winter metolachlor applications. King, W.O., K. Peterson, and G.D. Crabtree. Yellow nutsedge control, vegetable injury, and metolachlor dissipation were investigated in trials with early and late winter applications of metolachlor in the Willamette Valley, Oregon. One trial was established in an area free of yellow nutsedge with treatments applied December 11, 1985 and February 25, 1986. The other trial was on soil infested with yellow nutsedge and treated January 31 and March 14, 1986. Rates of metolachlor applied were 1.5, 3.0, 6.0, and 8.0 lb ai/ac; all four rates were applied at each date. Plots were in a randomized complete block with four replications at each location; individual plot size was 12 by 20 ft. Vegetables (beans, beets, broccoli, carrots, cauliflower, and onions) were planted in each plot on June 13 (infested) or June 16 (uninfested).

Visual evaluations of the yellow nutsedge infested trial on July 28 showed greater than 90% yellow nutsedge control for the 6.0 and 8.0 lb metolachlor treatments regardless of time applied. The early 3.0 lb treatment gave 60% control and the late 3.0 lb gave 70% control. Poor crop establishment resulted in inconclusive results from vegetable evaluations in the infested plots.

Crops from the uninfested trial were harvested in September and October. Onions were most affected by metolachlor, yields being 36% of the untreated control from the late applied 8.0 lb, 59% from late applied 6.0 lb, and 65% from early applied metolachlor. No other treatments significantly reduced onion yield at the 0.05 level. No other crop was significantly affected by herbicide treatment except cauliflower, which showed a significantly lower yield from the untreated control than all other treatments except the early applied lowest rate. No explanation for this response is offered, weed competition was not a factor in this trial because of repeated hand weeding.

A bioassay of soil metolachlor content was conducted in the greenhouse with soil from the uninfested trial. Soil samples from 0 to 4 inches and 4 to 8 inches deep were collected from each plot. Oats were planted in the soil (in pots) on May 25. Shoot heights 12 days after planting were compared to oats grown in the same soil with known concentrations of metolachlor. The herbicide was detected only in soil from 0-4 inch layer. Metolachlor activity was reduced an average of 85% and 77% for the December and February treatments, respectively.
(Department of Horticulture, Oregon State University, Corvallis, OR 97331-2911)

Vegetable crop tolerance to RE-45601 (Select). Murray, H. and R. D. William. In 1986, trials were conducted to evaluate phytotoxicity from pre- and post-emergence applications of RE-45601 on broccoli, beans, daikon radish, pumpkins, cucumbers and spinach. Field work was conducted at the Oregon State University Vegetable Research Farm.

Injury symptoms were not observed at any rates in the beans and spinach, and only slight injury was observed at the highest rates applied to daikon radishes. Broccoli showed signs of crop damage only at the highest post-emergence application rate. Cucumbers and pumpkins were affected at all rates, but were severely injured at the two highest post-emergence rates. The injury appeared as white patches and bronzing of leaves and subsequent reductions in plant growth. (Department of Horticulture, Oregon State University, Corvallis, OR 97331-2911)

Average crop tolerance rating[1/] to pre- and post-emergence applications of RE-45601 (Select) herbicide

Treatment	Rate lbs/ai/A	Application Date(s)	Evaluation Date(s)	Beans	Broccoli	Cucumber	Daikon Radish	Pumpkin	Spinach
Weeded check	0	--	7/17/86	0	0	0	0	0	0
Pre-emergence									
RE-45601	0.25	6/19/86	7/17/86	0	0	0.125	0	0.05	0
RE-45601	0.50	6/19/86	7/17/86	0	0	0.075	0	0.025	0
Post-emergence									
RE-45601	0.125	7/9/86	7/17/86	0	0	3.0	0	0.575	0
+ 1% crop oil		7/25/86	8/5/86	0	0	X	X	X	X
RE-45601	0.25	7/9/86	7/17/86	0	0	6.0	0.05	4.25	0
+ 1% crop oil		7/25/86	8/5/86	0	0	X	X	X	X
RE-45601	0.5	7/9/86	7/17/86	0	0.75	8.0	0.4	8.25	0
+ 1% crop oil		7/2/86	8/5/86	0	4.25	X	X	X	X

1/ Crop Tolerance Rating: 0 = No damage; 10 = Complete kill; X = No application made.

Layby herbicides in processing tomatoes. Orr, J.P. and T. Underwood. In Sacramento, CA on 7/24/86 Advantage processing tomatoes were planted at Cosumnes River College in a clay loam soil. Upon reaching the 4-6 leaf stage of growth on 9/4/86 emulsifiable concentrate formulations of diethatyl-ethyl, acifluorfen and isoxaben were applied post emergence directed in 40 gpa water. Granular applications of lactofen, chlorpropham and chloramben were applied directly over the tomato plants. All treatments were sprinkler incorporated. This study was established to evaluate tomato tolerance to layby herbicides for nightshade control.

Herbicide treatments were replicated 4 times in a randomized complete block design. Liquid formulations were applied with a CO2 backpack sprayer. Granules were applied by hand in a shaker.

Herbicides showing good tomato tolerance include diethatyl-ethyl at 3 and 6 lbs/A, acifluorfen at 0.5 and 1.0 lbs/A, isoxaben at 0.08 and 0.11 lbs/A, chloramben at 4.0 lbs/A., chloramben at 6.0 lbs/A, chlorpropham at 4 and 6 lbs/A and lactofen at 0.1 and 0.3 lbs/A showed poor tolerance. (University of California Cooperative Extension, Sacramento, CA 95827)

Layby herbicide study in processing tomatoes

Chemical	Form.	Rate	Tomato Fresh Wt. Yield Tons/A	Sig. Dif. at 5%	Tomato Stand Red. in.	Tomato Vigor Red. in.	Plant Height	Plant Width	# Plants/ 20 ft.
diethatyl-ethyl	4E	3.0	11.25	a	0.25	1.75	16.8	28.0	22.3
isoxaben	75DF	0.08	11.00	a	0.00	1.25	17.0	21.8	28.5
aciflurofen	2E	0.5	9.775	ab	0.50	1.25	17.3	24.0	25.3
diethatyl-ethyl	4E	6.0	8.750	abc	1.75	2.25	14.5	22.5	16.9
chloramben	10G	4.0	8.600	abc	0.75	2.75	15.8	24.3	21.8
Control	---	---	8.250	abc	2.0	1.75	15.5	21.75	17.5
aciflurofen	2E	1.0	7.825	abc	1.75	1.75	14.5	22.8	19.0
lactofen	1G	0.1	7.700	abcd	1.5	2.75	13.8	15.0	26.3
isoxaben	75DF	0.11	7.063	abcd	2.5	2.75	14.0	21.5	21.0
chlorpropham	20G	4.0	5.025	bcd	7.5	8.75	6.5	8.5	8.5
lactofen	1G	0.3	4.575	bcd	3.25	4.25	13.8	15.0	13.0
chloramben	10G	6.0	3.563	cd	2.0	5.25	12.3	16.0	20.0
chlorpropham	20G	6.0	2.000	d	7.5	8.0	6.75	10.5	8.3

Weed Control 10 = 100%

LSD = 4.9392
CV = 46.7524

Tomato Stand Reduction 10 = 100% kill
Tomato Vigor Reduction 10 = 100%
0 = no injury

Phytotoxicity 0 = no burn or malformation

Layby herbicides in processing tomatoes. Orr, J.P. and T. Underwood. In Sacramento, CA on 6/20/86 Campbell 204 tomatoes were planted at Cosumnes River College Research Farm in a clay loam soil. Upon reaching the 2 true leaf stage, 7/11/86 emulsifiable concentrate formulations of diethatyl-ethyl, acifluorfen and isoxaben were applied post emergence directed in 40 gpa water. Granular applications of lactofen, chlorpropham and chloramben were applied directly over the tomato plants. Treatments were sprinkler incorporated. This study was established to evaluate weed control and tomato crop tolerance.

All treatments were 4 replications in a randomized complete block design. Liquid formulations were applied with a CO2 backpack sprayer. Granules were applied in a shaker by hand. Weeds consisted of redroot pigweed, lambsquarter, watergrass and hairy nightshade.

Diethatyl-ethyl, acifluofen and isoxaben gave poor control of lambsquarter, lactofen, chlorpropham and chloramben gave good control of all weed species.

Generally tomato vigor reduction and phytotoxicity was unacceptable for all herbicides at this stage of tomato growth. (University of California Cooperative Extension, Sacramento, CA 95827)

Weed control with layby herbicides in processing tomatoes

Chemical	Formu-	Rate	Control				Tomato		
			R.Pigweed	Lambsquarter	Barn-	H.Nightshade	Stand Red.	Vigor Red.	Phyto-toxicity
diethatyl-ethyl	4E	3.0	5.5	4.5	10.0	8.5	0.0	3.3	1.3
diethatyl-ethyl	4E	6.0	10.0	6.8	10.0	10.0	0.0	4.8	8.0
aciflurofen	2E	0.5	9.3	7.5	10.0	10.0	0.0	5.5	4.0
aciflurofen	2E	1.0	7.5	4.5	10.0	10.0	0.0	4.3	2.5
isoxaben	75DF	0.088	4.0	2.3	8.5	10.0	0.0	3.0	2.5
isoxaben	75DF	0.11	0.8	0.0	1.0	0.5	0.0	1.5	2.0
chloramben	10G	4.0	10.0	9.5	9.5	10.0	0.0	6.3	9.5
chloramben	10G	6.0	10.0	8.0	10.0	10.0	0.0	6.0	8.8
chlorpropham	20G	4.0	7.0	2.5	10.0	10.0	0.0	7.3	10.0
chlorpropham	20G	6.0	10.0	10.0	6.5	10.0	0.0	5.8	8.5
lactofen	1G	0.1	10.0	8.3	6.0	10.0	0.0	8.8	9.5
lactofen	1G	0.3	10.0	10.0	9.5	10.0	0.0	9.0	9.5
Control			0.0	0.0	0.0	0.0	0.0	0.0	2.0

Weed Control 10 = 100%

Tomato Stand Reduction 10 = 100% kill
Tomato Vigor Reduction 10 = 100%
0 = no injury

Phytotoxicity 0 = no burn or malformation

<u>Evaluation of preemergence layby herbicides in processing tomatoes.</u> Orr, J.P. and T. Underwood. In Sacramento, CA on 5/29/86 preemergence herbicides diethatyl-ethyl, acifluorfen, chloramben, lactofen and chlorpropham were applied layby to Ferry Morse 785 tomatoes in the 4-6 leaf stage grown in a silt loam soil. diethatyl-ethyl and acifluorfen were directed; chloramben, lactofen and chlorpropham granules were applied directly over the top of the tomatoes. Herbicides were incorporated by sprinkler irrigation. This study was established to evaluate tomato tolerance to various layby herbicides.

A CO2 backpack sprayer, 30 gpa was used to apply diethatyl-ethyl and acifluorfen. Granules were applied by hand in a shaker. Treatments 1 row x 20 feet were replicated 4 times in a randomized complete block design.

Treatments were hand harvested on September 1, 1986. Tomatoes showed good tolerance to all treatments except chlorpropham at 6.0 lbs/A.

Acifluorfen at 0.5 lbs/A, chloramben at 4.0 lbs/A and diethatyl-ethyl at 6.0 lbs/A were the highest yielding treatments yielding 37.8, 37.5 and 34.7 tons/A respectively. This was significantly different than the other treatments. The control yielded 30.7 tons/A. (University of California Cooperative Extension, Sacramento, CA 95827)

Layby Herbicide yield study in processing tomatoes

Chemical	Formulation	Rate	Yield tons/A	Sig.dif. at 5%	Ferry Morse 785 Tomato Stand red.	Vigor red.
aciflurofen	2E	0.5	37.85	a	0	0
chloramben	10G	4.0	37.5	ab	0	0
diethatyl-ethyl	4E	6.0	34.7	abc	0	0
lactofen	1G	0.1	34.1	bcd	0	0
aciflurofen	2E	1.0	33.1	cde	0	0
chloramben	10G	6.0	33.06	cde	0	0
diethatyl-ethyl	4E	4.0	31.27	cdef	0	0
lactofen	1G	0.3	31.14	cdef	0	0
check	—	---	30.7	def	0	0
chlorpropham	20G	4.0	29.9	ef	0	0
chlorpropham	20G	6.0	27.6	f	2.5	4.3

Weed control 10 = 100%

Tomato stand reduction 10 = 100% kill
Tomato vigor reduction 10 = 100%
0 = no injury

Phytotoxicity 0 = no burn or malformation
LSD = 3.8712
CV = 6.84899

Layby herbicides in processing tomatoes. Orr, J.P. and T. Underwood. In Sacramento, CA on 6/3/86 diethatyl-ethyl and acifluorfen were applied postemergence directed to Murietta tomatoes in the 4-6 leaf stage grown in a loam soil at the Ferreria Ranch on Grand Island. Granular applications of lactofen, chlorpropham and chloramben were applied directly over the top of the tomatoes. All herbicides were sprinkler incorporated. The purpose of this study was to evaluate tomato tolerance to herbicides applied at layby for nightshade control.

Liquid formulations were applied with a CO2 backpack sprayer. Granules were applied with a shaker can. Treatments were replicated 4 times in a randomized complete block design.

There was no stand reduction from any treatment and only slight vigor reduction with chlorpropham at 6.0 lbs/A.

Yields were taken and there was no significant difference between any treatment. (University of California Cooperative Extension, Sacramento, CA 95827)

Chemical	Formulation	Rate	Yield lbs/A a.i.	Tomato Stand Red.	Tomato Vigor Red.	Phyto toxicity
lactofen	1G	0.2	26.45	0.0	0.5	0.0
lactofen	1G	0.3	29.06	0.0	0.8	0.0
chlorpropham	20G	4.0	23.23	0.0	0.8	0.0
chlorpropham	20G	6.0	25.50	0.0	1.9	0.0
diethatyl-ethyl	4E	4.0	28.76	0.0	0.5	0.0
diethatyl-ethyl	4E	6.0	26.05	0.0	0.3	0.0
aciflurofen	2E	0.5	30.44	0.0	0.5	0.0
aciflurofen	2E	1.0	27.86	0.0	0.8	0.0
chloramben	10G	4.0	27.57	0.0	0.5	0.0
chloramben	10G	6.0	24.89	0.0	0.5	0.0
Check	---	---	25.97	0.0	0.5	0.0

Weed Control 10 = 100%

Tomato Stand Reduction 10 = 100% kill
Tomato Vigor Reduction 10 = 100%
0 = no injury

Phytotoxicity 0 = no burn or malformation

CV = 12.1563

Influence of gel coated seeds on germination time and tolerance of seedling tomatoes to postemergence herbicides. Orr, J.P. and T. Underwood. In Sacramento, CA on April 10, 1986 gel tomato seed and drilled tomato seed, variety CXD8106 were planted in a clay loam soil. On May 6, acifluorfen, fomesafen and lactofen were applied post emergence to the tomatoes. Treatments were made with a CO2 backpack sprayer, 50 gpa, replicated 4 times in a randomized complete block design. this study was established to evaluate tomato tolerance to post emergence herbicide when tomato seeds are planted in a gel to increase emergence and vigor.

Phytotoxicity to the tomatoes was higher in the drilled tomatoes than in the gel treatment. Acifluorfen had the least amount phytotoxicity. Stand reduction, vigor reduction and phytotoxicity were very severe in the fomesafen and lactofen treatments. (University of California Cooperative Extension, Sacramento, CA 95827)

Gel Treatment

Chemical	Formulation	Rate lbs/A a.i.	Tomato Stand Red.	Tomato Vigor Red.	Tomato Phyto toxicity
aciflurofen	2E	0.0625	0.0	3.0	2.7
aciflurofen	2E	0.125	0.0	3.7	4.0
aciflurofen	2E	0.25	1.0	6.3	6.3
fomesafen	2E	0.0625	3.0	7.7	7.7
fomesafen	2E	0.125	5.7	8.7	9.0
lactofen	2E	0.031	2.7	7.7	7.7
lactofen	2E	0.0625	3.0	8.0	8.0
Check		0.0	0.0	0.0	0.0

Drill Treatment

Chemical	Formulation	Rate lbs/A a.i.	Tomato Stand Red.	Tomato Vigor Red.	Tomato Phyto toxicity
aciflurofen	2E	0.0625	0.7	4.0	3.0
aciflurofen	2E	0.125	1.7	5.7	4.3
aciflurofen	2E	0.25	2.7	7.0	6.3
fomesafen	2E	0.0625	4.3	8.0	8.0
fomesafen	2E	0.125	8.3	9.0	9.0
lactofen	2E	0.031	5.0	8.0	8.0
lactofen	2E	0.0625	4.3	8.3	8.3
Check		0.0	0.0	0.0	0.0

Yellow nutsedge control in onions with metolachlor. Anderson, W. Powell and Gary Hoxworth. Previous research at this location with preplant applications of metolachlor in spring-seeded onions resulted in 50% or greater reduction of onion stand. However, early postemergence applications of metolachlor to onions in the loop-stage or at any growth-stage thereafter caused no apparent onion injury. Applied early postemergence to the onions and preemergence to yellow nutsedge, metolachlor has provided excellent control of yellow nutsedge with no apparent onion injury. The onions were grown on raised plantbeds and furrow irrigated.

At this location in spring-seeded onions, pendimethalin has been an effective, selective herbicide when applied preplant onto preformed plantbeds and soil incorporated at .75 and 1.0 lb ai/A.

In 1986, onion bulb yield data was obtained to support earlier findings with regard to the safety of metolachlor to onions when applied early postemergence. To reduce plot maintenance, the entire experimental area was treated PPI with .75 lb ai/A pendimethalin. Metolachlor was applied at 2.0 lb ai/A in 30 gal/A of water as broadcast, over-the-top sprays to spring-seeded onions in the 1-leaf, 2-leaf, and 3-leaf stages of growth. Treated plot size was three 40-inch beds wide by 20 ft long, with 4 rows of onions seeded per bed. The onions were furrow irrigated and handweeded as needed. Treatments were randomized and replicated 3 times. The middle 15 ft of the center bed of each plot was harvested at bulb maturity and the bulbs counted, weighed, and graded for marketable size. The resulting yield data are shown in the Table. (New Mexico Agric. Exp. Sta., Las Cruces, NM 88003)

Onion bulb yields following postemergence applications of metolachlor at three growth stages

Onion growth-stage when treated	Total weight (kgm) onion bulbs per plot	Weight (kgm) of marketable onion bulbs per plot	Number of onion bulbs per plot	Percent (wt.) marketable bulbs per plot
Pendimethalin at .75 lb ai/A PPI; metolachlor postemergence at 2.0 lb ai/A				
1-leaf	14.7	13.3	65	90
2-leaf	14.4	12.3	67	86
3-leaf	16.5	14.7	71	89
Pendimethalin at .75 lb ai/A PPI				
preplant	13.6	12.1	67	89

Pendimethalin applied January 27, 1986. Metolachlor applied at 1-leaf stage, March 26; 2-leaf, April 7; and 3-leaf, April 17. Onions (var. Yellow Sweet Spanish) seeded January 27. Data represents the average of 3 replications.

Weed Control Practices for Fall Planted Bunching Onions. Bell, C. E., A. Durazo III and C. L. Elmore. Four weed control methods were tested against an untreated control for efficacy in bunching onions (Allium cepa L.) The four methods were: soil solarization for four weeks, soil solarization for four weeks plus metham at 30 gallons per acre, metham alone at 30 gallons per acre, and DCPA at 10 lb ai/A plus oxyfluorfen at .25 lb ai/A. Soil solarization is a non-herbicide technique that involves placing clear plastic polyethylene mulch (1.25 mil thick) over moist soil during times of high temperature and solar radiation. Heat trapped under the mulch, which can exceed temperatures of 150 F, is felt to kill weed seed by a process similar to pastuerization. Metham was applied to the plots through a drip irrigation system placed on the center of the 60 inch wide beds. In the case of the soil solarization plus metham, the drip irrigation hose was underneath the plastic mulch and the metham was applied two weeks after the start of the solarization period. DCPA was applied preemergence, after the onions had been planted. The oxyfluorfen was applied post-emergence after the onions had two true leaves. Plot size was one bed by 50 ft. with four replications in a Randomized Complete Block design.

The solarization period started on July 12, 1985, the metham was applied on July 26. The crop was planted and the DCPA was applied on September 4. Oxyfluorfen was applied on October 7. Plots were evaluated visually for weed control on September 23. The onions were harvested and weighed on November 14.

Overall, the best treatment was the soil solarization plus the metham. As shown below, this method provided good control of all the weeds and produced the most onions. (University of California Cooperative Extension, El Centro and Davis, California 92243)

Weed Control and Yield

	WEED CONTROL[1]					YIELD[2]
TREATMENT	ECHCO	CANT	POROL	AMAAL	TRBTE	GREEN
Solarization	8.5	9.5	6.8	9.3	10.0	488.8b
Sol. + metham	9.0	9.8	8.8	9.5	10.0	1178.0a
Metham	3.8	9.0	3.8	3.8	9.8	94.8c
DCPA + oxyf	9.5	1.2	9.0	2.5	10.0	686.8b
Untreated	0.0	0.0	0.0	0.0	0.0	1.8c

Numbers followed by the same letter are not significantly different at the 5% level according to DMRT.

1- 0 = no control, 10 = all weeds dead.

2 - average, in grams, per 15 ft. of row with four replications.

ECHCO = junglerice, CANT = volunteer cantaloupe, POROL = common purslane, AMAAL = tumble pigweed, TRBTE = puncturevine

Chemical control of Oxalis corniculata: A survey of available herbicides. Stowe, A.E., W.J. Chism and J.S. Holt. A survey was made of existing chemicals registered for weed control in ornamentals to assess their herbicidal activity on creeping woodsorrel (*Oxalis corniculata* L.). The 11 major chemical families of herbicides were divided into two groups according to timing of application. Eight post- and 9 pre-emergence formulations were selected. The survey contained 19 total treatments, including control treatments for each group (Table 1).

Post-emergence treatments were applied to fully mature, flowering plants, approximately 7 weeks old, growing under greenhouse conditions in 4-inch pots in UC potting mix. Pre-emergence treatments were applied to pots filled with moistened, low-organic matter soil, sown with an even layer of seeds mixed with sand, and covered with an additional light covering of sand. Eight replications were used in both trials. All applications were made with a CO_2 backpack plot sprayer, delivering 60 gal/acre at 20 psi through an 8004 nozzle. Pots were watered with distilled water for the duration of the experiment. The entire experiment was repeated twice. Plants receiving post-emergence treatments were evaluated for vigor 7, 12, 17, and 32 days following application. Pre-emergence treatments were evaluated for number of emerged seedlings 12 days following application. Data from all experiments were subjected to analysis of variance and mean separation.

Results of these experiments indicate that under our greenhouse conditions, atrazine, diuron, and oxyfluorfen were the most effective post-emergence herbicides for control of *Oxalis corniculata* (Table 2). Of the pre-emergence treatments tested, chloramben completely prevented *Oxalis corniculata* seed germination (Table 3). (Botany and Plant Sciences, University of California, Riverside, CA 92521)

Table 1. Herbicides and rates tested on *Oxalis corniculata*

	Post-emergence treatments1/		Pre-emergence treatments2/	
Chemical family	Herbicide	Rate (lb ai/A)	Herbicide	Rate (lb ai/A)
Acid amide	--	--	napropamide	6.0
Benzoic acid	dicamba	0.25	chloramben	4.0
Benzonitrile	bromoxynil	1.0	--	--
Carbamate				
phenyl-	chlorpropham	3.0	chlorpropham	3.0
thio-	--	--	EPTC	6.0
Dinitroaniline	--	--	oryzalin	4.0
Diphenoxy-carboxylic	fluazifop-butyl	0.5	--	--
Diphenyl ether	oxyfluorfen	0.5	oxyfluorfen	1.0
Phenoxy-carboxylic	2,4-D amine	2.0	--	--
Phthalic acid	--	--	DCPA	12.0
Triazine	atrazine	4.0	atrazine	4.0
Urea	diuron	4.0	diuron	4.0

1/ Post-emergence treatments consisted of 8 herbicides and a control.
2/ Pre-emergence treatments consisted of 9 herbicides and a control.

Table 2. Vigor of *Oxalis corniculata* following post-emergence herbicide applications[1/]

Treatment	Days after treatment 7	12	17	32
dicamba	7.50 bc	7.00 b	6.13 b	3.00 c
bromoxynil	5.25 d	6.75 b	6.31 b	7.88 b
chlorpropham	2.19 e	3.38 de	3.63 c	3.50 c
fluazifop-butyl	8.20 b	9.06 a	9.50 a	9.25 a
oxyfluorfen	4.63 d	2.25 e	1.50 d	0.00 d
2,4-D amine	6.93 c	4.50 cd	4.13 c	2.50 c
atrazine	7.57 bc	3.88 cde	0.75 d	0.00 d
diuron	8.00 b	5.13 c	0.63 d	0.00 d
untreated	9.75 a	9.50 a	9.75 a	9.69 a

1/ Vigor is rated from 0 to 10, where 10 = perfect vigor and 0 = plant death. Numbers are the average of 8 replications. Numbers within a column followed by the same letter are not significantly different at the 0.01 level.

Table 3. Number of emerged *Oxalis corniculata* seedlings following pre-emergence herbicide applications[1/]

Treatment	Number of emerged seedlings	Percent of untreated
napropamide	1.25 cd	11.10
chloramben	0.00 d	0.00
chlorpropham	3.50 c	31.11
EPTC	3.63 c	32.27
oryzalin	1.50 cd	13.33
oxyfluorfen	3.50 c	31.11
DCPA	4.25 bc	37.78
atrazine	6.88 b	61.16
diuron	3.13 c	27.82
untreated	11.25 a	100.00

1/ Numbers are the average of 8 replications. Numbers followed by the same letter are not significantly different at the 0.05 level.

Weed seed population dynamics during six years of weed management systems in irrigated soil. Menges, R. Cantaloupe, bell pepper, cotton, onion, and cabbage were sequentially grown in furrow-irrigated field plots in two, 3-year cycles. Palmer amaranth did not exist initially but storm-introduced seeds increased to 1.1 billion/ha as seed populations of common purslane decreased from 786 to 17 million/ha. Use of herbicides was more effective than hand weeding in reduction of weed seed populations. The highest crop yield often required the addition of other pesticides to herbicide applications. (USDA-ARS, Subtropical Agricultural Research Laboratory, P. O. Box 267, Weslaco, TX 78596)

Allelopathic effects of Palmer amaranth residues in soil on the growth of vegetable seedlings. Menges, R. Palmer amaranth residues of 4 and 8 kg/m^2 were soil-incorporated (5 cm) with soil to determine the allelopathic effects on the growth of carrot and onion seedlings in the field. Seedling growth of both plants was inhibited 32 to 63% with the greatest inhibition during the first 4-week period of soil incubation. Laboratory bioassays showed downward movement of phytotoxicity to the 10- to 15-cm soil depth with heavy rainfall. Removal of root tissues from whole plant residues had no effect on phytotoxicity. Cabbage seedlings were grown in other field experiments where 0, 4, and 8 kg/m^2 of Palmer amaranth was soil-incorporated with 0, 4, and 8 weeks of competition from standing plants of amaranth. The weight of cabbage seedlings was reduced 42 and 69% by 4 and 8 kg/m^2 of amaranth, respectively, without competition. Weight was reduced 59 and 97% after 4 and 8 weeks of competition, respectively, regardless of amaranth residues in soil. (USDA-ARS, Subtropical Agricultural Research Laboratory, P. O. Box 267, Weslaco, TX 78596)

Barnyardgrass control in seedling Kentucky bluegrass turf with new herbicides. Beck, K.G. An experiment was established near Henderson, CO in seedling Kentucky bluegrass to evaluate control of barnyardgrass (ECHCG) with fenoxaprop, BAS 514, and tank mixes of fenoxaprop and broadleaf herbicides (Table 2). The design was a randomized complete block with three replications. Treatments were applied on July 3 and July 7, 1986 with a CO_2 pressurized bicycle sprayer using 11005 flat fan nozzles calibrated to deliver 43 gpa at 45 psi. Other application data are presented in Table 1. Plot size was 5 by 10 ft.

Visual evaluations of barnyardgrass control and phytoxicity to seedling Kentucky bluegrass were taken on Jul 20, Aug 5, and Sep 2, 1986. Barnyardgrass was effectively (> 85%) controlled with fenoxaprop when applied alone or in combination with fluroxypyr or iron and nitrogen fertilizer (Table 2). However, severe (> 70%) turf damage occurred with the highest rate of fenoxaprop (0.36 lb ai/A) applied alone or in combination with chelated iron and nitrogen fertilizer. Chelated iron and nitrogen fertlizers when mixed with fenoxaprop are reported to decrease turf injury. Little to no turf damage occurred when fenoxaprop was applied at 0.18 lb ai/A with dicamba or phenoxy herbicides; however barnayardgrass was not adequately controlled. Some antagonistic effect was overcome when fenoxaprop was applied at 0.36 lb ai/A with these broadleaf herbicides. BAS 514 provided excellent control of barnyardgrass but, at a slower rate than fenoxaprop. Moderate (33%) turf damage occurred with the highest rate of BAS 514 approximately two months after application. (Weed Research Laboratory, Colorado State University, Ft. Collins, CO 80523).

Table 1. Application data for barnyardgrass control in seedling Kentucky bluegrass with new herbicides.

Environmental data		
Application dates	Jul 3	Jul 7
Application time	3:00 p	1:00 p
Air temperature, F	90	88
Cloud Cover, %	70	85
Relative humidity, %	38	45
Wind speed/direction, MPH	4/E	2/E
Soil temperature (2 in), F	72	61

Weed data

Application date	Species	Growth Stage	Diameter (in)	Density (plt/ft^2)
Jul 3	ECHCG	3 to 4 tillers	5 to 8	12
Jul 7	ECHCG	3 to 4 tillers	5 to 8	12

Table 2. Phytotoxicity to seedling Kentucky bluegrass and barnyardgrass control caused by grass herbicides.

Treatment	Rate	Phytotoxicity			Barnyardgrass		
		7-20	8-5	9-2	7-20	8-5	9-2
	(lb/A)	----------(% of control)---------					
fenoxaprop	0.18	0	18	18	75	95	98
fenoxaprop	0.36	3	82	73	90	98	98
fenoxaprop + broxmoxynil + 2,4-D	0.18 + 0.25 + 0.25	8	0	0	48	10	23
fenoxaprop + triclopyr + 2,4-D	0.18 + 0.13 + 0.25	0	0	0	63	70	63
fenoxaprop + dicamba + 2,4-D + dichlorprop	0.18 + 0.19 + 0.75 + 0.75	0	0	0	60	32	47
fenoxaprop + 2,4-D + dichlorprop	0.18 + 0.75 + 0.75	0	0	0	45	22	22
fenxoaprop + bromoxynil + 2,4-D	0.36 + 0.25 + 0.25	5	10	15	63	70	63
fenoxaprop + dicamba + 2,4-D + dichlorprop	0.36 + 0.19 + 0.75 + 0.75	7	3	7	91	90	90
fenoxaprop + 2,4-D + MCPA	0.36 + 0.25 + 0.25	0	5	0	68	73	77
fenoxaprop + safener B[1]	0.18	3	15	17	77	83	88
fenoxaprop + safener B	0.36	10	83	88	95	98	97
fenoxaprop + harmony	0.18 + 0.012	0	0	8	53	73	73
fenoxaprop + fluroxypyr	0.18 + 0.4	3	15	10	95	93	92
MSMA	2.0	0	0	0	48	10	23
BAS 514	0.5	0	0	3	43	85	90
BAS 514	1.0	0	0	18	70	75	100
BAS 514	2.0	2	5	33	68	98	100
LSD (0.05)		NS	11	16	17	13	19

[1]Safener B contains chelated iron applied at 0.5 lb of elemental iron/A and 18% urea nitrogen fertilizer applied at 2.3 lb of nitrogen/A

Evaluation of several herbicides for preemergent control of large crabgrass, *Digitaria sanquinalis*. Elmore, C. L. and J.A. Roncoroni. Two studies were bot conducted at two different sites to evaluate preemergent herbicides for crabgrass control. The herbicides oxadiazon, pendimethalin, prodiamine, benefin, and DCPA were tested at several rates and formulations. The two sites, University of California Davis and Ancil Hoffman Park, in Sacramento, were treated on February 24, and February 28, 1986, respectively. The pendimethalin granule and oxadiazon + benefin granule were applied on March 10, 1986 at the Sacramento site. All water dispersable granules and wettable powders were applied with a CO_2 backback at 30 psi using 50 gallons of water/acre applied with three 8004 Teejet nozzles. Granules were applied by hand shaker. Plot size was 10 ft. by 10 ft. with 4 replications. Plots were aligned in a randomized complete block design (each site was randomized separately). All evaluations were done on a 1 to 10 scale, 1 being no control and 10 being complete control. Statistical analysis was done using Duncans' method for analysis of variance. Two evaluations were taken at the Sacramento site which was very heavily infested with crabgrass. Only 1 evaluation was taken at the Davis site. The turf was predominately tall fescue at UC Davis and at Sacramento consisted primarily of a perennial ryegrass and Kentucky bluegrass mixture. At the first evaluation at the Sacramento site, June 25, 1986, all treatments gave almost complete control. Probable first emergence of crabgrass was March 1 to March 5 at the Sacramento site.

The final Sacramento rating on September 24, 1986, showed that 3 treatments DCPA, benefin + oryzalin and pendimethalin 60 WDG at 2 lb a.i./A were not able to control a late germination of crabgrass and therefore resulted in a lower control rating. Pendimethalin at 4 lbs. in both the water dispersiable granule and 2% granule form and prodiamine 65% WDG produced excellent control.

The evaluation of the Davis site on August 21, 1986, showed that all treatments gave effective weed control, except pendimethalin 60 WDG at 1 lb which showed a reduced crabgrass control. One of the reasons for this excellent late season control is the good competitive vigor of the tall fescue turf.

Oxadiazon as 2% granule, wettable powder, or in combination with benefin showed very good control with little difference between formulations. No phytotoxicity was observed with any treatment. (University of California Cooperative Extension, Davis 95616)

Ratings for several herbicides for preemergent control of large crabgrass *Digitaria sangunalis*.

			Ratings (crabgrass control)[1]		
Herbicide		lb a.i./A	Sacto. 6/25/86	Davis 8/21/86	Sacto. 9/24/86
1.	oxadiazon (Ronstar 2G)	2.0	10.0 A	9.0 A	6.9 ABCD
2.	oxadiazon	4.0	9.85 A	10.0 A	7.6 ABC
3.	oxadiazon (Ronstar 50 WP)	2.0	9.0 A	9.9 A	8.1 ABC
4.	oxadiazon	4.0	10.0 A	10.0 A	8.6 AB
5.	pendimethalin (Pre M 60 WDG)	2.0	9.85 A	6.0 B	5.3 CD
6.	pendimethalin	4.0	10.0 A	9.3 A	9.5 A
7.	prodiamine (Endurance 65 WDG)	0.5	9.5 A	10.0 A	9.3 ABC
8.	prodiamine	1.0	10.0 A	10.0 A	9.9 A
9.	prodiamine	2.0	10.0 A	10.0 A	9.0 A
10.	benifen + oryzalin (Balan 25% + Surflan 25%)	1.5	9.0 A	8.3 A	4.0 DE
11.	DCPA (Dacthal 75WP)	10.0	9.0 A	8.9 A	5.5 BCD
12.	pendimethalin (Scotts ProTurf 2G)	2.0	9.5 A	10.0 A	7.4 ABC
13.	pendimethalin	4.0	10.0 A	10.0 A	9.8 A
14.	Control	-	2.85 B	1.5 C	1.3 E
15.	oxadiazon + benefin (Regal Star 2 + 1G)	2.0	10.0 A	9.3 A	7.4 ABC
16.	oxadiazon + benefin	4.0	10.0 A	10.0 A	8.3 ABC

1 = no control, 10 = complete control. All numbers are an average of 4 replication.
All numbers with the same letter are not significantly different at 5% level.

Effects of fall applied phenoxy herbicide combinations on dandelion control in bluegrass turf. Anderson, J.L. and M.G. Weeks. This study was designed primarily to compare the control of broadleaf weeds in Kentucky bluegrass using phenoxy herbicide combinations. The test site was an established Kentucky bluegrass-white clover sod at the Logan, Utah community soccer fields. The treated area was mowed, fertilized and sprinkler irrigated routinely and was subject to heavy traffic by little league football and soccer teams during the summer months. The primary weed species was common dandelion; occasional broadleaf and buckhorn plantain were also present as dandelion was the only weed species common to all plots, it was the only weed considered in the plot evaluation.

Treatments were applied in 300 L of water/ha with a bicycle sprayer equipped with air tank pressurized to 46 psi and 8002 nozzles. Plots were established the morning of October 10, 1986, when the weather was clear and calm with a temperature of 22^{0} C. Temperatures did not exceed 19^{0} C thereafter until the plots were evaluated November 12, 1986.

Within the time limits of this study no treatment provided complete control of dandelion. Plots will be further evaluated in the spring of 1987. The ester formulations of dichlorprop tended to provide better weed control than their corresponding amine salt formulations. Dandelion control with the dimethylamine salt of 2,4-D or mecoprop was generally unsatisfactory. Dicamba alone or in combinations at rate of 0.1 lb ai/A or greater caused considerable browning of white clover. (Utah State Agricultural Experiment Station, Logan, UT 84322-4820).

Effects of herbicide combinations on common dandelion control in bluegrass turf

Treatment	Formulation	Rate[1] (lb ai/A)	Dandelion Control[2]
2,4-D	diethanolamine salt	0.75	6.4 BC
+ dichlorprop (f)[3]	diethanolamine salt	0.75	
2,4-D	diethanolamine salt	1.00	8.5 A
+ dichlorprop (f)	diethanolamine salt	1.00	
2,4-D	butoxyethyl ester	1.00	8.8 A
+ dichlorprop (f)	butoxyethyl ester	1.00	
2,4-D	diethanolamine salt	1.00	8.4 A
+ dichlorprop	diethanolamine salt	1.00	
+ dicamba (t)	diethylamine salt	0.125	
2,4-D	diethanolamine salt	0.75	7.8 AB
+ dichlorprop	diethanolamine salt	0.75	
+ dicamba (t)	diethylamine salt	0.10	
2,4-D	butoxyethyl ester	0.75	9.1 A
+ dichlorprop	butoxyethyl ester	0.75	
+ dicamba (t)	diethylamine salt	0.10	
dicamba	diethylamine salt	0.25	7.6 AB
2,4-D	diethylamine salt	1.00	7.5 AB
+ mecoprop	diethylamine salt	0.50	
+ dicamba (f)	diethylamine salt	0.10	
2,4-D	diethylamine salt	0.50	4.0 D
+ mecoprop	diethylamine salt	0.50	
+ dicamba (f)	diethylamine salt	0.50	
2,4-D	isooctyl ester	0.75	8.1 A
+ dichlorprop	butoxyethanol ester	0.75	
+ dicamba (f)		0.188	
2,4-D	butoxyethyl ester	0.75	7.9 AB
+ triclopyr (f)	butoxyethyl ester	0.375	
2,4-D	diethylamine salt	1.5	5.5 C
Untreated		---	0 E

[1]Treated October 10, 1986

[2]Rated November 12, 1986; 10 = complete browning of dandelion;; 0 = no control; figures are the average of 4 replications; values followed by a common letter are not significantly different at Duncan's 5% level.

[3]f = formulated product; t = tank mixture

The effect of orifice, pressure and formulation on the drift of glyphosate. Lourens, A. F. and A. H. Lange. Forty feet of a one hundred foot wind tunnel 15 inches in diameter with stations every 10 feet was used for this study. Spinach in the 8-10 leaf stage and 8-10 inch nemaguard peach seedlings were placed at each station before spraying herbicides for 10 seconds into the air stream from a 10 inch fan. The treated plants were then placed in the greenhouse and rated October 16 and November 1, 1986.

An early rating at one week showed differences due to the type of orifice and pressure, the lower pressure reducing the amount of drift as expected. The effect of distance from the spray nozzle was not as striking with the commercial glyphosate formulation whereas the other formulation used in Europe and South Africa was more active close to the nozzle suggesting a more active form. The differences due to the distance from the nozzle as well as orifice, pressure and formulation were much more apparent in the later rating at one month. The results with MCPA were similar to the more active formulation of glyphosate.

Spinach was much more sensitive as a test plant than peach seedlings. The effects of drift with low pressure nozzles a 40 feet (from the spray nozzle) was markedly less with the more active glyphosate formulation and MCPA whereas the glyphosate formulation in use in our agriculture seemed less affected by orifice and pressure. This may explain why we have experienced good safety when glyphosate is applied with reasonable care under California orchard conditions. The other formulation, used in South Africa, has shown considerable phytotoxicity in trees and vines which may be in part due to drift at the time of application. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. The effect of orifice type, pressure and formulation on drift of glyphosate compared to MCPA at one week (425-73-502-100-9-86A-4).

Treatment[1/]	kg/h	Orifice size	Feet from fan	Wind speed	Phyto[2/] Spinach	Phyto[2/] Peach[3/]
Check	0		0	10	1.3	1.0
Glyphosate(R)	2	8002 LP[4/]	10	9	1.7	2.0
Glyphosate(R)	2	8002 LP	20	8.5	1.7	1.7
Glyphosate(R)	2	8002 LP	30	8	0.3	1.0
Glyphosate(R)	2	8002 LP	40	7.5	0.3	1.0
Glyphosate(R)	2	8002 E[5/]	10	9	3.7	2.7
Glyphosate(R)	2	8002 E	20	8.5	3.0	3.3
Glyphosate(R)	2	8002 E	30	8	1.7	1.0
Glyphosate(R)	2	8002 E	40	7.5	1.7	1.0
Glyphosate(S)	2	8002 LP	10	9	5.3	4.0
Glyphosate(S)	2	8002 LP	20	8.5	3.0	2.3
Glyphosate(S)	2	8002 LP	30	8	2.7	1.3
Glyphosate(S)	2	8002 LP	40	7.5	3.0	2.0
Glyphosate(S)	2	8002 E	10	9	7.3	5.0
Glyphosate(S)	2	8002 E	20	8.5	3.3	4.0
Glyphosate(S)	2	8002 E	30	8	2.3	1.2
Glyphosate(S)	2	8002 E	40	7.5	2.7	2.7
MCPA	2	8002 LP	10	9	5.0	4.3
MCPA	2	8002 LP	20	8.5	4.3	3.7
MCPA	2	8002 LP	30	8	5.0	3.7
MCPA	2	8002 LP	40	7.5	2.3	2.0
MCPA	2	8002 E	10	9	6.7	5.3
MCPA	2	8002 E	20	8.5	5.3	5.0
MCPA	2	8002 E	30	8	4.3	4.0
MCPA	2	8002 E	40	7.5	4.3	3.0

1/ The treatment was sprayed for 10 sec. in the air stream before entering the wind tunnel.
2/ Average of 3 replications where 0 = no phytotoxicity symptoms and 10 = plant dead. Treated 9/30/86. Evaluated 10/6/86.
3/ Nemaguard seedlings 8-10" high.
4/ LP series nozzle is low pressure at 12 psi.
5/ E series nozzle was operated at 30 psi.
R = Roundup; U.S. commercial product.
S = Sting; European and South African formulation.

Table 2. The effect of orifice type, pressure and formulation on drift of glyphosate compared to MCPA at one month (425-73-502-100-9-86A-4).

Treatment[1/]	kg/h	Orifice size	Feet from fan	Wind speed	Phyto[2/] Spinach	Peach[3/]
Check	0		0	10	1.7	0.3
Glyphosate(R)	2	8002 LP[4/]	10	9	10.0	9.3
Glyphosate(R)	2	8002 LP	20	8.5	6.3	3.7
Glyphosate(R)	2	8002 LP	30	8	3.7	2.7
Glyphosate(R)	2	8002 LP	40	7.5	1.3	0.3
Glyphosate(R)	2	8002 E[5/]	10	9	10.0	10.0
Glyphosate(R)	2	8002 E	20	8.5	10.0	4.3
Glyphosate(R)	2	8002 E	30	8	4.3	2.3
Glyphosate(R)	2	8002 E	40	7.5	0.7	1.3
Glyphosate(S)	2	8002 LP	10	9	10.0	10.0
Glyphosate(S)	2	8002 LP	20	8.5	9.7	6.3
Glyphosate(S)	2	8002 LP	30	8	5.3	3.3
Glyphosate(S)	2	8002 LP	40	7.5	3.3	2.0
Glyphosate(S)	2	8002 E	10	9	10.0	10.0
Glyphosate(S)	2	8002 E	20	8.5	10.0	9.3
Glyphosate(S)	2	8002 E	30	8	9.0	4.3
Glyphosate(S)	2	8002 E	40	7.5	7.3	4.3
MCPA	2	8002 LP	10	9	8.0	9.3
MCPA	2	8002 LP	20	8.5	8.0	5.0
MCPA	2	8002 LP	30	8	6.7	3.3
MCPA	2	8002 LP	40	7.5	5.7	0.7
MCPA	2	8002 E	10	9	10.0	10.0
MCPA	2	8002 E	20	8.5	10.0	8.3
MCPA	2	8002 E	30	8	8.0	4.7
MCPA	2	8002 E	40	7.5	4.7	4.0

1/ The treatment was sprayed for 10 sec. in the air stream before entering the wind tunnel.
2/ Average of 3 replications where 0 = no phytotoxicity symptoms and 10 = plant dead. Treated 9/30/86. Evaluated 11/1/86.
3/ Nemaguard seedlings 8-10" high.
4/ LP series nozzle is low pressure at 12 psi.
5/ E series nozzle was operated at 30 psi.

PROJECT 5.

WEEDS IN AGRONOMIC CROPS

Doug Ryerson - Project Chairman

The evaluation of trifluralin 10% granules for the control of dodder (Cuscuta sp.) in alfalfa hay. Vargas, Ron. A second year stand of WL-515 variety alfalfa, known to be infested with dodder, was divided into plots and replicated four times in a randomized complete block design. The initial application of trifluralin granules was made on January 27, 1986 with a Valmar® spreader. A second application was applied after the first cutting on April 16, 1986 to a 2#ai and 3#ai treatment.

An evaluation on March 25, 1986, 60 DAT indicated 100 percent control with all treatments. The 2#ai/A treatment was starting to break down on April 12, 1986, 75 DAT. Control was still acceptable on June 10, 1986, but at 200 DAT all treatments were exhibiting poor control. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Trifluralin granules for dodder control in alfalfa hay

Treatments	#ai/A 1/27 + 4/16	DAT:	Percent control[1] 60 3/25/86	75 4/12/86	135 6/10/86	200 8/12/86
trifluralin	2		100	90	77	31
trifluralin	4		100	100	92	34
trifluralin	6		100	100	71	22
trifluralin	2 + 2		100	90	83	22
trifluralin	3 + 3		100	100	73	24
check	-		0	0	0	0

[1] Average of four replications

Effect of post-attachment dodder control treatment in alfalfa on weed seed emergence. Cudney, D. W. and S. B. Orloff. Dodder is customarily controlled by burning or contact herbicides after it has attached to the alfalfa. There has been speculation that these treatments may influence subsequent weed seed germination. A trial was initiated in the Lucerne Vally of southern California to determine if such an effect could be measured. The field was harvested four days prior to treatment and regrowth for the fourth cutting had begun. Attached dodder was then treated with either dinoseb or burned with a propane burner as is commonly practiced. The treatments were: a single "light" burn (to simulate a broad-scale field burn), a "heavy" burn (to simulate a concentrated spot treatment) a "double" burn (one light burn followed by another light burn three days later), treatment with dinoseb followed by a light burn three days later, and an untreated check. The treatments were replicated six times in a randomized complete block design. Each plot was sixteen square feet in size. The center two square feet were sampled to a depth of two centimeters to determine weed seed viability. The soil and plant debris were screened to remove large stems and roots. The remaining material was placed on the top of flats containing U.C. greenhouse planting mix. The flats were then kept moist in a greenhouse at the University of California, Riverside and emerged dodder and other weed seedlings were counted every two days for a period of ten days.

Burning significantly reduced the emergence of dodder and sowthistle. Yellow foxtail, barnyardgrass, and tansy mustard showed a trend toward a reduction in emergence with burning, however, the trend was not statistically significant due to the variability in emergence within each treatment. (University of California Cooperative Extension, Riverside, CA 92521)

Effect of post-attachment dodder control
treatment on weed seed emergence

	*Weed Counts				
Treatment	Dodder	Yellow Foxtail	Barnyard grass	Tansy Mustard	Sowthistle
single burn	2.2	21.5	10.7	85.3	5.2
heavy burn	0.5	9.0	15.3	18.3	2.0
double burn	1.3	6.7	6.3	4.2	1.2
dinoseb + burn	3.8	22.6	8.2	37.0	3.2
check	34.2	30.5	16.2	73.0	48.5
LSD .05	20.5	NS	NS	NS	33.7

* Weed counts: average of six replicates,
2 ft. sq. samples

The effect of treatments to control attached dodder on alfalfa growth. Cudney, D. W. and S. B. Orloff. Field observations have indicated that alfalfa growth is significantly impacted by post-attachment dodder control treatments. A study was conducted in Lancaster, California to compare the effects of burning and an herbicide treatment of dinoseb with untreated alfalfa. A completely random design was used. Burning and dinoseb treatments were made on August 26, six days after the fourth cutting. Plant samples were taken for evaluation 23 days later. Measurements were made on ten random stems from each of four replications.

Stem length, number of leaves per stem, leaf area per leaf, and leaf weight were all significantly affected by both dinoseb and burning (see Table). Total leaf area, stem length, stem weight, and the number of leaves were decreased by burning and dinoseb treatments. Burning resulted in the greatest decrease, one-half that of the untreated plants. Conversely, individual leaf area and leaf weight were increased by burning and dinoseb treatments. Thus, these treatments resulted in fewer larger leaves on shorter stems. This effect was most pronounced with burning. (University of California Cooperative Extension, Riverside, CA 92521)

The effect of treatments to control attached dodder on alfalfa growth

Treatment*	Leaf Area (cm^2)	Leaf Wt. grams	Stem Wt. grams	Stem length (cm)	No. leaves	Leaf Area/ leaf(cm^2)	Wt./Leaf grams
dinoseb	547	2.92	2.90	28.00	183.5	3.02	.016
burn	621	2.74	2.75	25.50	149.0	4.18	.018
control	765	3.90	4.40	38.50	353.3	2.18	.011
LSD .05	.58	.68	.63	1.40	55.0	.54	.003

* Average of four replications

The effect of post-attachment dodder control treatments on alfalfa growth and yield. Orloff, S. B. and D. W. Cudney. A trial was conducted in Lancaster, California to compare the effect of commonly used post-attachment dodder control practices on alfalfa growth and yield. The treatments were applied to alfalfa regrowth five days after the third cutting on July 25, 1986. Twelve patches of dodder were burned with a propane fueled burner and another twelve patches were treated with dinoseb. Measurements were taken from each of the treated areas and from a corresponding untreated area adjacent to each plot. Statistical analysis was conducted on a paired comparison basis.

Plant height evaluations taken 12 and 27 days after treatment showed reduced plant height for both burning and dinoseb treatment (see Table). Burning resulted in the more severe reduction. Both burning and dinoseb treatments caused a reduction in the number of stems per square meter and stems per crown. Burned areas had the fewest stems per crown, implying that in the burned plots bud regrowth was more severely damaged. Yield the cutting after treatment was less than half that in the untreated areas. Treatment with either burning or dinoseb reduced the number of crowns per square meter. (University of California Cooperative Extension, Riverside, CA 92521)

The effect of post-attachment dodder control treatments on alfalfa growth and yield

Treatment	Plant Height (cm) Date 12	27	Stems/M^2	Stems/ crown	Yield tons/Ha	Crowns/ M^2
dinoseb	21.8	53.0	244	11.1	2.37	25
burning	12.0	48.7	217	9.4	1.98	23
untreated 1/	42.5	65.8	438	13.2	4.75	37
significant	yes	yes	yes	yes	yes	yes

1/ Significance: All measurements significant at the 99% confidence level

The effect of contact herbicides on alfalfa desiccation. Orloff, S. B. and D. W. Cudney. Dinoseb compounds have been the major contact herbicides used for desiccation and control of attached dodder on alfalfa. The recent removal of dinoseb registration has left growers without an efficient and economical means of controlling attached dodder. Burning has been found to be effective, but at a much higher cost. The following study was conducted to evaluate alternative means of desiccation. The trial was conducted in the Antelope Valley, ten miles west of Lancaster, California. The study was divided into two trials. The first trial was used to compare seven fertilizer solutions and herbicides against dinoseb. The second trial was used to evaluate rates and spray volumes of one of the more promising fertilizer solutions. Both trials were replicated four times using a randomized complete block experimental design. The treatments were made to plots 80 inches by 10 feet utilizing a CO_2 backpack sprayer with TeeJet flat fan nozzles at a pressure of 25 psi. The treatments were applied at the end of the season, after fifth cutting, to alfalfa with approximately five to six inches of regrowth. Desiccation ratings were taken starting five hours after treatment and then daily for the next five days. Additional ratings were made seven and ten days after treatment. The second trial utilized rates and dilutions of a commercially available urea-sulfuric acid solution. Rates of 20, 40, and 80 gallons of product were used at full concentration and with a 50 percent dilution with water.

Five hours after treatment all materials in trial one were producing significant effects on the alfalfa (see Table 1). Dinoseb and ammonium polysulfide exhibited the greatest degree of desiccation.

Twenty-four hours after application, urea-sulfuric acid solution had equalled ammonium polysulfide and dinoseb. All materials increased in effectiveness forty-eight hours after treatment with urea-sulfuric acid solution, ammonium polysulfide, and dinoseb still producing the most dramatic effects. The same trend was apparent seventy-two and ninety-six hours after treatment.

Seven and ten days after treatment, ammonium thiosulfate showed most complete alfalfa dessication. Thus, ammonium thiosulfate was slower acting, but provided the most complete desiccation.

Desiccation improved with increasing application rate for all materials tested. Ammonium thiosulfate at 60 and 120 gallons per acre provided equal to superior desiccation of alfalfa compared to dinoseb. Ammonium polysulfide and ammonium nitrate at 120 gallons per acre and urea-sulfuric acid solution at 80 gallons per acre were also equivalent to the dinoseb treatment.

Trial two demonstrated that improved desiccation was achieved with each increase in rate of urea-sulfuric acid solution (see Table 2). Performance also improved when spray volume was doubled from 40 to 80 gallons per acre. (University of California Cooperative Extension, Riverside, CA 92521)

Table 1. Evaluation of contact herbicides for alfalfa desiccation

Treatment*	Rate**	Rating Dates 1/ 11/13	11/14	11/15	11/16	11/17	11/20	11/23
ammonium nitrate solution	30 gal.	3.3	3.8	4.6	4.8	4.8	5.1	4.8
	60 gal.	2.5	2.0	4.0	4.9	5.5	6.8	6.9
	120 gal.	2.8	3.3	5.0	6.0	7.4	7.6	8.3
ammonium thiosulfate	30 gal.	2.3	2.5	3.0	4.3	4.8	6.1	6.4
	60 gal.	2.5	2.5	4.0	4.5	5.9	8.3	8.3
	120 gal.	3.0	2.5	4.6	6.3	7.5	9.4	9.3
ammonium polysulfide	30 gal.	3.8	4.8	4.5	5.5	5.1	5.3	5.0
	60 gal.	5.5	5.3	5.5	6.5	6.0	6.1	6.0
	120 gal.	5.8	6.8	7.5	8.4	8.4	8.1	8.1
urea-sulfuric acid solution	80 gal.	4.6	7.0	7.8	8.5	8.3	8.4	8.0
ammonium sulfate	5 lbs.	1.8	1.3	2.0	2.0	2.8	2.0	2.5
	10 lbs.	1.8	1.5	2.1	2.3	3.0	2.8	3.3
paraquat	.5 lbs.	3.0	2.5	4.0	4.5	4.9	5.8	7.1
diesel	120 gal.	4.5	4.0	3.8	4.3	4.0	4.5	5.4
dinoseb	2.5 lbs.	5.5	6.3	6.8	7.3	7.5	7.5	7.8
check	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
LSD .05		1.0	1.0	.7	1.0	.9	1.2	1.0

* Average of four replications
**Rate in gallons of commercially available product per acre or pounds of active ingredient per acre.
1/ Rating 0 = no desiccation 10 = All plants desiccated

Table 2. Effect of rate and dilution of urea-sulfuric acid solution on alfalfa desiccation

	Rate 1/	Gal/A 2/	Rating 3/ 11/17	11/20	11/23
	20	40	4.6	5.1	5.5
	40	40	3.9	5.3	5.6
	40	80	6.0	7.6	7.1
	80	80	6.0	8.0	8.4
	80	160	6.8	8.4	8.5
check	-0-	-0-	-0-	-0-	-0-
LSD .05			.4	.8	.6

1/ Rate expressed as gallons per acre of commercially available product
2/ Gallons per acre spray volume
3/ Rating 0 = no effect 10 = complete desiccation

Dodder control in alfalfa with dinitroanaline herbicides. Dawson, J. H. Pendimethalin, prodiamine, and trifluralin were applied in plots of established alfalfa on March 25, 1986, at Prosser, Washington. Pendimethalin was applied as a liquid formulation, prodiamine as a wettable powder, and trifluralin both as a liquid and as a 10% active granular formulation. Chlorpropham and DCPA were included as standard herbicides. DCPA was applied on March 25 at the same time as the other herbicides, and a granular formulation of chlorpropham was applied to the surface of moist soil on April 9. All herbicides applied on March 25 were incorporated with the surface 1 inch of soil. Individual plots were 3 by 6 ft. and were surrounded by a 3-ft. wide bare alleyway.

Throughout the growing season, the plots were sprinkle irrigated in a manner that induced dodder to emerge in separate flushes, spaced about 1 month apart.

Seed of field dodder was distributed on each plot at the rate of 250 lb/A in March and incorporated into the surface soil along with the herbicides. The same quantity of dodder seed was applied again to each plot at the end of the second, third, and fourth flush of dodder emergence. These seed were left on the soil surface. Seed of Russian thistle was sown with the dodder seed in March, and the dodder seed included some seed of alfalfa. Shoots of established alfalfa and seedlings of Russian thistle and alfalfa served as hosts for the dodder.

From each flush of dodder emergence, dodder seedlings that became attached to host plants were counted. These seedlings, together with the host tissue to which they were attached, were removed and destroyed. The percent control of dodder was calculated for each flush of emergence. Dodder control was considered satisfactory if the reduction in attached dodder was 95% or more. The herbicide treatments and the percent control of dodder in each of five flushes of emergence are presented in the table.

The standard herbicide, chlorpropham, at 6 lb ai/A, controlled dodder only during the first flush of emergence. The second standard herbicide, DCPA, at 10 lb ai/A, controlled dodder effectively during the first two flushes, and was not effective thereafter.

Trifluralin at 2 lb ai/A, like chlorpropham at 6 lb/A, controlled dodder effectively during the first flush of emergence only. At 4 lb/A, either as a liquid or granular formulation, or at 6 lb/A as a liquid formulation, trifluralin controlled dodder effectively during the first two flushes of emergence, but was ineffective thereafter.

Pendimethalin and prodiamine both controlled dodder for longer periods than did trifluralin. Both materials at 2 lb/A controlled dodder effectively during the first two flushes of emergence. At 4 lb/A, pendimethalin controlled dodder during three flushes of emergence, and prodiamine controlled it during four flushes of emergence. At 6 lb/A, control from each herbicide lasted for one flush longer.

Under Washington conditions, dodder sometimes begins to emerge in March. Control is needed from then until mid-July for alfalfa grown for seed production to remain dodder free until harvest. Longevity of control was clearly adequate from pendimethalin at 4 lb/A or from prodiamine at 3 lb/A, and closely approached being satisfactory from these two materials at 2 and 3 lb/A, respectively. Control from trifluralin was initially very good, but did not persist as long as that from pendimethalin and prodiamine. (USDA-ARS, Irrigated Agriculture Research and Extension Center, Prosser, WA 99350)

Dodder control in May through September 1986 from several herbicides applied in established alfalfa in March 1986

Herbicide	Rate lb/A	1st flush ending May 19	2nd flush ending June 24	3rd flush ending July 28	4th flush ending Aug 25	5th flush ending Sept 16
		-------------------------(% Control)-----------------------				
Pendimethalin	2	100	100	69	54	54
	3	100	100	92	73	41
	4	100	100	98	87	84
	6	100	100	99	97	88
Prodiamine	2	100	99	87	86	77
	3	100	100	95	95	83
	4	100	99	98	98	99
	6	100	100	100	99	98
Trifluralin (liquid)	2	97	75	25	--	--
	4	99	97	32	0	--
	6	100	97	58	54	--
Trifluralin (granular)	4	95	95	59	42	--
Chlorpropham (granular)	6	97	67	8	--	--
DCPA	10	99	97	15	--	--
None	--	(4014)*	(461)*	(1394)*	(599)*	(423)*

* Total attached dodder removed from the three reps of the untreated check plots. Percent control values are calculated comparing counts from treated plots with counts from the checks.

Dodder control in alfalfa grown for seed. Schmierer, Jerry L. The objective of this research was to evaluate trifluralin 10% granules and chloropropham 20% granules for control of small-seeded alfalfa dodder (Cuscuta approximata var. urceolata) and field dodder (Cuscuta pentagona) in alfalfa grown as a seed crop in the mountain valleys of Northeastern California. A field scale replicated strip trial was applied on May 15, 1986 using a Velmar Airflow applicator. Trifluralin 10% granules were applied at the rate of 2 lb ai/A and chloropropham 20% granules were applied at the rate of 4 lb ai/A. Plot size was 15 feet by 1320 feet. Untreated areas were left on both sides of all treatment plots. Four replications of the two treatments were made. The trial area was irrigated by sprinkler with approximately 2 1/2 inches of water within 24 hours of the application. No dodder plants could be found at the time of application and the beginning germination date for dodder was believed to be approximately 2 weeks after application.

Evaluation was made at 49 and at 106 days after treatment by counting dodder colonies in a 8,800 sq. feet portion of each plot and untreated area. Chloropropham at 4 lb ai/A provided 56.8% control at 46 days and slipped to 36.6% control at 106 days after treatment. Trifluralin at 2 lb ai/A provided 99.4% control at 46 days and 95.4% control 106 days after treatment. The majority of the dodder colonies were small-seeded dodder, however, no determination between dodder species was done when colonies were counted. (University of California Cooperative Extension, Susanville, CA 96130)

Dodder control in alfalfa grown for seed

		49 D.A.T.		106 D.A.T.	
Treatment	Rate lb.ai/A	Dodder Colonies /8,800sq.ft.	Dodder Control	Dodder Colonies /8,800sq.ft.	Dodder Control
untreated	0	50.3 A	0%	109.3 A	0%
trifluralin	2.0	21.7 B	56.8%	69.3 A	36.6%
choropropham	4.0	0.3 C	99.4%	5.0 B	95.4%
% C.V.		35.18		46.12	
LSD @ 5%		19.23		64.01	

Winter weed control in established alfalfa. Orloff, S. B. and D. W. Cudney. A study was established in Lancaster, California to evaluate the efficacy of several standard and new herbicides for the control of annual grasses and broadleaf weeds in established alfalfa. The plots were 80 inches by 25 feet in size and were replicated four times in a completely randomized block design. Treatments without the contact herbicide paraquat were applied on January 14 and those including paraquat were applied on January 26. Treatments were applied with a CO_2 backpack sprayer, calibrated to deliver 30 gallons per acre at 30 psi. The field was recently grazed by sheep. The broadleaf weeds, London rocket and Shepherd's purse, were two to four inches in diameter and the grasses, wild barley and rescue grass, were three to four inches tall and in the early-tillering stage.

Phytotoxicity ratings were not possible as an Egyptian alfalfa weevil infestation masked the effects of the herbicides on the alfalfa. However, no alfalfa injury was evident at the time of first cutting.

Hexazinone, the higher two rates (.75 and 1.0 lbs ai/A), provided good control of all the weeds present (see Table). The addition of paraquat did not improve the performance of hexazinone. Diuron failed to control the grassy species which had already germinated at the time of application. Mustard species were adequately controlled. The addition of paraquat improved grass control with diuron. Isoxaben without paraquat failed to control both grassy and broadleaf weeds. The combination of isoxaben and paraquat provided better grass control initially, but the grasses had recovered by the later evaluation. Imazamethabenz provided 100 percent control of the mustard species with poor to intermediate control of the grasses. The addition of a surfactant did not improve the performance of this herbicide. Paraquat alone did not adequately control the weeds present. (University of California Cooperative Extension, Riverside, CA 92521)

Winter weed control in established alfalfa

Treatment*	Rate lbs. ai/A	Weed Control Rating 1/ 3/6 Grasses 2/	3/6 Mustard spp. 3/	4/25 Foxtail barley	4/25 Rescue grass
hexazinone 90%	.25	4.25	7.25	4.25	3.75
hexazinone 90%	.50	7.00	9.75	7.75	6.75
hexazinone 90%	.75	8.00	10.00	9.50	8.75
hexazinone 90%	1.00	8.75	10.00	9.75	10.00
diuron 80%	1.00	4.00	7.75	2.50	1.25
diuron 80%	1.50	4.00	9.00	3.50	3.25
diuron 80%	2.00	5.00	7.25	2.75	2.50
isoxaben 75%	.25	2.25	3.50	1.50	1.00
isoxaben 75%	.50	1.25	1.25	1.50	.50
isoxaben 75%	1.00	2.00	2.25	3.75	2.75
imazamethabenz	.125	4.50	10.00	1.50	.50
imazamethabenz	.250	7.00	10.00	4.75	3.00
imazamethabenz + surfactant	.125 + .25	4.75	10.00	2.00	1.50
imazamethabenz + surfactant	.25 + .25	6.25	9.75	5.00	2.75
paraquat 2.1b.	.50	4.75	3.75	4.00	5.75
diuron + hexazinone	1.5 + .25	7.50	10.00	7.50	5.25
diuron + hexazinone	1.5 + .50	8.75	10.00	9.50	8.75
diuron + hexazinone	1.0 + .50	8.75	10.00	10.00	10.00
hexazinone + paraquat	.25+ .50	7.75	8.75	6.125	7.25
hexazinone + paraquat	.50+ .50	9.00	10.00	9.00	9.25
diuron + paraquat	1.0 + .50	8.50	9.50	5.75	7.25
diuron + paraquat	1.5 + .50	6.75	9.00	6.125	5.75
diuron + hexazinone + paraquat	1.5 + .50 + .50	8.50	10.00	10.00	9.50
isoxaben + paraquat	.25+ .50	7.25	7.75	3.00	4.50
isoxaben + paraquat	.50+ .50	8.00	8.75	3.50	4.75
Check		-0-	-0-	.75	1.50
LSD .05		1.80	2.00	1.80	2.80

* Average of four replications

1/ 0 = No weed control
   10 = Complete weed control

2/ Grasses included foxtail barley, rescue grass and annual bluegrass

3/ Mustard spp. included Shepherd's purse and London rocket

Evaluation of herbicide treatments in dormant alfalfa. Miller, S.D. Research plots were established at the Agronomy Farm, Laramie, WY to evaluate the efficacy of herbicide treatments for weed control in dormant alfalfa (var. Ranger). 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 six-nozzle knapsack unit delivering 20 gpa at 40 psi March 13, 1986 (air temp. 38 F, relative humidity 83%, wind NW 10 mph, sky overcast and soil temp. - 0 inch 44 F, 2 inch 40 F, 4 inch 38 F). The soil was classified as a sandy loam (66% sand, 16% silt and 18% clay) with 2.6% organic matter and a 7.6 pH. Plots were flood irrigated. Visual weed control and crop damage evaluations were made May 30 and plots harvested for yield July 3, 1986. Weed infestations were moderate and uniform throughout the experimental area.

Slight (5% or <) alfalfa injury was observed with several treatments; however, none of the treatments reduced alfalfa stands. Alfalfa yields generally related to weed control with treatments providing control of downy brome and tansymustard yielding the highest. Downy brome (BROTE) control was 90% or greater with AC-263,499 at 0.094 lb/A or above, terbacil at 0.5 lb/A, metribuzin at 0.75 lb/A alone or 0.5 lb/A in combinations and cinmethylin at 0.75 lb/A. Tansymustard (DESPI) control was 95% or greater with AC-263,499 at 0.063 lb/A or above, hexazinone at 0.5 lb/A, terbacil at 0.5 lb/A and metribuzin at 0.75 lb/A alone or 0.5 lb/A in combinations. The only herbicide providing 90% or greater control of skeletonleaf bursage (FRSTO) was AC-263,499 at 0.094 lb/A or above. Dandelion (TAROF) control was not adequate with any treatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1400 .)

Weed control in dormant alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa[2] injury %	Alfalfa[2] stand red %	Alfalfa[2] yield lb/A	Control[3] DESPI %	Control[3] BROTE %	Control[3] TAROF %	Control[3] FRSTO %
pendimethalin	2.0	0	0	3656	20	57	0	0
AC-263,499	0.063	3	0	3892	100	67	30	77
AC-263,499	0.094	2	0	3902	100	90	57	90
AC-263,499	0.125	5	0	4147	100	100	67	93
AC-263,499	0.25	5	0	4219	100	100	75	95
hexazinone	0.5	3	0	3916	100	83	15	0
prodiamine	0.5	0	0	3674	7	20	0	0
prodiamine	0.75	0	0	3720	7	43	0	0
prodiamine	1.0	0	0	3585	7	50	0	0
prodiamine + metribuzin	0.5 + 0.5	2	0	3909	100	100	18	0
prodiamine + metribuzin	0.75 + 0.5	2	0	4101	100	97	18	0
prodiamine + AC-263,499	0.5 + 0.063	0	0	3945	100	97	37	75
terbacil	0.5	2	0	4175	100	93	17	0
metribuzin	0.75	3	0	4194	97	100	22	0
cinmethylin	0.75	0	0	3795	0	90	17	0
cinmethylin + metribuzin	0.75 + 0.5	3	0	4051	100	100	42	0
cinmethylin + AC-263,499	0.75 + 0.063	2	0	3994	100	100	50	73
weedy check	------------	0	0	3649	0	0	0	0

[1]Treatments applied March 13, 1986
[2]Alfalfa injury and stand reduction visually evaluated May 30 and plots harvested July 3, 1986
[3]Weed control visually evaluated May 30, 1986

Evaluation of herbicide treatments in dormant alfalfa. Miller, S.D. Research plots were established at the Archer Research and Extension Center, Archer, WY to evaluate the efficacy of herbicide treatments for weed control in dormant alfalfa (var. Ranger). 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 six-nozzle knapsack unit delivering 20 gpa at 40 psi March 14, 1986 (air temp. 49 F, relative humidity 54%, wind calm, sky overcast and soil temp. - 0 inch 50 F, 2 inch 48 F, 4 inch 47 F). The soil was classified as a sandy loam (72% sand, 18% silt and 10% clay) with 1.6% organic matter and a 7.6 pH. Plots were not irrigated. Visual weed control and crop damage evaluations were made May 31, 1986. Weed infestations were moderate and uniform throughout the experimental area; however, alfalfa stands were light and variable.

Slight (5% or <) alfalfa injury was observed with several treatments however, none of the treatments reduced alfalfa stands. Tansymustard (DESPI) control was 95% or greater with terbacil at 0.5 lb/A, metribuzin at 0.75 lb/A alone or 0.5 lb/A in combinations and AC-263,499 at 0.063 lb/A or above. Povertyweed (MOPNU) control was 90% or greater with AC-263,499 at 0.125 lb/A or above and metribuzin at 0.75 lb/A alone or 0.5 lb/A in combinations. The only herbicide providing good control of downy brome (BROTE) was metribuzin alone or in combinations. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1401 .)

Weed control in dormant alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa[2] injury %	Alfalfa[2] stand red %	Control[3] DESPI %	Control[3] BROTE %	Control[3] MOPNU %
pendimethalin	2.0	0	0	27	33	54
terbacil	0.5	2	0	97	78	77
metribuzin	0.75	5	0	100	97	90
AC-263,499	0.063	0	0	100	52	80
AC-263,499	0.094	0	0	99	53	85
AC-263,499	0.125	0	0	100	67	96
AC-263,499	0.25	5	0	100	88	100
simazine	0.8	0	0	55	53	78
prodiamine	0.25	0	0	7	38	60
prodiamine	0.5	0	0	10	48	73
prodiamine	0.75	0	0	7	57	80
prodiamine	1.0	0	0	7	60	82
prodiamine	2.0	0	0	7	67	87
prodiamine + metribuzin	0.5 + 0.5	0	0	100	95	98
prodiamine + metribuzin	0.75 + 0.5	0	0	100	93	98
trifluralin	2.0	0	0	0	13	67
cinmethylin	0.75	0	0	0	33	53
cinmethylin + metribuzin	0.75 + 0.5	2	0	100	94	98
cinmethylin + AC-263,499	0.75 + 0.063	0	0	100	78	87
weedy check	------------	0	0	0	0	0

[1] Treatments applied March 14, 1986
[2] Alfalfa injury and stand reduction visually evaluated May 31, 1986
[3] Weed control visually evaluated May 31, 1986

Downny brome control in dormant alfalfa. Arnold, R.N., E.J. Gregory and D. Smeal. Research plots were established on December 7, 1985 to evaluate the efficacy of several new herbicides for control of downy brome in established alfalfa (var. Lahonton). Soil type was a Persayo-Farb silty clay loam with a pH of 7.5 and an organic matter content of less than 1%. Individual plots were 12 by 30 ft in size with four replications arranged in a randomized complete block design. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Preemergence treatments were applied December 7, 1985 and postemergence treatments were applied April 11, 1986 with 1 qt. COC per acre. Downy brome and alfalfa heights averaged 11 and 9 in, respectively during postemergence applications.

Visual evaluations of crop injury and weed control were made May 14 and plots harvested for yield June 6, 1986. Downy brome infestations were heavy and uniform throughout the experimental area. None of the herbicide treatments injured alfalfa. Alfalfa yield in herbicide treated plots were increased 488 to 1046 lb/A compared to the untreated check plots. Downy brome control was excellent with all treatments except sethoxydim at 0.19 and 0.14 lb/A. All treatments resulted in a higher protein content than the untreated check. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Downy brome control in dormant alfalfa, 1986

Treatment	Timing[1]	Rate lb ai/A	Crop Injury[2]	Weed Control[2] Dobr	Yield[3]	Protein
				-----%-------	-lb/A-	---%---
haloxyfop-methyl	POST	0.13	0	100	2509	18.9
haloxyfop-methyl	POST	0.19	0	100	2300	18.7
haloxyfop-methyl	POST	0.25	0	100	2509	18.2
fluazifop-P-butyl	POST	0.13	0	100	2788	18.5
fluazifop-P-butyl	POST	0.19	0	100	2439	18.7
fluazifop-P-butyl	POST	0.25	0	100	2648	18.9
hexazinone	PE	0.50	0	100	2858	19.7
metribuzin	PE	0.50	0	100	2648	19.0
sethoxydim	POST	0.28	0	89	2858	17.0
sethoxydim	POST	0.19	0	74	2927	15.9
sethoxydim	POST	0.14	0	54	2858	13.8
check			0	0	1812	10.6

1. POST = postemergence and PE = preemergence.
2. Based on a visual scale from 0 - 100 where 0 = no control or crop injury and 100 = dead plants.
3. Forage yields are expressed on a 20% moisture basis.

Evaluation of herbicide treatments in dormant alfalfa. Arnold, R.N., E.J. Gregory and D. Smeal. Research plots were established on December 6, 1985 to evaluate the efficacy of herbicide treatments for weed control in dormant alfalfa (var. Lanhonton). Soil type was a Persayo-Farb silty clay loam with a pH of 7.5 and an organic matter content of less than 1%. Individual plots were 12 by 30 ft in size with four replications arranged in a randomized complete block design. Treatments were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi.

Visual weed control and crop injury evaluations were made on May 14 and plots harvested for yield June 15, 1986. Downy brome and tansy mustard infestations were heavy throughout the experimental area. Downy brome control was good to excellent with all treatments except norflurazon at 2.0 and 1.0 lb ai/A; tansy mustard control was excellent with all treatments. All treatments resulted in a higher protein content than the untreated check. Alfalfa yield in herbicide treatments were increased 1115 to 1463 lb/A compared to the untreated check plots. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Herbicide evaluations in dormant alfalfa, 1986

Treatment	Rate lb ai/A	Crop Injury[1]	Weed Control[1] Dobr	Weed Control[1] Tamu	Yield[2]	Protein
			---------%---------		-lb/A-	---%---
hexazinone	0.50	0	100	100	2997	19.3
hexazinone	0.75	0	100	100	3206	19.8
metribuzin	0.38	0	100	100	3206	19.3
metribuzin	0.50	0	100	100	2997	19.7
terbacil	0.50	0	100	100	3067	18.4
terbacil	0.75	0	100	100	3067	19.1
terbacil	1.00	0	100	100	3067	19.7
hexazinone	0.25	0	99	100	3345	18.9
norflurazon	4.00	0	98	100	3067	18.7
diuron	3.00	0	98	100	2997	18.7
metribuzin	0.25	0	97	99	3136	18.4
diuron	2.00	0	91	100	2997	17.8
diuron	1.00	0	80	100	3067	16.1
norflurazon	2.00	0	76	100	3206	15.3
norflurazon	1.00	0	65	95	3136	14.1
check		0	0	0	1882	10.6

1. Based on a visual scale from 0 - 100 where 0 = no control or crop injury and 100 = dead plants.
2. Forage yields are expressed on a 20% moisture basis.

Postemergence control of summer grasses in alfalfa. Orloff, S. B. and D. W. Cudney. A postemergence grass control trial was established in an alfalfa field in Lancaster, California. The field was heavily infested with yellow foxtail, green foxtail and barnyardgrass. The plots were 80 inches by 25 feet in size and arranged in a completely randomized block design with four replicates. Treatments were applied with a CO_2 backpack sprayer, calibrated to deliver 30 gallons per acre at 30 psi.

No phytotoxicity was noted with any of the herbicide treatments. Two rates of application were used for each of the five herbicides evaluated. Control was improved with increasing rates of application for all herbicides. Sethoxydim, clethodim, and haloxyflop methyl at the higher use rates gave ratings of nine or higher. Haloxyfop methyl at .125 lbs ai/A was less effective than sethoxydim and clethodim at their lower use rate. DPX-Y6202 was slightly less effective at the higher rate. Fluazifop-butyl was the least effective of the herbicides tested. (University of California Cooperative Extension, Riverside, CA 92521)

Postemergence control of summer grasses in alfalfa

Treatment*	Rate 1/ lbs ai/A	Grass Control Rating 8/9/86
DPX-Y6202	.125	7.6
DPX-Y6202	.25	8.1
fluazifop-butyl(enantiomer)	.125	2.2
fluazifop-butyl(enantiomer)	.25	3.9
sethoxydim	.25	6.2
sethoxydim	.50	9.0
clethodim	.125	7.6
clethodim	.25	9.2
haloxyfop methyl	.125	4.8
haloxyfop methyl	.25	9.0
check	.25	-0-
LSD .05		1.5

* Surfel added to all treatments at .25%
Average of four replications

1/ 0 = No effect
10 = All plants dead

Preemergence control of yellow and green foxtail in established alfalfa. Orr, J.P., D. Colbert and D. Havens. In Sacramento, CA on January 16, 1985 herbicide applications were made with a CO2 backpack sprayer to a clay loam soil and replicated 4 times. Herbicides were incorporated by rainfall.

In comparing trifluralin, pendemethalin and prodiamine at 2 lbs. a.i./A; trifluralin and prodiamine 4F gave the best yellow and green foxtail control (see fig. 1).

In comparing trifluralin, pendimethalin and prodiamine at 3.0 lbs. a.i./A; trifluralin and prodiamine 4F gave the best control and showed greater stability than the 2.0 lbs. a.i./A applications (see fig. 2).

Ac 263,499 at 0.25 and 0.5 lbs. a.i./A gave 90 to 92% control through September at the 0.25 lbs. rate and 90 to 96% control at the 0.5 lbs. rate (see fig. 3). There was very slight initial vigor reduction to the alfalfa, which it outgrew later.

There was no stand or vigor reduction with any of the other preemergence treatments. (University of California Cooperative Extension, Sacramento, CA 95827)

Alfalfa: Yellow/Green Foxtail Control

January 16, 1985, Application @ 2.0 lb. a.i./A

Δ ———— trifluralin
O ---------- pendimethalin
X ———— prodiamine 1.25g
X ---------- prodiamine 4F

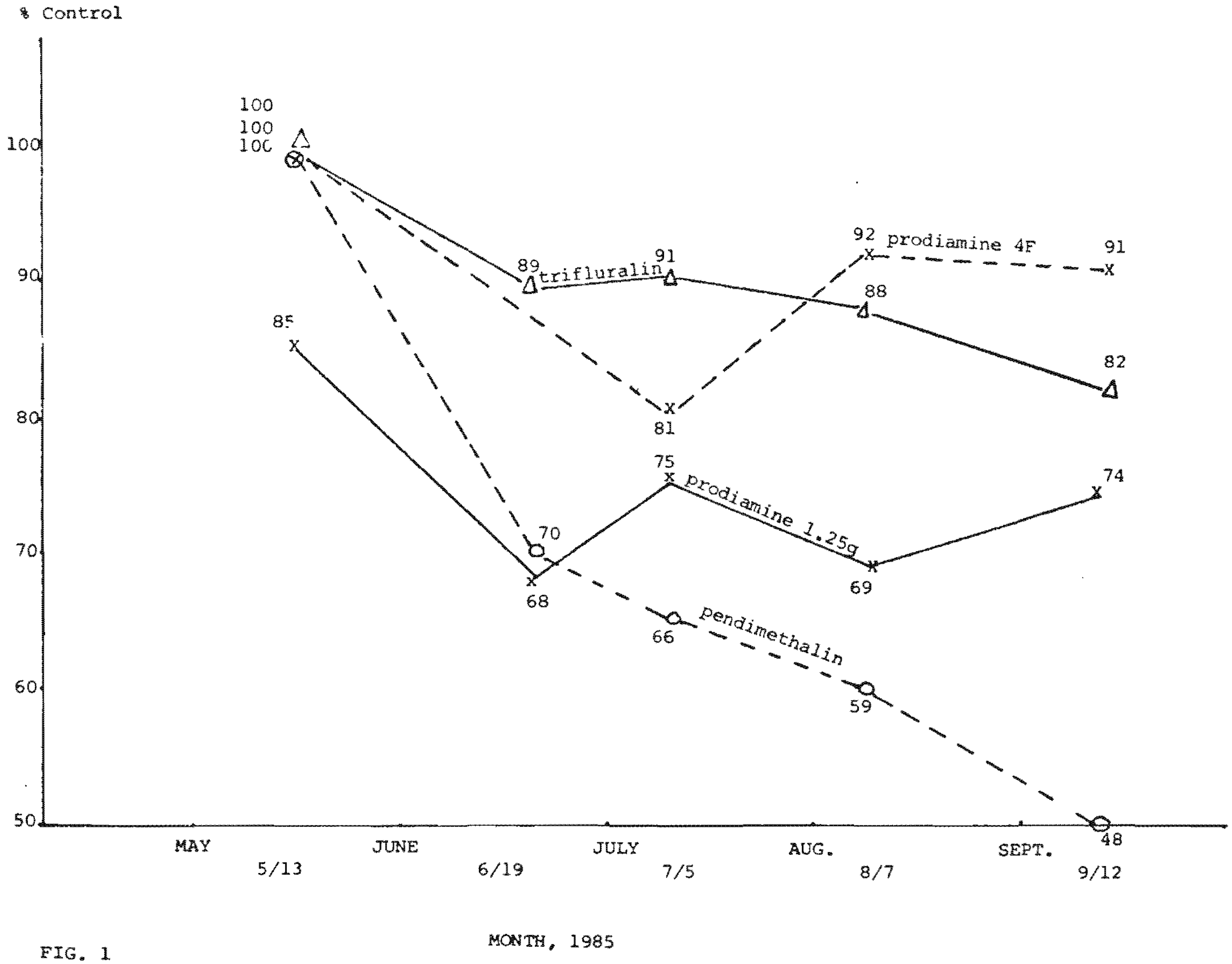


FIG. 1

Alfalfa: Yellow/Green Foxtail Control

January 16, 1985, Application @ 3.0 lb. a.i./A

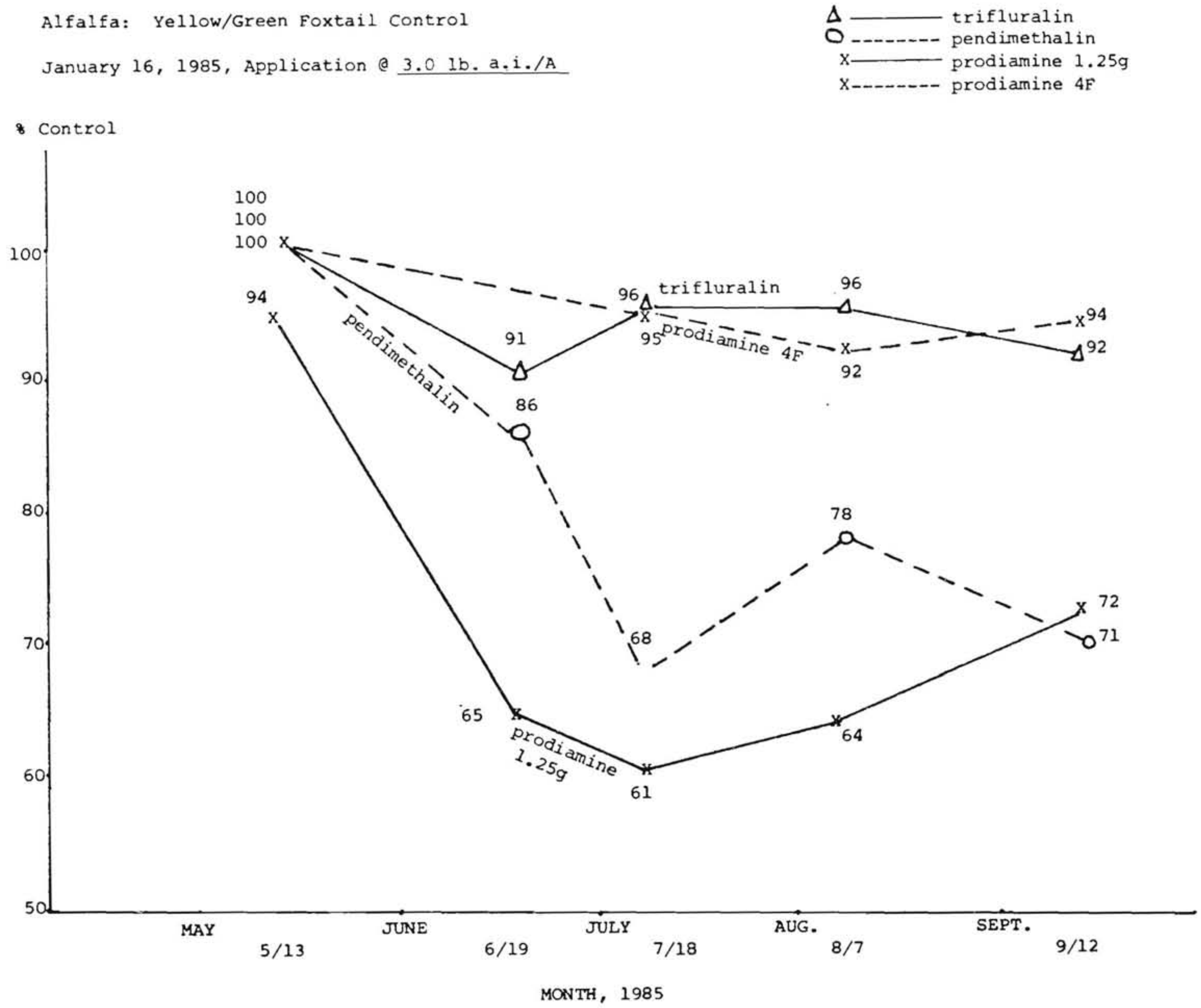


FIG. 2

Experiment 2 - Alfalfa: Yellow/Green Foxtail Control

Application: January 16, 1985 (pre-emergence)

lbs. a.i./A

x--------- prodiamine 4F (2.0)
x_________ prodiamine 4F (3.0)
Δ _________ AC 263,499 (0.25)
Δ --------- AC 263,499 (0.5)
(imazethapyr)

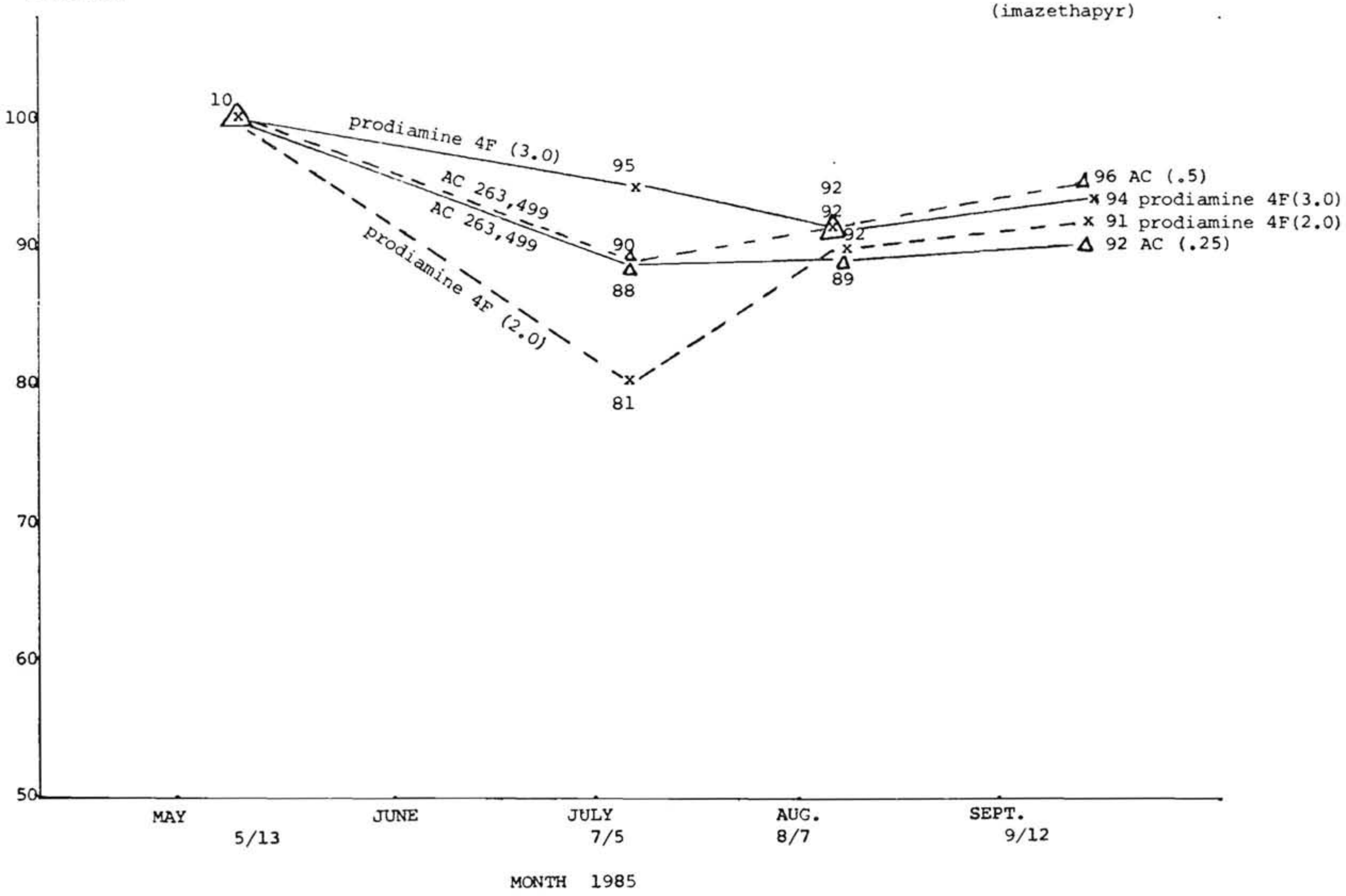


FIG. 3

Bermudagrass control in established alfalfa. Orloff, S. B. and D. W. Cudney. Bermudagrass can be a serious production problem for alfalfa growers in the desert regions of the southwest. This weed has been especially difficult to control using the commercially available herbicides. A trial was established in Lancaster, California. Plots 80 inches by 20 feet in size were replicated four times in a randomized complete block design. Treatments were applied to a severe infestation of bermudagrass in a field of alfalfa five days after the second cutting. The treatments consisted of two application rates and a split application of the lower use rate. The first application was made five days after the second cutting on June 27. The second application of the split treatment was made on August 5 after the third cutting.

No alfalfa injury was noted with any of the six herbicide formulations used. The plots were evaluated August 5, 13, and September 10, (see Table). Best control was achieved with the two formulations of fluazifop-butyl, followed by sethoxydim, haloxyfop methyl, DPX-Y6202, and clethodim. Control improved with increasing rate of application. The split application of each herbicide was found to be most effective. Commercially acceptable control was achieved only with the split applications of fluazifop butyl. (University of California Cooperative Extension, Riverside, CA 92521)

Bermudagrass control in established alfalfa

Treatment*	Rate 1/ lbs ai/A	Control Rating 8/5	Control Rating 8/13	Control Rating 9/10
DPX-Y6202	.125	2.5	0.8	0.8
DPX-Y6202	.25	7.9	7.8	3.2
DPX-Y6202	.125 + .125	---	6.9	5.5
fluazifop-butyl	.25	7.9	8.9	6.1
fluazifop-butyl	.5	7.2	7.0	3.8
fluazifop-butyl	.25 + .25	---	9.1	9.0
fluazifop-butyl (enantiomer)	.125	6.3	6.1	2.8
fluazifop-butyl (enantiomer)	.25	7.6	8.0	5.4
fluazifop-butyl (enantiomer)	.125 + .125	---	7.1	8.0
sethoxydim	.25	7.0	5.0	1.8
sethoxydim	.50	7.8	8.1	4.2
sethoxydim	.25 + .25	---	7.2	6.8
clethodim	.125	6.5	4.5	1.8
clethodim	.25	7.1	6.6	2.5
clethodim	.125 + .125	---	6.4	4.4
haloxyfop methyl	.125	6.8	4.6	1.8
haloxyfop methyl	.25	7.8	8.0	2.8
haloxyfop methyl	.125 + .125	---	7.2	6.4
check		1.2	0.2	1.0
LSD .05		1.0	1.4	1.8

* Surfel added to all treatments at .25%
Average of four replications

1/ 0 = No effect
10 = All plants dead

Evaluation of preplant incorporated or preemergence herbicide treatments in new seeding alfalfa. Miller, S.D. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of preplant incorporated or preemergence herbicide treatments for weed control in new seeding alfalfa. Plots were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Preplant herbicides were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 1.5 to 2 in March 31, 1986 (air temp. 48 F, relative humidity 65%, wind NW 10 mph, sky clear and soil temp. - 0 inch 58 F, 2 inch 53 F and 4 inch 51 F). Alfalfa (var. Apollo II) was planted and preemergence herbicides broadcast applied with a six-nozzle knapsack unit delivering 20 gpa at 40 psi April 1, 1986 (air temp. 45 F, relative humidity 35%, wind SE 20 mph, sky clear and soil temp. - 0 inch 62 F, 2 inch 44 F and 4 inch 44 F). The soil was classified as a sandy loam (76% sand, 14% silt and 10% clay) with 1.2% organic matter and a 7.6 pH. Plots were furrow irrigated. Visual weed control and crop damage evaluations were made May 22 and plots harvested for yield July 2, 1986. Weed infestations were moderate and uniform throughout the experimental area.

Preplant incorporated applications of EPTC and pendimethalin alone and in combination caused the least alfalfa injury or stand reduction. Alfalfa stand reductions and injury increased as AC-263,499 rate increased from 0.063 to 0.125 lb/A regardless of application method. Alfalfa stands were reduced 22 to 43% and 18 to 48% while surviving plants were stunted 50 to 72% and 45 to 73% by preplant incorporated and preemergence applications of AC-263,499; respectively. New seeding alfalfa yields related closely to crop injury and stand reduction. Kochia (KCHSC) and common lambsquarters (CHEAL) control was 90% or greater with all treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1402 .)

Herbicide evaluation new seeding alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa[2] injury %	stand red %	yield lb/A	Control[3] KCHSC %	CHEAL %
Preplant incorporated						
EPTC + trifluralin	2.0 + 1.0	23	20	1980	100	100
EPTC + pendimethalin	2.0 + 1.0	8	7	2990	100	100
pendimethalin	1.5	7	7	2872	100	100
AC-263,499	0.063	50	22	1241	100	100
AC-263,499	0.094	62	33	885	100	100
AC-263,499	0.125	72	43	843	100	100
EPTC	3.0	2	2	3081	90	95
Preemergence						
AC-263,499	0.063	45	18	1896	100	100
AC-263,499	0.094	70	42	1080	100	100
AC-263,499	0.125	73	48	1011	100	100
pendimethalin	1.5	20	13	1819	97	100
weedy check	---	0	0	2830	0	0

[1]Preplant incorporated treatments applied March 31 and preemergence treatments April 1, 1986
[2]Alfalfa injury and stand reduction visually evaluated May 22 and plots harvested July 2, 1986
[3]Weed control visually evaluated May 22, 1986

Broadleaved weed control in seedling alfalfa. Cudney, D. W. and S. B. Orloff. Two seedling alfalfa trials were established on November 20, 1985 in the high desert region of San Bernardino county southeast of Victorville. The herbicides were applied with a CO_2 backpack sprayer operated at 30 psi with a spray volume of 30 gallons per acre. Four replications of each treatment were made. The alfalfa was in the three to five trifoliate leaf stage and the weeds were in the seedling stage, three to five inches in diameter. A comparison was made of the ester and amine formulations of 2,4-DB. Other treatments included oxyfluorfen, bromoxynil, paraquat, and imazamethabenz (AC 263, 499). The field was heavily infested with London rocket, shepherd's purse, tansy mustard, filaree, and common groundsel. There was also a light infestation of malva. Two trials were conducted to evaluate the herbicides on the full spectrum of weeds.

Crop injury ratings were made ten weeks after application (see Tables 1 and 2). Crop injury increased with increasing rates of 2,4-DB. Slightly more injury was noted for the ester formulation. Initially oxyfluorfen caused foliar burn, but by the time of the injury rating the symptoms had diminished. None of the other herbicides caused significant injury.

Weed control was evaluated twice prior to the first harvest (Tables 1 and 2). The ester formulation of 2,4-DB was found to be twice as effective as the amine formulation on weeds in the Brassicaceae family. Filaree was partially controlled at the higher rates of 2,4-DB ester, while the amine formulation was not effective. Neither formulation of 2,4-DB controlled common groundsel. Oxyfluorfen caused an initial leaf burn, but the weeds soon recovered. Bromoxynil gave partial control of London rocket and shepherds purse, but was less effective on tansy mustard and had no effect on filaree. Bromoxynil gave good control of common groundsel at the .5 lb ai/A rate of application. The combination of oxyfluorfen and bromoxynil was no more effective than bromoxynil alone. Imazamethabenz, especially at the higher rates, provided superior control of the weeds present except common groundsel. The .25 lb ai/A rate of Imazamethabenz was necessary to completely control common groundsel. Paraquat provided approximately 80 percent control of the weeds present except filaree. (University of California Cooperative Extension, Riverside, CA 92521)

Table 1. Broadleaved weed control in seedling alfalfa

		Control Rating 1/													2/
	Rate	London rocket			Shepherd's purse		Tansy mustard			Filaree			Malva	Crop Injury
Treatment*	lbs. ai/A	2/5	4/4	4/25	2/5	4/4	2/5	4/4	4/25	2/5	4/4	4/25	2/5	2/5
2,4-DB amine	.50	2.5	5.0	6.5	3.8	8.5	2.0	5.0	4.2	1.2	.8	3.5	-0-	.9
2,4-DB amine	.75	4.2	7.4	7.5	6.0	8.8	3.2	7.0	3.8	1.5	.8	3.5	.2	1.0
2,4-DB amine	1.00	7.5	7.8	6.8	7.2	8.8	4.5	7.0	4.2	2.5	3.8	2.5	2.5	1.9
2,4-DB amine	1.50	8.8	8.8	9.2	9.0	8.5	7.0	7.8	6.5	3.8	1.5	4.8	1.8	2.0
2,4-DB ester	.50	10.0	9.9	10.0	9.0	10.0	10.0	9.6	9.0	4.0	2.0	6.0	1.5	1.6
2,4-DB ester	.75	10.0	9.8	10.0	10.0	10.0	10.0	9.8	9.2	6.0	6.6	7.2	4.0	2.1
2,4-DB ester	1.00	10.0	10.0	10.0	10.0	10.0	10.0	9.5	8.8	7.0	7.5	8.0	2.5	2.9
oxyfluorfen	.125	2.0	-0-	1.0	1.8	.8	-0-	-0-	.5	.5	-0-	4.0	7.2	1.1
oxyfluorfen	.25	-0-	-0-	-0-	-0-	.8	-0-	-0-	-0-	.8	.5	2.2	6.8	1.4
bromoxynil	.25	7.2	8.2	8.5	6.2	9.0	1.8	6.2	5.0	-0-	.5	2.5	-0-	.1
bromoxynil	.50	9.0	6.8	8.8	8.0	8.8	2.0	8.0	3.5	.5	1.5	1.2	1.2	.2
oxyfluorfen + bromoxynil	.125 + .25	8.2	4.5	7.2	6.2	5.8	.5	3.2	1.8	.5	1.0	3.2	4.8	1.1
imazamethabenz	.063	9.8	8.6	9.8	9.8	7.2	10.0	8.8	7.0	8.2	7.0	6.2	4.2	.9
imazamethabenz	.125	10.0	9.8	10.0	10.0	8.2	10.0	10.0	9.5	8.5	8.2	8.5	3.2	1.8
imazamethabenz	.25	10.0	10.0	10.0	10.0	9.2	10.0	10.0	10.0	9.1	9.8	9.6	4.7	1.8
paraquat	.25	-0-	7.6	8.2	-0-	6.9	-0-	8.6	5.8	-0-	1.2	4.0	-0-	.2
paraquat	.50	-0-	8.6	9.5	-0-	9.1	-0-	10.0	7.2	-0-	4.2	4.5	-0-	.2
Check		-0-	-0-	1.8	-0-	-0-	-0-	-0-	1.8	-0-	-0-	1.0	-0-	-0-
LSD .05		2.2	2.1	1.3	2.1	2.0	1.7	1.2	2.0	1.1	2.2	2.0	2.9	---

* Average of four replications

1/ Rating 0 = no control 10 = all weeds dead

2/ No crop injury rating as paraquat was applied after the rating date

Table 2. Broadleaved weed control in seedling alfalfa

Treatment*	Rate lbs. ai/A	Control Rating 1/ Groundsel 2/5	Groundsel 4/4	Tansy mustard 2/5	Tansy mustard 4/4	Crop 2/ Injury 2/5
2,4-DB amine	.5	2.2	1.0	2.2	3.0	.6
2,4-DB amine	.75	2.0	.2	5.5	3.8	1.0
2,4-DB amine	1.00	3.0	.5	7.2	5.8	1.5
2,4-DB amine	1.50	3.8	3.2	7.2	7.2	2.4
2,4-DB ester	.50	3.8	.8	8.0	8.1	1.2
2,4-DB ester	.75	3.2	.5	10.0	10.0	1.8
2,4-DB ester	1.00	5.0	2.8	10.0	10.0	2.9
oxyfluorfen	.125	1.8	2.5	2.5	.8	.9
oxyfluorfen	.25	3.8	1.8	-0-	.5	1.1
bromoxynil	.25	6.5	8.0	1.0	1.2	.2
bromoxynil	.50	10.0	9.8	3.5	6.2	.4
oxyfluorfen + bromoxynil	.125 + .25	7.2	7.0	4.1	2.8	1.0
imazamethabenz	.063	6.9	2.0	10.0	9.8	1.5
imazamethabenz	.125	8.2	6.0	10.0	10.0	1.9
imazamethabenz	.25	10.0	10.0	10.0	10.0	3.4
paraquat	.25	.2	8.2	-0-	6.2	.2
paraquat	.50	-0-	10.0	-0-	8.6	.2
check		-0-	-0-	-0-	-0-	-0-
LSD .05		1.2	2.5	2.2	2.0	.9

* Average four replications

1/ 0 = no contol 10 = all weeds dead

2/ no crop injury rating as paraquat was applied after the rating date

The evaluation of postemergence herbicides for the control of winter annual weeds in seedling alfalfa. Vargas, R. A uniform stand of WL-515 alfalfa was divided into plots 10 by 20 ft. and replicated four times in a randomized complete block design. Herbicides were applied on January 14, 1986 with a CO_2 backpack sprayer in 20 GPA at 30 PSI. At the time of application the alfalfa was in the 3 to 6 trifoliate leaf stage. The fiddleneck was 12 to 22 inches in diameter with 18 to 24 leaves, and the shepherdspurse 3 to 6 inches in diameter with 10 to 12 leaves. All treatments contained a non-ionic surfactant at .5% by volume.

An early evaluation on January 24, 1986 indicated good control with paraquat, bromoxynil, dinoseb and oxyfurofen. Hexazinone and AC-263-499 were exhibiting poor control at 15 to 45%. A later evaluation on February 26, 1986 indicated increased control with most herbicides. Hexozinone at .25#ai/A was still exhibiting poor control of both weed species. AC-263-499 was exhibiting excellent control at both rates. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Shepherdspurse and fiddleneck control in seedling alfalfa

Treatments	#ai/A	Percent control*			
		January 24, 1986		February 26, 1986	
		Shepherdspurse	Fiddleneck	Shepherdspurse	Fiddleneck
paraquat	.25	75	77	95	95
bromoxynil	1.0	95	90	97	100
dinoseb	1.0	87	85	77	95
hexazinone	.125	25	32	35	37
hexazinone	.25	25	45	77	92
oxyfluorfen	.125	70	75	57	47
oxyfluorfen	.25	70	75	90	42
AC-263-499	.125	15	22	100	77
AC-263-499	.25	20	20	100	97
check	-	0	0	0	0

*Average of four replications

Postemergence herbicides for annual grass and mixed broadleaf weed control in seedling alfalfa. Norris, R.F. and R.A. Lardelli. A field study designed to compare the efficacy of several new herbicides in seedling alfalfa was established at Davis, California. Treatments were applied in newly seeded alfalfa (var. WL Southern Spec.) on May 8, 1986, when the alfalfa was in the 3- to 4-trifoliate leaf growth stage. Height of weeds varied from 0.5 to 4 inches. All treatments were applied with a CO_2 backpack handsprayer, calibrated to deliver 30 gal./A to 5 ft. by 8 ft. plots. A randomized complete block design was used, and the treatments were replicated three times.

Visual ratings for weed control efficacy were taken on May 23 prior to the first cutting and July 17, prior to the second cutting. Weed infestation was uniform throughout the entire experimental area. Alfalfa stand was reduced over 50% by the high rate of DPX M6316; however, heavy weed competition may be a significant contribution to this loss. Combination treatments of DPX Y6202 or haloxyfop at 0.25 and 0.50 lb/A plus bromoxynil at 0.33 and 1.00 lb/A resulted in the highest weed control through July 17, except for pigweed control. When bromoxynil was applied early in the morning (7:30 AM), as opposed to early evening (8:00 PM), no difference in weed control was observed. (Botany Department, University of California, Davis, CA 95616.)

Control of Annual Winter Weeds in Seedling Alfalfa[1/]

Treatment[3/]	Rate	Alfalfa (7/17/86)	Weed Control[2/] ECHCG	CHEAL	AMARE	ECHCG
			----- (5/23/86)		-----	(7/17/86)
	(lb ai/A)	(% Stand)	-------- (% Control)			----------
2,4-DB ester	0.75	53 ghi	10 cde	80 ab	50 a	10 fg
Bromoxynil (AM)	0.33	67 d-h	7 cde	70 abc	23 ab	10 fg
Bromoxynil (AM)	1.00	57 f-i	20 cd	93 a	43 ab	0 g
Bromoxynil (PM)	0.33	67 d-h	3 de	70 abc	43 ab	0 g
Bromoxynil (PM)	1.00	57 f-i	13 cde	100 a	50 a	0 g
Dinoseb	1.00	83 a-d	7 cde	37 b-f	7 ab	13 fg
Sethoxydim + oil	0.375	100 a	87 a	17 def	0 b	75 abc
Sethoxydim + oil	0.50	100 a	97 a	33 b-f	7 ab	92 a
Sethoxydim + 2,4 DB ester + oil	0.375 + 0.75	90 ab	87 a	63 a-d	13 ab	70 bc
Sethoxydim + bromoxynil + oil	0.375 + 0.33	87 abc	83 a	63 a-d	40 ab	47 d
DPX M 6316	0.0313	57 f-i	13 cde	0 f	27 ab	0 g
DPX M 6316	0.0625	50 hi	13 cde	10 ef	17 ab	0 g
DPX M 6316	0.125	40 i	13 cde	13 ef	47 ab	0 g
AC 263-499 + X77	0.063 + 0.25%	63 e-h	17 cde	27 c-f	33 ab	10 fg
AC 263-499 + X77	0.094 + 0.25%	70 c-g	40 b	0 f	17 fg	23 ef
AC 263-499 + X77	0.125 + 0.25%	63 e-h	23 c	13 ef	0 b	7 fg
AC 263-499 + X77	0.20 + 0.25%	77 b-e	50 b	13 ef	0 b	37 de
DPX Y 6202 + bromoxynil + oil	0.25 + 0.33	97 a	88 a	93 a	10 ab	70 abc
DPX Y 6202 + bromoxynil + oil	0.50 + 0.33	100 a	90 a	90 a	37 ab	90 ab
Haloxyfop + bromoxynil + oil	0.25 + 0.33	90 ab	80 a	53 a-e	0 b	67 c
Haloxyfop + bromoxynil + oil	0.50 + 0.33	100 a	95 a	13 ef	3 ab	90 ab
Untreated check		73 b-f	0 e	0 f	0 b	10 fg

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

2/ Abbreviations are WSSA code numbers from Composite List of Weeds, Weed Sci., 32, Suppl. 2.

3/ Oil = Pace oil adjuvant applied at 1 qt/A.

Evaluation of postemergence herbicide treatments in new seeding alfalfa. Miller, S.D. and J.M. Krall. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center, Torrington, WY to evaluate their efficacy for weed control in newly seeded alfalfa (var. Apollo II). The alfalfa was seeded April 1 and postemergence treatments applied June 4, 1986 (air temp. 57 F, relative humidity 55%, wind NE 5 mph, sky cloudy and soil temp. - 0 inch 60 F, 2 inch 67 F, and 4 inch 67 F) to 4 inch alfalfa, 4 inch common lambsquarters (CHEAL), 8 inch kochia (KCHSC), 3 inch wild buckwheat (POLCO), 2 inch Russian thistle (SASKR) and 2 inch yellow foxtail (SETLU). 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 six-nozzle knapsack unit delivering 10 gpa at 40 psi. The soil was classified as a sandy loam (76% sand, 14% silt and 10% clay) with 1.2% organic matter and a 7.6 pH. Plots were furrow irrigated. Visual weed control and crop damage evaluations were made June 17 and plots harvested for yield July 2, 1986. Weed infestations were moderate and uniform throughout the experimental area.

Some alfalfa injury (10% or less) was observed with treatments containing 2,4-DB, bromoxynil or AC-263,499; however, none of the treatments reduced alfalfa stands. Alfalfa yields in herbicide treated plots were greater than alfalfa yields in untreated check plots. Herbicide treatments increased alfalfa yields 180 to 480 lb/A compared to the untreated check. Yellow foxtail control was 90% or greater with treatments containing fenoxaprop, sethoxydim and BAS-517. The addition of 2,4-DB, bromoxynil, AC-263,499, ammonium sulfate (AMS) or 28% nitrogen (N) did not influence yellow foxtail control with the grass herbicides. Common lambsquarters control was 85% or greater with treatments containing 2,4-DB or bromoxynil, kochia control 80% or greater with treatments containing bromoxynil or AC-263,499, wild buckwheat control 90% or greater with treatments containing bromoxynil and Russian thistle control 80% or greater with treatments containing 2,4-DB or bromoxynil. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1403 .)

Postemergence herbicide evaluation new seeding alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa[2] injury %	Alfalfa[2] stand red %	Alfalfa[2] yield lb/A	Control[3] CHEAL %	Control[3] KCHSC %	Control[3] POLCO %	Control[3] SASKR %	Control[3] SETLU %
fenoxaprop + oc	0.1	0	0	3988	0	0	0	0	99
fenoxyprop + oc	0.2	0	0	3866	0	0	0	0	100
fenoxaprop + oc	0.4	0	0	4064	0	0	0	0	100
fenoxaprop + 2,4-DB + oc	0.2 + 0.5	5	0	3820	93	75	10	82	97
fenoxaprop + bromoxynil (2E) + oc	0.2 + 0.25	10	0	3896	88	83	100	100	97
fluazifop + oc	0.19	0	0	4140	0	0	0	0	82
fluazifop + oc	0.25	0	0	4170	0	0	0	0	83
fluazifop + AMS + oc	0.19 + 2.5	0	0	4041	0	0	0	0	86
fluazifop + 2,4-DB + oc	0.19 + 0.5	5	0	3881	97	70	10	82	78
fluazifop + bromoxynil (4E) + oc	0.19 + 0.25	8	0	3995	92	83	100	100	75
fluazifop + AC-263,499 + oc	0.19 + 0.063	5	0	3965	40	89	50	72	83
sethoxydim + oc	0.2	0	0	4018	0	0	0	0	90
sethoxydim + oc	0.3	0	0	3896	0	0	0	0	95
sethoxydim + AMS + oc	0.2 + 2.5	0	0	3934	0	0	0	0	93
sethoxydim + 28% N + oc	0.2 + 1 gal	0	0	4018	0	0	0	0	90
sethoxydim + 2,4-DB + oc	0.2 + 0.5	7	0	3858	92	75	10	85	90
sethoxydim + bromoxynil (2E) + oc	0.2 + 0.25	8	0	4049	88	82	100	98	92
sethoxydim + bromoxynil (4E) + oc	0.2 + 0.25	10	0	4010	87	82	98	100	90
sethoxydim + AC-263,499 + oc	0.2 + 0.063	7	0	3950	40	92	60	75	85
BAS-517 + oc	0.05	0	0	3889	0	0	0	0	95
BAS-517 + oc	0.1	0	0	3988	0	0	0	0	100
BAS-517 + oc	0.15	0	0	4170	0	0	0	0	100
BAS-517 + bromoxynil (4E) + oc	0.1 + 0.25	10	0	3942	90	80	100	100	97
bromoxynil (2E)	0.25	8	0	3896	90	80	92	100	0
bromoxynil (2E) + oc	0.25	10	0	3934	92	82	97	100	0
bromoxynil (4E)	0.25	7	0	3950	90	83	95	100	0
bromoxynil (4E) + oc	0.25	10	0	4041	92	83	100	100	0
AC-263,499	0.063	2	0	3919	33	75	50	70	80
AC-263,499 + oc	0.063	6	0	4071	42	92	55	77	80
weedy check	-----	0	0	3690	0	0	0	0	0

[1]Treatments applied June 4, 1986; oc = At Plus 411 F at 1 qt/A, AMS = ammonium sulfate, and 28% N = 28% (W/W) nitrogen at 1 gpa
[2]Alfalfa injury and stand reduction visually evaluated June 17 and plots harvested July 2, 1986
[3]Weed control visually evaluated June 13, 1986

Evaluation of preplant incorporated herbicides for weed control and crop injury in 'Linden Red' kidney beans. Mitich, L.W., and G.B. Kyser. Twenty-three preplant incorporated herbicide treatments and one preemergence treatment were evaluated on 'Linden Red' kidney beans in a field of Yolo clay loam soil at UC Davis. Experimental plots were 10 ft. wide (four 30-inch rows) by 20 ft. long, in 4 replications in a randomized block design. Treatments were applied on June 20, 1986, with a CO_2 backpack sprayer with five 8002 nozzles at 30 psi; total spray volume per plot was 375 ml (approximately 20 gpa) in 2 passes. Treatments were incorporated to 2 inches with a power shaper/incorporator. Weather at application was sunny and warm (80 to 90 F); soil moisture was intermediate. Beans were planted the same day with a precision planter set to approximately 2 inches. Paraquat was applied June 23 to control existing weeds; on the same day, cinmethylin was applied as a preemergence treatment, and lactofen was applied at 2 rates in sequential treatments following metolachlor. Tomatillo groundcherry and barnyardgrass seed were sown June 25. Beans emerged June 26 and were subsequently furrow-irrigated at intervals of 12 to 14 days. Bean vigor was visually evaluated July 11 and August 8. Control of planted weeds and native redroot pigweed was visually evaluated August 8 and September 8; the last evaluation was conducted after the beans had begun to senesce, so relative vigor was not evaluated. Beans were cut September 10, windrowed, and harvested October 12.

Cinmethylin + EPTC (0.75 + 3 lb/A), acetochlor (3 lb/A), isoxaben + ethalfluralin (0.2 + 0.75 lb/A), isoxoben + alachlor (0.2 + 3.0 lb/A), and isoxaben + trifluralin (0.2 + 0.75 lb/A) produced greater than 80% groundcherry control in both evaluations. Many treatments gave good to excellent control of barnyardgrass; however, both rates of SC 0051 and both rates of isoxaben produced unusually poor control ($\leq$40%). Redroot pigweed was distributed sporadically in the field, so ratings varied too much to yield significant control data. However, cinmethylin (1.5 lb/A preemergence) and SC 0051 appeared to produce poor control compared to other treatments.

SC 0051 produced excessive injury and in fact killed the beans by the second evaluation (August 8); however, SC 0051 is a broadleaf herbicide intended for grass crops. Acetochlor (3 lb/A) and metolachlor + lactofen (2.5 + 0.2 lb/A) caused substantial injury (45% to 60%) in the first evaluation (July 11); injury subsided to 30% to 35% by August 8. Isoxaben + trifluralin (0.2 + 0.75 lb/A), isoxaben alone (0.25 lb/A), metolachlor + lactofen (2.5 + 0.3 lb/A), and trifluralin + lactofen also caused significant injury in the first evaluation. In the second evaluation, cinmethylin (1.5 lb/A preemergence) reduced bean vigor by 30% to 35%, but this rating probably reflects poor weed control rather than crop phytotoxicity; for comparison, vigor was reduced 30% by competition in the unweeded control.

Yield reductions occurred primarily due to lack of groundcherry control. Poor yields seem attributable to phytotoxicity only in plots treated with acetochlor or SC 0051. Highest yields were obtained from plots treated with isoxaben + ethalfluralin (0.2 + 0.75 lb/A), ethalfluralin + metolachlor (1.0 + 3.0 lb/A), alachlor (1.0 lb/A), pendimethalin + metolachlor (1.0 + 3.0 lb/A), and trifluralin (0.75 lb/A). (University of California Cooperative Extension, Davis, CA 95616)

Weed control in 'Linden Red' kidney beans with preplant incorporated herbicides, UC Davis, 1986

		Evaluations[2] for crop vigor and weed control[3]								
	Rate	7/11[4]	8/8[5]				9/8[6]			Yield[2,7]
Herbicide[1]	(lb ai/A)	Vigor	Vigor	PHYIX	ECHCG	AMARE	PHYIX	ECHCG	AMARE	(lb/A)
1. Acetochlor	3.0	40	65	85	93	100	85	90	100	1343
2. Alachlor	1.0	90	92	58	48	100	78	83	100	1759
3. Alachlor MT	3.0	72	82	28	88	100	40	90	100	1376
4. Cinmethylin	1.5 pre	82	67	25	100	50	38	100	50	1211
5. Cinmethylin + EPTC	0.75 + 3.0	80	85	95	100	83	100	100	75	1625
6. Ethalfluralin	1.0	77	85	60	83	100	65	93	88	1611
7. Ethalfluralin + alachlor	1.0 + 3.0	85	87	48	100	100	65	100	100	1483
8. Ethalfluralin + metolachlor	1.0 + 3.0	82	87	65	100	100	80	100	100	1761
9. Isoxaben	90 gm (3 oz)	75	82	43	13	98	60	40	95	1033
10. Isoxaben	120 gm (4 oz)	70	75	73	18	75	70	38	75	1318
11. Isoxaben + alachlor	0.2 + 3.0	77	85	83	68	100	83	85	98	1561
12. Isoxaben + ethalfluralin	0.2 + 0.75	90	92	85	98	100	95	100	100	1892
13. Isoxaben + trifluralin	0.2 + 0.75	67	85	85	100	100	95	100	100	1594
14. Metolachlor	1.0	87	87	30	13	50	48	83	50	1523
15. Metolachlor	3.0	75	82	48	93	80	55	90	93	1726
16. Metolachlor + lactofen	2.5 + 0.2	55	65	20	93	75	20	95	75	1260
17. Metolachlor + lactofen	2.5 + 0.3	70	85	43	68	75	68	95	75	1396
18. Pendimethalin	1.0	82	82	38	98	83	33	93	68	1477
19. Pendimethalin + metolachlor	1.0 + 3.0	82	87	75	100	100	75	100	100	1750
20. SC-0051	0.25	10	2	0	20	60	0	0	25	0
21. SC-0051	0.5	5	2	0	15	80	0	8	50	0
22. Trifluralin	0.75	95	92	55	88	95	65	95	93	1712
23. Trifluralin/lactofen sequential	0.75/0.2 pre	92	87	68	98	100	75	98	100	1554
24. Trifluralin/lactofen sequential	0.75/0.3 pre	70	80	33	70	100	45	90	100	1433
25. Unweeded check	----	77	70	43	0	45	33	23	38	995

[1]All treatments include Paraquat (17.4 ml) to control existing weeds, plus X-77 (7.1 ml) as a surfactant.
[2]All values average of 4 replications.
[3]Rated on a scale of 0 to 100, where 0 = dead crop, no weed control; 100 = healthy crop, complete control.
[4]LSD at 5% level = 21%.
[5]At 5% level, LSD for Vigor = 21%; LSD for PHYIX = 42%; LSD for ECHCG = 30%; LSD for AMARE = 43%.
[6]At 5% level, LSD for PHYIX = 40%; LSD for ECHCG = 23%; LSD for AMARE = 44%.
[7]LSD at 5% level = 428 lb/A.

Evaluation of bentazon tank mixes for weed control in dry bean. Kidder, D.W. The herbicide bentazon, in combination with acifluorfen, imazaquin, DPX-F6025, 2,4-DB and 32% N was evaluated for control of common lambsquarters and redroot pigweed at the Kimberly Research and Extension Center. Twelve treatments, including the control, were applied in a randomized complete block design with four replications. Dry bean (NW-59 Small Red) was planted on May 31, 1986 at a rate of 95,000 plants/A on 22 inch row spacing. At the time of application, the crop had 1 to 2 trifoliolate leaves and the broadleaf weeds were 1 to 2 inches tall.

Herbicides were applied on June 23 using a CO_2 backpack sprayer with 8002 nozzles at a rate of 20 gallons/A and a pressure of 30 psi. Treatment plots were 10 feet wide by 30 feet long and only the three center rows were treated. The soil type was Portneuf silt loam with a organic matter of 1.5% and a pH of 8. Furrow irrigation was applied as needed. Visual evaluations of percent weed control and crop injury were made on June 27 and July 7.

Early bean injury was observed in the acifluorfen + 32% N, bentazon + acifluorfen + COC, bentazon + acifluorfen + 32% N, bentazon + acifluorfen + 2,4-DB + 32% N, and the bentazon + DPX-F6025 + COC treatments; however, bean injury recovery was nearly complete by the second evaluation. The exception was the bentazon + DPX-F6025 + COC treatment which increased crop injury by the second evaluation. (Univ. of Idaho Cooperative Extension Service, Twin Falls, ID 83301)

Bentazon Tank Mixes in Dry bean.

		June 27				July 14			
		Crop Response		Control		Crop Response		Control	
Treatment[1]	Rate	Inj.	Std. Red.	Cheal[2]	Amare[2]	Inj.	Std. Red.	Cheal	Amare
	(lb/A)	-----------	-----------	-----------	-----------	(%)	-----------	-----------	-----------
Check		0	0	0	0	0	0	0	0
Bentazon	0.75	1	0	18	48	0	0	38	35
Acifluorfen (Blazer)	0.125	1	0	18	48	0	0	45	46
Bentazon + 32% N[3]	0.75 + 1 gal/A	1	0	21	78	0	0	41	53
Acifluorfen + 32%	0.125 + 1 gal/A	20	0	69	93	1	0	44	49
Bentazon + Acifluorfen + COC[4]	0.75 + 0.125 + 1 qt/A	16	0	92	98	1	0	89	83
Bentazon + Imazaquin + COC	0.75 + 0.047 + 1 qt/A	3	0	92	85	3	0	95	88
Bentazon + DPX-F6025 + COC	0.75 + 0.008 + 1 qt/A	22	0	74	73	40	3	86	81
Bentazon + Acifluorfen + 32% N	0.75 + 0.125 + 1 gal/A	11	0	93	95	2	0	91	88
Bentazon + Imazaquin + 32% N	0.75 + 0.047 + 1 gal/A	1	0	61	76	1	0	69	69
Bentazon + 2,4-DB + 32% N	0.5 + 0.03 + 1 gal/A	1	0	33	61	0	0	41	43
Bentazon + Acifluorfen + 2,4-DB + 32% N	0.5 + 0.125 0.03 + 1 gal/A	23	0	97	95	1	0	90	84
LSD (0.05)		5	NS	20	18	4	1	28	29

[1]Applied June 23 when beans were between the first and second trifoliolate stage and broadleaf weeds were 1 to 2 inches tall.
[2]Amare = redroot pigweed
Cheal = common lambsquarters
[3]Uran liquid fertilizer
[4]Crop oil concentrate (Atplus 411F)

Evaluation of preplant incorporated or complementary preplant incorporated/preemergence treatments in pinto beans. Miller, S.D. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of preplant incorporated or complementary preplant incorporated/preemergence herbicide treatments for weed control in pinto beans. Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 2.5 to 3 inch depth, May 21, 1986 (air temp. 87 F, relative humidity 39%, wind E 10 mph, sky partly cloudy and soil temp. - 0 inch 102 F, 2 inch 79 F and 4 inch 70 F). Pinto beans (var. UI-111) were planted immediately after herbicide incorporation and preemergence treatments applied May 22 (air temp. 55 F, relative humidity 50%, wind SE 10 mph, sky cloudy and soil temp. - 0 inch 57 F, 2 inch 65 F and 4 inch 64 F). The soil was classified as a sandy loam (73% sand, 18% silt and 9% clay) with 1.6% organic matter and a 7.6 pH. Weed counts, crop stand counts and visual injury ratings were made June 30, visual weed control ratings August 20 and yields determined August 26, 1986. Common lambsquarters (CHEAL) and yellow foxtail (SETLU) infestations were moderate and redroot pigweed (AMARE) and hairy hightshade (SOLSA) infestations light throughout the experimental area.

FMC-57020 reduced pinto bean stands 20 to 41% and caused 20 to 28% visual injury. No other treatment injured pinto beans or reduced stand over 10%. Pinto bean yields related closely to weed control and/or crop injury. All treatments except FMC-57020 at 0.75 and 1.0 lb/A increased pinto bean yields compared to the untreated check. Season long weed control was better with herbicide combinations than with single herbicide treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1405.)

Weed control in pinto beans

Treatment[1]	Rate	Pinto beans[2]			Control[3]							
					June 30				August 20			
	Rate lb ai/lb	stand %	injury %	yield lb/A	CHEAL %	AMARE %	SOLSA %	SETLU %	CHEAL %	AMARE %	SOLSA %	SETLU %
<u>Preplant incorporated</u>												
trifluralin	0.75	100	0	1780	100	92	0	100	85	82	0	78
ethafluralin	0.94	99	0	1874	100	92	60	100	90	90	47	82
pendimethalin	1.5	91	0	1740	97	92	60	98	80	77	0	83
EPTC	3.0	100	0	2036	100	80	100	93	72	47	70	73
FMC-57020	0.75	80	20	1153	97	80	60	98	47	50	37	74
FMC-57020	1.0	59	28	1333	97	80	100	98	57	55	47	82
EPTC + trifluralin	2.0 + 0.5	100	0	2228	100	100	100	95	87	83	67	83
EPTC + ethafluralin	2.0 + 0.75	100	0	2243	100	100	100	92	83	82	80	73
EPTC + pendimethalin	2.0 + 1.0	98	0	2291	100	100	100	100	87	83	73	87
metolachlor	1.5	100	0	1665	92	32	100	87	50	38	60	81
metolachlor	2.0	100	0	2044	89	68	100	95	60	43	65	87
CGA-24704	0.75	100	0	2032	57	60	40	57	43	43	43	63
CGA-24704	1.0	100	0	2059	59	80	100	92	41	45	62	92
CGA-24704	1.1	100	0	2129	65	92	100	98	48	63	62	93
CGA-24704	1.4	100	0	2108	62	88	100	93	48	63	63	95
acetochlor	1.5	100	0	2059	77	32	100	92	58	37	40	72
acetochlor	2.0	100	0	2127	82	88	100	95	65	43	55	77
alachlor (MT)	2.0	100	0	1990	85	80	100	92	67	47	60	78
alachlor	2.0	100	0	2041	85	72	100	93	67	42	50	77
<u>Preplant incorporated/preemergence</u>												
EPTC/chloramben	2.0 + 2.25	100	0	2403	82	60	100	95	62	62	72	82
EPTC/cinmethlylin	2.0 + 0.75	100	0	2452	100	100	100	100	83	80	87	95
trifluralin/chloramben	0.75 + 2.25	100	0	2310	100	92	60	100	85	85	75	93
ethafluralin/chloramben	0.75 + 2.25	100	0	2503	100	100	100	100	88	87	85	97
EPTC + trifluralin/chloramben	2.0 + 0.5 + 2.25	100	0	2461	100	100	100	98	92	90	87	95
weedy check	----------------	100	0	1513	0	0	0	0	0	0	0	0
plants/ft row 6 in band		3.7	---	----	1.0	0.4	0.1	2.4	---	---	---	---

[1] Treatments applied May 21 and 22, 1986; MT = micro tech formulation

[2] Crop stand counts and visual crop injury evaluated June 30 and plots harvested August 26, 1986

[3] Weed stand counts June 30 and visual weed control ratings August 20, 1986

Evaluation of preemergence herbicide treatments in pinto beans. Miller, S.D. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of preemergence herbicide treatments for weed control in pinto beans. Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Pinto beans (var. UI-111) were planted in a sandy loam soil (73% sand, 18% silt and 9% clay) with 1.6% organic matter and a 7.6 pH May 21, 1986. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 pga at 40 psi May 22, 1986 (air temp. 65 F, relative humidity 30%, wind NW 15 mph, sky clear and soil temp. - 0 inch 90 F, 2 inch 65 F and 4 inch 62 F). Weed counts, crop stand counts and visual injury ratings were made June 30, visual weed control ratings August 20 and yields determined August 26, 1986. Common lambsquarters (CHEAL) and grass (yellow foxtail and witchgrass) infestations were moderate and redroot pigweed (AMARE) and hairy nightshade (SOLSA) infestations light throughtout the experimental area.

Pinto bean stands were reduced 10 and 16%; respectively, by FMC-57020 at 1.0 lb/A alone or 0.75 lb/A in combination with AC-263,499. In addition, pinto bean growth was reduced 15 to 28% by all treatments containing FMC-57020. Pinto bean yields increased from 601 to 1319 lb/A in areas receiving herbicide treatments. Yield increases were directly related to weed control and/or crop injury. Season long weed control was better with herbicide combinations than with single herbicide treatments. AC-263,499 combinations with cinmethylin or FMC-57020 provided excellent broad-spectrum weed control throughout the season. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1406.)

Weed control in pinto beans with preemergence herbicides

Treatment[1]	Rate	Pinto beans[2]			Control[3]							
					June 30				August 20			
	Rate	stand	injury	yield	CHEAL	AMARE	SOLSA	GRASS	CHEAL	AMARE	SOLSA	GRASS
	lb ai/A	%	%	lb/A	%	%	%	%	%	%	%	%
cinmethylin	0.75	100	0	2874	89	50	24	100	65	68	67	92
chloramben	2.25	100	0	2790	81	65	24	63	58	55	55	50
FMC-57020	0.75	100	15	2936	100	25	100	100	73	57	65	93
FMC-57020	1.0	84	28	2408	100	100	100	100	87	75	67	96
AC-263,499	0.032	100	0	2972	82	100	62	40	96	95	93	23
AC-263,499	0.063	100	0	2906	100	100	77	54	99	99	97	40
cinmethylin + chloramben	0.75 + 2.25	100	0	2792	93	100	8	100	82	77	68	92
cinmethylin + FMC-52070	0.75 + 0.75	100	15	3126	100	90	100	100	85	83	78	93
cinmethylin + AC-263,499	0.75 + 0.032	100	0	3073	100	100	62	100	96	95	93	98
FMC-57020 + chloramben	0.75 + 2.25	100	17	2685	100	75	85	100	75	75	77	95
FMC-57020 + AC-263,499	0.75 + 0.032	90	25	2872	100	100	100	100	98	96	96	96
metolachlor	1.5	100	0	2667	84	75	85	100	67	63	65	95
metolachlor	2.0	100	0	2926	96	100	100	100	80	77	82	100
acetochlor	1.5	100	0	2942	96	100	90	100	68	62	67	83
alachlor	2.0	100	0	2960	92	85	77	100	87	82	87	90
alachlor (MT)	2.0	100	0	2900	89	85	85	100	77	67	72	68
weedy check	---	100	0	1807	0	0	0	0	0	0	0	0
plants/ft row 6 inch band		--		----	3.7	0.4	0.3	2.0	---	---	---	---

[1]Treatments applied May 22, 1986; MT = micro tech formulation
[2]Crop stand counts and visual crop injury evaluated June 30 and plots harvested August 26, 1986
[3]Weed stand counts June 30 and visual weed control ratings August 20, 1986

Evaluation of preplant incorporated herbicides in field corn. Mitich, L.W., M.S. Duey and N.L. Smith. Several herbicides were tested for efficacy and crop phytotoxicity in field corn at the UC Davis Experimental Farm. Herbicides were applied on June 9, 1986, with a CO_2 backpack sprayer calibrated to 40 gpa at 30 psi, and were power incorporated to a depth of 2 to 3 inches. 'Pioneer 3413' corn was planted on 30-inch listed beds on June 9, and furrow irrigated the next day. The experiment consisted of 13 treatments, 4 replicated times, on 10 by 20 ft plots arranged in a randomized complete block pattern. In addition to the natural weed population (barnyardgrass, purslane, redroot pigweed, and lambsquarters), one row of each plot was lightly seeded with velvetleaf at time of planting. Ammonium nitrate was added on July 15 at a rate of 160 units per acre.

Alachlor EC (3 lb/A) + cyanazine (1.5 lb/A) and vernolate (4 lb/A) gave excellent (94% to 100%) control of all weeds, resulting in high yields. (Values for velvetleaf may have been influenced by variable stand due to light planting rate and unknown germination values.) Metolachlor (1.5 lb/A) + cyanazine (1.5 lb/A) provided excellent (93% to 100%) control on barnyardgrass, purslane, velvetleaf, and lambsquarters, and produced a high - yield. Except for velvetleaf, acetochlor (2 lb/A and 3 lb/A) and alachlor EC (4 lb/A) gave very good to excellent (83% to 100%) weed control and produced excellent yields. Alachlor EC (3 lb/A) performed well (75% to 100%) on all weeds except purslane. SC 0774 (0.5 lb/A) gave excellent control of velvetleaf and lambsquarters, but poor control of the remaining weeds. SC 0098 (both rates) gave both low yields and very poor (less than 25%) weed control. (University of California Cooperative Extension, Davis, CA 95616)

Control of Summer Annual Weeds in 'Pioneer 3413' Corn
with Preplant Incorporated Herbicides at the UC Davis Experimental Farm[1]

Herbicide	Rate (lb/A)	Crop[2] vigor	% Weed control[2]					Yield[2,3] (lb/A)
			Barnyard-grass	Purslane	Velvet-leaf	Redroot pigweed	Lambs-quarters	
Alachlor 4EC	3.0	97	98	66	75	100	85	9,348 ABC
Alachlor 4EC	4.0	98	99	85	50	100	100	10,393 A
Alachlor 4ME	4.0	100	89	75	50	85	68	9,060 ABC
Acetochlor 8E	2.0	95	98	83	25	100	100	10,132 A
Acetochlor 8E	3.0	95	100	97	75	100	100	9,566 ABC
Metolachlor 8	2.5	97	97	15	25	68	55	10,324 A
Alachlor EC + cyanazine 90DF	3.0 + 1.5	100	100	100	38	100	100	9,871 AB
Metolachlor 8E + cyanazine 90DF	1.5 + 1.5	100	95	93	100	68	100	10,324 A
Vernolate 6.7E	4.0	95	95	100	75	94	100	10,106 A
SC 0774 1E	0.5	100	48	48	100	18	100	7,928 BC
SC 0098 1.7E	0.06	92	10	18	0	0	100	8,364 ABC
SC 0098 1.7E	0.12	98	5	0	25	0	25	7,971 BC
Control	___	90	5	12	0	8	55	7,710 C

[1]Crop planted on June 9, 1986; herbicides applied on June 9, 1986; crop harvested on November 5, 1986.

[2]All values average of 4 replications; 100 = excellent crop vigor or complete weed control; 0 = crop death or no weed control.

[3]Values followed by a common letter are not significantly different at the 5% level according to Duncan's Multiple Range test.

Evaluation of preplant incorporated herbicides in corn. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of preplant incorporated herbicide treatments for weed control in corn. Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 1.5 to 2 inch May 6, 1986 (air temp. 72 F, relative humidity 29%, wind SE 10 mph, sky partly cloudy and soil temp. - 0 inch 85 F, 2 inch 82 F and 4 inch 70 F). Corn (var. DeKalb T1000) was planted immediately after herbicide incorporation. The soil was classified as a sandy loam (78% sand, 13% silt and 9% clay) with 1.2% organic matter and a 7.4 pH. Weed counts, crop stand counts, and visual crop injury ratings were made June 4, visual weed control ratings July 1 and silage yields determined August 21, 1986. Common lambsquarters (CHEAL), kochia (KCHSC), redroot pigweed (AMARE) and hairy nightshade (SOLSA) infestations were light and yellow foxtail (SETLU) infestations moderate throughout the experimental area.

Acetochlor combinations with cyanazine reduced corn stand 10% and caused 15 to 17% corn injury; however, silage yields were not reduced when compared to the untreated check. All herbicide treatments provided excellent early season weed control and good to excellent late season weed control in this study. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1436 .)

Weed control in corn with preplant incorporated herbicides

		Corn[2]			Control[3]								
					June 4					July 1			
	Rate	stand	injury	silage	CHEAL	KCHSC	AMARE	SOLSA	SETLU	CHEAL	KCHSC	SOLSA	SETLU
Treatment[1]	lb ai/A	%	%	T/A	%	%	%	%	%	%	%	%	%
metolachlor + cyanazine	2.0 + 1.5	99	0	24.9	100	100	100	100	100	100	100	100	99
metolachlor + cyanazine	4.0 + 1.5	100	7	25.4	100	100	100	100	100	100	100	100	100
CGA180937 + cyanazine	2.0 + 1.5	100	0	25.9	100	100	100	100	100	97	100	100	100
CGA180937 + cyanazine	4.0 + 1.5	100	0	25.9	100	100	100	100	100	100	100	100	100
alachlor + cyanazine	2.0 + 1.5	97	0	25.8	100	100	100	100	100	100	100	100	99
alachlor + cyanazine	4.0 + 1.5	95	7	24.0	100	100	100	100	100	100	100	100	99
metolachlor + atrazine (PM)	1.25 + 1.0	99	0	25.5	100	100	100	100	100	100	100	100	100
metolachlor + atrazine (PM)	2.5 + 2.0	100	0	27.8	100	100	100	100	100	100	100	100	100
metolachlor + atrazine (PM-LD)	1.25 + 1.0	99	0	25.6	100	100	100	100	100	100	100	100	98
metolachlor + atrazine (PM-LD)	2.5 + 2.0	100	0	26.6	100	100	100	100	100	100	100	100	100
cycloate + dichlormid (PM)	4.0	97	0	25.2	100	100	100	100	100	99	93	100	100
cycloate + dichlormid (PM)	6.0	97	3	26.9	100	100	100	100	100	98	100	100	100
EPTC + dichlormid (PM)	4.0	100	0	28.1	100	100	100	100	100	93	100	92	90
EPTC + dichlormid (PM-encap)	4.0	95	0	27.8	100	100	100	100	100	100	100	100	99
butylate + dichlormid	4.0	100	0	28.0	100	100	100	100	97	90	97	98	88
acetochlor + cyanazine	1.25 + 1.5	90	15	25.5	100	100	100	100	100	100	100	98	93
acetochlor + cyanazine	1.5 + 1.5	90	17	23.9	100	100	100	100	100	100	100	99	97
cyanazine	2.0	100	0	26.2	100	100	100	100	100	97	100	100	90
weedy check	---	100	0	23.9	0	0	0	0	0	0	0	0	0
plants/ft row 6 inch band		1.9	--	----	0.1	0.1	0.1	0.15	1.4	---	---	---	---

[1]Treatments applied May 6, 1986; PM = package mix, LD = experimental formulation, and encap = encapsulated formulation
[2]Crop stand counts and visual crop injury evaluated June 4 and plots harvested August 21, 1986
[3]Weed stand counts June 4 and visual weed control ratings July 1, 1986

Evaluation of preemergence herbicides in corn. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of preemergence herbicide treatments for weed control in corn. Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Corn (var. DeKalb T1000) was planted in a sandy loam soil (78% sand, 13% silt and 9% clay) with 1.2% organic matter and a 7.4 pH May 6, 1986. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 40 psi May 10, 1986 (air temp. 60 F, relative humidity 25%, wind calm, sky clear and soil temp. - 0 inch 72 F, 2 inch 60 F and 4 inch 54 F). Weed counts, crop stand counts and visual crop injury ratings were made June 3 and visual weed control ratings July 1, 1986. Common lambsquarters (CHEAL), redroot pigweed (AMARE) and yellow foxtail (SETLU) infestations were moderated and uniform throughout the experimental area.

No treatment reduced corn stand over 2%; however, corn injury was evident with SC-0774 at 1.5 lb/A without safener or SC-0735 at 0.75 lb/A alone or in combination with cyanazine. Early season weed control was excellent and late season weed control good with herbicide combinations containing cyanazine or atrazine. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1437.)

Weed control in corn with preemergence herbicides

Treatment[1]	Rate lb ai/A	Corn[2] stand %	Corn[2] injury %	Control[3] June AMARE %	June CHEAL %	June SETLU %	July 1 AMARE %	July 1 CHEAL %	July 1 SETLU %
cycloate + dichlormid (PM)	4.0	100	0	86	44	83	43	43	30
butylate + dichlormid (PM)	4.0	100	0	0	7	77	13	13	33
butylate + dichlormid (PM-encap)	4.0	100	0	58	59	86	37	37	40
EPTC + dichlormid (PM)	4.0	100	0	0	0	47	13	10	33
EPTC + dichlormid (PM-encap)	4.0	100	0	94	100	96	63	70	70
metolachlor + cyanazine	2.0 + 1.5	100	0	100	100	100	99	100	99
alachlor + cyanazine	2.0 + 1.5	100	0	100	100	100	97	98	93
acetochlor + cyanazine	1.5 +1.5	100	0	100	100	100	98	100	96
SC-0774	0.25	100	0	38	84	69	43	77	50
SC-0774	0.38	100	0	57	100	80	48	93	53
SC-0774	0.5	100	2	94	100	92	63	96	62
SC-0774	0.75	100	2	100	100	94	63	95	65
SC-0774	1.5	100	10	100	100	98	70	97	83
SC-0774 + R-29148	0.75 + 0.25	100	0	91	100	97	65	95	75
SC-0774 + R-29148	1.5 + 0.5	100	0	100	100	98	70	97	85
SC-0774 + atrazine	0.38 + 0.5	99	0	100	100	97	100	100	87
SC-0774 + atrazine	0.25 + 0.75	100	0	100	100	100	100	100	91
SC-0774 + atrazine	0.38 + 0.75	100	0	100	100	100	100	100	93
SC-0774 + atrazine	0.5 + 0.75	100	0	100	100	100	100	100	93
SC-0774 + atrazine	0.75 + 0.75	100	0	100	100	100	100	100	95
SC-0774 + atrazine	0.25 + 1.0	100	0	100	100	100	100	100	95
SC-0774 + atrazine	0.38 + 1.0	100	0	100	100	100	100	100	96
SC-0774 + atrazine	0.5 + 1.0	100	0	100	100	100	100	100	99
SC-0774 + atrazine	0.75 + 1.0	98	0	100	100	100	100	100	99
atrazine	0.75	100	0	100	100	94	100	100	75
atrazine	1.0	100	0	100	100	96	100	100	78
SC-0735	0.75	100	18	100	100	100	87	95	72
SC-0735 + cyanazine	0.75 + 2.0	100	27	100	100	100	100	100	93
weedy check	----------	100	0	0	0	0	0	0	0
plants/ft row 6 inch band		1.7	--	0.7	0.6	2.4	---	---	---

[1] Treatments applied May 10, 1986; PM = package mix and encap = encapsulated formulation
[2] Crop stand counts and visual crop injury evaluated June 3, 1986
[3] Weed stand counts June 3 and visual weed control ratings July 1, 1986

The effect of SC0774 and combinations on weed control in field corn. Lange, A. H. and K. F. Lange. Earlier field work in 1985 showed the potential of SC0774 for weed control in corn. At preemergence rates around one and one half pound per acre it gave control of annual weeds as well as yellow nutsedge in a sandy loam soil. It gave partial control of purple nutsedge. Applied postemergence at one fourth to one half pound per acre it was safe on sweet corn.

The objective of the 1986 field work was to evaluate SC0774 and combinations for preemergence annual grass control in field corn, one of the main problems in California corn crops. Northrup King field corn was planted May 11, 1986 on thirty inch raised beds of a Hanford fine sandy loam (OM 0.76%, sand 74%, silt 21%, and clay 5%). Green foxtail was seeded on the shoulder of each bed prior to herbicide application. On May 13, 1986 the herbicides were applied with one 8004 LP @ 10 psi in 50 gpa of water. The plots were sprinkled immediately after herbicide application with one half acre inch of water. The soil temperature at one inch was 25 C, air temperature 30 C. Vigor and phytotoxicity and/or weed control ratings were made on May 19 through June 26, 1986.

The results showed selectivity with SC0774, but there appeared to be a slight early effect at about 0.75 pounds of SC0774 per acre and even this effect was transient. Weeds appeared to do more damage to corn than any of the herbicides. The weed control was good except at the 0.25 pound per acre rate of SC0774. The phytotoxicity to corn was also absent except some slight symptoms at the 0.75 pound per acre rate which disappeared with time.

The effect of SC0774 and combinations on weed control in field corn

Herbicide	Lb/A	Green Foxtl 5/31	Pig-weed 6/26	Average[1] corn vigor 5/19	5/31	6/12
SC0774	0.25	4.7	8.0	5.0	9.0	9.9
"	0.38	10.0	8.3	5.7	8.3	9.0
"	0.50	10.0	7.7	3.0	8.7	9.0
"	0.75	10.0	9.7	3.3	6.3	9.7
SC0774 + Cyanazine	0.25+1.0	9.3	9.3	6.0	8.7	10.0
" + "	0.38+1.0	10.0	9.3	5.7	8.3	9.3
" + "	0.50+1.0	9.0	7.0	4.7	10.0	9.3
" + "	0.75+1.0	10.0	10.0	3.3	7.0	8.7
" + "	0.25+1.5	9.7	9.3	5.3	8.3	10.0
" + "	0.38+1.5	9.3	9.0	5.3	9.0	9.3
" + "	0.50+1.5	9.7	8.3	5.0	9.7	9.7
" + "	0.75+1.5	9.7	9.7	8.3	8.0	9.3
" + "	0.25+2.0	9.7	9.7	4.7	8.3	8.7
" + "	0.38+2.0	9.7	9.7	5.3	7.7	8.7
" + "	0.50+2.0	9.7	10.0	7.0	7.7	9.3
" + "	0.75+2.0	10.0	9.7	7.7	8.0	9.3
Cyanazine	1.0	9.0	8.3	5.0	8.0	9.7
"	1.5	8.3	8.3	6.3	9.3	9.3
	2.0	9.3	9.7	6.7	9.7	9.3
SC0774 + Metolachlor	1.5 +2.0	10.0	9.7	3.0	8.3	9.0
Check	- -	0.3	0	4.3	8.3	5.7

1 Average of three replications where 0 = no weed control or no corn growth and 10 = no weeds and most vigorous corn.

Pre-emergence, preplant incorporated, and post-emergence weed control of field corn. Orr, J.P. and D. Havens. At Cosumnes College, Sacramento, CA, pre-emergence, preplant incorporated, and post-emergence herbicides were applied to a clay loam soil. Pre-emergence treatments were made June 20, 1985, and June 24, 1985, and incorporated with a power tiller to a depth of 2 inches. Post-emergence herbicides were applied July 18, 1985, to corn in the 2-3 leaf stage. Treatments were made with a CO2 backpack sprayer to 20 gpa water and replicated 4 times. Post-emergence treatments were made in Herbimax oil at 1 qt/A. Pioneer 344 was planted 2 inches in depth.

SC0051 gave good to excellent control of redroot pigweed and lambsquarters in all treatments. At 2.0 lb/A it gave excellent pre-emergence, post-emergence control of barnyard grass, but poor control of barnyard grass when preplant incorporated. SC0051 produced slight stand and vigor reduction. In the early stages of crop growth, SC0051 at the 2 lb/A rate produced a moderate degree of chlorosis. In the post-emergence treatments however, there was no apparent detrimental effects in the later stages.

SC0774 gave good to excellent weed control at 1.0 lb/A, but produced slight stand and vigor reduction and moderate phytotoxicity in the form of chlorosis in the lower leaves. At the lower 0.5 lb/A rate, only lambsquarters was controlled with SC0774.

SC5676 gave good to excellent control at 3.0 lb/A with slight stand reduction and moderate vigor reduction. When the safener N,N-diallyl-2,2-dichloroacetamide was added, vigor reduction decreased.

Alachlor gave good to excellent control with slight stand reduction.

Butylate + safener showed poor weed control. When SC0058 was added, it gave excellent control of pigweed and barnyard grass with slight stand reduction and no vigor reduction.

Vernolate + safener and Vernolate + safener + SC0058 gave excellent weed control with slight stand and vigor reduction. (University of California Cooperative Extension, Sacramento, CA 95827)

Pre-emergence, preplant incorporated, and post-emergence weed control in field corn

Treatment	Formu-lation	Rate lbs/A a.i.	Control			Corn	
			R.Pigweed	Barnyard-grass	Lambsquarters	Stand/Vigor Reduction	Phyto-toxicity
Preplant Incorporated Rated 8/1/85							
SC0051	0.55E	1.0	8.3	4.3	9.8	1.2/0.3	0
SC0051	0.55E	2.0	8.0	6.5	9.6	0.6/0	0
SC0774	1E	0.5	4.8	5.5	9.0	0/0	0
SC0774	1E	1.0	8.3	9.8	10.0	0.6/2.8	2.8
butylate+	6.7E	4.0	5.8	7.8	4.0	1.4/0	0
butylate+	6.7E	6.0	1.5	7.5	0	0/0.3	0
butylate+ + SC0058	6.7E+6E	4.0+1.0	7.3	10.0	2.3	0.5/0	0
butylate+ + SC0058	6.7E+6E	6.0+2.0	10.0	10.0	0.5	0.8/0	0
vernolate + safener	6.7E	4.0	9.6	10.0	9.6	1.6/0	0
vernolate + safener	6.7E	6.0	9.6	10.0	9.8	0.5/0.8	0
vernolate+ + SC0058	7E+6E	4.0+1.0	9.8	10.0	9.8	1.2/0.3	0
vernolate+ + SC0058	7E+6E	6.0+2.0	9.5	10.0	9.8	0/1.0	0

Pre-emergence, preplant incorporated, and post-emergence weed control in field corn

Treatment	Formulation	Rate lbs/A a.i.	Control: R.Pigweed	Control: Barnyardgrass	Control: Lambsquarters	Corn: Stand/Vigor Reduction	Corn: Phytotoxicity
Preemergence Rated 8/1/85							
SC0051	0.55E	1.0	9.4	6.0	10.0	3.0/0	0
SC0051	0.55E	2.0	10.0	9.3	10.0	1.6/0	0
SC0774	1EC	0.5	7.8	7.1	9.8	2.7/0	0
SC0774	1EC	1.0	9.3	9.3	9.5	1.5/0.5	2.8
SC5676	8EC	1.5	7.3	5.6	7.3	3.7/1.3	0
SC5676	8EC	3.0	9.6	9.6	8.8	1.9/4.5	0
SC5676+	7EC	1.5	9.5	8.8	8.3	2.6/0	0
SC5676+	7EC	3.0	9.8	8.5	9.3	2.9/0.8	0
SC0106	2S	2.0	5.5	5.8	5.0	4.2/0.3	0.5
SC0106 + R29148	2S+2E	2.0+1.0	6.8	6.1	7.0	2.2/0.5	0.3
SC0106	2S	4.0	6.3	6.8	6.3	0/0.3	3.0
SC0106 + R29148	2S+2E	4.0+2.0	4.5	4.3	4.5	2.1/1.5	2.8
alachlor	4EC	4.0	9.8	8.3	9.5	2.8/0	0

Pre-emergence, preplant incorporated, and post-emergence weed control in field corn

Treatment	Formu-lation	Rate lbs/A a.i.	Control: R.Pigweed	Control: Barnyard-grass	Control: Lambsquarters	Corn: Stand/Vigor Reduction	Corn: Phyto-toxicity
Post-emergence Rated 8/25/85							
SC0051	0.55EC	0.5	9.5	9.2	9.8	1.4/0.3	0
SC0051	0.55EC	1.0	9.4	9.2	10.0	0.7/0	0
SC0051	0.55EC	2.0	9.5	9.2	10.0	2.5/1.0	0
Check	______	___	0	0	0	0/0	0

Weed Control and Stand/Vigor Reduction: 0 = none
10 = 100%

Phytotoxicity: 0 = none
5 = dead plant

butylate+ = butylate + safener

Evaluation of postemergence herbicide treatments for weed control in corn. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of individual and/or herbicide combinations applied postemergence for weed control in corn. Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi June 3, 1986 (air temp. 94 F, relative humidity 26%, wind calm, sky clear and soil temp. - 0 inch 110 F, 2 inch 86 F and 4 inch 82 F) to 1.5 to 4 inch weeds and 4-leaf corn. Corn (var. DeKalb T1000) was planted May 6, 1986 in a sandy loam soil (78% sand, 14% silt and 8% clay) with 1.2% organic matter and a 7.7 pH. Weed counts, crop stand counts and visual crop injury ratings were made June 17, 1986. Common lambsquarters (CHEAL), redroot pigweed (AMARE) and grass (an equal mixture of yellow foxtail, stinkgrass and witchgrass) infestations were light but uniform throughout the experimental area.

No corn injury or stand reduction was observed with any treatment. Broadleaf weed control was 85% or greater with all treatments except pendimethalin at 1.5 lb/A. Grass control ranged from 0 to 100% and was generally best with treatments containing cyanazine or SC-0051 treatments combined with atrazine. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1438 .)

Weed control in corn with postemergence herbicide treatments

Treatment[1]	Rate lb ai/A	Corn[2] stand %	Corn[2] injury %	Weed control[3] CHEAL %	Weed control[3] AMARE %	Weed control[3] GRASS %
bromoxynil (2E)	0.25	100	0	100	100	8
bromoxynil (4E)	0.25	100	0	95	95	0
bromoxynil (4E)	0.37	100	0	100	100	0
bromoxynil + atrazine (PM)	0.25 + 0.5	100	0	100	100	63
bromoxynil (4E) + atrazine	0.3 + 0.4	100	0	100	100	41
bromoxynil (2E) + cyanazine	0.25 + 0.5	100	0	100	100	85
bromoxynil (2E) + cyanazine	0.25 + 1.0	100	0	100	100	93
bromoxynil (4E) + cyanazine	0.3 + 1.0	100	0	100	100	97
SC-0051 + S	0.25	100	0	95	92	0
SC-0051 + S	0.5	100	0	95	95	52
SC-0051 + S	1.0	100	0	100	100	52
SC-0051 + atrazine + S	0.25 + 0.5	100	0	100	100	66
SC-0051 + atrazine + S	0.25 + 1.0	100	0	100	100	78
SC-0051 + atrazine + S	0.5 + 0.5	100	0	100	100	85
SC-0051 + atrazine + S	0.5 + 1.0	100	0	100	100	93
SC-0051 + atrazine + S	1.0 + 0.5	100	0	100	100	90
SC-0051 + atrazine + S	1.0 + 1.0	100	0	100	100	100
atrazine + S	0.5	100	0	95	79	36
atrazine + S	1.0	100	0	100	100	67
bromoxynil (4E) + 2,4-D	0.25 + 0.25	100	0	92	100	7
bromoxynil (4E) + dicamba	0.25 + 0.25	100	0	95	100	0
dicamba + atrazine (PM)	0.275 + 0.52	100	0	85	90	40
dicamba + atrazine (PM)/cyanazine	0.275 + 0.52/1.0	100	0	100	100	95
dicamba + atrazine (PM) /pendimethalin	0.275 + 0.52 /1.5	100	0	92	92	63
dicamba + atrazine (PM) /bromoxynil (2E)	0.275 + 0.52 /0.25	100	0	100	100	51
pendimethalin	1.5	100	0	0	3	8
pendimethalin + cyanazine	1.0 + 1.0	100	0	100	66	90
weedy check	---------	100	0	0	0	0
plants/ft row 6 inch band		1.3	---	0.7	0.6	1.1

[1]Treatments applied June 3, 1986; PM = package mix and S = surfactant Tween 20 at 0.5% v/v
[2]Crop stand counts and visual crop injury evaluated June 17, 1986
[3]Weed stand counts June 17, 1986

Evaluation of postemergence herbicides in field corn. Mitich L.W., M.S. Duey and N.L. Smith. Research plots were established on June 9, 1986 in order to evaluate efficacy and crop phytotoxicity of postemergence herbicides on field corn. 'Pioneer 3413' corn was planted on June 9 into 30-inch beds of Yolo clay loam and was furrow irrigated on June 10. Herbicides were applied on June 25 with a CO_2 backpack sprayer calibrated to 40 gpa at 30 psi with 8002 nozzles. At application time , barnyardgrass was at the 2- to 3-leaf stage and the redroot pigweed, purslane, velvetleaf and black nightshade were at the emergence to 2-inch stage. The plots were 10 by 20 ft and arranged in a randomized block design consisting of 4 replications of 16 treatments. Velvetleaf was lightly seeded in one row of each plot.

All treatments produced very poor to no control of barnyardgrass except for SC 0051 + atrazine + oil (1 lb/A), which gave good (88%) control; the 0.5 lb/A rate of this combination gave poor (46%) control. Both rates of SC 0051 + atrazine + oil gave excellent (100%) control of all other weeds, resulting in high yields. SC 0098 + oil, dicamba, atrazine + oil, cyanazine + oil, and cyanazine + tridiphane + oil gave good to excellent (80% to 100%) control of broadleaf weeds, resulting in moderate to high yields. SC 0098 (all 3 rates without oil) gave fair to excellent (73% to 100%) control of purslane, pigweed, and lambsquarters, and poor (50% to 68%) control of nightshade. SC 0051 (2 rates) and SC 0051 + oil provided good to excellent (78% to 100%) control of lambsquarters and nightshade, and poor (less than 50%) control of purslane and pigweed. Bromoxynil gave 75% to 100% control of pigweed, lambsquarters, and nightshade. There was no significant crop injury caused by any of the herbicides. (University of California Cooperative Extension, Davis, CA 95616)

Control of Summer Annual Weeds in 'Pioneer 3413' Corn with Postemergence Herbicides at the UC Davis Experimental Farm[1]

Herbicide	Rate (lb/A)	Crop[2] vigor	% Weed control[2] Barnyard-grass	Purslane	Redroot pigweed	Lambs-quarters	Night-shade	Yield[2,3] (lb/A)
SC 0051	0.25	95	0	40	35	100	95	5166 F
SC 0051	0.5	100	8	0	0	100	100	6647 DEF
SC 0051 + oil	0.25 + 1qt	100	0	40	50	100	78	7649 BCD
SC 0098	0.03	100	0	84	80	88	55	8494 ABC
SC 0098	0.06	100	0	86	73	100	68	6212 DEF
SC 0098	0.12	100	0	86	100	100	50	8799 ABC
SC 0098 + oil	0.06 + 1qt	100	8	100	100	100	80	7971 ABCD
Dicamba	0.25	100	0	89	100	100	93	7257 CDE
2,4-D amine	0.5	100	0	68	100	100	73	7736 BCD
Bromoxynil	0.5	97	0	13	75	100	100	5732 EF
Atrazine + oil	1.0 + 1qt	100	0	100	100	100	100	7579 BCD
Cyanazine + oil	2.0 + 1qt	100	0	100	85	100	100	6490 DEF
Cyanazine + tridiphane + oil	2.0 + 0.75 + 1qt	95	0	100	100	100	95	9365 AB
SC 0051 + atrazine + oil	0.5 + 1.0 + 1qt	100	46	100	100	100	100	9692 A
SC 0051 + atrazine + oil	1.0 + 1.0 + 1qt	100	88	100	100	100	100	9348 AB
Control	---	97	5	23	0	0	70	5097 F

[1]Crop planted on June 9, 1986; herbicides applied on June 25, 1986; crop harvested on November 5, 1986.
[2]All values average of 4 replications; 100 = complete crop vigor or weed control; 0 = no crop vigor or weed control.
[3]Values followed by a common letter are not significantly different at the 5% level according to Duncan's Multiple Range test.

Postemergence weed control in short season field corn. Wright, S.D., and L.W. Mitich. Several experimental herbicides, applied postemergence or post-plant preemergence (PES), were evaluated for control of purple nutsedge and barnyardgrass. PES treatments were applied on June 16, 1986; no weeds were present. Postemergence treatments were applied on June 30, 1986, when corn was 4 to 6 inches tall; at this time, purple nutsedge populations were moderate to heavy. Barnyardgrass emerged after the postemergence applications. A CO_2 backpack sprayer delivering 20 gpa was used at both times. Plots were 6 by 30 feet, replicated 4 times.

All herbicide treatments suppressed purple nutsedge, but none gave greater than 75% control. All treatments gave fair to good control (70% to 88%) of barnyardgrass, with the exception of SC 5676/R-25788 (2.0 lb/A) and SC 0051 + Tween 20 (0.5 lb/A + 0.5%). Adding Tween 20 to SC-0051 did not appear to enhance control. Weed populations and weed control ratings both varied significantly between replications. No crop injury was observed. (University of California Cooperative Extension, Visalia, CA 93291; Davis, CA 95616)

Postemergence control of purple nutsedge and barnyardgrass in field corn

Treatment	Rate (lb ai/A)	Timing	Percent control: Purple nutsedge 7/16	Purple nutsedge 9/5	Barnyardgrass 9/5
SC-0051	2.0	PES	70	53	70
SC-0774	1.0	PES	30	75	88
SC-5676/R-25788	2.0	PES	73	38	53
SC-0051	0.25	Post	38	53	73
SC-0051	0.5	Post	45	40	73
SC-0051	1.0	Post	68	55	83
SC-0051 + Tween 20	0.25+0.5%	Post	20	53	83
SC-0051 + Tween 20	0.50+0.5%	Post	45	48	58
Dicamba + pendimethalin	0.75 + 1.0	Post	10	40	85
Check	-	-	0	0	0

Postemergence weed control in field corn. Wright, S.D., and L.W. Mitich. Several herbicides were applied over the top of 4- to 7-inch tall corn on April 18, 1986. Plots were two 38-inch rows 25 ft long, and were replicated 4 times. Herbicides were applied using a CO_2 backpack sprayer with 8002 nozzles at 27 psi delivering 27 gpa. Weeds present included purple nutsedge, johnsongrass, black nightshade, common lambsquarters, and sparse barnyardgrass. Air temperature at application was 60 F. 'Pioneer 3183' corn was seeded at 32,000 plants per acre. The field was irrigated and cultivated twice prior to the first evaluation; furrows were cleared prior to the final evaluation.

Purple nutsedge gave the greatest competition throughout the duration of the experiment, and was uniformly distributed; SC-0051 at 1.0 lb/A provided 100% control of this weed.

All herbicide treatments gave good control of black nightshade and common lambsquarters. Barnyardgrass was not uniformly distributed in the experimental field; rhizomatous johnsongrass was heavy in some areas but was not evenly distributed. Barnyardgrass and johnsongrass were chiefly controlled by cultivations.

SC-0774 was very phytotoxic to corn for about 30 days following application. Affected plants turned yellow to white and were severely stunted. By May 22 only the lower leaves were chlorotic or bleached; the rest of the plant looked normal. SC-0051 at 1.0 lb/A produced slight to moderate injury; however, it did not adversely affect corn growth. (University of California Cooperative Extension, Visalia, CA 93291; Davis, CA 95616)

Weed control in field corn with postemergence herbicide applications

Treatment	Rate (lb ai/A)	Purple nutsedge 5/14	Purple nutsedge 5/20	Broadleaves[1] 5/14	Broadleaves[1] 5/20	Barnyardgrass 5/14	Barnyardgrass 5/22	Johnsongrass 5/22	Crop phytotoxicity 5/14	Crop phytotoxicity 5/22
2,4-D	0.5	13	38	57	88	43	100	25	0	0
Dicamba	0.5	23	50	80	93	70	100	38	0	0
Dicamba + pendimethalin	0.5+1.0	18	0	68	100	63	100	50	0	0
Dicamba + cyanazine	0.5+1.5	30	50	60	100	60	100	75	0	0
Cyanazine	1.5	15	50	57	88	43	100	63	0	0
Bromoxynil	0.5	20	40	70	100	53	100	50	0	0
SC-0051	0.25	37	68	76	88	77	100	100	0	0
SC-0051	0.5	35	60	70	100	70	100	100	0	0
SC-0051	1.0	30	100	70	100	70	100	75	30	20
SC-0774	1.0	23	75	47	100	47	100	75	60	30
Check	---	0	25	33	50	67	100	100	0	0

[1]Broadleaves include black nightshade and common lambsquarters.
Evaluations were visual estimates taken 26, 30, and 32 days after application.

Wild proso millet control in corn. Miller, S.D. Research plots were established at Cassa, WY to evaluate the efficacy of preplant incorporated, preplant incorporated/preemergence or preplant incorporated/postemergence herbicide treatments for wild proso millet control in corn. Plots were established under furrow irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 40 psi. Preplant herbicides were applied May 12 (air temp. 62 F, relative humidity 54%, wind NW 3 mph, sky cloudy and soil temp. - 0 inch 62 F, 2 inch 62 F and 4 inch 64 F) and incorporated twice with a roller harrow operating at 2.5 to 3 inch immediately after application. Corn (var. Pioneer 3247) was planted in a silt loam soil (52% sand, 34% silt and 14% clay) with 2.1% organic matter and a 7.7 pH May 18 and preemergence treatments applied May 20 (air temp. 76 F, relative humidity 28%, wind SE 6 mph, sky partly cloudy and soil temp. - 0 inch 78 F, 2 inch 74 F and 4 inch 69 F). Postemergence treatments were applied to 1 inch wild proso millet and 2-leaf corn June 13, 1986 (air temp. 72 F, relative humidity 57%, wind SE 6 mph, sky cloudy and soil temp. - 0 inch 84 F, 2 inch 74 F and 4 inch 70 F). Visual crop injury ratings were made June 23, visual weed control ratings June 23, July 17 and August 22 and plots harvested August 26, 1986. Wild proso millet (PANMI) infestations were heavy (>50 plants/linear ft. row) and uniform throughout the experimental area.

No corn injury or stand reduction was observed with any treatment. Silage yields related closely to wild proso millet control and yields were 2.8 to 8.7 T/A higher in herbicide treated areas compared to untreated plots. Season long control of wild proso millet was 80% or greater with preplant incorporated applications of EPTC plus dichlormid or cyloate plus dichlormid followed by complementary preemergence applications of pendimethalin alone or with cyanazine and complementary postemergence applications of cyanazine with tridiphane and/or pendimethalin. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1404.)

Wild proso millet control in corn

Treatment[1]	Rate lb ai/A	Corn[2] injury %	std red %	silage T/A	PANMI control[3] June %	July %	August %
Preplant incorporated							
cycloate + dichlormid (PM)	4.0	0	0	16.1	78	68	25
cycloate + dichlormid (PM)	6.0	0	0	17.0	85	77	45
EPTC + dichlormid (PM)	4.0	0	0	15.3	40	28	17
EPTC + dichlormid (PM)	6.0	0	0	16.4	63	43	27
Preplant incorporate/preemergence							
metolachlor/metolachlor	1.5/1.5	0	0	15.4	70	63	35
metolachlor/metolachlor	2.0/1.5	0	0	16.6	82	73	62
metolachlor/metolachlor	2.0/2.0	0	0	16.6	88	83	63
metolachlor/metolachlor + atrazine (PM)	1.5/1.5 + 1.2	0	0	15.8	70	63	36
metolachlor/metolachlor + atrazine (PM)	2.0/1.5 + 1.2	0	0	16.2	77	70	60
metolachlor + atrazine (PM) /metolachlor	1.5 + 1.2 /1.5	0	0	17.1	77	70	33
EPTC + dichlormid (PM)/cyanazine	4.0/1.5	0	0	20.9	87	84	72
EPTC + dichlormid (PM)/pendimethalin	4.0/1.5	0	0	20.7	90	93	80
EPTC + dichlormid (PM)/cyanazine + pendimethalin	4.0/1.5 + 1.5	0	0	20.3	90	95	85
cycloate + dichlormid (PM)/cyanazine	4.0/1.5	0	0	21.2	93	94	79
cycloate + dichloramid (PM) /pendimethalin	4.0 /1.5	0	0	20.3	92	98	90
cycloate + dichlormid (PM) /cyanazine + pendimethalin	4.0 /1.5 + 1.5	0	0	20.7	92	98	92
Preplant incorporated/postemergence							
EPTC + dichlormid (PM)/cyanazine	4.0/1.0	0	0	19.4	70	75	72
EPTC + dichlormid (PM) /cyanazine + tridiphane	4.0 /1.0 + 0.5	0	0	21.1	92	94	87
EPTC + dichlormid (PM) /cyanazine + pendimethalin	4.0 /1.0 + 1.5	0	0	20.9	85	92	90
EPTC + dichlormid (PM)/cyanazine + pendimethalin + tridiphane	4.0/1.0 + 1.5 + 0.5	0	0	21.2	90	96	88
weedy check	-----------	0	0	12.5	0	0	0

[1] Preplant incorporated treatments applied May 12, preemergence treatments May 20 and postemergence treatments June 13, 1986; PM = package mix

[2] Corn injury and stand reduction visually evaluated June 23 and plots harvested August 26, 1986

[3] Weed control visually evaluated June 23, July 17 and August 22, 1986

The effect of additives on the activity of sethoxydim. A. F. Lourens and A. H. Lange. Young newly emerged corn is quite sensitive to sethoxydim. However, once the base of the stock approaches maturity the corn becomes quite tolerant of directed sprays as long as the older leaves are not sprayed. In order to learn more about the tolerance of older corn plants a 90 day old field planting of Northrup King field corn was cut off at a height of 3 feet which left a number of older green and brown leaves and the unprotected corn stock about one inch in diameter. The planting was divided up into single row, 20-foot long plots and sprayed July 12, 1986 over the top. One 8004 low pressure at 15 pounds per square inch delivering 21 gallons per acre was used. The air temperature was 100°F. The regrowth from the center of the stock was evaluated on July 26, 1986.

The apparent uptake and translocation of sethoxydim was evaluated on the basis of the reduced vigor in the regrowth occuring from the center of the corn stock. This regrowth was somewhat rate dependent, the higher herbicide rates having the least regrowth. The addition of X-77 did not enhance activity, whereas the addition of nonphyto oil plus surfactant (Agridex) demonstrated the increased effect, i.e., reduced regrowth. The largest effect from sethoxydim on the growth of mature corn required 1/4 pound per acre plus Agridex sprayed over the top.

Fluazifop as a comparison at 1/8 pound per acre was much more active than sethoxydim on corn as measured in this test.

This field test of apparent uptake and translocation in corn was very effective in demonstrating differences in surfactants. It could be used for comparing different surfactants and oil concentrate combinations. The corn regrowth appeared to be a possible quantitative method of measuring activity.

In view of the response of corn to foliar application of sethoxydim on mature leaves care must be exercised when using this herbicide for postemergence grass control in corn. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of adjuvants on the activity of sethoxydim on corn.

		Average[1/]	
Herbicides	Lb/A	Corn Phyto	New growth Vigor
Sethoxydim	1/16	3.0	6.0
Sethoxydim	1/8	4.0	4.0
Sethoxydim	1/4	4.0	4.2
Sethoxydim	1/2	3.5	4.8
Sethoxydim+X-77 @ 1%	1/16	2.2	6.2
Sethoxydim+X-77 @ 1%	1/8	3.0	5.8
Sethoxydim+X-77 @ 1%	1/4	2.5	5.5
Sethoxydim+Agridex @ 1%	1/16	2.7	7.8
Sethoxydim+Agridex @ 1%	1/8	3.0	5.0
Sethoxydim+Agridex @ 1%	1/4	3.8	2.5
Fluazifop	1/8	4.5	1.5
Check	-	2.2	7.5
Check	-	2.5	7.5

1/ Average of four replications where 0 = no phyto symptoms or no new growth and 10 = most vigorous regrowth or high phyto. Evaluated 7/26/86.

Evaluation of SC-0051 and SC-0098 for postemergence weed control in sweet corn. Kidder, D.W. The herbicides SC-0051 and SC-0098 were tested at the Kimberly Research and Extension Center for their effectiveness in controlling redroot pigweed, common lambsquarters and hairy nightshade in sweet corn. Eleven treatments, including the control, were applied in a randomized complete block design with four replications. Corn (Green Giant code 40) was planted on May 31, 1986 and had 3 to 5 leaves at the time of application. Seeding rate was 22,000 plants/A on 22 inch row spacing. Broadleaf weeds were 1 to 2 inches tall at the time of application.

Herbicides were applied on June 23 using a CO_2 backpack sprayer with 8002 nozzles at a rate of 20 gallons per acre and a pressure of 30 psi. Each plot was 10 feet wide by 30 feet long and only the three center rows were treated. The soil type was Portneuf silt loam with 1.5% organic matter and a pH of 8. Furrow irrigation was applied as needed. Visual evaluations of percent weed control and crop injury were made on June 27 and July 7.

SC-0098 provided excellent control of common lambsquarters and redroot pigweed, and fair control of hairy nightshade at the 0.06 and 0.12 lb ai/A rates. At the 0.03 rate, control was reduced on all three species. The addition of a crop oil concentrate improved the effectiveness of SC-0098 at the 0.03 lb ai/A rate on common lambsquarters and redroot pigweed. Excellent control of common lambsquarters was obtained with SC-0051 at the 0.50 lb ai/A rate but 1.00 lb ai/A was necessary for equivalent control of redroot pigweed. An increase in nightshade control was observed by increasing the rate of SC-0051 from 0.50 lb to 1.00 lb ai/A. Atrazine results were excellent on common lambsquarters, fair on redroot pigweed and poor on hairy nightshade.

Early corn injury was observed on the SC-0098 treatments and was increased by the addition of a crop oil concentrate; however, corn injury recovery was nearly complete by the second evaluation date. (Univ. of Idaho Cooperative Extension Service, Twin Falls, ID 83301)

SC-0051 and SC-0098 for postemergence weed control in sweet corn

Treatment[1]	Rate	June 27 Crop response Inj.	June 27 Crop response Std. Red.	June 27 Control Cheal[2]	June 27 Control Amare[2]	June 27 Control Solsa[2]	July 14 Crop response Inj.	July 14 Control Cheal	July 14 Control Amare	July 14 Control Solsa
	(lb/A)	(%)								
Check		0	0	0	0	0	0	0	0	0
SC-0098	0.03	4	0	63	56	24	0	38	38	8
SC-0098	0.06	11	1	94	98	60	2	93	95	43
SC-0098	0.12	9	0	99	100	79	4	99	96	40
SC-0098 + COC[3]	0.03 + .25 pt/A	20	4	97	100	76	3	79	81	20
SC-0098 + COC	0.06 + .25 pt/A	24	5	99	100	86	4	97	98	55
2,4-D	0.5	0	0	-	-	-	1	91	85	74
SC-0051 + Surf.[4]	0.25 + .5% v/v	0	0	-	-	-	0	50	54	10
SC-0051 + Surf.	0.5 + .5% v/v	0	0	-	-	-	1	98	61	26
SC-0051 + Surf.	1.0 + .5% v/v	0	0	-	-	-	3	100	97	82
Atrazine + COC	1.0 + 1% v/v	0	0	96	82	45	0	98	77	38
LSD (0.05)		4	2	9	12	14	2	19	23	25

[1] Applied June 23 when corn was in the 3 to 5 leaf stage (4 to 8 inches tall) and broadleaf weeds were 1 to 2 inches tall.

[2] Amare = redroot pigweed
Cheal = common lambsquarters
Solsa = hairy nightshade

[3] Crop oil concentrate (Atplus 411F)

[4] Surfactant (Tween 20)

Factors affecting the response of cotton to preplant applications of EPTC and butylate. Chernicky, J.P., E.S. Heathman, K.C. Hamilton, and B.B. Barstow. The thiocarbamate herbicides are not used by Arizona cotton growers because of marginal crop safety, and short residual under irrigated conditions. However since cotton acreage infested with purple nutsedge is increasing, growers are willing to risk some crop injury, if early season competition from purple nutsedge (Cyperus rotundus) can be eliminated. Research was conducted in 1986 to identify production practices that might influence weed control and crop selectivity achieved with the Eptc and butylate. Three field trials were conducted at Maricopa, Az. to measure the response of cotton (Gossypium hirsutum), palmer's amaranth (Amaranthus palmeri), and wright groundcherry (Physalis wrightii) to butylate and EPTC. In test 1 butylate was applied at 2.24 and 3.36 kg/ha and Eptc was applied at 1.12 kg/ha. These thiocarbamates were applied three different ways to determine if method of application affected their performance. Preplant applications (PPI) were made on flat ground on March 8 and incorporated to a depth of 5 and 10 cm. Preharrow (PH) applications were applied over peaked beds (100 cm apart) and shallowly incorporated with a bed mulcher on March 23. Eptc and butylate were compared against trifluralin/prometryn (PPI 0.84 + 1.8 kg/ha). Data collected are reported in table 1.

Tests 2 and 3 were conducted to determine if butylate activity is affected by tank-mixing it with other cotton herbicides (see treatments in table 2). Test 2 was applied PPI and incorporated to a depth of 10 cm. Test 3 had essentially the same treatments as test 2 but applications were made PH not PPI. In all tests, each plot was 4.0 M wide and 12.1 M long and replicated four times in a randomized complete block design. Herbicides were applied by a tractor mounted sprayer at 187 L/ha.

Crop response was measured by obtaining cotton stand per 3 M of row (May 5, 27) and yield of seedcotton. Comparing methods of application in test 1, preharrow applications of butylate and Eptc did not reduce cotton stand and adequately controlled weeds which is reflected in seedcotton yields (table 1). In contrast, severe stand reductions and poor weed control resulted when these same treatments were PPI (table 1). On average, reduction of stand was 32% greater when butylate treatments were incorporated 10 cm compared to 5 cm.

In tests 2 and 3, butylate combinations applied PPI provided greater weed control than butylate alone (PPI) but stand reductions were so severe that the PPI test was not harvested. Like test 1, no reduction in cotton stand and excellent weed control was obtained with butylate combinations applied PH (see table 2). (University of Arizona Plant Science Department, Tucson, AZ 85721)

Table 1. Cotton and weed reponse to Eptc and butylate applied preplant and incorporated at 5 cm and 10 cm (PPI) compared to a preharrow (PH) application.

Herbicide	Rate	Method of application	Stand		Weed control		Seed cotton
			5/5	5/27	Pa	Gc	
	(kg/ha)		(plts per 3 M)		----%-----		(kg/ha)
butylate	2.24	PPI (5 cm)	47	29	60	99	3700
butylate	2.24	PPI (10 cm)	44	15	50	95	1940
butylate	2.24	PH	52	52	97	99	5330
butylate	3.36	PPI (5 cm)	37	19	70	97	3470
butylate	3.36	PPI (10 cm)	46	6	40	94	1370
butylate	3.36	PH	53	51	96	98	5300
Eptc	1.12	PPI (5 cm)	49	40	90	98	3670
Eptc	1.12	PPI (10 cm)	44	38	20	97	2260
Eptc	1.12	PH	63	65	87	99	4740
trifluralin prometryn	0.84 1.80	PPI (10 cm)	59	58	99	94	5530
LSD (p=0.05)			(7)	(9)	(25)	(6)	(1420)

Table 2. Cotton and weed reponse to Eptc and butylate combinations applied preplant (PPI) and preharrow (PH).

Herbicide	Rate	Stand May 5 PPI	Stand May 5 PH	Stand May 27 PPI	Stand May 27 PH	Weed control PA 1/ PPI	Weed control PA 1/ PH	Weed control GC 2/ PPI	Weed control GC 2/ PH	Seed cotton PH
	(kg/ha)	(plants/ 3 M)				---------%---------				(kg/ha)
trifluralin prometryn	0.84 1.8	57	54	56	48	99	99	99	99	5280
EPTC prometryn	2.24 1.8	9	55	1	54	15	99	97	99	4840
butylate trifluralin prometryn	2.24 0.84 1.8	49	58	22	57	96	99	98	99	4890
butylate trifluralin prometryn	3.36 0.84 1.8	44	59	11	55	95	99	94	99	5020
butylate	2.24	37	53	23	54	62	80	98	99	4510
butylate	3.36	35	55	6	51	32	99	91	99	4830
butylate prometryn	2.24 1.8	43	58	17	49	24	99	70	99	4860
butylate prometryn	3.36 1.8	36	52	11	51	53	99	98	99	4840
butylate trifluralin	2.24 0.84	36	57	20	57	98	99	95	99	4860
butylate trifluralin	3.34 0.84	17	59	4	57	96	99	97	99	4800
LSD (P=0.05)		(8)	(5)	(7)	(5)	(30)	(10)	(21)	(1)	(470)

1/ PA= palmer's amaranth, 2/ GC= wright groundcherry

The evaluation of postemergence selective grass herbicides for the control of bermudagrass in cotton. Vargas, Ron. A stand of GC-510 variety cotton infested with bermudagrass was divided into plots 13.3 by 20 ft. and replicated four times in a randomized complete block design. The bermudagrass was slightly stressed for water and had stolons 10 to 28 inches long at the time of application. The herbicides were applied on June 16, 1986 and again on July 17, 1986 with 1qt/A of a crop oil concentrate in 20 gallons of water per acre.

An evaluation on July 11, 1986 after the initial application indicated acceptable control with all herbicides except MON-0139. All treatments were exhibiting a small amount of new growth. An evaluation on August 6, 1986, after two applications, again indicated acceptable control with all herbicides except MON-0139. Boll counts on September 30, 1986 indicated a significant reduction with the MON-0139 treatment. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Control of bermudagrass in cotton
with postemergence selective grass herbicides

Treatments	#ai/A 6/16 + 7/17	Percent bermudagrass* control 7/11/86	8/6/86	Bolls/1/1000A* 9/30/86
sethoxydim	.5 + .5	90	83	122
fluazifop-P-dibutyl	.5 + .5	80	96	157
cycloxydim	.2 + .2	86	80	209
cycloxydim	.4 + .4	90	90	152
RE-45601	.2 + .2	90	80	161
RE-45601	.4 + .4	76	80	156
DPX-Y6202	.25 + .25	80	73	137
DPX-Y6202	.5 + .5	83	86	165
MON-0139	.5 + .5	30	26	105
MON-0139	1.0 + 1.0	50	46	96
check	-	0	0	124

*Average of four replications

Cyanazine combinations preplant for broadleaf weed control in cotton. Chernicky, J.P., E.S. Heathman, K.C. Hamilton and B. Barstow. Two field trials were conducted at Maricopa, Az. in 1986 on a sandy clay loam soil to evaluate preplant combinations of cyanazine as an alternative to prometryn for controlling broadleaf weeds in cotton (Gossypium hirsutum). Herbicides were applied to plots 4.0 M wide by 12.1 M long. Each treatment was replicated four times in a randomized complete block design. Treatments were applied by a tractor mounted sprayer with an output of 187 L/ha that was maintained by 276 KPa of pressure. In test C1 herbicides were applied to flat ground (March 8) and disked to a depth of 10 cm (PPI). On March 23, herbicides were applied over-the-top of peaked beds (100 cm apart) and shallowly incorporated (5 cm) with a bed mulcher (PH). In both tests four rates of butylate (0.56, 1.12, 2.2, 3.3 kg/ha) were tank-mixed with 0.84 kg/ha of pendimethalin but only the 1.12 kg/ha rate was included with trifluralin (0.84 kg/ha) and cinmethylin (0.56 kg/ha). Butylate combinations were compared to a pendimethalin/prometryn combination (see table).

Parameters measured included: cotton stand per 3 M of row, (May 27), crop injury, percent control of palmer's amaranth, (Amaranthus palmeri) wright groundcherry (Physalis wrightii) and seedcotton yield. Of the herbicide combinations applied PPI, only cyanazine/cinmethylin (1.12 kg/ha + 0.56 kg/ha) and cyanazine/pendimethalin (3.3 kg/ha + 0.84 kg/ha) reduced cotton stand and caused significant crop injury. Crop injury was most noticeable after the first postemergence irrigation and diminished as the season progressed. All treatments with the exception of cyanazine/cinmethylin provided greater than 85% broadleaf weed control which was reflected in yield of seedcotton. (University of Arizona, Plant Science Depart. Tucson, AZ 85721)

Response of cotton and broadleaf weeds to cyanazine combinations applied preplant-(PPI) and preharrow (PH)

Herbicide	Rate	Cotton stand May 27 PPI	Cotton stand May 27 PH	1/ Weed control August 12 PPI Pa	1/ Weed control August 12 PPI GC	1/ Weed control August 12 PH Pa	1/ Weed control August 12 PH GC	2/ Crop injury June 13 PPI	2/ Crop injury June 13 PH	Seed cotton PPI	Seed cotton PH
	(kg/ha)	p/3M		--------%-------						(kg/ha)	
cyanazine pendimethalin	0.56 0.84	68	57	99	98	93	99	0	0	5520	4820
cyanazine pendimethalin	1.12 0.84	53	61	99	94	85	98	0	0	5360	4730
cyanazine pendimehtalin	2.24 0.84	63	58	99	97	97	99	0	2	5360	4960
cyanazine pendimehtalin	3.34 0.84	40	55	99	99	97	97	1	5	5350	4470
prometryn pendimethalin	1.80 0.84	54	56	99	95	96	99	0	0	5320	4880
cyanazine cinmethylin	1.12 0.56	23	58	40	5	91	92	6	0	4400	4590
cyanazine trifluralin	1.12 0.84	56	57	99	99	97	97	0	1	5340	4970
weedy check	0.0	56	--	--	0	--	0	-	0	----	2220
LSD (p=0.05)		(7)	(8)	(14)	(6)	(12)	(13)	(1)	(1)	(680)	(810)

1/
Weed control 0%= no control 100%= complete control
Gc= wright groundcherry
Pa= Palmer's amaranth

2/
Crop injury 0=no injury 10=severe injury

The evaluation of glyphosate, paraquat and oxyfluorfen for the control of winter annual broadleaves on cotton fallow beds. Vargas, Ron. Cotton fallow beds infested with both black mustard (*Brassica nigra*) and redstem filaree (*Erodium cicutarium*) were divided into 12.6 (4 row) by 20 ft. plots and replicated four times in a randomized complete block design. The herbicides were applied on February 4, 1986 with a CO_2 plot sprayer at 30 PSI in 20 GPA. All treatments contained .5% by volume a non-ionic surfactant. At the time of application the mustard was in the seedling to flowering stage and the filaree at 6 inch rosette to flowering.

An evaluation on February 20, 1986, 16 DAT indicated effective control of mustard with the paraquat, oxyfluorfen combinations. The glyphosate plus oxyfluorfen was giving poorer control of mustard as was the glyphosate by itself. Glyphosate was giving poor control of filaree by itself, but excellent control with oxyfluorfen when at the higher rates. Oxyfluorfen by itself and in combination with paraquat was also giving excellent control of filaree. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Winter annual weed control on cotton fallow beds

Treatment	#ai/A	Percent control - February 20, 1986*	
		Brassica	Erodium
paraquat	.5	70	77
glyphosate	.5	42	35
oxyfluorfen	.5	75	95
glyphosate + oxyfluorfen	.5 + .031	55	82
glyphosate + oxyfluorfen	.5 + .062	55	92
glyphosate + oxyfluorfen	.5 + .125	70	97
glyphosate + oxyfluorfen	.5 + .25	77	100
paraquat + oxyfluorfen	.5 + .125	90	97
paraquat + oxyfluorfen	.5 + .25	90	100

*Average of four replications

The effect of initial irrigation on the activity of two preemergence herbicides. Lange, A. H. and K. F. Lange. The effectiveness of most preemergence herbicdies is dependent on the amount of water for incorporation and the time interval of irrigation or rainfall after herbicide application. Movement of herbicides into the first inch usually gives satisfactory annual weed control. If the crop germinates below the incorporated herbicide or its roots are able to grow below the treated inch selectivity will usually results. Both alachlor and fluometuron are relatively insoluble.

The objective of this study was to determine the effects of different amounts of initial sprinkler irrigation on the activity of alachlor and fluometuron in a sandy loam soil.

On May 11, 1986 freshly prepared 30 inch beds were seeded to Acala SJ-2 cotton and a midwestern variety of soybean. The soil was a Hanford fine sandy loam with 0.75% organic matter, 74% sand, 21% silt and 5% clay. The pH was 6.9. A natural stand of pigweed, crabgrass, lovegrass, and witchgrass was present. The herbicides were applied in 100 gallons of water per acre on May 17 through May 21, 1986. As each two sets of plots were sprayed, they were sprinkler irrigated with a specially designed "rain-simulator" at 1/4, 3/4 or 2-1/4 acre inch. The exact amount of water for each treatment was calculated and applied from a portable graduated steel tank. In addition, small rain gauges were randomly placed in the plots as a double check on the amount of water for incorporation. The experimental design was a split plot with the amounts of water being the main plots and the herbicides being the sub-plots. The air temperature ranged from 82 to 95°F and the soil temperature was 20°C at 7 a.m. and 28°C at 2 p.m.

In order to ensure a good stand and good crop growth drip tape down the seed line (center) of each bed was utilized. Water was supplied about fifteen minutes per day increasing to one hour per day as the crop needed it and summer temperatures increased.

Phytotoxicity was read on June 2, 1986 and weed control on June 5 and July 4, 1986. Crop vigor was rated June 12 and July 4, 1986.

The control of pigweed and crabgrass appeared to be best with alachlor and not affected initially by the amount of water and fluometuron gave less control of pigweed and crabgrass. Fluometuron appeared to be most active on pigweed with 1/4 to 3/4 acre inch of water. The loss of control at 2-1/4 acre inch was consistent with pigweed control but the opposite seemed true with crabgrass.

At the later ratings alachlor appeared to give better crabgrass control with increasing amounts of water.

The picture with the deeper planted cotton and soybeans indicated greater depth of herbicide movement with more water up to 2-1/4 acre inch. This was emphasized with the higher amounts of water with fluometuron. Alachlor did not appear to be as toxic on soybean as fluometuron but quite phytotoxic to cotton. On the cotton alachlor showed more response from the initial amount of water for incorporation.

By two months both cotton and soybeans had recovered at the lower amounts of water, but the 2-1/4 inches continued to illustrate the decreased selectivity with increasing amounts of water, i.e., alachlor on cotton and fluometuron on soybeans. The results in this experiment emphasize the change in selectivity that can occur with changes in the initial irrigation.

The degree of weed control influenced the final vigor ratings and undoubtedly masked some of the early differences due to the irrigation levels. The poorer crop growth in the check was due to better weed growth, i.e., weed competition or the greater compaction at the high amount of initial irrigation. Some of these differences can be separated out as one check was hand weeded once whereas the other check was left weedy. (Herbicide Research Institute, 9400 S. Lac Jac, Reedley, CA 93654.)

The effect of initial irrigation on the activity of two preemergence herbicides.

		Average Weed Control[1/]					
			Pigweed			Crabgrass	
Herbicides[2/]	Lb/A	1/4	3/4	2-1/4	1/4	3/4	2-1/4
		-----	inches	-----	-----	inches	-----
Alachlor	1	9.8	9.8	9.0	6.5	6.8	9.0
Alachlor	2	9.8	9.8	9.2	6.5	8.2	9.3
Fluometuron	1/2	7.8	8.2	5.5	4.5	2.8	4.5
Fluometuron	1	9.5	9.2	4.0	4.5	6.2	6.2
Check[3/]	-	8.3	9.1	8.0	7.6	7.5	7.0
Check	-	5.5	1.5	4.2	1.5	2.5	1.8

Rated July 4, 1986

		Average Vigor[4/]					
			Cotton			Soybeans	
Herbicides	Lb/A	1/4	3/4	2-1/4	1/4	3/4	2-1/4
		-----	inches	-----	-----	inches	-----
Alachlor	1	6.2	3.2	4.2	7.5	10.0	9.0
Alachlor	2	7.2	4.0	4.2	9.2	9.2	8.2
Fluometuron	1/2	7.0	6.5	5.5	8.8	7.8	4.2
Fluometuron	1	10.0	8.8	4.0	8.5	5.0	0.2
Check[3/]	-	8.0	8.0	6.5	8.2	9.8	8.0
Check	-	9.0	7.5	7.2	9.8	7.8	8.8

Rated June 12, 1986

Alachlor	1	8.8	5.2	4.8	9.0	9.2	8.8
Alachlor	2	8.5	6.0	4.8	9.8	10.0	9.5
Fluometuron	1/2	6.8	8.2	7.0	9.2	9.0	6.0
Fluometuron	1	7.5	9.8	7.0	8.0	7.2	1.8
Check[3/]	-	7.8	8.5	7.2	8.3	9.2	7.8
Check	-	9.0	6.8	6.8	9.2	8.2	7.8

Rated July 4, 1986

1/ Average where 0 = no effect and 10 = complete weed kill.

2/ Herbicide applied May 17 to May 19, 1986.

3/ Hand weeded check.

4/ Average of 4 replications where 0 = no growth and 10 = most vigorous growth.

Evaluation of preemergence herbicides for control of winter annual weeds in "Minnesota Ultra" lupines. Mitich, L.W., K. G. Cassman, K.J. Larson, N.L. Smith. In this trial, seven herbicides, applied in varied rates and combinations, were tested for their efficacy in controlling annual bluegrass, wild mustard, minerslettuce, shepherdspurse, and common chickweed. The lupines were planted October 24, 1985, on the UC Davis Experimental Farm, and the trial was evaluated on February 25, 1986. The herbicides were applied on October 28, 1985, prior to crop emergence.

The experiment was conducted in Yolo clay loam in a randomized complete block design with four replications. The plots measured 10 ft by 20 ft and were furrow irrigated. Herbicides were applied with a CO_2 backpack sprayer at 30 psi with a spray volume of 20 GPA and size 8002 nozzles.

Terbutryn gave excellent control (90% to 100%) of all weeds without crop injury. Prometryn likewise provided very good control of the entire spectrum of weeds. Metolachlor (4 lb/A) and the metolachlor + pendimethalin combination (2 + 0.75 lb/A) gave very good control (90% to 98%) of annual bluegrass, minerslettuce, shepherdspurse, and common chickweed, but control of wild mustard was weak. Pendimethalin (1.5 lb/A) performed well (85% to 100%) on wild mustard, minerslettuce, shepherdspurse, and common chickweed with a minor amount of phytotoxicity, but gave only moderate control of annual bluegrass. Metribuzin (both rates) provided good control (85% to 100%) of wild mustard, minerslettuce, shepherdspurse, and common chickweed, but the high rate produced high crop phytotoxicity (79%) and a corresponding loss of yield. Trifluralin and linuron (1 lb/A) provided only moderate weed control (30% to 75%) and linuron (2 lb/A) gave good control of wild mustard, shepherdspurse, and common chickweed. (University of California Cooperative Extension, Davis 95616.)

Control of Winter Annual Weeds in 'Minnesota Ultra' Lupines
with Preemergence Herbicides at the UC Davis Experimental Farm

Herbicide	Rate (lb/A)	Phyto-toxicity[1] (%)	% Weed control[1] Annual bluegrass	Wild mustard	Miners-lettuce	Shepherds-purse	Chick-weed	Yield[2] (lb/A)
Metolachlor	2.0	0	80	10	63	68	48	4214 AB
Metolachlor	4.0	0	95	40	75	93	95	4071 AB
Pendimethalin	0.75	0	45	25	68	73	73	3996 AB
Pendimethalin	1.5	3	68	100	100	85	98	3950 AB
Metolachlor + Pendimethalin	2.0+ 0.75	3	91	60	98	95	98	4150 AB
Terbutryn	2.0	0	91	80	99	100	100	3756 AB
Terbutryn	4.0	0	99	100	100	99	100	4071 AB
Metribuzin	0.25	8	75	100	85	88	88	4077 AB
Metribuzin	0.5	79	68	85	98	100	95	2126 C
Trifluralin	1.0	3	65	30	43	35	43	4138 AB
Linuron	1.0	0	43	75	43	58	25	4316 A
Linuron	2.0	0	81	100	85	100	93	4017 AB
Prometryn	2.0	0	90	100	94	98	91	3956 AB
Control	---	0	0	0	0	0	0	3555 B

[1] 100 = crop death or complete weed control; 0 = no crop injury or no weed control.
[2] Yields followed by a common letter are not significantly different at the 5% level according to Duncan's Multiple Range test.
All values average of 4 replications.
Lupines planted October 24, 1985.
Herbicides applied October 28, 1985.
Control and phytotoxicity evaluated February 25, 1986.

Clopyralid timing on meadowfoam. Peek, D.C., A.P. Appleby, and R.L. Spinney. Clopyralid was applied at two rates and six timings between fall and spring (Table 1) to evaluate phytotoxicity to meadowfoam (*Limnanthes alba*), an oilseed crop. The experiment was conducted at the Hyslop Research Farm. Plots were 2.5 m by 7.5 m, arranged in a randomized complete block design with five replications. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha. Visual evaluations of meadowfoam toxicity were made in May, 1986, and seed was harvested in June, 1986.

Clopyralid did not cause visual damage to meadowfoam at any application date (Table 2). Seed yield increased with the 0.28 kg ai/ha treatment in November and was reduced by the 0.28 kg/ha treatment in March. Most common weedy annual composites and legumes have been controlled in other experiments by 0.14 kg/ha or less, so tolerance of meadowfoam to clopyralid appears to be adequate. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Meadowfoam size and clopyralid application date

Application date	Meadowfoam size
Nov. 14, 1985	1-2 leaf
Dec. 22, 1985	4-6 leaf
Jan. 24, 1986	7.5-10 cm diam.
Feb. 28, 1986	10-12.5 cm diam.
Mar. 26, 1986	20 cm diam.
Apr. 23, 1986	35 cm diam., early bud

Table 2. Effect of clopyralid timing on meadowfoam phytotoxicity and seed yield

Application date	clopyralid rate	Meadowfoam injury	Seed yield
	(kg/ha)	(%)	(kg/ha)
Nov. 14, 1985	0.14	0	738
	0.28	0	864
Dec. 22, 1985	0.14	0	795
	0.28	0	767
Jan. 24, 1986	0.14	0	784
	0.28	0	780
Feb. 28, 1986	0.14	0	710
	0.28	0	613
Mar. 26, 1986	0.14	0	611
	0.28	0	531
Apr. 23, 1986	0.14	0	758
	0.28	0	699
Check	0	0	699

$LSD_{.05}$ = 100.9 kg/ha

Postemergence grass control in onions. Cudney, D. W. and S. Orloff. Onions are particularly poor competitors to weeds during their seedling stage. Grassy weeds can invade and completely annihilate an onion field. The most commonly used preemergence herbicde, DCPA, does not provide season-long grass control. A trial was initiated to evaluate the efficacy of post-emergence grass herbicides. The trial was located west of Lancaster in the high desert region of California. The herbicides were applied to plots one bed (40 inches) by 20 feet with a CO_2 pressurized backpack sprayer. A spray volume of 30 gallons per acre was used. The treatments were applied on May 22, when the onions were in the one and one-half leaf stage and the barnyard-grass was in the early-tillering stage with three to four leaves on the main culm. The experimental design was a randomized complete block with four replicates.

No crop injury resulted from any of the herbicide treatments. At the highest and intermediate rates, there was no significant difference among clethodim, DPX-Y6202, and sethoxydim. Haloxyfop methyl and fluazifop-butyl provided good control at the highest rate, but declined as the rate declined. Fluazifop-butyl exhibited a sharper drop in efficacy. (University of California Cooperative Extension, Riverside, CA 92521)

Postemergence grass control in onions.

Treatment*	Rate lbs ai/A	Control Rating 1/ 6/3	6/20	7/2
clethodim	.06	8.6	10.0	10.0
clethodim	.125	9.0	9.9	10.0
clethodim	.25	10.0	10.0	10.0
DPX-Y6202	.06	9.2	9.2	9.1
DPX-Y6202	.125	9.4	9.6	10.0
DPX-Y6202	.25	9.9	10.0	10.0
sethoxydim	.25	8.4	9.8	8.8
sethoxydim	.375	9.0	10.0	9.8
sethoxydim	.50	9.1	10.0	10.0
haloxyfop methyl	.06	7.4	7.1	6.2
haloxyfop methyl	.125	8.4	8.0	8.4
haloxyfop methyl	.25	9.2	9.8	9.8
fluazifop	.25	4.8	4.0	2.8
fluazifop	.375	7.5	7.8	7.9
fluazifop	.50	8.2	8.4	9.2
check		-0-	0.2	0.2
LSD .05		0.8	1.0	1.0

*Surfel crop oil concentrate added to all treatments at .25%
Average of four replications
1/ 0 = No effect
10 = All plants dead

Efficacy of two isomers of DPX-6202 on wild oat and spring peas. Prather, T. S., R. H. Callihan, and D. C. Thill. A field trial using two isomers of DPX-6202 (Y620231 and Y620233) was conducted to evaluate their effects on wild oat (*Avena fatua* L.) density and spring pea (*Pisum sativum* L.) production. Herbicides were applied on June 16, 1986 near Moscow, Idaho in a field seeded to Garfield spring peas. Soil texture was a silt loam. The field received a preemergent application of dinoseb (3 lb ai/A). A CO_2 pressurized backpack sprayer (40 psi with 8002 flat fan nozzles) was used to apply the chemicals. Plot size was 10 by 20 ft in four replications in a randomized complete block design. Visual evaluations of wild oat density were taken on August 14 prior to harvest with a small plot combine equipped with peavine lifters.

Visual evaluations indicated all treatments reduced wild oat density from 87 to 95%. Pea yield data showed that plots treated with Y620231 (0.13 lb ai/A) had a higher yield than those treated with Y620223 (0.13 lb ai/A). Pea yield in the Y620231 (0.13 lb ai/A) treatment was 437 pounds higher than the Y620223 (0.13 lb ai/A) treatment. No treatment resulted in greater yields than the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Efficacy of two isomers of DPX-6202
for the control of wild oats in spring peas

Herbicide	Rate	Density[1] Wild oat	Yield[2] S. pea
	(lb ai/A)	(%)	(lb/A)
Y620231	0.06	11a	1096ab
Y620231	0.13	05a	1495a
Y620223	0.06	05a	1347ab
Y620223	0.13	13a	1058b
Check	----	100b	1177ab

1 Density expressed as percent of check.
2 Yield expressed as pounds of dry peas per acre.
Numbers followed by the same letter are not significantly different at the 0.05 level using Fisher's LSD.

Metribuzin tolerance in chickpeas. Prather, T. S., R. H. Callihan, and D. C. Thill. Phytotoxicity data for postemergent applications of metribuzin to chickpeas (Cicer arietinum L.) were needed for a better understanding of tolerance to metribuzin. Metribuzin was applied on June 5, 1986 and June 16, 1986 to chickpeas (variety Aztec) planted near Moscow, Idaho. Applications were made at 3 mph with a CO_2 pressurized backpack sprayer set at 40 psi, delivering 23 gallons per minute using 8002 flat fan nozzles. The plot size was 10 by 30 ft with four replications in a randomized complete block design. Density, height, and yield were measured on September 15, 1986. Plots were harvested with a small plot combine equipped with peavine lifters.

Metribuzin (0.25 lb ai/A) applied June 6 resulted in taller plants than all dual application treatments. The check was 1.75 inches taller than metribuzin (0.50 lb ai/A dual application. The density of the metribuzin (0.25 lb ai/A) treatment was greater by 1 to 2.25 plants than metribuzin (0.50, 0.75 lb ai/A), and all dual application treatments. No treatment had a greater density than the check. Differences in density and height did not relate well to yield. No treatment resulted in higher yield than the check. The check was higher yielding than metribuzin (0.50 lb ai/A) by 419.08. The conclusion drawn from this experiment is that postemergent treatments of metribuzin, even at light rates (0.13 lb ai/A) will not increase yield of the crop and at moderate and high rates crop injury results. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Height, density, and yield responses of chickpeas to foliar applications of metribuzin

Herbicide	Date	Rate	Height	Density	Yield
		(lb ai/A)	(inches)	(plant/ft^2)	(lb/A)
check	------	----	7.50ab	5.25ab	735.84a
metribuzin	June 6	0.13	7.50ab	5.25ab	700.41ab
metribuzin	June 6	0.25	7.75a	6.25a	541.25ab
metribuzin	June 6	0.38	7.25ab	5.00ab	625.81ab
metribuzin	June 6	0.75	7.00ab	4.25b	604.56ab
metribuzin	June 6	0.50	6.75abc	4.25b	316.76b
metribuzin	June 6	0.25			
	June 16	0.25	6.50bc	4.00b	475.00ab
metribuzin	June 6	0.38			
	June 16	0.38	6.5bc	5.00b	542.79ab
metrubuzin	June 6	0.50			
	June 16	0.50	5.75c	4.75b	350.89ab

Numbers followed by the same letters are not significantly different at the 0.05 level using Fisher's LSD.

Evaluation of selected herbicides for the control of *Monochoria vaginalis* in water-seeded rice. Hill, J. E., D. E. Bayer, J. Wrysinski, and B. W. Brandon. *Monochoria vaginalis*, a widespread weed in Asian rice culture, is restricted to a small area of rice production in Butte County, California. Eight herbicides were evaluated for the control of this weed with applications made at the 2- to 3-leaf stage or at tillering of rice depending on the herbicide used. Crop injury was apparent with chlorsulfuron, oxyfluorfen, metsulfuron and the high rate of bensulfuron . Excellent control was obtained with dichlorprop and MCPA amine. Chlorsulfuron and metsulfuron also showed good control but crop injury was unacceptable with these herbicides. The highest yields were obtained with bensulfuron, dichlorprop or MPCA amine. Apparently the removal of early season competition by early applications of bensulfuron at the 2 to 3 leaf stage of rice compensated for the better weed control with the phenoxy herbicides applied later. It is also possible that the phenoxy herbicides damaged the crop but this was not obvious. (Department of Agronomy and Range Science and Botany Department, University of California, Davis, CA 95616).

Evaluation of selected herbicides for control of
Monochoria vaginalis in water seeded rice

Treatment	Rate (lb ai/A)	Timing[1/]	Injury[2/] 1/12/85	Monochoria[3/] control 6/12/85	Monochoria[3/] control 7/8/85	Yield (lb/A)
pendimethalin	1.0	2-3 LSR	3.0	3.5	1.0	3040
metsulfuron	0.011	2-3 LSR	6.4	7.6	8.3	1790
chlorsulfuron	0.063	2-3 LSR	8.0	8.4	7.5	560
oxyfluorfen	1.0	2-3 LSR	8.4	3.8	0.8	690
bromoxynil	0.5	2-3 LSR	3.4	3.3	2.3	4260
bensulfuron	0.063	2-3 LSR	3.1	6.6	6.8	6690
bensulfuron	0.125	2-3 LSR	4.3	5.4	6.5	5830
dichlorprop	1.0	tillering	-	-	9.5	6170
MCPA	1.0	tillering	-	-	9.7	5530
untreated	-	-	1.8	2.6	2.8	4570
LSD .05			2.5	N.S.	3.0	1700

[1/] LSR = leaf stage rice (May 29, 1985); tillering. = well tillered (June 20, 1985).

[2/] Subjective rating where 1 = no injury; 10 = all plants dead.

[3/] Subjective rating where 1 = no control; 10 = all plants controlled.

The response of weeds in water-seeded rice to the rate and timing of bensulfuron-methyl. Hill, J. E., J. L. Pacheco, B. W. Brandon, M. J. Holzer and D. E. Bayer.

Bensulfuron-methyl provides broadspectrum control of many broadleaf aquatic weeds and is selective to water-seeded rice in California. Additionally, the herbicide is active on the barnyardgrass spp. However, other herbicides are generally necessary in combination with bensulfuron-methyl to provide adequate control of barnyardgrass. A study of the rate and timing of bensulfuron-methyl was conducted to determine, 1) the interaction of these factors on the efficacy for broadleaf weeds, and 2) the optimum level of barnyardgrass control for targeting this weed in future combinations with more effective grass control herbicides.

Basins of 0.005A were separated by levees to prevent water movement of herbicides between plots and constructed with independent inlets and outlets for regulation of water depth. Bensulfuron-methyl (60 DF) was applied with a constant pressure CO_2 backpack sprayer into the water at either the 2 or 4-leaf stage of rice growth and at rates of 0.5, 1.0, 1.5 and 2.0 oz ai/A. Weed size within species varied widely with none beyond the 5-leaf stage at the time of early treatment nor beyond the 9-leaf stage at the second treatment date.

Rice stands were not affected by bensulfuron-methyl although weed competition in the untreated plots reduced stand from the treated weed-free plots. California arrowhead (SAGMO), smallflower umbrellaplant (CYPDI) and roughseed bulrush (SCPMU) were effectively controlled by bensulfuron-methyl at both early and late treatment timings and at all rates. Bensulfuron-methyl controlled redstem spp. at all rates at the 2-leaf stage of rice but was somewhat less effective at the later timing and lower rates. Ducksalad (HETLI) was the most difficult aquatic broadleaf to control with bensulfuron-methyl. Generally the early timing and higher rates were most effective with 1.5 and 2.0 oz ai/A, the only treatments completely controlling this weed.

Barnyardgrass spp., predominately early watergrass (ECHOR), was partially controlled by bensulfuron-methyl. The response for barnyardgrass control was rate dependent with the best control being 2.0 oz ai/A at the early timing. Control levels at all other rates and timing were not acceptable. However, the partial control of this weed with bensulfuron-methyl indicates that herbicides used to control barnyardgrass spp. in rice may be more effective in combination with a bensulfuron-methyl. (University of California Cooperative Extension, Davis, CA 95616 and 2180 Sand Hill Rd., Menlo Park, CA 94025).

Evaluation of the rate and time of application of bensulfuron-methyl for the control of California rice weeds.

Treatment	Rate (oz ai/A)	Time[1/]	Stand[2]	Rating[3/]						Yield (lb/A)
				Arrow-head	Duck-salad	Roughseed bulrush	Smallflower umbrellaplant	Red-stem	Barnyard-grass	
Untreated	-	-	7.6	2.8	2.0	0	0	1.5	0.5	3260
bensulfuron methyl	0.5	2 LSR	9.5	10	9	10	10	10	4.0	7740
bensulfuron methyl	1.0	2 LSR	9.5	10	10	10	10	10	5.5	8080
bensulfuron methyl	1.5	2 LSR	9.0	10	10	10	10	10	6.8	7650
bensulfuron methyl	2.0	2 LSR	8.8	10	10	10	10	10	8.4	8810
bensulfuron methyl	0.5	4 LSR	9.3	9.9	6.3	10	10	8.3	2.5	6930
bensulfuron methyl	1.0	4 LSR	9.4	10	6.4	10	10	9.8	4.5	8150
bensulfuron methyl	1.5	4 LSR	9.3	10	9.6	10	10	9.3	7.1	8070
bensulfuron methyl	2.0	4 LSR	9.4	10	9.8	10	10	10	6.0	7120
LSD (.05)			1.0	1.3	1.5	0	0	2.1	3.1	1682
CV (%)			7.5	9.3	12.3	0	0	16.6	40.2	15.8

[1/]LSR = leaf stage of rice

[2/]Subjective rating where 1 = no stand; 10 = excellent stand.

[3/]Subjective rating where 1 = no control; 10 = all plants controlled.

FMC-57020 applied preplant to no-till grain sorghum. Stahlman, Phillip W. FMC-57020 alone and plus atrazine was applied to a Crete silty clay loam soil with pH 6.4 and 1.6% organic matter near Hays, KS on March 20, 1986, to evaluate weed control and affect on no-till grain sorghum. Treatments were applied with a tractor-mounted, compressed-air, plot sprayer with 8001 LP flat fan nozzles delivering 12 gpa at 20 psi and 3 mph. Rainfall 2 and 4 weeks after application totaled 0.35 and 1.16 inches, respectively. Control of emerged tansymustard was estimated visually on April 2, then all plots were sprayed with 2,4-D at 1.0 lb/A on April 29, and with paraquat at 0.5 lb/A on May 22. All emerged weeds were killed with the paraquat application. 'DeKalb DK46' grain sorghum, treated commercially with CGA-92194 antidote, was seeded no-till in 36-inch rows with a John Deere 7000 Max Emerge planter on June 9. Crop injury and control of puncturevine and redroot pigweed were estimated on June 25, and 2,4-D at 0.33 lb/A was applied postemergence to all plots on June 26. The experiment was a randomized complete block with three replications, and experimental units were 12 by 30 ft. The two center sorghum rows of each plot were harvested October 30.

No treatment controlled tansymustard satisfactorily, and only treatments containing atrazine at 2 lb/A gave 90% or greater control of puncturevine (Table). Atrazine alone at 2 lb/A and FMC-57020 + atrazine at 0.5 or 0.75 + 1.0 or 2.0 lb/A gave 100% control of redroot pigweed. FMC-57020 alone failed to control puncturevine and redroot pigweed. FMC-57020 + atrazine at 0.75 + 2.0 lb/A injured sorghum slightly, but did not delay sorghum flowering or reduce yield significantly. Crop stands were unaffected by herbicide treatments (data not presented). (Fort Hays Branch, Kansas Agric. Exp. Sta., Hays).

Table. Control of weeds with FMC-57020 alone and plus atrazine or cyanazine and affect on grain sorghum, Hays, KS, 1986. (Stahlman).

		% weed control			Grain sorghum	
Treatments	Rate (lb/A)	Tamu 4-2	Puvi 6-25	Rrpw 6-25	Injury (%)	Yield (Bu/A)
FMC-57020 6E + atrazine 90DF	0.5 + 1	52	77	100	0	64.5
FMC-57020 6E + atrazine 90DF	0.75 + 1	43	77	100	0	64.6
FMC-57020 6E + atrazine 90DF	0.75 + 2	65	90	100	7	59.4
FMC-57020 6E + cyanazine 4L	0.5 + 1	67	50	53	0	51.7
FMC-57020 6E + cyanazine 4L	0.75 + 1	75	53	70	0	53.1
FMC-57020 6E + cyanazine 4L	0.75 + 2	72	53	82	0	60.1
Atrazine 90DF	2	30	92	100	0	64.5
Cyanazine 4L	2	25	47	67	0	52.6
FMC-57020 6E	0.75	72	0	0	0	42.7
Glyphosate/2,4-D amine as needed preplant	0.375/0.67	0	0	0	0	50.1
LSD (0.05)		22	28	25	3	NS

Postemergent SC-0051 alone and plus other herbicides in no-till grain sorghum. Stahlman, Phillip W. 'DeKalb DK46' grain sorghum, treated commercially with CGA-92194 antidote, was seeded no-till with a John Deere 7000 Max Emerge planter on a Crete silty clay loam soil with pH 6.4 and 1.6% organic matter near Hays, KS on June 9, 1986, to evaluate postemergent applications of SC-0051 alone and plus other herbicides. Emerged weeds on the experimental area were controlled with an application of glyphosate/2,4-D amine at 0.375/0.67 lb/A on April 29. Herbicide treatments were applied to 2- to 6-inch tall redroot pigweed and kochia, 1- to 2-inch tall foxtails, and puncturevine that was 2- to 4-inches across on June 17, with a tractor-mounted, compressed-air, plot sprayer with 8001 LP flat fan nozzles delivering 12 gpa at 20 psi and 3 mph. Grain sorghum was 2-inches tall. Rainfall in the 2 weeks after application totaled 2.89 inches. The experiment was a randomized complete block with three replications, and experimental units were 12 by 30 ft. Weed control and sorghum injury were estimated visually 7 and 23 days after application, on June 24 and July 10, respectively. The densities of all weeds were moderate to heavy. The two center rows of each plot were harvested on October 30.

Only the 1 lb/A rate of SC-0051 + surfactant gave adequate or greater control of all weeds in the study (Table). SC-0051 + atrazine + surfactant at 0.5 + 0.5 or 0.75 lb/A + 0.5% v/v gave excellent control of redroot pigweed, kochia, and puncturevine, but only fair control of foxtails. All treatments containing SC-0051 caused moderate to severe bleaching and stunting of the sorghum plants. The degree of injury was greatest at 7 days after application, then lessened, but injury remained unacceptable 3 weeks after application. (Fort Hays Branch, Kansas Agric. Exp. Sta., Hays).

Table. Control of weeds with postemergent herbicide applications and effects on no-till grain sorghum, Hays, KS, 1986. (Stahlman).

		% weed control								Grain sorghum			
	Rate	June 24				July 10				Plants/	% injury		Yield
Treatments[a]	(lb/A)	Rrpw	KOCZ	Puvi	Fxtl	Rrpw	KOCZ	Puvi	Fxtl	$150ft^2$	6-24	7-10	(Bu/A)
SC-0051	0.25	58	47	43	43	47	37	0	10	51	43	23	12.6
SC-0051	0.5	75	70	63	57	50	53	37	27	42	77	40	14.2
SC-0051	1.0	95	85	88	75	87	78	67	40	32	90	70	16.6
SC-0051 + atrazine 4L	0.25 + 0.5	97	92	78	60	92	80	65	27	59	43	27	22.7
SC-0051 + atrazine 4L	0.5 + 0.5	100	98	93	75	98	95	85	53	42	88	72	15.8
SC-0051 + atrazine 4L	0.25 + 0.75	97	92	83	62	97	83	70	30	47	55	37	20.0
SC-0051 + atrazine 4L	0.5 + 0.75	98	97	93	72	92	92	75	50	37	77	47	22.0
SC-0051 + dicamba	0.5 + 0.12	97	93	77	53	95	93	68	17	52	70	37	14.8
SC-0051 + tridiphane	0.5 + 0.75	95	87	65	57	87	83	23	33	50	65	37	13.3
Atrazine + tridiphane	1.0 + 0.75	100	100	87	73	100	100	85	53	58	30	12	30.4
Atrazine 4L	0.5	92	92	57	53	92	87	27	10	52	0	0	11.7
Atrazine 4L	0.75	87	92	60	50	85	93	50	10	64	0	0	19.8
Untreated control	---	--	--	--	--	--	--	--	--	53	--	--	8.5
LSD (0.05)		13	10	15	8	8	19	28	25	12	13	11	9.1

[a]Tween 20 surfactant at 0.5% v/v included in all treatments.

SC-0774 in no-till grain sorghum. Stahlman, Phillip W. A series of herbicide treatments were applied to a Crete silty clay loam soil with pH 6.4 and 1.6% organic matter near Hays, KS on May 19, 1986, to evaluate weed control in no-till grain sorghum. Treatments were applied with a tractor-mounted, compressed-air, plot sprayer with 8001 LP flat fan nozzles delivering 12 gpa at 20 psi and 3 mph. Rainfall totaled 2.0 inches 2 weeks after application. 'DeKalb DK46' grain sorghum, treated commercially with CGA-92194 antidote, was seeded no-till, 1.5-inches deep, in 36-inch rows on June 9, with a John Deere 7000 Max Emerge planter. The two center rows of each plot were harvested on October 30. The experiment was a randomized complete block with three replications, and experimental units were 12 by 30 ft. All treatments controlled 100% of existing weeds. Control of weeds that emerged after herbicide application was estimated visually 36 and 52 days after application, on June 24 and July 10, respectively. The densities of redroot pigweed and puncturevine were heavy and kochia and foxtails were moderate.

SC-0774 alone at rates of 0.75, 1.0, and 1.25 lb/A gave excellent control of kochia and good to excellent control of foxtails, but control of redroot pigweed and puncturevine were unacceptable (Table). Control of redroot pigweed and puncturevine was enhanced by tank mixing atrazine, cyanazine, or propazine with SC-0774. Crop injury from SC-0774 alone was minor and temporary; no treatment reduced crop stand (data not presented). Delayed sorghum flowering was due to moisture stress caused by the lack of redroot pigweed and puncturevine control, rather than herbicide injury. Lack of weed control also reduced sorghum yields. (Fort Hays Branch, Kansas Agric. Exp. Sta., Hays).

Table. Control of weeds and herbicide effects on no-till grain sorghum, Hays, KS. 1986. (Stahlman).

		% weed control								Grain sorghum			
	Rate	June 24				July 10				% injury		Days to ½	Yield
Treatments[a]	(lb/A)	Rrpw	KOCZ	Puvi	Fxtl	Rrpw	KOCZ	Puvi	Fxtl	6-24	7-10	bloom	(Bu/A)
SC-0774 75W	0.75	50	100	60	98	20	97	0	83	5	0	70	20.0
SC-0774 75W	1.0	53	100	58	100	27	97	0	89	10	3	72	14.8
SC-0774 75W	1.25	53	100	77	100	27	100	40	99	15	0	68	21.4
SC-0774 + atrazine 4L	1.0 + 1.5	100	100	98	98	98	100	91	100	20	10	63	46.3
SC-0774 + cyanazine 4L	1.0 + 2.0	100	100	98	100	88	100	83	98	12	7	63	49.7
SC-0774 + propazine 90DF	0.85 + 1.5	100	100	99	98	100	100	97	98	8	7	63	53.1
Cyanazine 4L + atrazine 4L	2.0 + 1.0	100	100	99	100	99	100	93	100	0	7	61	47.2
Atrazine 4L + metolachlor 8E	1.5 + 2.0	100	100	96	100	100	100	87	95	0	0	62	53.8
Atrazine 4L	2.0	100	100	97	97	100	100	92	87	0	0	62	43.9
Weedy control	---	---	---	--	--	---	---	--	---	0	0	79	13.9
LSD (0.05)		4	NS	5	NS	20	NS	10	8	10	6	5	9.6

[a]Glyphosate/2,4-D at 0.375/0.67 lb ae/A was tank mixed with all treatments and applied alone to the weedy control 20 days preplant to grain sorghum on May 19, 1986. All emerged weeds were killed.

Evaluation of postemergence grass herbicides in sugarbeets. Miller, S.D. and K.J. Fornstrom. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of postemergence grass herbicides for weed control in sugarbeets. Plots were established under irrigation and were 10 by 22 ft. in size with three replications arranged in a randomized complete block. Sugarbeets (Holly Hybrid 21) were planted in a sandy loam soil (71% sand, 17% silt and 12% clay) with 1.3% organic matter and a 7.3 pH April 15, 1986. Desmedipham plus phenmedipham was applied for broadleaf weed control to all plots except the weedy check May 21, 1986 (sugarbeets 4 to 6 true leaves and broadleaf weeds 1 to 2 inch tall with a tractor mounted sprayer delivering 20 gpa at 25 psi. Postemergence grass herbicide treatments were applied with a CO_2 pressurized six-nozzle knapsack unit delivering 10 gpa on May 31 (air temp. 85 F, relative humidity 20%, wind calm, sky clear and soil temp. - 0 inch 110 F, 2 inch 90 F and 4 inch 85 F) to 6 to 8-leaf sugarbeets and 1 to 3 inch green foxtail and June 6, 1986 (air temp. 83 F, relative humidity 43%, wind E 5 mph, sky clear and soil temp. - 0 inch 91 F, 2 inch 84 F and 4 inch 73 F) to 8 to 10-leaf sugarbeets and 4 to 7 inch green foxtail. Weed counts, crop stand counts and visual injury ratings were made July 1, 1986. Green foxtail (SETVI) infestations were moderate and uniform throughout the experimental area.

No sugarbeet injury was observed with any treatment. Sugarbeet yields were increased 4.0 T/A by application of desmedipham plus phenmedipham and an additional 1.0 to 5.4 T/A by the application of the postemergence grass herbicides. Green foxtail control with the postemergence grass herbicides was better when applied at the 1 to 3 than 4 to 7 inch stage. Green foxtail control exceeded 90% with all grass herbicide treatments except fluazifop at 0.19 and 0.25 lb/A when applied at the 1 to 3 inch stage. (Wyoming Agric. Exp. Sta., Laramie, WY 81071 SR 1446.)

Green foxtail control with postemergence grass herbicides

Treatment[1]	Rate lb ai/A	Sugarbeet[2] injury %	stand early %	beets/ 100 ft	sugar %	yield T/A	Control[3] SETVI %
desmediphan + phenmedipham	0.5 + 0.5	0	100	230	15.7	21.0	39
Grass 1 to 3 inch							
/sethoxydim + oc	0.5 + 0.5/0.2	0	96	220	15.7	24.7	95
/sethoxydim + AMS + oc	0.5 + 0.5/0.2	0	100	230	15.4	24.9	92
/sethoxydim + 28% N + oc	0.5 + 0.5/0.2	0	100	190	15.5	26.0	98
/fenoxaprop + oc	0.5 + 0.5/0.2	0	100	230	15.4	26.4	95
/haloxyfop + oc	0.5 + 0.5/0.1	0	97	190	15.9	25.5	96
/quizalofop + oc	0.5 + 0.5/0.1	0	100	190	15.8	25.6	97
/fluazifop + oc	0.5 + 0.5/0.19	0	100	220	15.8	23.3	81
/fluazifop + oc	0.5 + 0.5/0.25	0	100	180	15.4	25.1	87
/fluazifop + oc	0.5 + 0.5/0.375	0	100	230	15.8	25.3	96
/BAS-517 + oc	0.5 + 0.5/0.05	0	100	220	15.5	26.4	94
/BAS-517 + oc	0.5 + 0.5/0.1	0	100	220	15.8	25.2	97
/BAS-517 + oc	0.5 + 0.5/0.2	0	98	210	15.6	24.4	99
Grass 4 to 7 inch							
/sethoxydim + oc	0.5 + 0.5/0.2	0	100	220	15.7	22.6	85
/sethoxydim + AMS + oc	0.5 + 0.5/0.2	0	100	230	15.7	23.4	85
/sethoxydim + 28% N + oc	0.5 + 0.5/0.2	0	100	190	15.6	24.5	89
/BAS-517 + oc	0.5 + 0.5/0.05	0	97	220	15.7	23.8	92
/BAS-517 + oc	0.5 + 0.5/0.1	0	100	200	15.7	24.1	92
/BAS-517 + oc	0.5 + 0.5/0.2	0	100	200	15.6	25.2	94
/fluazifop + oc	0.5 + 0.5/0.19	0	100	190	15.8	22.2	61
/fluazifop + oc	0.5 + o.5/0.375	0	100	210	15.4	22.0	78
weedy check	---------------	0	100	190	15.9	17.0	0
plants/ft row 3 inch band		--	2.4	---	----	----	3.2

[1] Desmediphan plus phenmedipham applied May 21, 1 to 3 inch grass treatments May 31 and 4 to 7 inch grass treatments June 6, 1986; OC = At Plus 411 F at 1 qt/A, AMS = ammonium sulfate at 2.5 lb/A and 28% N = 28% (w/w) nitrogen at 1 gal/A

[2] Visual injury and stand counts determined July 1 and plots harvested October 5, 1986

[3] Weed counts determined July 1, 1986

Weed control in sugarbeets with split applications of postemergence herbicides. Miller, S.D. and K.J. Fornstrom. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of split applications of sethoxydim and desmedipham plus phenmedipham for weed control in sugarbeets. Plots were established under irrigation and were 10 by 22 ft. in size with three replications arranged in a randomized complete block. Sugarbeets (Holly Hybrid 21) were planted in a sandy loam soil (71% sand, 17% silt and 12% clay) with 1.3% organic matter and a 7.3 pH April 15, 1986. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack sprayer delivering 10 gpa at 40 psi. Initial herbicide treatments were applied May 27, 1986 (air temp. 67 F, relative humidity 49%, wind calm, sky partly cloudy and soil temp. - 0 inch 75 F, 2 inch 65 F and and 4 inch 63 F) to 4 to 6-leaf sugarbeets and 1 to 3 inch weeds. Three day split treatments were applied May 30 to 4 to 6-leaf sugarbeets and 2 to 3 inch weeds, six day split treatments June 3 to 6 to 8-leaf sugarbeets and 3 to 4 inch weeds and twelve day split treatments June 9, 1986 to 8 to 10-leaf sugarbeets and 3 to 5 inch weeds. Weed counts, crop stand counts and visual injury ratings were made June 23, 1986. Hairy nightshade (SOLSA) and kochia (KCHSC) infestations were light and variable and common lambsquarters (CHEAL) and green foxtail (SETVI) infestations light but uniform throughout the experimental area. Plots were not harvested for yield.

No treatment injured sugarbeets or reduced crop stand. Best weed control was obtained when sethoxydim and desmedipham plus phenmedipham were applied together or when sethoxydim applications were delayed three days after desmedipham plus phenmedipham application. Broadleaf weed control decreased as desmedipham plus phenmedipham applications were delayed three, six and twelve days after sethoxydim application. Similarly, green foxtail control decreased as sethoxydim applications were delayed six and twelve days after desmedipham plus phenmedipham application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1447 .)

Weed control with split applications of postemergence herbicides

Treatment[1]	Rate lb ai/A	Sugarbeet[2] injury %	Sugarbeet[2] stand %	Control[3] CHEAL %	Control[3] KCHSC %	Control[3] SOLSA %	Control[3] SETVI %
sethoxydim + desmedipham + phenmedipham + oc	0.2 + 0.5 + 1 qt	0	100	73	62	100	100
sethoxydim + oc/desmedipham + phenmedipham 3-day	0.2 + 1 qt + 0.5	0	100	60	39	25	100
sethoxydim + oc/desmedipham + phenmedipham 6-day	0.2 + 1 qt + 0.5	0	100	46	39	0	100
sethoxydim + oc/desmedipham + phenmedipham 12-day	0.2 + 1 qt + 0.5	0	100	41	39	0	100
desmedipham + phenmedipham/ sethoxydim + oc 3-day	0.5 + 0.2 + 1 qt	0	100	73	62	100	100
desmedipham + phenmedipham/ sethoxydim + oc 6-day	0.5 + 0.2 + 1 qt	0	100	69	62	100	97
desmedipham + phenmedipham/ sethoxydin + oc 12-day	0.5 + 0.2 + 1 qt	0	100	73	61	100	65
weedy check	---------	0	100	0	0	0	0
plants/ft row 3 inch band		---	1.9	0.8	0.1	0.1	2.0

[1]Treatments before / applied May 27, 3-day treatments May 30, 6-day treatments June 3 and 12 day treatments June 9, 1986; OC = At Plus 411 F
[2]Sugarbeet stand counts and visual injury ratings June 23, 1986
[3]Weed counts determined June 23, 1986

Evaluation of postemergence herbicide treatments for weed control in sugarbeets. Miller, S.D. and K.J. Fornstrom. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of postemergence herbicide treatments for weed control in sugarbeets. Plots were established under irrigation and were 10 by 22 ft. in size with three replications arranged in a randomized complete block. Sugarbeets (Holly Hybrid 21) were planted in a sandy loam soil (71% sand, 17% silt and 12% clay) with 1.3% organic matter and a 7.3 pH April 15, 1986. Herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack sprayer delivering 10 gpa at 40 psi May 18 (air temp. 70 F, relative humidity 20%, wind calm, sky clear and soil temp. - 0 inch 82 F, 2 inch 70 F, 4 inch 64 F) to cotyledon to 4-leaf sugarbeets and 0.5 to 1 inch weeds or May 27, 1986 (air temp. 67 F, relative humidity 49% wind calm, sky partly cloudy and soil temp. - 0 inch 75 F, 2 inch 65 F and 4 inch 63 F) to 4 to 6-leaf sugarbeets and 1 to 3 inch weeds. Weed counts, crop stand counts and visual injury ratings were made June 18, 1986. Common lambsquarters (CHEAL) and green foxtail (SETVI) infestations were moderate and kochia (KCHSC) and hairy nightshade (SOLSA) infestations light but uniform throughout the experimental area. Plots were not harvested for yield.

No treatment injured sugarbeets or reduced crop stand. Green foxtail control was good to excellent with all herbicide treatments. Desmedipham plus phenmedipham combinations with the grass herbicides did not influence green foxtail control. Broadleaf weed control was better with the split application of desmedipham plus phenmedipham (0.37 + 0.37 lb/A) than with the single application (0.75 lb/A). (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR _____.)

Weed control with postemergence herbicides in sugarbeets

Treatment[1]	Rate lb ai/A	Sugarbeets[2] injury %	Sugarbeets[2] stand %	Control[3] CHEAL %	Control[3] KCHSC %	Control[3] SOLSA %	Control[3] SETVI %
sethoxydim + AMS + oc	0.2 + 2.5	0	100	0	0	0	97
sethoxydim + 28% N + oc	0.2 + 1 gal	0	100	0	0	0	100
sethoxydim + desmedipham + phenmedipham + AMS + oc	0.2 + 0.75 + 2.5	0	100	69	54	75	92
sethoxydim + desmedipham + phenmedipham + 28% N + oc	0.2 + 0.75 + 1 gal	0	100	73	54	75	100
desmedipham + phenmedipham/ sethoxydim + desmedipham + phenmedipham + AMS + oc	0.37/0.2 + 0.37 + 2.5	0	100	79	62	90	97
desmedipham + phenmedipham/ sethoxydim + desmedipham + phenmedipham + 28% N + oc	0.37/0.2 + 0.37 + 1 gal	0	100	79	62	90	95
fluazifop + oc	0.19	0	100	0	0	0	85
fluazifop + desmedipham + phenmedipham + oc	0.19+ 0.75	0	100	73	54	75	91
desmedipham + phenmedipham/ fluazifop + desmedipham + phenmedipham + oc	0.37/ 0.19 + 0.37	0	100	79	62	85	88
BAS-517 + oc	0.1	0	100	0	0	0	92
BAS-517 + desmedipham + phenmedipham + oc	0.1 + 0.75	0	100	68	54	65	100
desmedipham + phemedipham/ BAS-517 + desmedipham + phenmedipham + oc	0.37/ 0.1 + 0.37	0	100	79	62	85	100
weedy check		0	100	0	0	0	0
plants/ft row 3 inch band		--	1.9	2.5	0.3	0.4	1.9

[1] Early desmedipham plus phenmedipham treatments applied May 18 all other treatmens applied May 27, 1986; OC = At Plus 411 F at 1 qt/A, AMS = ammonium sulfate and 28% N = 28% (w/w) nitrogen

[2] Sugarbeet stand counts and crop injury ratings June 18, 1986

[3] Weed counts determined June 18, 1986

Evaluation of preemergence and postemergence weed control in fall-planted sugarbeets. Norris, R.F., R.A. Lardelli and R.L. Sailsbery. Herbicide activity of ethofumesate, diethatyl and pyrazon when applied preemergence followed by three postemergence herbicides was investigated for selective control of various winter weeds. This trial was established in Glenn County, California.

Preemergence herbicides were applied on October 2 and 3, 1985, with a CO_2 backpack handsprayer calibrated to deliver 30 gal/A. The main plot size was 2 beds on 30-inch center (5 ft) by 50 ft, and each treatment was replicated four times in a randomized complete block design. The same method was used for the postemergence applications in the sub plot, except the size was 2 beds on 30-inch centers (5 ft) by 10 ft. The sugarbeets were at the early 2-leaf growth stage, and the weeds varied from 0.5 to 3.0 inches at treatment time.

No preemergence herbicides affected the sugarbeet stand or vigor. Satisfactory ryegrass control was achieved only with diethatyl at 2.0 lb/A. Combination of diethatyl plus pyrazon improved broadleaf control and was the most successful treatment.

Mixtures of phenmedipham + desmedipham with sethoxydim provided good grass and broadleaf control. Control of Chamomile mayweed was best achieved with the two combinations of diethatyl, or ethofumesate + pyrazon followed by an application of phenmedipham/desmedipham. (Botany Department, University of California, Davis, CA 95616 and Cooperative Extension, Orland, CA 95963).

Preemergence/Postemergence Weed Control in Fall-Planted Sugarbeets, Glenn County, CA.

Treatment (Preemergence)		Treatment[1/] (Postemergence)	Rate	Weed control[3/] LOLMU (12/12/1985)	BL	LOLMU (3/4/1986)	CAPBP	EROCI	ANTCO	BRS	AMSIN	SON	STEME
	(lb ai/A)		(lb ai/A)	(% Control)									
Pyrazon	3.0	Sethoxydim + oil	0.375			100	73	88	20	90	100	78	35
		Phenm/desm[2/]	1.30			50	100	98	53	100	100	90	85
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	100	60	100	100	83	98
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	100	95	48	70	100	90	60
		Not treated postemergence		25	55	18	65	100	18	68	95	30	38
Ethofumesate	2.0	Sethoxydim + oil	0.375			100	63	100	0	45	95	73	100
		Phenm/desm	1.30			15	100	100	8	95	100	100	100
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	100	15	95	98	90	100
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	93	100	8	60	100	90	100
		Not treated postemergence		5	43	0	15	100	0	45	95	90	100
Diethatyl	2.0	Sethoxydim + oil	0.375			75	23	95	20	63	95	60	15
		Phenm/desm	1.30			85	100	100	40	95	100	80	60
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	100	53	100	100	95	70
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	88	95	45	63	88	85	38
		Not treated postemergence		48	50	80	15	100	23	53	100	93	13
Ethosumesate + pyrazon	2.0 + 3.0	Sethoxydim + oil	0.375			100	68	95	35	100	93	93	100
		Phenm/desm	1.30			75	100	100	78	95	95	95	100
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	100	78	100	100	90	95
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	100	100	68	95	88	90	83
		Not treated postemergence		28	70	35	83	100	35	85	85	80	100
Diethatyl + pyrazon	2.0 + 3.0	Sethoxydim + oil	0.375			100	75	100	43	93	100	80	50
		Phenm/desm	1.30			100	100	90	78	95	100	100	93
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	95	78	100	100	100	93
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	95	100	76	100	100	100	75
		Not treated postemergence		68	73	80	88	95	45	100	95	95	40
Not treated preemergence		Sethoxydim + oil	0.375			100	0	90	0	50	83	15	13
		Phenm/desm	1.30			5	98	90	10	90	100	78	60
		Sethoxydim + phenm/desm + oil	0.375 + 1.30			100	100	80	5	93	100	60	68
		Sethoxydim + pyrazon + oil	0.375 + 3.00			100	43	90	10	43	78	88	28
		Untreated check		0	0	0	0	93	0	99	88	60	15

1/ Oil = Pace spray adjuvant; used at volume of 1 qt./A.

2/ Phenm/desm = Phenmedipham + desmedipham.

3/ BL = broadleaf; BRS = Brassica spp.; SON = Sonchus spp.; other letters are species code numbers from WSSA Composite List of Weeds, Weed Sci., 32, Suppl. 2.

<u>Annual weed control in sugarbeets with preplant or preemergence herbicides</u>. Haderlie, L.C. and D.K. Harrington. Weed control and sugarbeet injury was determined following application of several soil-applied herbicides in the field at the Aberdeen Research and Extension Center during 1985. The soil was a declo fine sandy loam with pH 8.0, 1.5% organic matter, and 13.2 meq CEC. Herbicides were applied by a tractor-mounted compressed-air sprayer with an 11 ft boom delivering 17.5 gpa at 30 psi with TJ11002 nozzles. Cycloate was applied 30 April and double disced into soil. All other herbicides were sprayed 2 May and sprinkler irrigated with 0.7 inch of water on 7 May 85. Sugarbeets (var. WS 76) were planted 1 May 85 with a 6-row John Deere plate planter.
Plot size was 11 (6-rows) by 42.5 ft and replicated four times in a randomized complete block design. Harvest of the center two rows by 30 ft was made on 11 Oct 85.

Control of weeds was very good (87% or more) for grasses and broadleaves when evaluated 29 May (Data not shown). By 8 July most treatments gave good control of all weeds except kochia and Russian thistle (Table 1). Ethofumesate and SC-5676/R-25788 were the only herbicide treatments giving 78% or better kochia control. Kochia has the capacity to grow very large and just a few plants can compete strongly with sugarbeets, hence, early evaluations would need at least 90% control for kochia to be adequate. Ethofumesate treatments controlled Russian thistle adequately (over 85%) except when diethatyl was used with ethofumesate (Table 1). Russian thistle was not uniform throughout the experiment, so variation was high.

The best treatments overall for weed control were ethofumesate at all three rates, ethofumesate + pyrazon, ethofumesate + diethatyl, and SC-5676/R-25788 (Table 1). Cycloate gave excellent control on all weeds except kochia and Russian thistle.

Sugarbeet injury was significant for all herbicide treatments on 29 May (Table 1). Crop size and vigor, stand reduction, and injury were visually integrated into our injury ratings. SC-5676/R-25788 gave 89 and 100% injury at the 1.5 and 3.0 lb a.i./A rates respectively, on 29 May. Injury was reduced for all treatments by 8 July but ethofumesate at 3.0 lb a.i./A was 10% and SC-5676/R-25788 was 76 and 93% for the two rates (Table 1).

Sugarbeet yields were highest for the handweeded check, and all ethofumesate treatments (Table 2). Kochia reduced yields in cycloate and metolachlor treatments. The cycloate treatment demonstrates how severe kochia interference was with sugarbeets. All other major weeds were controlled by cycloate except kochia, and yields were reduced 58% compared to handweeded check.

Yields with SC-5676/R-25788 were surprisingly high for the severity of injury (Table 1,2). SC-5676/R-25788 at 3.0 lb a.i./A showed 93% injury by 8 July and very few sugarbeets were growing in each plot. At harvest, the few sugarbeets that did emerge and grow were very large beets.

In summary, low rates of ethofumesate, alone or in combination with pyrazon, performed best overall. However, even a few kochia plants reduced sugarbeet yields. Metolachlor herbicide has potential in sugarbeets if it is mixed with another herbicide. SC-5676/R-25788 at rates tested gave good weed control but much too severe sugarbeet injury. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Table 1. Annual weed control in sugar beets evaluated on 8 July following application of preplant (PPI) and preemergence (Pre) herbicides at Aberdeen Idaho. Data are means of four replications

Chemical	Formulation	Rate (lb ai/A)	Type of Applcn	Incorporation Method	% Injury My 29	% Injury Jl 8	% Control Fox tail	Wild oats	Kochia	Lambs qrtrs	Redroot Pigweed	Tansy mustard	Black mustard	Night shade	Russian thistle
1. untreated (weedy)					0	0	0	0	0	0	0	0	0	0	0
2. untreated (hand weeded)					0	0	100	100	100	100	100	100	100	100	75
3. cycloate	6 EC	4.0	PPI(30 Apr)	Double disc	17	2	97	87	22	92	95	94	92	98	40
4. ethofumesate	1.5 EC	1.5	Pre(2 May)	0.65 in water	16	5	84	90	76	90	92	94	99	83	86
5. ethofumesate		2.0	Pre	0.65 in water	24	9	89	91	81	89	98	81	100	94	91
6. ethofumesate		3.0	Pre	0.65 in water	20	10	91	96	78	90	94	81	99	98	96
7. ethofumesate + pyrazon	4.2 F(Pyram)	1.5 + 1.5	Pre	0.65 in water	19	3	86	95	78	93	93	98	99	95	85
8. ethofumesate + diethatyl	4 ES (Dieth)	1.5 + 1.5	Pre	0.65 in water	24	1	88	91	78	85	95	86	95	76	64
9. metolachlor	8 E	2.0	Pre	0.65 in water	30	8	91	81	53	81	93	94	95	53	33
10. SC-5676/R-25788	7 E	1.5	Pre	0.65 in water	89	76	86	66	83	93	100	95	100	100	35
11. SC-5676/R-25788		3.0	Pre	0.65 in water	100	93	95	91	91	98	100	100	99	95	49
LSD (0.05)						9	7	17	14	8	6	19	5	20	35
CV						35	6	15	15	7	5	15	4	17	41
Mean number of weeds/m^2 in untreated checks							104	5	21	10	39	10	NA	4	NA

Table 2. Harvest weights in tons/A and tons/ha following application of preplant (PPI) and preemergence (Pre) herbicide at Aberdeen, Idaho. Harvested on 11 Oct 85. Data are means of four replications.

Chemical	Formulation	Rate (lb a.i./A)	Type of Application	Incorporation Method	Yield T/A	Yield t/ha
1. untreated (weedy)					4.6	10.2
2. untreated (hand weeded)					30.4	68.1
3. cycloate	6 EC	4.0	PPI (30 Apr)	Double disc	12.7	28.5
4. ethofumesate	1.5 EC	1.5	Pre (2 May)	0.65 inch water	25.1	56.2
5. ethofumesate		2.0	Pre	0.65 inch water	27.4	61.4
6. ethofumesate		3.0	Pre	0.65 inch water	25.7	57.6
7. ethofumesate + pyrazon	4.2 F (Pyram)	1.5 + 1.5	Pre	0.65 inch water	28.6	63.9
8. ethofumesate + diethatyl	4 ES (Dieth)	1.5 + 1.5	Pre	0.65 inch water	26.3	58.9
9. metolachlor	8 E	2.0	Pre	0.65 inch water	14.4	32.2
10. SC-5676/R-25788	7 E	1.5	Pre	0.65 inch water	18.4	41.1
11. SC-5676/R-25788		3.0	Pre	0.65 inch water	10.9	24.5
LSD (0.05)					5	11
CV					17	17

Annual grass control in sugarbeets with BAS-517. Haderlie, L.C. and D.K. Harrington. Grass weed control and sugarbeet injury were evaluated by visual ratings following application of BAS-517 to sugarbeets in the field at the Aberdeen Research & Extension Center during 1985. Soil was a declo fine sandy loam with pH of 8.2 and 1.1% organic matter. Herbicide treatments were applied on 13 June 85 with a tractor-mounted compressed air sprayer with an 11 ft boom. Spray delivery was 8.8 gpa at 30 psi with TJ11001 nozzles. Plot size was 11 (6-row) by 40 ft and each treatment was replicated four times in a randomized complete block design. No harvest was made because the broadleaved weeds were not sufficiently controlled with Dowco 290 broadcast over the experiment.

BAS-517 treatment resulted in 50 to 92% control 2 wk after application of green foxtail, witchgrass, and volunteer grain without crop injury (Table 1). A late response was observed. As herbicide rates were increased from 0.05 to 0.2 lb a.i./A, grass control increased. A later evaluation may have shown that lower rates would control the weed. (University of Idaho Research & Extension Center, Aberdeen, ID 83210)

Table 1. Annual grass control in sugarbeets treated 13 June and evaluated on 26 June with BAS-517. Data are means of four replications

Chemical	Formulation	Rate (lb ai/A)	% Control Foxtail & Witchgrass	% Control V. Grain
1. Untreated (Weedy)			0	0
2. BAS 517+OC*	1.5 E	0.05 + 1%	50	36
3. BAS 517+OC		0.075 + 1%	63	51
4. BAS 517+OC		0.10 + 1%	81	80
5. BAS 517+OC		0.15 + 1%	73	59
6. BAS 517+OC		0.2 + 1%	92	88
LSD (0.05)			25	30
CV			28	38
Mean number of weeds/m^2 on 14 and 21 June in untreated checks			40	

*O.C. = Herbimax

When grasses were 2-4 inches tall

Weed control in spring-seeded sugarbeets by sethoxydim alone or mixed with phenmedipham + desmedipham. Norris, R.F., R.A. Lardelli and F.R. Kegel. Sethoxydim when applied as a single treatment or tank mixed with phenmedipham + desmedipham and as influenced by varying the volume of water used for application was investigated for postemergence weed control. This experiment was established in San Joaquin County, California. Herbicide treatments were applied on April 20, 1986, when sugarbeet plants were in the 2 to 4 true-leaf growth stage. Size of weeds varied from 2 to 6 true-leaf growth stage. The treatments were applied with a CO_2 backpack handsprayer calibrated to deliver 10, 20, 30 or 40 gal/A of spray solution. The plot size was 2 beds on 30 inch centers (5 ft) by 12 ft, replicated 4 times.

Crop tolerance and weed control were evaluated visually on May 22, 1986. No treatments affected the sugarbeet stand (data not presented). The greatest reduction in sugarbeet vigor resulted from the tank-mix application of phenmedipham/desmedipham plus sethoxydim with oil at both rates tested. The grass control achieved by sethoxydim in this trial was good. However, when sethoxydim was applied in a spray volume of 40 gal/A, there was a trend for decreased efficacy at both rates tested. Activity of phenmedipham/desmedipham was increased by increasing carrier volume. Combination of phenmedipham/desmedipham with sethoxydim plus oil showed good broadleaf weed control. (Botany Department, University of California, Davis, CA 95616 and Cooperative Extension, Stockton, CA 95205).

Postemergence weed control in relation to spray volume[1]

Treatment	Rate	Spray volume	SugarBeet (vigor)	Weed Control[2] ECHCG	CHEAL	AMARE
			--------	(May 22, 1986)	---------	
	(lb ai/A)	(gal/A)	(%)	---	(% control)	----
Sethoxydim[3]	0.14	10	100 a	98 ab	0 b	0 b
Sethoxydim	0.14	20	93 a	93 ab	23 b	20 b
Sethoxydim	0.14	30	100 a	84 ab	15 b	3 b
Sethoxydim	0.14	40	98 a	81 b	13 b	8 b
Sethoxydim	0.28	10	95 a	96 ab	20 b	18 b
Sethoxydim	0.28	20	93 a	95 ab	0 b	0 b
Sethoxydim	0.28	30	90 a	94 ab	26 b	22 b
Sethoxydim	0.28	40	100 a	92 ab	13 b	0 b
Phenm/desm[4]	1.00	10	75 b	18 de	86 a	80 a
Phenm/desm	1.00	20	73 bc	13 de	95 a	73 a
Phenm/desm	1.00	30	73 bc	25 d	96 a	89 a
Phenm/desm	1.00	40	65 bc	50 c	100 a	89 a
Sethoxydim + phenm/desm	0.14 + 1.00	10	70 bc	93 ab	91 a	78 a
Sethoxydim + phenm/desm	0.14 + 1.00	20	68 bc	96 ab	96 a	85 a
Sethoxydim + phenm/desm	0.14 + 1.00	30	73 bc	93 ab	95 a	81 a
Sethoxydim + phenm/desm	0.14 + 1.00	40	58 c	95 ab	96 a	92 a
Sethoxydim + phenm/desm	0.28 + 1.00	10	68 bc	100 a	93 a	79 a
Sethoxydim + phenm/desm	0.28 + 1.00	20	68 bc	99 ab	98 a	89 a
Sethoxydim + phenm/desm	0.28 + 1.00	30	73 bc	99 ab	96 a	85 a
Sethoxydim + phenm/desm	0.28 + 1.00	40	68 bc	99 ab	100 a	94 a
Untreated check			95 a	7 e	25 b	18 b

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

2/ Abbreviations are WSSA code numbers from Composite List of Weeds, Weed Sci., 32, Suppl. 2.

3/ 1 qt/A of pace oil adjuvant added to all sethoxydim treatments.

4/ Phenm/desm = phenmedipham + desmedipham.

Endothall or ethofumesate combinations with phenmedipham/desmedipham for broadleaf weed control in sugarbeets.. Norris, R.F., R.A. Lardelli and F.R. Kegel. A trial was established in San Joaquin County, California, to evaluate the efficacy of mixtures of endothall or ethofumesate alone or mixed with phenmedipham/desmedipham for broadleaf weed control in sugarbeets; all herbicide mixtures were evaluated at 10 or 30 gal/A application volume. The sugarbeets were in the cotyledon to early 4 true-leaf growth stage. Herbicides were applied on April 25, 1986, with a CO_2 backpack handsprayer calibrated to deliver 10 or 30 gal/A of spray solution. The plot size was 2 beds on 30-inch centers (5 ft) by 15 ft, treatments were replicated 4 times in a randomized complete block design.

Velvetleaf proved to be particularly difficult to control; the only treatment that gave good (94%) control was endothall at 2.0 lb/A. This treatment injured the beets and did not control the other two weeds present (see table). The mixture of endothall with phenmedipham/desmedipham provided excellent (95% to 99%) control of all weeds present but injury to the sugarbeets was severe; the stand was 20% below that in the control plots, and the vigor was approximately 30% lower than that in treatments with good weed control. The vigor of beets in the untreated checks was reduced by weed competition at the May 22 evaluation. A factorial analysis of only the above treatment mixtures (data not presented) indicated that endothall gave better control when applied at 10 gal/A than at 30 gal/A. Spray volume did not alter the activity of the other two herbicides. Factorial analysis of the ethofumesate mixtures with phenmedipham/desmedipham showed that these treatments had no long-lasting effect on the beets; all differences were not significant at the 5% level by the May 22 evaluation. Neither herbicide controlled velvetleaf. Ethofumesate provided only partial control of the other two weed species, while phenmedipham/desmedipham gave very good control. Overall, no treatment provided complete weed control combined with low phytotoxicity to the sugarbeets. (Botany Department, University of California, Davis, CA 95616 and Cooperative Extension, Stockton, CA 95205).

Endothall or ethofumesate combinations with phenmedipham/desmedipham for broadleaf weed control in sugarbeets.[1]

Treatment	Rate	Spray volume	Sugarbeet 5/6[2]	Sugarbeet 5/22		Weed Control[3] AMARE 5/6	AMARE 5/22	CHEAL 5/6	CHEAL 5/22	ABUTH 5/6	ABUTH 5/22
	(lb ai/A)	(gal/A)	(Vigor/ injury)	(Stand)	(Vigor)	(% Control)					
Untreated check		10	93 a	100 a	74 a-e	0 h	48 a	0 h	43 ghi	5 hi	46 f
Untreated check		30	80 ab	100 a	73 a-e	0 h	70 a-d	0 h	65 a-g	0 i	55 c-f
Phenm/desm[5]	0.65	10	65 cd	100 a	76 a-e	75 a-f	93 a	75 a-f	99 a	10 hi	53 def
Phenm/desm	0.65	30	63 cd	100 a	80 abc	78 a-f	97 a	78 a-f	98 a	10 ghi	65 a-f
Phenm/desm	1.30	10	55 de	91 ab	68 b-e	95 abc	99 a	95 abc	98 a	20 ghi	53 def
Phenm/desm	1.30	30	53 de	100 a	63 cde	95 abc	99 a	95 abc	100 a	23 fgh	60 b-f
Endothall + oil[4]	1.00	10	28 ghi	63 efg	60 de	45 g	50 cd	45 g	20 i	53 b-e	84 abc
Endothall + oil	1.00	30	35 fgh	93 ab	4 a-e	53 efg	51 cd	53 fg	60 efg	33 efg	76 a-f
Endothall + phenm/desm + oil	1.00 + 0.65	10	30 f-i	88 a-d	9 b-e	68 b-g	50 cd	68 c-g	71 b-f	45 cde	69 a-f
Endothall + phenm/desm + oil	1.00 + 0.65	30	33 f-i	88 a-d	1 a-e	60 d-g	59 bcd	60 d-g	80 a-e	43 c-f	55 c-f
Endothall + phenm/desm + oil	1.00 + 1.30	10	23 hij	78 b-e	0 a-e	75 a-f	86 ab	75 a-f	91 ab	40 d-g	78 a-e
Endothall + phenm/desm + oil	1.00 + 1.30	30	30 f-i	83 a-d	0 a-e	73 a-g	85 ab	85 a-d	99 a	48 b-e	71 a-f
Endothall + oil	2.00	10	18 ij	45 g	60 de	83 a-e	83 ab	63 d-g	53 fgh	85 a	93 a
Endothall + oil	2.00	30	23 hij	70 def	64 b-e	50 fg	58 bcd	20 h	35 hi	53 b-e	88 ab
Endothall + phenm/desm + oil	2.00 + 0.65	10	23 hij	58 fg	68 b-e	80 a-f	80 abc	65 d-g	66 c-g	53 b-e	81 a-d
Endothall + phenm/desm	2.00 + 0.65	30	28 ghi	83 a-d	68 b-e	65 c-g	79 abc	65 d-g	80 a-e	53 b-e	84 abc
Endothall + phenm/desm + oil	2.00 + 1.30	10	10 j	38 h	60 de	80 a-f	86 ab	80 a-f	89 a-d	65 bc	94 a
Endothall + phenm/desm	2.00 + 1.30	30	23 hij	73 c-f	58 e	98 ab	93 a	98 ab	98 a	45 cde	70 a-f
Ethofumesate	0.75	10	73 bc	98 a	83 ab	68 b-g	80 abc	70 a-g	95 ab	48 b-e	63 b-f
Ethofumesate	0.75	30	75 bc	100 a	89 a	55 d-g	89 ab	55 efg	92 ab	48 b-e	60 b-f
Ethofumesate + phenm/desm	0.75 + 0.65	10	38 fgh	95 ab	73 a-e	98 ab	99 a	98 ab	100 a	58 bcd	76 a-f
Ethofumesate + phenm/desm	0.75 + 0.65	30	45 ef	98 a	81 abc	83 a-e	98 a	83 a-e	98 a	50 b-e	80 a-d
Ethofumesate + phenm/desm	0.75 + 1.30	10	45 ef	88 a-d	68 b-e	98 ab	100 a	100 a	100 a	50 b-e	48 ef
Ethofumesate + phenm/desm	0.75 + 1.30	30	40 efg	90 abc	80 abc	95 abc	98 a	95 abc	99 a	45 cde	65 a-f

Continued on next page.

Endothall or ethofumesate combinations with phenmedipham/desmedipham for broadleaf weed control in sugarbeets.[1]

						Weed Control[3]					
		Spray	Sugarbeet			AMARE		CHEAL		ABUTH	
Treatment	Rate	volume	5/6[2]	5/22	5/22	5/6	5/22	5/6	5/22	5/6	5/22
	(lb ai/A)	(gal/A)	(Vigor/ injury)	(Stand)	(Vigor)	(% Control)					
Ethofumesate	1.50	10	55 de	99 a	73 a-e	85 a-d	95 a	85 a-d	98 a	53 b-e	86 ab
Ethofumesate	1.50	30	55 de	100 a	73a-e	75 a-f	95 a	75 a-f	90 abc	53 b-e	78 a-e
Ethofumesate + phenm/desm	1.50 + 0.65	10	43 efg	95 ab	75 a-e	98 ab	96 a	98 ab	100 a	65 abc	65 a-f
Ethofumesate + phenm/desm	1.50 + 0.65	30	43 efg	100 a	83 ab	100 a	100 a	100 a	100 a	65 abc	86 ab
Ethofumesate + phenm/desm	1.50 + 1.30	10	38 fgh	98 a	78 a-d	100 a	99 a	100 a	100 a	58 bcd	69 a-f
Ethofumesate + phenm/desm	1.50 + 1.30	30	28 ghi	83 a	76 a-e	98 ab	100 a	98 ab	99 a	70 ab	74 a-f

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

2/ 100 = full vigor, no injury; 0 = no vigor or dead.

3/ Abbreviations are WSSA code numbers from composite list of weeds, Weed Science 32, Suppl. 2

4/ Oil = super spread 200; used at volume of 1 qt/A

5/ Phenm/desm = phenmedipham + desmedipham.

Broadleaf weed control in barley with sulfonyl urea herbicides. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of short soil residual sulfonyl urea herbicide treatments for broadleaf weed control in barley. Barley (var. Steptoe) was seeded in a sandy loam soil (72% sand, 15% silt and 13% clay) with 1.0% organic matter and a 7.9 pH March 12, 1986. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1 to 2 inch kochia or common lambsquarters and 4-leaf barley April 29, 1986 (air temp. 68 F, relative humidity 42%, wind calm, sky partly cloudy and soil temp. - 0 inch 74 F, 2 inch 68 F and 4 inch 64 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made May 21, barley height measured July 2 and plots harvested July 17, 1986. Common lambsquarters (CHEAL) infestations were moderate and kochia (KCHSC) infestations light but uniform throughout the experimental area.

No treatment reduced barley stand; however, slight injury (5 to 10%) was observed with DPX-L5300 at 0.023 lb/A or higher and DPX-R9674 at 0.031 lb/A or higher. Barley yields generally related to weed control and/or crop injury. Barley yields were 5.5 to 30.0 bu/A higher in herbicide treated compared to untreated plots. Common lambsquarters control was 90% or greater with all treatments except bromoxynil at 0.09 lb/A or 2,4-D at 0.125 and 0.25 lb/A. Similarly, kochia control was 90% or greater with all treatments except bromoxynil at 0.09 and 0.19 lb/A or 2,4-D at 0.125, 0.25, and 0.5 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1442 .)

Broadleaf weed control in barley

Treatment[1]	Rate lb ai/A	Barley[2] injury %	stand red %	height inch	yield bu/A	Control[3] CHEAL %	KCHSC %
DPX-L5300 + X-77	0.008	0	0	37	99.6	95	90
DPX-L5300 + X-77	0.016	0	0	36	89.1	100	95
DPX-L5300 + X-77	0.023	5	0	36	87.5	100	97
DPX-L5300 + X-77	0.031	7	0	36	81.8	100	100
DPX-L5300 + X-77	0.047	7	0	36	80.2	100	100
DPX-R9674 + X-77	0.008	0	0	37	93.2	98	90
DPX-R9674 + X-77	0.016	0	0	37	93.2	100	95
DPX-R9674 + X-77	0.023	0	0	35	88.3	100	100
DPX-R9674 + X-77	0.031	5	0	35	86.7	100	100
DPX-R9674 + X-77	0.062	10	0	35	82.3	100	100
DPX-L5300 + bromoxynil (2E) + X-77	0.008 + 0.09	0	0	37	88.3	100	95
DPX-L5300 + bromoxynil + X-77	0.008 + 0.19	0	0	37	86.7	100	100
DPX-L5300 + bromoxynil + X-77	0.016 + 0.09	0	0	36	85.1	100	98
DPX-L5300 + bromoxynil + X-77	0.016 + 0.19	0	0	35	85.1	100	100
DPX-L5300 + bromoxynil + X-77	0.016 + 0.25	0	0	35	85.4	100	100
thiameturon + X-77	0.008	0	0	37	87.5	92	86
thiameturon + X-77	0.016	0	0	37	85.9	98	93
thiameturon + X-77	0.023	0	0	37	89.1	100	97
thiameturon + X-77	0.031	0	0	36	105.3	100	100
thiameturon + bromoxynil + X-77	0.008 + 0.09	0	0	36	89.9	97	95
thiameturon + bromoxynil + X-77	0.008 + 0.19	0	0	37	86.7	100	100
thiameturon + bromoxynil + X-77	0.016 + 0.09	0	0	36	87.5	99	98
thiameturon + bromoxynil + X-77	0.016 + 0.19	0	0	36	92.3	100	100
thiameturon + bromoxynil + X-77	0.016 + 0.25	0	0	36	86.7	100	100
thiameturon + 2,4-D + X-77	0.008 + 0.125	0	0	37	89.9	97	92
thiameturon + 2,4-D + X-77	0.008 + 0.25	0	0	37	95.6	100	98
thiameturon + 2,4-D + X-77	0.016 + 0.125	0	0	36	86.7	100	97
thiameturon + 2,4-D + X-77	0.016 + 0.25	0	0	36	91.5	100	100
bromoxynil + X-77	0.09	0	0	37	85.1	88	78
bromoxynil + X-77	0.19	0	0	36	88.3	92	88
bromoxynil + X-77	0.25	0	0	36	89.1	97	93
bromoxynil	0.38	0	0	36	89.1	100	98
2,4-D + X-77	0.125	0	0	37	87.5	77	58
2,4-D + X-77	0.25	0	0	37	89.9	88	75
2,4-D	0.5	0	0	36	89.9	93	88
weedy check	---	0	0	36	75.3	0	0

[1] Treatments applied April 29, 1986 and X-77 applied at 0.25% v/v

[2] Barley injury and stand reduction visually evaluated May 21, plant height measured July 2 and plots harvested July 17, 1986

[3] Weed control visually evaluated May 21, 1986

Tolerance of spring-planted cereals to sulfonylurea herbicides. Spinney, R.L., A.P. Appleby, and B.D. Brewster. Six spring cereal cultivars were tested in separate trials to evaluate their tolerance to sulfonylurea herbicides. The experiment was a randomized complete block design with four replications. Plots were 2.5 m wide by 6.0 m long. Herbicides were applied in water at a spray volume of 234 l/ha delivered at 138 kPa pressure through 8002 flat fan nozzles arranged in a double-overlap pattern. Herbicides were applied on April 29, 1986, when the cereals were fully tillered.

Plent height was measured three times during the season, but only the final measurement on June 4 is reported (Table 1). Grain yields were obtained by harvesting with a Hege combine in mid-summer.

Most treatments tended to reduce plant height, particularly at higher rates, although variation among cultivars did occur. DPX M6316 seemed to cause less height reduction than other treatments. Although statistical differences in grain yield (Table 2) did not occur within all cultivars, the untreated control was among the highest yielding treatments. Metsulfuron-methyl-treated plots produced the lowest grain yields in all cultivars. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Height of spring cereals 36 days after treatment with sulfonylurea herbicides.

Herbicide	Rate	Plant height					
		Owens wheat	Dirkwin wheat	Kombar barley	Steptoe barley	Cayuse oats	Otana oats
	(kg ai/ha)	(cm)					
DPX M6316	.026	92	78	83	99	83	99
DPX M6316	.052	93	78	80	95	84	101
DPX M6316	.070	90	78	78	97	84	101
DPX L5300	.018	91	76	81	95	82	99
DPX L5300	.035	89	74	81	95	82	94
DPX L5300	.070	88	73	79	93	81	94
DPX R9674	.026	87	75	83	99	82	101
DPX R9674	.052	88	72	79	93	81	97
DPX R9674	.070	86	71	77	96	81	95
DPX E8698	.026	90	75	84	97	80	99
DPX E8698	.052	84	73	80	93	78	94
chlorsulfuron + metsulfuron-methyl	.018 + .004	87	74	82	96	77	96
chlorsulfuron + metsulfuron-methyl	.035 + .069	83	73	79	90	73	85
metsulfuron-methyl	.018	87	74	80	88	72	83
trisulfuron	.018	91	77	81	100	83	94
Check	0	92	80	84	102	88	102
$LSD_{0.05}$		2.9	3.4	3.6	n.s.	2.1	3.9
$LSD_{0.01}$		3.9	4.5	4.8	n.s.	3.0	5.2

Table 2. Grain yield of spring cereals treated with sulfonylurea herbicides.

Herbicide	Rate	Grain yield					
		Owens wheat	Dirkwin wheat	Kombar barley	Steptoe barley	Cayuse oats	Otana oats
	(kg ai/ha)	(kg/ha)					
DPX M6316	.026	5578	7123	5161	4785	5699	6057
DPX M6316	.052	5443	7325	5215	4677	6164	6559
DPX M6316	.070	5914	7258	5430	4946	5985	5914
DPX L5300	.018	5846	7123	5376	4623	5770	5770
DPX L5300	.035	5645	6787	5268	4731	5555	6021
DPX L5300	.070	5510	6787	5160	4462	5197	5806
DPX R9674	.026	5846	7190	5484	4516	5985	6415
DPX R9674	.052	5309	6720	5215	4570	5591	6093
DPX R9674	.070	5309	6653	5268	4623	5555	5842
DPX E8698	.026	6115	6922	5322	4892	5770	5914
DPX E8698	.052	5309	6720	5215	4785	5233	5591
chlorsulfuron + metsulfuron-methyl	.018 + .004	5846	7056	5322	4355	5448	5878
chlorsulfuron + metsulfuron-methyl	.035 + .069	5040	6518	5215	4247	5197	5555
metsulfuron-methyl	.018	5578	6720	4838	4301	4767	5125
trisulfuron	.018	5981	7325	5107	4516	6021	5949
Check	0	6451	7526	5376	4946	5878	6308
$LSD_{0.05}$		743	n.s.	n.s.	n.s.	593	661
$LSD_{0.01}$		989	n.s.	n.s.	n.s.	791	n.s.

Broadleaf weed control in barley with clopyralid and fluroxypyr alone or in combinations. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of clopyralid and fluroxypyr alone or in combination with other herbicides for broadleaf weed control in barley. Barley (var. Steptoe) was seeded in a sandy loam soil (72% sand, 15% silt and 13% clay) with 1.0% organic matter and a 7.7 pH March 12, 1986. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1 to 2 inch kochia and common lambsquarters and 4-leaf barley April 29, 1986 (air temp. 74 F, relative humidity 40%, wind calm, sky partly cloudy and soil temp. - 0 inch 90 F, 2 inch 72 F and 4 inch 65 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made May 22, barley height measured July 2 and plots harvested July 17, 1986. Common lambsquarters (CHEAL) infestations were moderate and kochia (KCHSC) infestations light but uniform throughout two replications of the experiment.

No treatment reduced barley stand; however, several treatments injured barley 2 to 15%. Greatest barley injury was observed with dicamba at 0.125 lb/A and the injury was reflected in shortened plants. Barley yields were 3.2 to 17.8 bu/A higher in herbicide treated compared to untreated plots and generally related to weed control. Common lambsquarters control was 93% or greater with all treatments except clopyralid or fluroxypyr alone or in combination with each other and kochia control 90% or greater with all treatments except clopyralid at 0.09 and 0.125 lb/A or fluroxypyr at 0.063 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1444.)

Broadleaf weed control in barley

Treatment[1]	Rate lb ai/A	Barley[2] injury %	stand red %	height inch	yield bu/A	Control[3] CHEAL %	KCHSC %
clopyralid	0.09	0	0	37	81.8	30	15
clopyralid	0.125	0	0	37	81.8	53	15
clopyralid + bromoxynil (2E)	0.09 + 0.25	0	0	36	89.9	98	92
clopyralid + bromoxynil	0.125 + 0.25	0	0	37	90.7	100	95
XRM-4896	0.55	0	0	36	88.3	100	95
XRM-4896	0.65	0	0	36	92.3	100	100
clopyralid + chlorsulfuron	0.09 + 0.01	2	0	36	89.1	99	95
clopyralid + chlorsulfuron	0.125 + 0.01	2	0	36	89.1	99	95
fluroxypyr	0.063	0	0	36	81.8	10	75
fluroxypyr	0.125	0	0	36	84.2	13	92
fluroxypyr	0.187	3	0	36	83.4	15	97
fluroxypyr	0.25	6	0	35	84.2	13	97
fluroxypyr + bromoxynil	0.125 + 0.25	2	0	35	90.7	100	100
fluroxypyr + bromoxynil	0.25 + 0.25	2	0	35	90.7	100	100
fluroxypyr + chlorsulfuron	0.125 + 0.01	2	0	37	96.4	98	97
fluroxypyr + chlorsulfuron	0.25 + 0.01	4	0	37	94.0	100	100
fluroxypyr + chlorsulfuron + bromoxynil	0.125 + 0.01 + 0.25	3	0	37	92.3	99	100
fluroxypyr + chlorsulfuron + bromoxynil	0.25 + 0.01 + 0.25	4	0	36	92.3	100	100
clopyralid + fluroxypyr	0.09 + 0.125	0	0	37	84.2	65	90
clopyralid + fluroxypyr	0.125 + 0.25	0	0	36	84.2	72	95
clopyralid + fluroxypyr + bromoxynil	0.09 + 0.125 + 0.25	0	0	36	89.9	100	100
clopyralid + fluroxypyr + + bromoxynil	0.125 + 0.25 0.25	5	0	36	89.9	100	100
clopyralid + fluroxypyr + chlorsulfuron	0.09 + 0.125 + 0.01	0	0	37	89.9	100	100
clopyralid + fluroxypyr + chlorsulfuron	0.125 + 0.25 + 0.01	5	0	35	89.9	100	100
bromoxynil	0.375	0	0	37	94.0	100	92
bromoxynil + MCPA (2 + 2)	0.25 + 0.25	0	0	37	93.2	97	95
dicamba	0.125	15	0	32	92.3	93	95
weedy check	-----	0	0	36	78.6	0	0

[1] Treatments applied April 29, 1986
[2] Barley injury and stand reduction visually evaluated May 22, plant height measured July 2 and plots harvested July 17, 1986
[3] Weed control visually evaluated May 22, 1986

Evaluation of herbicides for weed control in barley. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate broadleaf weed control and barley tolerance with several experimental herbicides. Barley (var. Steptoe) was seeded in a sandy loam soil (72% sand, 15% silt and 13% clay) with 1.0% organic matter and a 7.7 pH March 12, 1986. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 0.5 to 1.5 inch kochia, 1 to 2 inch common lambsquarters, emerging hairy nightshade and 4-leaf barley April 29, 1986 (air temp. 69 F, relative humidity 43%, wind SW 5 mph, sky partly cloudy and soil temp. - 0 inch 89 F, 2 inch 71 F and 4 inch 63 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made May 22, barley height measured July 2 and plots harvested July 17, 1986. Kochia (KCHSC) and hairy nightshade (SOLSA) infestations were light and common lambsquarters (CHEAL) infestations moderate throughout the experimental area.

No treatment reduced barley stand; however, several treatments injured barley slightly (2 to 8%). Dicamba injury to barley was reflected in a 4 to 6 inch height reduction compared to the untreated control. Barley yields generally related to weed control and/or crop injury. Broad-spectrum weed control was good (all species controlled 90% or greater) with treatments containing dicamba. SC-0098 at 0.063 and 0.125 lb/A provided 90% or greater control of kochia and common lambsquarters but only 70 to 80% control of hairy nightshade. SC-0735 at 0.063 to 0.25 lb/A provided 95% or greater control of common lambsquarters and hairy nightshade but only 73 to 77% control of kochia. SC-0051 at rates of 0.125 to 0.5 lb/A provided less than 90% control of all weed species. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1441.)

Broadleaf weed control in barley

Treatment[1]	Rate lb ai/A	Barley[2] injury %	stand red %	height inch	yield bu/A	Control[3] KCHSC %	CHEAL %	SOLSA %
SC-0051	0.125	0	0	32	79.4	27	17	60
SC-0051	0.25	0	0	35	82.6	68	73	83
SC-0051	0.5	0	0	35	82.6	73	73	83
SC-0051 + R-29148	0.5 + 0.25	0	0	35	84.3	75	72	85
SC-0735	0.063	0	0	35	84.3	77	95	99
SC-0735	0.125	0	0	35	85.9	73	100	98
SC-0735	0.25	0	0	36	85.1	82	99	99
SC-0735 + R-29148	0.25 + 0.25	0	0	35	82.6	83	100	100
SC-0098	0.031	0	0	35	86.7	85	83	70
SC-0098	0.063	2	0	35	83.4	90	100	70
SC-0098	0.125	3	0	35	83.4	97	100	80
dicamba + MCPA	0.063 + 0.25	3	0	31	90.7	92	97	98
dicamba + MCPA	0.125 + 0.25	8	0	29	83.4	98	100	100
dicamba + metsulfuron	0.063 + 0.0038	3	0	31	92.3	92	95	97
dicamba + CGA-131036	0.063 + 0.01	3	0	31	90.7	90	98	98
dicamba + CGA-131036	0.125 + 0.01	7	0	29	87.5	100	99	100
weedy check	------------	0	0	35	76.2	0	0	0

[1]Treatments applied April 29, 1986
[2]Barley injury and stand reduction visually evaluated May 22, plant height measured July 2 and plots harvested July 17, 1986
[3]Weed control visually evaluated May 22, 1986

Broadleaf weed control in barley. Miller, S.D. and J. Lauer. Research plots were established at the Powell Research and Extension Center, Powell, WY to evaluate the efficacy of herbicide treatments for broadleaf weed control in barley. Barley (var. Moravian III) was seeded in a clay loam soil (47% sand, 27% silt and 26% clay) with 1.6% organic matter and a 7.9 pH April 15, 1986. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1 to 2 inch wild buckwheat, 1 to 3 inch common lambsquarters, 4 to 6 inch wild mustard and 4 to 5-leaf barley May 28, 1986 (air temp. 85 F, relative humidity 15%, wind calm, sky clear and soil temp. - 0 inch 95 F, 2 inch 80 F and 4 inch 78 F). Plots were established under furrow irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control, crop damage, and plant height measurements were made June 26, 1986. Weed infestations were heavy and uniform throughout the experimental area.

No treatment reduced barley stand; however, dicamba combinations with 2,4-D and thiameturon injured barley 7 and 13%; respectively. Common lambsquarters control was 90% or greater with all treatments except clopyralid, clopyralid combinations with fluroxypyr or dicamba; wild buckwheat control was 80% or greater with all treatments except DPX-L5300, DPX-R9674 or thiameturon and wild mustard control 80% or greater with all treatments except clopyralid or dicamba. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1432.)

Broadleaf weed control in barley

Treatment[1]	Rate lb ai/A	Barley[2] injury %	stand red %	height inch	Control[3] CHEAL %	POLCO %	SINAR %
DPX-L5300 + X-77	0.008	0	0	26	99	3	100
DPX-L5300 + X-77	0.016	0	0	27	100	17	100
DPX-R9674 + X-77	0.008	0	0	27	99	0	99
DPX-R9674 + X-77	0.016	0	0	27	100	40	100
thiameturon + X-77	0.008	0	0	27	90	53	88
thiameturon + X-77	0.016	0	0	26	96	57	91
DPX-L5300 + bromoxynil (4E) + X-77	0.008 + 0.25	0	0	27	100	87	100
DPX-R9674 + bromoxynil + X-77	0.008 + 0.25	0	0	26	100	82	100
clopyralid	0.125	0	0	27	42	96	27
clopyralid + 2,4-D (PM)	0.125 + 0.5	0	0	27	95	95	97
clopyralid + bromoxynil	0.125 + 0.25	0	0	26	97	97	83
clopyralid + fluroxypyr	0.125 + 0.125	0	0	27	70	95	88
bromoxynil	0.375	0	0	26	95	80	87
dicamba	0.125	0	0	28	70	82	73
dicamba + 2,4-D	0.062 + 0.375	7	0	25	99	82	100
dicamba + thiameturon + X-77	0.062 + 0.008	13	0	24	98	95	96
weedy check	-------------	0	0	27	0	0	0

[1] Treatments applied May 28, 1986; X-77 applied at 0.25% v/v and PM = package mix
[2] Barley injury and stand reduction visually evaluated and plant height measured June 26, 1986
[3] Weed control visually evaluated June 26, 1986

Mayweed chamomile control in small grains in northern Idaho. Lish, J. M., D. C. Thill, and S. P. Yenne. Mayweed chamomile (ANTCO) control was evaluated in 'Steptoe' spring barley and 'Stephens' winter wheat. Herbicides were applied with a CO_2 pressurized sprayer at 20 gpa and 40 psi. The experiments were designed as a randomized complete block with four replications and plot size was 10 by 30 ft. The spring barley was treated on June 5 except for the SC0051 which was applied on June 6. Application data is in Table 1. Mayweed chamomile was evaluated in wheat on July 1. The wheat grain was not harvested due to injury from a broadcast treatment of difenzoquat at 1.0 lb a.i./a for wild oat control. Mayweed chamomile, common lambsquarters (CHEAL), and crop injury were evaluated in barley on June 30 and grain was harvested with a small plot combine on August 14.

Table 1. Application data for mayweed chamomile control in small grains

Crop	Spring barley		Winter wheat
Location	Moscow		Winchester
Date	6/5/86	6/6/86	4/8/86
Air temperature (F)	68	63	60
Soil temperature, 2 in (F)	64	62	52
Relative humidity (%)	50	50	65
Wind (mph)	0	0-2	1-3
Dew	none	light	none
Soil pH	5.3		5.3
Organic matter (%)	3.4		4.3
CEC (meg/100g)	16.5		21.4
Texture	silt		silt

Mayweed chamomile control in wheat was excellent with all treatments except CGA 131036 applied at rates under 0.25 oz a.i./a (Table 2). However, those treatments controlled at least 86% of the mayweed chamomile. Mayweed chamomile control in barley was good to excellent with SC0051, DPXR9674, and bromoxynil combinations (Table 3). Common lambsquarters control was good to excellent with all treatments. SC0051 at 1.0 a.i./a injured 15% of the barley compared to the untreated check. Barley treated with SC0098 was chlorotic 2 to 10 days after treatment, but the barley recovered by June 30. Chlorosis on barley treated with SC0098 + crop oil concentrate (COC) was more severe and appeared earlier than SC0098 applied alone. Barley grain yield was lower than the untreated check with SC0098 + COC (1.0 lb a.i./a + 0.15% v/v) and SC0051 + Tween 20 (1.0 lb a.i./a + 0.5% v/v). (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Mayweed chamomile control in winter wheat

Treatment[1]	Formulation	Rate[2]	ANTCO control
		(oz ai/A)	(% of check)
CGA131036	75 DF	0.063	86
chlorsulfuron	75 DF	0.063	100
DPXR9674	75 DF	0.063	94
CGA131036	75 DP	0.13	89
chlorsulfuron	75 DF	0.13	100
DPXR9674	75 DF	0.13	99
CGA131036	75 WP	0.188	88
chlorsulfuron	75 DF	0.188	100
DPXR9674	75 DF	0.188	98
CGA131036	75 DF	0.25	91
chlorsulfuron	75 DF	0.25	100
DPXR9674	75 DF	0.25	100
DPXG8311	75 DF	0.25	100
bromoxynil + chlorsulfuron	2 EC + 75 DF	0.25 + 0.25	100
bromoxynil + chlorsulfuron	2 EC + 75 DF	0.25 + 0.25	100
bromoxynil + DPXR9674	2 EC + 75 DF	0.25 + 0.25	100
bromoxynil + chlorsulfuron	2 EC + 75 DF	0.19 + 0.25	100
bromoxynil + DPXG8311	2 EC + 75 DF	0.19 + 0.25	100
bromoxynil + DPXR9674	2 EC + 75 DF	0.19 + 0.25	100
LSD (0.05)			5
plants/sq ft			20

[1]All treatments, except those containing bromoxynil, were applied with nonionic surfactant, R-11, at 0.25% v/v.
[2]Rate of application for bromoxynil is expressed in lb ai/A.

Table 3. Mayweed chamomile and common lambsquarters control in spring barley

Treatment	Formulation	Rate	Time applied	Crop injury	Weed control ANTCO	Weed control CHEAL	Grain yield
		(lb ai/a)[1]		---(% of check)----			(lb/a)
check	--	0	--	0	0	0	3222
SC0051+Tween20	3 EC+SF	0.25+0.5	June 5	0	80	98	3096
SC0051+Tween20	3 EC+SF	0.5+0.5	June 5	15	99	100	2531
SC0051+Tween20	3 EC+SF	1.0+0.5	June 5	0	100	100	2000
SC0098+COC	1.7EC+SF	0.5+0.15	June 6	2	48	92	2532
SC0098+COC	1.7EC+SF	1.0+0.15	June 6	0	66	96	2174
SC0098	1.7EC	0.5	June 6	0	48	90	2874
SC0098	1.7EC	1.0	June 6	5	54	95	2948
SC0098	1.7EC	2.0	June 6	0	79	96	2761
bromoxynil/MCPA	3 EC	0.38	June 5	0	96	100	2990
DPXR9674+R11	75 DF	0.008+0.25	June 5	0	95	90	3143
DPXR9674+R11	75 DF+SF	0.016+0.25	June 5	0	99	94	3360
DPXR9674+R11	75 DF+SF	0.031+0.25	June 5	0	98	99	2858
DPXR9674+bromoxynil	75 DF+4 E	0.008+0.25	June 5	0	98	100	3138
DPXR9674+bromoxynil	75 DF+4 EC	0.008+0.19	June 5	2	96	100	2876
DPXR9674+bromoxynil	75 DF+4 EC	0.012+0.29	June 5	0	96	99	2921
CGA131036+R11	75 WP+SF	0.012+0.25	June 5	0	60	89	2570
CGA131036+bromoxynil	75 WP+4 EC	0.012+0.19	June 5	0	95	99	3102
LSD (0.05)				5	17	5	983
plants/sq ft				-	13	5	-

[1]Tween20 (surfactant) and Moract (COC) rates are expressed as % v/v.

Broadleaf weed control in spring barley in Fremont County. Dial M. J., J. M. Lish, D. C. Thill and T. J. Herrman. Broadleaf weed control with seven herbicide treatments was visually evaluated in spring barley at three locations in Fremont County, Idaho during 1986. The treatments were applied at 20 gpa with a CO_2 pressurized backpack sprayer at 45 psi and 3 mph. The treatments were replicated four times in a randomized complete block design at each location. The plots were 10 by 30 ft. Soil type was a silt loam with a range of 5.4 to 5.8 pH, 2.1 to 3.3% organic matter, and 9.7 to 12.8 meq/100g CEC at the three locations. The plots were harvested on September 17 with a small plot combine. Application dates and weather data are summarized in Table 1.

Table 1. Application and weather data

Location	1	2	3
Date of application	June 21	June 23	June 21
Air temperature(F)	70	70	70
Soil temperature at 2 in(F)	65	65	70
Relative humidity(%)	40	40	40
Cloud cover(%)	0	50	0
Dew	none	none	none
Crop variety (spring barley)	Morex	Klages	Klages

Location two and three had sufficient densities of corn spurry (SPRAR) to visually estimate percent control (Table 2). The DPX herbicides controlled 70% or more of the corn spurry at both locations. Control of corn spurry was 50% or less with metribuzin, 2,4-D and bromoxynil suggesting that these herbicides are not suitable for corn spurry control in Fremont County. The control of cow cockle (VAAPY), shepherdspurse (CAPBP), redroot pigweed (AMARE), and corn cockle (AGOGI) were also evaluated (Table 2). The DPX compounds tended to control these broadleaf weeds better than metribuzin, 2,4-D, or bromoxynil (Table 2). DPXL5300 did not control redroot pigweed as well as the other DPX compounds, but its control was similar to 2,4-D or bromoxynil.

There were no differences in grain yield among herbicide treatments at location one or two (Table 2). At location three, grain yield was increased slightly when the higher rate of DPXR9674 was applied to the barley. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 2. Grain yield of spring barley and percent control of accompanying weed species, using seven herbicide treatments at three locations in Fremont County

Treatment	Rate	Weed Control[1]								Seed Yield[2]		
		SPRAR		VAAPY		CAPBP	AMARE		AGOGI			
		Location[3]										
		2[4]	3	1	3	3	1	2	1	1	2	3
	(lb ai/a)	(% of check)								(bu/a)		
metribuzin	0.33	0	52	67	27	53	0	0	17	68	32	56
DPXL5300	0.0156	86	86	97	68	93	25	45	98	72	32	59
DPXM6316	0.0312	74	79	92	40	54	95	85	96	71	36	56
DPXR9674	0.0234	88	88	95	82	94	68	81	94	68	33	59
DPXR9674	0.0468	80	85	98	45	76	95	89	98	69	34	63
2,4-D	0.5	9	38	62	30	58	16	51	26	71	34	55
bromoxynil	0.38	20	40	88	51	64	31	13	58	68	29	54
check	-	-	-	-	-	-	-	-	-	70	35	52
LSD 0.05		11	25	NS	43	48	NS	27	30	NS	NS	NS
Weed density/ft^2		15	6	3	3	2	1	8		7		

[1] All locations were evaluated 7/23/86.

[2] Bushels per acre were determined by using either 48 lb/bu or 52 lb/bu, the standards for six row and two row barley, respectively.

[3] Locations were within a 10 square mile area.

[4] If a weed species was not present at a particular location, then the location was omitted from the table.

Canada thistle control in barley. Miller, S.D. A series of postemergence herbicide treatments were applied near Powell, WY, May 27, 1986 (air temp. 78 F, relative humidity 25%, wind W 5 mph, sky clear and soil temp. - 0 inch 95 F, 2 inch 80 F, and 4 inch 76 F) to Canada thistle in the rosette stage (1 to 6 inch tall) and barley (var. Moravian III) in the 4 to 5-leaf stage to evaluate weed control and crop tolerance. Plots were established under irrigation and were 9 by 40 ft. in size with three replications arranged in a randomized complete block. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (67% sand, 17% silt and 16% clay) with 2.1% organic matter and a 8.1 pH. Visual weed control evaluations were made June 25 and August 7, visual crop damage evaluations were made June 25 and plots harvested August 7, 1986. Canada thistle (CIRAR) infestations were moderate and uniform throughout the experimental area.

No injury or stand reduction was observed with any treatment. Barley yields were 9.5 to 19.3 bu/A higher in plots treated with clopyralid than in the untreated controls. Canada thistle suppression in barley was good (90% or greater) with all clopyralid treatments except when combined with 2,4-D. DPX-L5300, thiameturon, picloram plus 2,4-D or dicamba plus 2,4-D did not provide acceptable Canada thistle suppression in this trial. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1426.)

Canada thistle control in barley

		Barley[2]			CIRAR control[3]	
Treatment[1]	Rate lb ai/A	injury %	stand red %	yield bu/A	June %	August %
DPX-L5300 + X-77	0.03	0	0	82.3	27	48
thiameturon + X-77	0.03	0	0	80.4	17	27
clopyralid	0.125	0	0	95.1	87	91
clopyralid	0.25	0	0	99.7	90	92
clopyralid	0.5	0	0	97.9	97	95
clopyralid + bromoxynil (2E)	0.25 + 0.25	0	0	98.3	88	92
clopyralid + 2,4-D (PM)	0.125 + 0.5	0	0	89.5	70	78
picloram + 2,4-D	0.01 + 0.5	0	0	84.4	37	30
dicamba + 2,4-D	0.063 + 0.5	0	0	86.4	33	52
weedy check	-----------	0	0	80.4	0	0

[1]Treatments applied May 27, 1986; X-77 applied at 0.25% v/v and PM = package mix
[2]Barley injury and stand reduction visually evaluated June 25 and plots harvested August 7, 1986
[3]Canada thistle control visually evaluated June 25 and August 7, 1986

BAY FOE 3440 for selective wild oat control in spring barley. Rydrych, D.J. A trial was established in the spring of 1986 to compare the activity of four postemergence herbicides in spring barley. BAY FOE 3440, diclofop, difenzoquat, and AC 222293 were applied when wild oat (3 to 5 leaf) and spring barley (var. Steptoe) were in the seedling stage. Herbicides were applied on May 20, 1986 using 8002 nozzles in 20 GPA at 30 psi. There were 8 wild oat plants/ft^2 in the experimental area.

Weed control evaluations were made on July 31, 1986. Excellent wild oat control was obtained using either difenzoquat or AC 222293. Diclofop and BAY FOE 3440 gave very poor wild oat control. All compounds had excellent crop safety.

The failure of diclofop and BAY FOE 3440 to control wild oat may have been due to MCPA antagonism. Diclofop is known to be affected by phenoxy antagonism and BAY FOE 3440 may have the same problem. MCPA was applied for broadleaf weed control in the experimental area within one hour of the wild oat treatments. MCPA had little effect on the wild oat activity of difenzoquat or AC 222293. (Oregon State University, CBARC, Pendleton, OR 97801)

Wild oat control in spring barley--Elgin, Oregon, 1985

Treatment[1/]	Rate (lb/A)	Wild oat control R1	R2	R3	Avg.	Spring barley injury
diclofop	1.25	20	30	40	30	0
difenzoquat	.75	99	100	99	99	2
AC 222293	.75	90	99	99	96	3
AC 222293	.50	90	99	99	96	0
AC 222293	.33	60	85	90	78	0
BAY 3440	.54	25	40	70	45	0
BAY 3440	.27	20	30	50	33	0
BAY 3440	.18	20	50	30	33	0
control	---	0	0	0	0	0

1/ Treated - May 30, 1986, spring barley (Steptoe) - 4 to 5 leaf, wild oat - 3 to 5 leaf.

Treated with MCPA (.50 lb/A) on May 30, 1986 for broadleaf control.

Wild oats control in barley. Miller, S.D. and J. Lauer. Research plots were established at the Powell Research and Extension Center, Powell, WY to evaluate the efficacy of postemergence herbicide treatments for wild oats control in barley. Barley (var. Klages) was seeded in a clay loam soil (47% sand, 27% silt and 26% clay) with 1.4% organic matter and a 7.7 pH April 14, 1986. Treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 10 gpa at 40 psi to 1.5 to 4-leaf wild oats and 4 to 5-leaf barley May 28 (air temp. 78 F, relative humidity 20%, wind NW 5 mph, sky clear and soil temp. - 0 inch 85 F, 2 inch 78 F and 4 inch 78 F) and the second diclofop application in the split treatments applied to 2 to 6-leaf wild oats and 6 to 7-leaf barley June 7, 1986 (air temp. 90 F, relative humidity 15%, wind calm, sky clear and soil temp. - 0 inch 96 F, 2 inch 90 F and 4 inch 85 F). Plots were established under furrow irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made July 22 and plots harvested August 6, 1986. Wild oats (AVEFA) infestations were heavy and uniform throughout the experimental area.

No injury or stand reduction was observed with any treatment. Barley yields were 5.6 to 27.3 bu/A higher in herbicide treated compared to untreated plots and related closely to level of wild oats control. Wild oats control was excellent (93% or greater) with AC-222,293 alone or in combination with bromoxynil and fair (80%) with difenzoquat. The only diclofop treatment providing fair (78%) wild oats control was the split application with oil concentrate. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1433 .)

Wild oats control in barley

Treatment[1]	Rate lb ai/A	Barley[2] injury %	Barley[2] stand red %	Barley[2] yield bu/A	Control[3] AVEFA %
AC-222,293 + X-77	0.37	0	0	82.5	93
AC-222,293 + X-77	0.5	0	0	82.5	96
AC-222,293 + bromoxynil (4E) + X-77	0.37 + 0.5	0	0	84.3	95
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	0	0	84.9	95
difenzoquat	1.0	0	0	80.6	80
diclofop	0.75	0	0	64.5	27
diclofop + oc	0.75	0	0	66.3	33
diclofop + bromoxynil + MCPA (PM)	0.75 + 0.25 + 0.045	0	0	65.1	15
diclofop + bromoxynil + MCPA	0.75 + 0.25 + 0.045	0	0	64.5	20
diclofop + bromoxynil	0.75 + 0.25	0	0	63.2	27
diclofop + thiameturon	0.75 + 0.016	0	0	64.5	27
diclofop/diclofop (10 days)	0.37/0.37	0	0	68.8	62
diclofop + oc/diclofop + oc (10 days)	0.37/0.37	0	0	71.3	78
weedy check	---------	0	0	57.6	0

[1]Treatments applied May 28 and June 7, 1986; X-77 applied at 0.25% v/v, OC = At Plus 411 F at 1 pt/A and PM = package mixture

[2]Barley injury and stand reduction visually evaluated July 22 and plots harvested August 6, 1986

[3]Wild oats control visually evaluated July 22, 1986

Timing of difenzoquat application for wild oat control in small-grain cereals. Sattler, C. A., S. P. Yenne, and D. C. Thill. Two field experiments were established to compare wild oat (AVEFA) control with difenzoquat applied at different wild oat growth stages. The experiments were established in winter barley near Lewiston, Idaho and winter wheat (var. Stephens) near Deary, Idaho. A randomized complete block design with four replications was used for both experiments. Plots were 10 by 30 ft. Treatments were applied with a CO_2 pressurized sprayer calibrated to deliver 10 gpa at 40 psi and 3 mph. Application and edaphic information are in Table 1. The winter barley plots were evaluated July 1 for wild oat control, but were not harvested due to a high wild oat population and poor crop stand. Wild oat control in the winter wheat was evaluated July 9 and grain was harvested with a small plot combine in August.

Table 1. Application and edaphic data

	Barley			Wheat		
Treatment date	4/8	4/15	5/1	5/15	5/23	5/29
Wild oat leaf stage	3-4	5	6-8	3	4-5	6-8
Method of application		broadcast			broadcast	
Air temperature (F)	70	58	69	53	51	80
Soil temp. (F, 2 in)	66	58	69	60	48	78
Relative humidity (%)	48	62	55	44	75	58
Cloud cover (%)	0	100	80	100	50	0
Wind (mph)	0-3	3-5	0	2-4	4-6	1-3
Soil type		silt loam			silt loam	
Organic matter (%)		2.8			3.4	
pH		6.1			5.3	
CEC (meq/100 g soil)		20.5			16.9	

Only diclofop effectively controlled wild oat in the winter barley (Table 2). Difenzoquat applied with Moract, a crop oil concentrate, at the 3 leaf stage and difenzoquat alone applied at the 4 to 5 leaf stage of wild oat were the only treatments to control more than 80% of the wild oat in the winter wheat (Table 2). Yields were higher than the check with all herbicide treatments except the difenzoquat applied at the 6 to 8 leaf stage. (Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Wild oat control in winter barley and winter wheat

Treatment	Rate	Leaf stage	Barley Control	Wheat Control	Wheat Yield
	(lb ai/a)		(%)	(%)	(bu/a)
check	0.00	-	-	-	26
difenzoquat	1.00	3	52	62	32
difenzoquat + Moract[1]	1.00 + 1.25	3	55	81	33
difenzoquat	1.00	4 to 5	42	82	31
difenzoquat	1.00	6 to 8	61	61	27
AC 222,293	0.47	3	48	76	32
diclofop	1.00	3	89	32	33
LSD (0.05)			16	22	4

[1] Equivalent to 1 pt/a

Days after seeding and application of diclofop for wild oat control. Dial, M. J., D. C. Thill, and S. P. Yenne. Control of wild oat (AVEFA) was visually estimated after treatments of diclofop were applied at 18, 23, 27, and 30 days after seeding spring barley. AC222293 + R-11 also was applied as a treatment on May 29 for comparison. All treatments were applied with a CO_2 pressurized sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. The entire plot area was sprayed on May 29 with DPXM6316 + R-11 at 0.375 oz ai/a and 0.25 % v/v, respectively, to control broadleaf weeds. The study was designed as a randomized complete block with four replications. Wild oat control was evaluated on June 9. The plot area was commercially harvested before grain yield samples could be collected. Application and weather data are in Table 1.

Table 1. Application and weather data

Date applied	May 5	May 7	May 11	May 15	May 29
Growth stage of wild oat	pre[1]	pre	pre	pre	1-3 lf
Air temperature(F)	59	44	47	59	68
Soil temperature at 2 in(F)	55	53	55	62	72
Relative humidity(%)	73	80	60	30	88
Cloud cover(%)	100	100	75	50	0
Wind(mph)	2	3	5	4	1

[1] Preemergence to wild oat.

Diclofop at 0.75 or 1.0 lb ai/a did not control wild oat when applied 18 days after seeding (Table 2). The 1.0 lb ai/a rate controlled 90% of the wild oat compared to the check at 23 days after seeding while the 0.75 lb ai/a rate did not effectively control wild oat. Both the 27 and 30 day applications of diclofop controlled wild oat (Table 2). There was no difference in wild oat control among the following treatments; AC222293 and diclofop applied 23, 27, and 30 days after seeding at 1.0 lb ai/a or diclofop applied at 0.75 lb ai/a at 27 and 30 days after treatment. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Control of wild oat with diclofop applications 18, 23, 27, and 30 days after seeding spring barley

		Days after seeding[1]			
Treatment	Rate	18	23	27	30
	(lb ai/a)	----------(% of check)---------			
diclofop	0.75	66	69	89	93
diclofop	1.00	46	90	94	97
AC222293 + R-11[2]	0.47+ 0.25% v/v	-	-	-	97
check	-	-	-	-	-
LSD (0.05)			ns		

1 Plots were evaluated for wild oat control June 9.
2 Growth stage of the crop was two to four leaf and and wild oat was in the one to two leaf stage.

Wild oat control in no-tillage spring barley in southeastern Idaho. Lish, J. M. and D. C. Thill. Wild oat (AVEFA) is the major weed problem in southeastern Idaho small grains. Triallate has been used traditionally in conventional tillage systems, but it requires incorporation thus limiting its use in reduced tillage systems. Three experiments were established to evaluate wild oat control with a pre-emergence and several postemergence applied herbicides in no-tillage spring barley. Fall and spring applied herbicides were compared in sprinkler irrigated 'Steptoe' barley. Granular herbicides were applied with a 5 ft Gandy spreader and liquids were applied with a CO_2 pressurized plot sprayer at 10 gpa and 42 psi. The experiment was a randomized complete block design with four replications and plots were 15 by 50 ft. A split plot experiment was established at two locations to evaluate granular triallate, diclofop, AC222,293, and difenzoquat for wild oat control. Granular triallate at 0 and 1.25 lb ai/a were the main plots and diclofop at 1 lb ai/a, difenzoquat at 1 lb ai/a, AC222,293 at 0.5 lb ai/a, and a no postemergence herbicide treatment were the subplots. Plots were 15 by 30 ft at the 'Karla' barley location and 13 by 25 ft at the 'Gustoe' barley location. Herbicides were applied in dryland 'Karla' barley the same as in the previous experiment. Granular triallate was banded between the rows with a no-till drill and was incorporated with a tine-toothed harrow at the sprinkler irrigated 'Gustoe' barley location. 'Steptoe' barley was evaluated visually in June and September and harvested on September 16. 'Karla' and 'Gustoe' were evaluated visually and height, tillers, and biomass were measured for barley and wild oat. 'Karla' was harvested September 16. Wild oat seed was separated from grain to determine the level of contamination.

Wild oat control was acceptable only with difenzoquat, diclofop, and AC222,293 applied at the 2 to 3 lf stage of wild oat in 'Steptoe' barley (Table 2). However, only diclofop and AC222,293 reduced wild oat contamination in grain compared to the untreated check. Plots treated with granular triallate applied preplant surface (PPS), difenzoquat, diclofop, and AC222,293 all yielded higher than the untreated plots.

Wild oat was shorter in 'Karla' barley treated with postemergence herbicides than barley that was not treated with postemergence herbicides (Table 3). Triallate did not decrease wild oat height. There were no effects on any of the other parameters measured except that wild oat was controlled with all herbicides.

'Gustoe' barley was 6 cm shorter in plots treated with triallate compared to those receiving no triallate (Table 4). The trend was the same for barley tiller number and biomass. Wild oat was shortest with AC222,293. Diclofop and difenzoquat treated wild oat was shorter than wild oat receiving no postemergence herbicide. Triallate did not affect wild oat height. All other parameters measured were not affected by herbicide treatment. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Environmental data for wild oat control in no-tillage spring barley

Variety	Type of application	Date	Air temp. (F)	Soil temp, 2 in (F)	Relative humidity (%)	Soil pH	Soil CEC (meq)	Soil OM (%)	Soil Text.
Steptoe	Fall	10/29/85	41	44	50	7.6	19	3.4	Loam
	PPS	5/ 6/86	40	41	90				
	PPS	5/ 7/86	42	42	70				
	1-3 lf	6/10/86	41	49	92				
	4 lf	6/24/86	74	70	78				
Karla	triallate	5/ 8/86	39	39	92	7.6	17	2.6	Silt loam
	diclofop, AC222,293	5/19/86	-	-	-				
	difenzoquat	5/23/86	67	60	85				
Gustoe	triallate	5/20/86	-	-	-	7.5	18	2.9	Loam
	diclofop, AC222,293	6/ 6/86	68	60	30				
	difenzoquat	6/10/86	47	48	80				

Table 2. Granular and postemergence herbicide wild oat control in spring barley, in Caribou County, Idaho

Treatment	Rate	Time of application	Wild oat control June	Wild oat control September	Wild oat[1] seed	Grain[2] yield
	(lb ai/a)		-(% of check)--		(lb/a)	(lb/a)
check	0	-	-	-	40	3340
triallate G	1.25	fall	29	39	34	3853
triallate G	1.25	PPS	56	53	25	4208
difenzoquat	1.00	3-5 lf	95	94	27	4494
diclofop	1.00	2-4 lf	92	90	14	4905
trifluralin G	0.5	fall	18	0	54	3366
trifluralin G	0.5	PPS	23	16	49	3475
AC222293	0.47	2-3 lf	99	99	4	4745
AC222293	0.47	PPS	84	69	51	4125
triallate WS	1.25	PPS	19	10	42	3856
triallate G+ trifluralin G	1.25+ 0.5	fall	38	28	35	3925
triallate G+ trifluralin G	1.25+ 0.5	PPS	53	25	27	4423
LSD (0.05)			33	33	22	629

[1]After cleaning
[2]Wild oat free grain yield

Table 3. Granular triallate and postemergence wild oat herbicide effects on wild oat and no-till 'Karla' barley

Treatment	Wild oat Height (in)	Tiller (no)	Biomass (oz)	Visual (%)	Seed weight (oz)	'Karla' barley Height (in)	Tiller (no)	Biomass (oz)	Grain yield (bu/a)
check	28	4.6	0.23	40	1.0	23	88	4.5	37
diclofop	20	3.1	1.55	89	0.3	24	104	5.3	37
AC222,293	13	1.1	0.42	93	0.7	23	88	4.3	33
difenzoquat	17	0.4	0.01	85	1.0	23	87	4.5	36
LSD (0.05)	5	ns	ns	9	ns	ns	ns	ns	ns
triallate	22	0.8	0.04	88	1.2	23	94	4.7	36
no triallate	17	3.9	0.18	63	0.3	23	90	4.5	36
LSD (0.05)	ns	ns	ns	6	ns	ns	ns	ns	ns

Table 4. Granular triallate and postemergence wild oat herbicide effects on 'Gustoe' notill barley

Treatment	Wild oat Height (in)	Tiller (no)	Biomass (oz)	'Gustoe' barley Height (in)	Tiller (no)	Biomass (oz)
check	41	87	0.15	26	86	5.4
diclofop	24	92	0.03	26	92	5.9
AC222,293	6	99	0	27	99	6.0
difenzoquat	20	100	0	28	100	5.8
LSD (0.05)	10	ns	ns	ns	ns	ns
triallate	24	88	0.1	25	88	5.1
no triallate	22	101	6.4	28	101	6.4
LSD (0.05)	ns	ns	ns	1	ns	ns

Barley no-till weed management trial Riverside county - 1986. Cudney, D. W. and A. Baameur. Barley is one of the major agronomic crops in Riverside county (over 25,000 acres). Dryland growers are faced with the need to reduce production costs and conserve soil moisture. One of the procedures that has been proposed is conservation or reduced tillage. The following trial was established in an effort to assess the effects of this cultural method on weed control and barley yield.

The trial was established on the Frank Enders farm in the dryland grain production area of western Riverside county. The trial was established in volunteer barley. The field was drill planted January 15 using a "Haybuster" no-till drill. The plots consisted of the following treatments: Glyphosate applied at .25 lbs ai/A prior to planting; glyphosate applied at .5 lbs ai/A prior to planting; glyphosate plus dicamba at .25 plus .25 lbs ai/A prior to planting; glyphosate plus 2,4-D at .25 plus 1.0 lbs ai/A prior to planting; paraquat at .5 lbs ai/A prior to planting; and a check. The check consisted of barley drill planted into a clean tilled seedbed as is the normal practice for the area. The tilled, treatment also consisted of barley drill planted into a clean tilled seedbed as is the normal practice for the area.

All chemical treatments were applied with a backpack plot sprayer on December 31, 1986. A spray volume of 30 gallons/A was used. The plots were 30-feet long and 13-feet wide. Ratings and weed counts were made on January 23, 1986. A second rating was made on April 10, 1986. The plots were harvested on June 16, 1986. Plant height, seed weight and yield measurements were made.

The highest volunteer barley control was attained in the paraquat-treated plots. However, all chemical treatments gave significantly higher control when compared to the check (Tables 1 and 2).

Black mustard control was best for paraquat, tilled, glyphosate plus 2,4-D combination, and glyphosate at .5 lbs/A. Intermediate in control were the glyphosate plus dicamba combination and glyphosate at .25 lbs ai/A (Table 1).

Height of barley was similar in all plots except for the tilled and the check plots which were shorter in stature. Seed weight was not significantly affected by treatment (Table 2). Yield was not significantly different for any of the treatments. There was a trend for higher yield from the treatments which gave the best weed control compared to the tilled plots. The check plots had a yield boost from the volunteer barley. The check plots were difficult to harvest and clean due to weed overgrowth and foreign debris. (University of California Cooperative Extension, Riverside, CA 92521)

Table 1. Control of black mustard and volunteer barley

		Visual evaluation - control[1]				Weed count[2]	
Treatment*	Rate lbs ai/A	Mustard 1/23/86	Barley 1/23/86	Mustard 4/10/86	Barley 4/10/86	Mustard 1/23/86	Barley 1/23/86
paraquat	0.5	10.0 A[3]	10.0 A	9.5 A	10.0 A	0.0 D	0.0 B
tilled	---	10.0 A	10.0 A	10.0 A	10.0 A	0.0 D	0.0 B
glyphosate + 2,4-D	0.25 + 0.25	8.9 AB	8.6 C	10.0 A	9.9 A	2.8 CD	4.8 B
glyphosate	0.5	8.4 BC	10.0 A	9.2 A	10.0 A	3.5 ED	0.0 B
glyphosate + dicamba	0.25 + 0.25	7.4 C	8.6 C	8.0 B	8.6 B	6.0 BC	3.5 B
glyphosate	0.25	7.2 C	9.3 B	7.1 B	9.8 A	9.2 AB	4.0 B
check	---	0.0 D	0.0 D	0.0 C	0.0 C	13.8 A	5.9 A

1. Rate: 0=No Control, 10=Complete Control.
2. Black mustard and volunteer barley plant/3 sq. ft.
3. Means followed by the same letter(s) are not significantly different. (.05)

* Average of four replications

Table 2. Yield and yield components' response to weed control

Treatment*	Rate lbs ai/A	Yield lb/acre	Seed weight gm/1000 seeds	Plant height (cm)
paraquat	0.5	1850	30.23	74.25
tilled	---	1407	31.66	71.50
glyphosate + 2,4-D	0.25 + 1.0	1680	31.77	69.00
glyphosate	0.5	1487	31.13	71.50
glyphosate + dicamba	0.25 + 0.25	1467	29.66	72.25
glyphosate	0.25	1402	29.34	75.25
Check	---	1637	32.39	64.25
LSD (.05)		N.S.	N.S.	N.S.

* Average of four replications.

Evaluation of postemergence herbicides in wheat. Mitich, L.W., T.E. Kearny, M.S. Duey. This trial was established on June 9, 1986 in Yolo County to evaluate efficacy and crop phytotoxicity of herbicides in wheat. 'Yolo' wheat was planted June 9 on the A.H. Romenger ranch in Sehorn clay soil. Herbicides were applied on January 10, 1986, with a CO_2 backpack sprayer calibrated to deliver 20 gpa at 30 psi with 8002 nozzles. The trial contained 13 treatments and 4 replications arranged in a randomized complete block design with 10 by 19 ft plots. At application time, the wheat was at the 3-leaf stage and the weeds (Italian ryegrass, common groundsel, mayweed camomile, prickly lettuce, and common chickweed) were at the emergence to 2-inch height stage.

Fenoxaprop + HOE 542 + MCPA + bromoxynil (both rates), fenoxprop + 2,4-D + bromoxynil (both rates), fenoxaprop + HOE 408 + MCPA + bromoxynil, and HOE 408 + MCPA + bromoxynil all gave excellent (90% to 100%) control of common groundsel, mayweed camomile, and prickly lettuce but only poor to fair (0% to 70%) control of italian ryegrass and common chickweed. Fenoxaprop (0.16 lb/A), fenoxaprop + HOE 542 (0.16 + 0.04 lb/A) and diclofop provided moderate (73% to 78%) control of Italian ryegrass, but gave poor (0% to 37%) control of all other weeds. Fenoxaprop (0.11 lb/A), fenoxaprop + HOE 542 (0.11 + 0.03 lb/A), and AC 222,293 gave poor to moderate (33% to 63%) control of Italian ryegrass. Yields subjected to Duncan's Multiple Range test showed no significant differences at the 5% level. (University of California Cooperative Extension, Davis, CA 95616)

Control of Winter Annual Weeds in 'Yolo' Wheat with Postemergence Herbicides in Yolo County[1]

		% Weed control[2,3]					
Herbicide	Rate (lb/A)	Italian ryegrass	Common grounsel	Chamo-mile	Prickly lettuce	Common chickweed	Yield[2] (lb/A)
Fenoxaprop	0.11	63	27	0	0	0	1032
Fenoxaprop	0.16	77	10	10	10	37	2078
Fenoxaprop + HOE 542	0.11 + 0.03	63	33	0	0	0	1576
Fenoxaprop + HOE 542	0.16 + 0.04	78	27	0	0	0	1204
Fenoxaprop + HOE 542 + MCPA + bromoxynil	0.11 + 0.03 + 0.25 + 0.25	63	100	90	90	23	1361
Fenoxaprop + HOE 542 + MCPA + bromoxynil	0.16 + 0.04 + 0.25 + 0.25	67	100	100	97	30	1834
Fenoxaprop + 2,4-D + bromoxynil	0.11 + 0.25 + 0.25	53	100	100	100	27	1505
Fenoxaprop + 2,4-D + bromoxynil	0.16 + 0.25 + 0.25	70	100	100	100	0	1089
Fenoxaprop + HOE 408 + MCPA + bromoxynil	0.07 + 0.6 + 0.25 + 0.25	70	100	97	97	47	1719
HOE 408 + MCPA + bromoxynil	1 + 0.07 + 0.3	67	100	100	97	0	1433
Diclofop	1	73	33	30	0	0	1376
AC 222,293	0.32	33	27	27	0	0	1462
Control	--	0	27	0	0	0	1089

[1] Crop planted on November 9, 1985. Herbicides applied on January 10, 1986. Crop evaluated on March 3, 1986. (There was no crop phytotoxicty).

[2] All values average of 3 replications.

[3] 100% = total control; 0% = no control.

Evaluation of preemergence and postemergence herbicides in wheat. Mitich, L.W., N.L. Smith, and M.S. Duey. Research plots were established at the UC Davis Experimental Farm to evaluate the efficacy and crop phytotoxicity of several preemergence and postemergence herbicides on wheat. 'Anza' wheat was planted on October 31, 1985, in Yolo clay loam. Preemergence herbicides were applied on November 4 with a CO_2 backpack sprayer calibrated to deliver 20 gpa at 30 psi with 8002 nozzles. Postemergence herbicides were applied on December 19 with the same equipment and specifications. The trial consisted of 4 replications of 16 treatments arranged in a randomized block design. Existing weeds included wild radish, wild mustard, minerslettuce, and wild oats.

BAY SMY 1500 (both rates), and BAY SMY 1500 + metribuzin (both rates) gave good to excellent (75% to 100%) control of all weeds. BAY SMY 1500 + metribuzin produced some moderate crop phytotoxicity. DPX-M6316 (0.75 lb/A) and bromoxynil gave excellent (100%) control of wild radish, wild mustard, and minerslettuce, but poor (15% to 25%) control of wild oats. All rates of SC 0051 applied postemergence gave fair to excellent (73% to 100%) control of wild radish and wild mustard; no control of minerslettuce; and poor to excellent (50% to 100%) control of wild oats. The 1 lb/A rate of SC 0051 produced a moderate amount of crop phytotoxicity. DPX-M6313 (0.19 and 0.375 lb/A) gave excellent (98% to 100%) control of minerslettuce, but poor to moderate (38% to 78%) control of the other weeds. SC 0051 (both rates applied preemergence) gave poor (13% to 50%) control of all weeds. Isoxaben (both rates) gave fair to excellent (73% to 100%) control of wild radish, wild mustard, and minerslettuce, but poor (less than 48%) control of wild oats. (University of California Cooperative Extension, Davis, CA 95616)

Control of Winter Annual Weeds in Anza Wheat
at the UC Davis Experimental Farm, 1985-1986

Herbicide	Rate (Ai/A)	Phyto- toxicity[1] (%)	% Weed control: Wild radish	Wild mustard	Miners- lettuce	Wild oats	Yield[2] (lb/A)
Preemergence							
Isoxaben	2.0 oz	3	95	95	73	48	5126 AB
Isoxaben	4.0 oz	0	100	100	90	0	4912 AB
SC 0051	0.5 lb	0	50	25	13	25	4036 B
SC 0051	1.0 lb	0	25	45	18	50	4905 AB
Postemergence							
SC 0051	0.25 lb	3	73	100	0	50	4846 AB
SC 0051	0.5 lb	3	100	100	0	100	4809 AB
SC 0051	1.0 lb	18	100	100	0	50	5389 AB
BAY SMY1500	0.75 lb	0	100	100	90	75	5329 A
BAY SMY1500	.5 lb	0	100	100	100	100	5110 A
BAY SMY1500 +Metribuzin	0.75 lb + 2 oz	20	100	100	100	90	4840 AB
BAY SMY1500 +Metribuzin	1.5 lb + 2 oz	15	100	100	100	100	4997 AB
DPX-M6316	0.19 oz	0	43	78	98	75	5051 A
DPX-M6316	0.375 oz	0	38	68	100	50	4625 AB
DPX-M6316	0.75 oz	0	100	100	100	25	4865 AB
Bromoxynil	0.5 lb	0	100	100	100	15	5035 A
Control	-	0	0	0	0	0	4613 AB

[1] 100% = total crop damage; 0% = no crop damage.
[2] Yields followed by a common letter are not significantly different at the 5% level according to Duncan's multiple range test.
All values are averaged from 4 replications.
Wheat planted October 31, 1985.
Preemergence herbicides applied November 4, 1985.
Postemergence herbicides applied December 19, 1985.
Efficacy evaluated March 25, 1986.
Harvested July 11, 1986.

Phytotoxic effects of pre- and postemergence herbicide treatments on 'Yecora Rojo' wheat, Tulelake Field Station, California. Mitich, L.W., N.L. Smith, and M.S. Duey. 'Yecora Rojo' wheat was planted April 11, 1986, at the Tulelake Field Station, California. Seventeen herbicides were applied in 36 treatments, both pre- and postemergence, to evaluate phytotoxicity and subsequent effects on yield.

Preemergence herbicides were applied April 15, during cool weather (40 F) with a CO_2 backpack sprayer in a total spray volume of 20 gpa.

Postemergence herbicides were applied on June 3, when the crop had 2 to 5 tillers and 3 to 4 leaves. At this time the field exhibited a scattered population of wild oats (in the 1 to 2 tiller stage) and seedlings of common lambsquarters, horseweed, and wild mustard. Weather during application was calm and 75 to 85 F. Herbicides were applied with a CO_2 backpack sprayer in a total spray volume of 20 gpa. Surfactants were used as a variable with certain of the nonregistered herbicides tested.

Crop phytotoxicity was visually evaluated on June 21; at this time, the weed population was too sparse to allow weed control evaluation. Wheat was harvested on August 25. Treatments causing injury of 30% or greater generally reduced wheat yields significantly. These treatments included both rates of SC 0098 + oil (though SC 0098 without oil did not induce excessive injury); SC 0051 + Tween 20 (0.5 lb/A + 0.5%) - again, SC 0051 applied at the same rate without surfactant did not injure the crop unduly. Although SC 0051 at 1.0 lb/A caused 48% injury resulting in a low yield, this yield was not statistically different from the check. In certain other cases, treatments may have reduced yields without visibly injuring the wheat, but yield statistics permit no further conclusions. (University of California Cooperative Extension, Davis, CA 95616)

Effect of herbicides on phytotoxicity and yield
of "Yecora Rojo" wheat, Tulelake Field Station, California, 1986

Herbicide	Rate (lb/A)	Phytotoxicity[1,2] (%)	Yield[1,3] (lb/A)
Isoxaben	0.25	0	5284 ABC
Isoxaben	0.5	0	6049 AB
AC 222,293	0.38	0	5569 ABC
AC 222,293	0.5	0	5022 ABCD
AC 222,293 + bromoxynil	0.38 + 0.25	0	5517 ABC
AC 222,293 + bromoxynil	0.5 + 0.25	0	4820 ABCD
AC 222,293 + bromoxynil + MCPA	0.5 + 0.25 + 0.25	0	6112 AB
AC 222,293 + DPX 6376	0.5 + 0.16 oz	20	3924 ABCD
AC 222,293 + DPX 9674	0.5 + 0.16 oz	2.5	6039 AB
AC 222,293 + chlorsulfuron	0.5 + 0.5 oz	0	5555 ABC
BAY SMY 1500	1.5	5.0	4631 ABCD
BAY SMY 1500 + metribuzin	1.5 + 2.0 oz	2.75	4169 ABCD
CGA-131036	0.25 oz	2.5	5499 ABC
CGA-131036	0.5 oz	0	6431 A
CGA-131036 + terbutryn	0.25 oz + 0.2 lb	2.5	4716 ABCD
CGA-131036 + terbutryn	0.25 oz + 0.4 lb	12.5	4301 ABCD
Chlorsulfuron	0.5 oz	0	5651 ABC
SC 0098	0.03	2.5	5090 ABCD
SC 0098	0.12	7.5	4083 ABCD
SC 0098 + oil	0.03 + 0.25 pt	30	3730 BCD
SC 0098 + oil	0.06 + 0.25 pt	50	2725 D
SC 0051	0.5	25	5254 ABCD
SC 0051	1.0	48	3963 ABCD
SC 0051 + Tween 20	0.5 + 0.5%	48	3176 CD
Lactofen	0.1	0	6125 AB
PPG 1013	0.05	23	4171 ABCD
DPX 9674 + X-77[4]	0.5 oz	0	6292 A
DPX 9674 + X-77	1.0 oz	10	4988 ABCD
DPX L5300 + X-77	0.25 oz	2.5	6079 AB
DPX L5300 + X-77	0.5 oz	0	5118 ABCD
DPX R9674 + X-77	0.375 oz	2.5	5767 AB
DPX R9674 + X-77	0.75 oz	5	5059 ABCD
Diclofop	0.75	0	6227 AB
Bromoxynil + MCPA	0.25 + 0.25	5	4269 ABCD
Control	---	0	5403 ABC
Control	---	0	6017 AB

[1]All values are averaged from 4 replications.

[2]100% = total crop kill; 0% = no crop damage.

[3]Yields followed by a common letter are not significantly different at the 1% level according to Duncan's multiple range test. LSD for 5% = 1671 lb/A.

[4]X-77 included at 0.25%.

Broadleaf weed control in dryland wheat at Ducor, California. Wright, S.D., and L.W. Mitich. This study was conducted to evaluate the effects of broadleaf herbicides applied late, just prior to the 2,4-D aerial cutoff time. Another objective was to evaluate the effect of reduced rates of chlorsulfuron and DPX-L5300 with the adjuvant 'Penetrator.' Treatments were applied on February 28, 1986, with a CO_2 backpack sprayer delivering 20 gpa. Plots were 6 by 30 feet and replicated three times. 'Yecora Rojo' wheat was 10 to 12 inches tall and in the early jointing stage at treatment time. Coast fiddleneck was 6 to 8 inches tall and shepherdspurse was 5 to 6 inches tall.

Dinoseb and bromoxynil gave excellent control (90% to 100%) of both fiddleneck and shepherdspurse; all other treatments produced suppression, or at best fair control. Poorest control of fiddleneck was produced by 2,4-D. Dinoseb caused moderate crop injury.

Addition of 'Penetrator' to chlorsulfuron and DPX L5300 did not increase weed control. Half rates alone, half rates with 'Penetrator', and standard rates of these herbicides all produced similar control in this study. (University of California Cooperative Extension, Visalia, CA 93291; Davis, CA 95616)

Broadleaf weed control in dryland wheat

Treatments	Rate (lb ai/A)	Percent control: Fiddleneck 3/19	Fiddleneck 3/28	Shepherspurse 3/19	Shepherspurse 3/28	Percent crop phytoxicity 3/19	3/28
Chlorsulfuron	0.004	83	83	70	70	0	0
Chlorsulfuron + 'Penetrator'	0.004 + 12 oz	87	73	67	43	0	0
Chlorsulfuron	0.008	80	67	63	70	0	0
DPX L5300	.004	80	70	63	63	0	0
DPX L5300 + 'Penetrator'	0.004 + 12 oz	73	70	57	67	0	0
DPX L5300	0.008	83	73	63	63	0	0
2,4-D	0.48	63	73	67	73	0	0
Bromoxynil	0.50	90	93	90	97	0	0
MCPA + dicamba	0.35 + 0.13	70	80	67	70	0	0
Dinoseb	0.75	97	100	90	90	26	26
Check	-	0	27	0	27	0	0

Evaluations were visual estimates taken March 19 and March 28, 1986.

Wild oats control with AC-222,293 and difenzoquat in spring wheat. Miller, S.D. and M.S. Page. Research plots were established at the Sheridan Research and Extension Center, Sheridan, WY to evaluate the efficacy of AC-222,293 and difenzoquat for wild oats control in spring wheat when applied alone or in combination with several broadleaf herbicides. Spring wheat (var. Olaf) was seeded in a loam soil (49% sand, 27% silt and 24% clay) with 1.4% organic matter and a 6.3 pH March 26, 1986. Treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 10 gpa at 40 psi to 2 to 3-leaf wild oats and 3 to 4-leaf spring wheat May 14, 1986 (air temp. 55 F, 2 inch 69 F and 4 inch 65 F). Plots were established under dryland conditions and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control, crop damage and plant height measurements were made June 24 and plots harvested August 6, 1986. Wild oats (AVEFA) infestations were heavy and uniform throughout the experimental area.

No treatment reduced crop stand; however, AC-222,293 combinations with XRM-4816 injured wheat 7 to 12% and difenzoquat alone or in combination with broadleaf herbicides injured wheat 20 to 33%. Wheat yields related closely to wild oats control and/or crop injury. Wild oats control was excellent (99% to 100%) with AC-222,293 and good (91 to 94%) with difenzoquat alone or in combination with broadleaf herbicides. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1434 .)

Wild oats control in spring wheat

Treatment[1]	Rate lb ai/A	Spring wheat[2] injury %	stand red %	height inch	yield bu/A	Control[3] AVEFA %
AC-222,293 + X-77	0.25	0	0	23	30.9	100
AC-222,293 + X-77	0.37	0	0	23	31.3	100
AC-222,293 + X-77	0.5	0	0	22	31.6	100
AC-222,293 + bromoxynil (2E) + X-77	0.37 + 0.5	0	0	22	32.1	100
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	0	0	22	31.9	100
AC-222,293 + thiameturon + X-77	0.37 + 0.016	0	0	22	31.4	99
AC-222,293 + DPX-L5300 + X-77	0.37 + 0.016	0	0	22	30.6	100
AC-222,293 + DPX-R9674 + X-77	0.37 + 0.016	0	0	21	30.5	100
AC-222,293 + clopyralid + X-77	0.37 + 0.125	0	0	22	31.0	100
AC-222,293 + CGA-131036 + X-77	0.37 + 0.018	3	0	21	31.7	100
AC-222,293 + XRM-4813 + X-77	0.37 + 0.52	0	0	21	31.4	100
AC-222,293 + XRM-4813 + X-77	0.37 + 0.59	0	0	23	31.2	100
AC-222,293 + XRM-4816 + X-77	0.37 + 0.52	7	0	21	29.7	100
AC-222,293 + XRM-4816 + X-77	0.37 + 0.59	12	0	22	29.0	100
difenzoquat	1.0	27	0	17	26.8	93
difenzoquat + bromoxynil	1.0 + 0.5	27	0	16	27.3	94
difenzoquat + thiameturon	1.0 + 0.016	20	0	18	26.7	93
difenzoquat + DPX-L5300	1.0 + 0.016	22	0	18	27.0	92
difenzoquat + CGA-131036	1.0 + 0.018	27	0	18	27.2	92
difenzoquat + XRM-4813	1.0 + 0.59	25	0	17	26.4	92
difenzoquat + XRM-4816	1.0 + 0.59	33	0	17	25.2	91
weedy check	----------	0	0	22	22.5	0

[1] Treatments applied May 14, 1986 and X-77 applied at 0.25% v/v
[2] Wheat injury and stand reduction visually evaluated June 24 and plots harvested August 6, 1986
[3] Wild oats control visually evaluated June 24, 1986

Wild oat control with diclofop in Boundary County, Idaho. Yenne, S. P., D. L. Zamora and D. C. Thill. Field experiments were conducted at three locations near Bonners Ferry in Boundary County, Idaho to compare wild oat (AVEFA) control in spring barley and spring wheat with diclofop alone and in tank mixture with selected broadleaf herbicides. Treatments were applied with a CO_2 pressurized sprayer calibrated to deliver 20 gpa at 3 mph and 40 psi. The experiments were randomized complete block designs with four replications. Plot size was 10 by 25 ft. Application and edaphic data are in Table 1. Wild oat control was visually evaluated at each location and grain was harvested at two locations with a small plot combine on September 4.

Diclofop with or without Certrol controlled 36 to 56% of the wild oat in spring barley (Barley 2) on the early evaluation date (Table 2). Certrol in a tank mixture with diclofop did not alter control of wild oat significantly from diclofop alone, although there was a tendency for reduced control when diclofop was combined with Certrol. A tank mix of AC 222,293 with bromoxynil controlled an equivalent amount of wild oat as AC 222,293 alone (83% and 93%, respectively). By the late evaluation, control of wild oat declined more for the diclofop treatments (16 to 25%) compared to the AC 222,293 treatments (7 to 12%). Wild oat control with AC 222,293 + bromoxynil was 20% less than AC 222,293 alone. There were no differences in yield among diclofop applied alone and AC 222,293 treatments. AC 222,293 treated plots had the highest grain yield.

There were no differences in wild oat control among all treatments at the early evaluation in spring wheat (Table 3). At the late evaluation, diclofop alone controlled more wild oat (65%) than diclofop tank mixed with Certrol (45%) at 0.8 and 0.3 lb ai/a, respectively. AC 222,293, with and without bromoxynil controlled 93 to 95% of the wild oat at both evaulation dates. This is in contrast from the previously discussed experiment where control was less at the late evaluation date when AC 222,293 was mixed with bromoxynil. Also in contrast to the spring barley experiment,there were no differences in grain yield among all treatments (except for the check) for the spring wheat; although, the AC 222,293 treatments tended to yield more grain.

Diclofop at 1.0 lb ai/a controlled 54 to 73% of the wild oat, while at 0.75 lb ai/a it controlled 33 to 56% of the wild oat in spring barley (Barley 1) (Table 4). No tank mix of diclofop with a broadleaf herbicide altered wild oat control compared to diclofop alone. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 1. Application and soil data

Location	Barley 1	Wheat	Barley 2
Date applied	6/11	6/2	5/27
Method of application	-------------	broadcast	---------
Leaf stage of wild oat	1-3	2-3	2-3
Air temperature (F)	69	73	64
Soil temperature @ 2 in (F)	77	73	68
Relative humidity (%)	52	48	82
Cloud cover (%)	0	10	0
Wind Speed (mph)	0	0-3	0
Soil type	clay loam	loam	silty clay loam
Organic matter (%)	9.02	8.66	8.1
pH	7.59	7.56	5.4
CEC (meq/100 g soil)	24.0	22.8	24.0

Table 2. Wild oat control in spring barley (Barley 2) with diclofop

Treatment	Rate	AVEFA control 7/23	AVEFA control 7/29	Yield
	(lb ai/a)	----(%)----		(lb/a)
check	-	-	-	1447
diclofop	1.0	56	31	2871
diclofop + Certrol[1]	1.0 + 0.37	41	25	2261
diclofop + Certrol	0.8 + 0.3	36	17	2465
AC 222,293[2]	0.47	93	91	3565
AC 222,293 + bromoxynil	0.47 + 0.25	83	71	3662
$LSD_{(0.05)}$		22	19	1335

[1]Combination of bromoxynil + MCPA ester.
[2]AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

Table 3. Wild oat control in spring wheat with diclofop

Treatment	Rate	AVEFA control 7/23	AVEFA control 7/29	Yield
	(lb ai/a)	----(%)----		(lb/a)
check	-	-	-	1263
diclofop	1.0	91	65	2136
diclofop + Certrol[1]	1.0 + 0.37	87	55	2113
diclofop + Certrol	0.8 + 0.3	77	45	2057
AC 222,293[2]	0.47	95	95	2312
AC 222,293 + bromoxynil	0.47 + 0.25	95	93	2390
$LSD_{(0.05)}$		NS	13	461

[1]Combination of bromoxynil + MCPA.
[2]AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

Table 4. Wild oat control in spring barley (Barley 1) with tank mixes of diclofop and broadleaf herbicides

Treatment	Rate	AVEFA control
	(lb ai/a)	(%)
diclofop	0.75	33
diclofop + DPX-M6316	0.75 + 0.031	49
diclofop + DPX-L5300	0.75 + 0.016	37
diclofop + DPX-R9674	0.75 + 0.003	56
diclofop + bromoxynil	0.75 + 0.25	53
diclofop	1.0	64
diclofop + DPX-M6316	1.0 + 0.031	60
diclofop + DPX-L5300	1.0 + 0.016	60
diclofop + DPX-R9674	1.0 + 0.003	54
diclofop + bromoxynil	1.0 + 0.25	73
$LSD_{(0.05)}$		23

Wild oat control with AC 222,293 in Boundary County, Idaho. Yenne, S. P., D. L. Zamora and D. C. Thill. Field experiments were conducted at three locations near Bonners Ferry in Boundary County, Idaho to evaluate the effect of surfactants on wild oat (AVEFA) control with AC 222,293 and to compare wild oat control in spring barley and spring wheat with AC 222,293 alone and in selected tank mixes to barban, difenzoquat and diclofop herbicides. All treatments were applied with a CO_2 pressurized sprayer calibrated to deliver 10 or 20 gpa at 3 mph and 40 psi. The experiments were randomized complete block designs with four replications. Plot size was 10 by 25 ft. Application and edaphic data are in Table 1. Evaluations of wild oat control were made at each location and grain was harvested at one location of spring barley with a small plot combine on September 4. Weight of wild oat caryopses in the grain samples varied from 0.05 to 3.1% of the total weight after processing through a Clipper cleaner twice.

AC 222,293 (except with dicamba) and difenzoquat (except with barban at the 1 to 3 leaf stage) effectively controlled (>83%) wild oat in spring barley (Barley 1) at the early evaluation (Table 3). Control with AC 222,293 tended to be better than all other treatments. Wild oat control remained high (>83%) for all rates of AC 222,293 alone and AC 222,293 plus DPX-M6316, DPX-L5300 or DPX-R9674 at the late evaluation date in spring barley. Control of wild oat declined compared to the early evaluations for the AC 222,293 tank mixes with bromoxynil, bromoxynil and MCPA, MCPA and 2,4-D. All treatments containing difenzoquat ineffectively controlled wild oat by the late evaluation. There appears to be a trend for decreased wild oat control later in the season when AC 222,293 is tank mixed with bromoxynil, MCPA or 2,4-D. Even more apparent is a potential antagonistic reaction between AC 222,293 and dicamba that was evident at both the early and late evaluations. Plots treated with AC 222,293 alone and tank mixed had the highest grain yield.

The same treatments as in the previous study applied to spring wheat controlled wild oat similarly (Table 3). Spring wheat was injured 15% by the difenzoquat-bromoxynil tank mix. These results agree closely to the same experiments conducted in 1985 near Bonners Ferry (p. 226, WSWS 1986 Research Progress Report).

Wild oat control in spring barley (Barley 2) with AC 222,293 was equal with or without a surfactant (Table 4). AC 222,293 applied at 0.38 lb ai/A with 0.03% v/v Moract controlled 97% of the wild oat and again was not different from AC 222,293 alone. Wild oat control with barban declined when applied at 20 gpa (64%) compared to 10 gpa (81%). (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 1. Application and soil data

Location	Barley 1		Wheat		Barley 2
Date applied	5/27	6/23	6/2	6/11	6/11
Method of application	---------- broadcast ------------				
Leaf stage of wild oat	2-3	4-5	2-3	4-5	4-5
Air temperature (F)	64	65	69	79	69
Soil temperature @ 2 in (F)	68	64	74	74	77
Relative humidity (%)	82	65	78	32	52
Cloud cover (%)	0	0	0	0	0
Wind Speed (mph)	0	0	0	0-2	0
Soil type	----silty clay loam-----				clay loam
Organic matter (%)	--- 8.1 --		-- 6.5 --		9.0
pH	--- 5.4 --		-- 7.8 --		7.6
CEC (meq/100 g soil)	---29.2 --		- 18.7 --		24.0

Table 2. Wild oat control in spring barley

Treatment	Rate	Appl date	AVEFA control 7/3	AVEFA control 7/30	Yield
	(lb ai/a)		-----(%)---		(lb/a)
check	-	-	-	-	997
barban	0.38	5/27	41	13	2373
diclofop	1.0	5/27	55	25	2458
difenzoquat[1]	1.0	6/23	83	64	3541
AC 222,293	0.38	5/27	90	83	4265
AC 222,293	0.5	5/27	94	90	4581
AC 222,293	0.75	5/27	96	96	4572
AC 222,293	1.0	5/27	97	95	4284
barban + bromoxynil	0.38 + 0.38	5/27	25	10	1633
diclofop + bromoxynil	1.0 + 0.38	5/27	51	13	2386
difenzoquat + bromoxynil	1.0 + 0.38	6/23	84	65	3289
AC 222,293 + bromoxynil	0.5 + 0.38	5/27	84	77	4293
AC 222,293 + bromoxynil & MCPA	0.5 + 0.38	5/27	93	71	4028
AC 222,293 + MCPA LVE	0.5 + 0.5	5/27	91	65	3598
AC 222,293 + 2,4-D LVE	0.5 + 0.5	5/27	92	74	3198
AC 222,293 + DPX-M6316	0.5 + 0.031	5/27	91	93	4210
AC 222,293 + DPX-L5300	0.5 + 0.016	5/27	90	83	4033
AC 222,293 + DPX-R9674	0.5 + 0.023	5/27	94	89	4388
AC 222,293 + dicamba	0.5 + 0.13	5/27	64	37	2950
bromoxynil & MCPA	0.38	5/27	0	0	607
barban + difenzoquat	0.19 + 0.5	6/23	85	57	3103
barban + difenzoquat	0.19 + 0.5	5/27	77	44	3119
$LSD_{(0.05)}$			16	14	801

[1]All difenzoquat and AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

Table 3. Wild oat control in spring wheat

Treatment	Rate	Appl date	AVEFA control 7/3	AVEFA control 7/30
	(lb ai/a)		-----(%)-----	
barban	0.38	5/27	70	37
diclofop	1.0	5/27	81	71
difenzoquat[1]	1.0	6/23	95	93
AC 222,293	0.38	5/27	94	84
AC 222,293	0.5	5/27	95	86
AC 222,293	0.75	5/27	95	97
AC 222,293	1.0	5/27	95	97
barban + bromoxynil	0.38 + 0.38	5/27	79	25
diclofop + bromoxynil	1.0 + 0.38	5/27	73	57
difenzoquat + bromoxynil	1.0 + 0.38	6/23	95	93
AC 222,293 + bromoxynil	0.5 + 0.38	5/27	95	83
AC 222,293 + bromoxynil & MCPA	0.5 + 0.38	5/27	93	83
AC 222,293 + MCPA LVE	0.5 + 0.5	5/27	94	86
AC 222,293 + 2,4-D LVE	0.5 + 0.5	5/27	95	80
AC 222,293 + DPX-M6316	0.5 + 0.031	5/27	95	95
AC 222,293 + DPX-L5300	0.5 + 0.016	5/27	95	95
AC 222,293 + DPX-R9674	0.5 + 0.023	5/27	95	94
AC 222,293 + dicamba	0.5 + 0.13	5/27	61	36
bromoxynil & MCPA	0.38	5/27	0	0
barban + difenzoquat	0.19 + 0.5	6/23	95	85
barban + difenzoquat	0.19 + 0.5	5/27	94	89
$LSD_{(0.05)}$			11	15

[1]All difenzoquat and AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

Table 4. Wild oat control in spring barley using AC 222,293 with and without surfactant

Treatment	Rate	Volume	AVEFA control
	(lb ai/a)	(gpa)	(%)
AC 222,293	0.47	10	98
AC 222,293 + R-11[1]	0.47 + 0.5% v/v	10	98
AC 222,293 + Moract	0.38 + 0.03% v/v	10	97
barban	0.38	10	81
barban	0.38	20	64
$LSD_{(0.05)}$			16

[1]R-11 and Moract are nonionic surfactants.

Weed control in wheat from postemergence herbicides injected through the sprinkler system. Longley, T.S., P.J. Petersen and L.C. Haderlie. Bromoxynil, with and without MCPA, diclofop-methyl, and combinations of bromoxynil + MCPA with difenzoquat-methyl, and bromoxynil + diclofop-methyl, were evaluated for postemergence annual weed control and wheat injury when applied through the sprinkler system. Owens spring wheat was planted 10 May 84 on the Research & Extension Center at Aberdeen, Idaho. Treatments were applied on 12 and 26 Jun 84 to 80 ft (24.4 m) diameter plots around a single sprinkler head equipped with a 1/8 inch (0.3 cm) CDS nozzle. A Mazzei Venturi injector was used at 40 psi. Herbicide treatments at the calculated rate were in concentric circles between 10 and 25 ft from the head. A randomized complete block design with four replications per treatment was employed.

The wheat was in the 2 to 3 tiller stage at the early treatment date and in the joint stage on 26 June. The dominant weeds on 12 June were common lambsquarters (Chenopodium album, 2 inch), spiny sowthistle (Sonchus asper, 12 inch) and kochia (Kochia scoparia, 2 inches). By 26 June, the lambsquarters were 6 to 10 inches tall, spiny sowthistle 6 to 12 inches, and kochia 6 to 8 inches. Some hairy nightshade (Solanum sarrachoides) was also noted but its distribution was erratic. Green foxtail (Setaria viridis) was in part of the experiment. Otherwise, very little annual grass weeds were present.

Bromoxynil combined with MCPA or diclofop controlled over 90% of the broadleaf weeds in both evaluations. Bromoxynil alone in the first evaluation had controlled 75% of the weeds present but many of those weeds were injured and died by the second evaluation. Diclofop-methyl, a grass herbicide, failed to control the broadleaf weeds by itself, but appeared to enhance bromoxynil's action.

Due to the extreme variation in the wheat growth in the study, crop thinning and stunting evaluations were difficult and suspect as is emphasized by the high coefficient of variation figures. No harvest was taken. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Annual weed control in spring wheat from postemergence herbicides when injected through sprinkler at Aberdeen, Idaho - 1984. Each was evaluated twice

				July 9, 1984					August 2, 1984			
						Weed Control					Weed Control	
Chemical	Formulation	Rate Lb a.i./A	Time Applied	Crop Injury	Crop Stunting	Spiny Sow Thistle	Lambs-quarters	Night-shade	Crop Stunting	Crop Thinning	Spiny Sow Thistle	Lambs-quarters
				%								
1. bromoxynil	4 ME	0.5	11 June	10	4	75	75	75	5	9	99	100
2. bromoxynil + MCPA	3+3	0.38+0.38	26 June	18	9	96	94	100	4	13	92	100
3. bromoxynil + MCPA +		0.38+0.38+	26 June	10	5	99	90	98	10	19	98	100
difenzoquat	2E	0.75										
4. bromoxynil+diclofop	3EC (diclo)	0.5+1.3	12 June	10	6	96	97	98	0	9	92	100
5. diclofop		1.3	12 June	0	5	0	0	0	8	3	0	0
	$LSD_{0.05}$			12	10	23	24	24	13	20	10	1
	CV			83	114	20	22	21	160	129	9	1
Weed counts/m^2 (2 July 1984)						6	3	16				

Evaluation of CGA-131036 for broadleaf weed control in winter wheat. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of CGA-131036 for broadleaf weed control in winter wheat. Winter wheat (var. Archer) was seeded in a sandy loam soil (74% sand, 16% silt and 10% clay) with 1.9% organic matter and a 7.2 pH September 16, 1985. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1 to 3 inch rosette tansymustard and 5 to 6 tiller wheat March 25, 1986 (air temp. 48 F, relative humidity 19%, wind NW 15 mph, and soil temp. - 0 inch 48 F, 2 inch 48 F and 4 inch 50 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made April 29, wheat height measured July 1 and plots harvested July 15, 1986. Tansymustard (DESPI) infestations were moderate and uniform throughout the experimental area.

No treatment reduced winter wheat stand; however, CGA-131036 in combination with dicamba injured wheat 13%. Wheat yields were 7.1 to 11.7 bu/A higher in herbicide treated compared to untreated plots. Tansymustard control was excellent (100%) with all herbicide treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1440.)

Weed control with CGA-131036 in winter wheat

Treatment[1]	Rate lb ai/A	Wheat[2] injury %	Wheat[2] stand red %	Wheat[2] height inch	Wheat[2] yield bu/A	Control[3] DESPI %
CGA-131036 + X-77	0.009	0	0	35	88.4	100
CGA-131036 + X-77	0.018	0	0	36	91.7	100
CGA-131036 + X-77	0.027	0	0	35	88.4	100
CGA-131036 + 2,4-D + X-77	0.018 + 0.25	0	0	36	92.3	100
CGA-131036 + 2,4-D + X-77	0.018 + 0.5	0	0	35	92.3	100
CGA-131036 + bromoxynil (4E) + X-77	0.018 + 0.25	0	0	35	93.0	100
CGA-131036 + clopyralid + X-77	0.018 + 0.125	0	0	35	91.0	100
CGA-131036 + dicamba + X-77	0.018 + 0.063	13	0	36	93.0	100
chlorsulfuron + X-77	0.018	0	0	35	92.3	100
weedy check	-----	0	0	36	81.3	0

[1] Treatments applied March 25, 1986 and X-77 applied at 0.25% v/v
[2] Wheat injury and stand reduction visually evaluated April 29, plant height measured July 1 and plots harvested July 15, 1986
[3] Tansymustard control visually evaluated April 29, 1986

Evaluation of broadleaf herbicide treatments in winter wheat. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of herbicide treatments for broadleaf weed control in winter wheat. Winter wheat (var. Archer) was seeded in a sandy loam soil (74% sand, 16% silt and 10% clay) with 1.9% organic matter and a 7.2 pH September 16, 1985. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1 to 3 inch rosette tansymustard and 5 to 6 tiller wheat March 25, 1986 (air temp. 45 F, relative humidity 20%, wind NW 10 mph, sky overcast and soil temp. - 0 inch 48 F, 2 inch 48 F and 4 inch 50 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made April 29, wheat height measured July 1 and plots harvested July 15, 1986. Tansymustard (DESPI) infestations were moderate and uniform throughout the experimental area.

No treatment reduced winter wheat stand; however picloram - 2,4-D - dicamba combinations injured wheat 10 to 15%. Wheat yields generally related to weed control and/or crop injury. Wheat yields were 7.1 to 18.8 bu/A higher in herbicide treated compared to untreated plots. Tansymustard control was 90% or greater with all treatments except dicamba at 0.062 and 0.125 lb/A or thiameturon at 0.015 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1443.)

Broadleaf weed control in winter wheat

Treatment[1]	Rate lb ai/A	Wheat[2] injury %	stand red %	height inch	yield bu/A	Control[3] DESPI %
bromoxynil (4E)	0.25	0	0	35	89.1	92
bromoxynil	0.37	0	0	35	91.0	96
dicamba	0.062	0	0	36	84.5	50
dicamba	0.125	0	0	35	89.7	78
2,4-D	0.75	0	0	35	93.6	100
thiameturon + X-77	0.015	0	0	36	94.9	80
thiameturon + X-77	0.023	0	0	36	93.6	96
picloram + 2,4-D	0.016 + 0.38	0	0	36	87.1	99
picloram + 2,4-D	0.023 + 0.38	0	0	36	87.8	100
picloram + 2,4-D + dicamba	0.016 + 0.38 + 0.062	10	0	34	87.1	100
picloram + 2,4-D + dicamba	0.023 + 0.38 + 0.062	15	0	34	87.1	100
picloram + 2,4-D + fluroxypyr	0.016 + 0.38 + 0.125	0	0	34	91.0	100
picloram + 2,4-D + fluroxypyr	0.023 + 0.38 + 0.125	0	0	35	89.1	100
picloram + 2,4-D + thiameturon	0.016 + 0.38 + 0.01	0	0	34	91.0	100
picloram + 2,4-D + thiameturon	0.023 + 0.38 + 0.01	0	0	35	86.5	100
bromoxynil + MCPA (3 + 3)	0.25 + 0.25	0	0	35	93.0	100
bromoxynil + thiameturon	0.25 + 0.005	0	0	35	91.0	96
dicamba + thiameturon	0.062 + 0.01	0	0	36	89.7	96
dicamba + fluroxypyr	0.062 + 0.125	0	0	34	89.7	94
fluroxypyr + 2,4-D	0.125 + 0.5	0	0	34	90.4	100
fluroxypyr + thiameturon	0.125 + 0.01	0	0	34	96.2	99
2,4-D + dicamba	0.5 + 0.062	0	0	34	88.4	99
weedy check	-----------	0	0	34	77.4	0

[1] Treatments applied March 25, 1986 and X-77 applied at 0.25% v/v
[2] Wheat injury and stand reduction visually evaluated April 29, plant height measured July 1 and plots harvested July 15, 1986
[3] Tansymustard control visually evaluated April 29, 1986

Postemergence herbicide application for broadleaf weed control in winter wheat in northern Idaho. Lish, J. M., D. C. Thill and S.P. Yenne. Postemergence herbicide applications were evaluated for broadleaf weed control in winter wheat. Herbicides were applied with a CO_2 pressurized plot sprayer at 42 psi in water at 20 gpa. Two randomized complete block experiments were designed with four replications. Plots were 10 by 30 ft. Application data is in Table 1. Scentless chamomile (MATIN), catchweed bedstraw (GALAP), and henbit (LAMAM) were evaluated on May 22 and June 30 in 'Cashup' wheat. Wild buckwheat (POLCO), coast fiddlneck (AMSIN), mayweed chamomile (ANTCO), and field pennycress (THLAR) were evaluated in 'Stephens' wheat on July 1. 'Cashup' wheat was harvested with a small plot combine.

Table 1. Application data for postemergence herbicides in winter wheat.

Variety	Cashup		Stephens
Location	Moscow		Winchester
Date of application	4/11	4/30	5/12
Air temperature (F)	46	47	50
Soil temperature at 2 in (F)	44	48	42
Relative humidity (%)	66	66	73
Dew	light	none	none
Soil pH	6.2		
OM (%)	3.7		
CEC (meq/100 g soil)	20.3		
Texture	silt loam		

Scentless chamomile and catchweed bedstraw were not controlled adequately with any of the treatments in 'Cashup' wheat (Table 2). Henbit control was good with some bromoxynil combinations, but bromoxynil did not provide consistent control. The best treatment in the experiment overall was bromoxynil/MCPA + diflufenican (0.25 + 0.09 lb ai/A). Grain yield was best with CGA036 + metribuzin; however, weed control was poor. Wild buckwheat and field pennycress were controlled with all treatments in 'Stephens' wheat except XRM4757 (0.47 lb ai/A) and MCPA (0.38 lb ai/A) (Table 3). These treatments also did not control coast fiddleneck or mayweed chamomile. (Idaho Agricultural Research Station, Moscow, Idaho 83843)

Table 2. Broadleaf weed control in 'Cashup' winter wheat

Treatment	Formulation	Rate[1]	MATMA 5/22/86	GALAP 5/22/86	LAMAM 5/22/86	MATMA 6/30	Grain yield
		(lb ai/A)	(% of check)				(bu/A)
check	-	0	-	-	-	-	77
bromoxynil/MCPA	2 EC	0.25	82	57	73	67	64
bromoxynil/MCPA+ diflufenican	2 EC 4 FL	0.19+0.06	83	70	85	75	79
bromoxynil/MCPA+ diflufenican	2 EC 4 FL	0.19+0.09	70	42	73	77	73
bromoxynil/MCPA+ diflufenican	2 EC 4 FL	0.25+0.06	72	78	88	72	72
bromoxynil/MCPA+ diflufenican	2 EC 4 FL	0.25+0.09	83	68	88	83	86
bromoxynil+diflufenican	2 EC+4 FL	0.25+0.13	75	68	90	71	80
bromoxynil+DPX9674	2 EC+75 DF	0.25+0.13	63	53	73	63	88
DPX9674+R11	75 DF+SF	0.13+0.25	27	40	35	37	71
DPX9674+R11	75 DF+SF	0.25+0.25	40	62	50	48	73
DPX9674+R11	75 DF+SF	0.02+0.25	43	36	30	43	81
DPX9674+R11	75 DF+SF	0.05+0.25	57	57	47	60	71
dicamba+DPX9674+ R11	4 WS+75 DF+ SF	0.13+0.13+ 0.25	43	55	32	30	73
dicamba+DPX9674+ R11	4 WS+75 DF+ SF	0.13+0.25+ 0.25	60	70	33	33	76
dicamba+DPX9674+ R11	4 WS+75 DF+ SF	0.13+0.02+ 0.25	80	77	68	50	67
terbutryn+MCPA amine	80 WP+	0.80+0.5	58	53	50	57	77
terbutryn+MCPA amine	4 FL+3.8 WS	0.80+0.5	60	50	50	53	70
terbutryn+MCPA amine	4 FL+3.8 WS	0.70+0.5	58	63	57	23	68
terbutryn+MCPA amine	4 FL+3.8 WS	0.60+0.5	45	45	37	30	87
bromoxynil/MCPA	3 EC	0.25	77	72	72	33	81
bromoxynil+DPXR9674	3 EC+75 DF	0.25+0.13	43	53	37	43	84
bromoxynil+DPXR9674	3 EC+75 DF	0.19+0.13	57	50	60	60	75
CGA131036+R11	75 WP+SF	0.01+0.25	72	77	57	63	75
CGA131036+bromoxynil	75 WP+4 EC	0.01+0.25	72	72	68	78	78
CGA131036+bromoxynil	75 WP+4 EC	0.13+0.19	73	67	53	42	75
CGA131036+dicamba+ R11	75 WP+4 WS+ SF	0.13+0.13+ 0.25	47	47	45	43	76
CGA131036+dicamba+ R11	75 WP+4 WS+ SF	0.01+0.13+ 0.25	73	72	67	58	72
CGA131036+terbutryn	75 WP+4 FL	0.13+0.6	40	50	37	40	80
CGA131036+metribuzin	75 WP+75 DF	0.13+0.13	30	30	30	40	94
check	-	0	-	-	-	-	83
LSD (0.05)			41	51	33	38	18
plants/sq ft			5	2	2	5	-

[1]DPX9674 and CGA131036 rates are expressed in oz ai/A. Surfactant rates are expressed as % v/v.

Table 3. Broadleaf weed control in 'Stephens' winter wheat

Treatment	Rate	Weed control			
		POLCO	AMSIN	THLAR	ANTCO
	(lb ai/A)	-------(% of check)-------			
XRM4757	0.47	67	62	67	67
XRM4757	0.63	99	89	99	99
XRM4757+bromoxynil	0.47+0.16	100	100	100	100
XRM 4757+terbutryn	0.47+0.70	100	100	100	100
XRM 4757+metribuzin	0.47+0.19	100	100	100	100
MCPA LV3	0.38	49	45	76	48
XRM4896	0.52	100	95	100	100
XRM4896	0.58	99	84	100	99
XRM4813	0.43	98	55	100	100
XRM4813	0.52	98	61	98	98
XRM4813+bromoxynil	0.43+0.16	100	99	100	100
XRM4813+dicamba	0.43+0.06	99	92	100	100
fluroxypyr+bromoxynil+ MCPA ester	0.09+0.16+ 0.38	99	95	100	92
fluroxypyr+bromoxynil+ MCPA ester	0.13+0.16+ 0.13	100	96	99	74
fluroxypyr+2,4-D amine+ dicamba	0.10+0.38+ 0.06	100	94	100	80
fluroxypry+2,4-D amine+ dicamba	0.13+0.38+ 0.06	100	100	100	98
LSD (0.05)		22	28	19	28
plants/sq ft		5	3	2	2

Herbicides for control of tansymustard in winter wheat. Stahlman, Phillip W. An experiment was conducted near Hays, KS to evaluate several herbicide treatments for control of tansymustard in 'Newton' winter wheat seeded in 10-inch rows at 45 lb/A on September 28, 1985. Treatments were applied to 1 to 5-inch diameter rosettes of tansymustard on March 20, 1986 with a tractor-mounted, compressed-air plot sprayer with 8001 LP flat fan nozzles delivering 12 gpa at 20 psi and 3.0 mph. The wheat had 5 to 7 tillers and was 3 to 5-inches tall on March 20, and 6 to 10-inches tall on April 1. Rainfall for the 2-week period after March 20 was 0.34 inches and after April 1 was 0.36 inches. Weed control was estimated approximately 2 and 4 weeks after herbicide application. The experimental area was a Crete silty clay loam soil with pH 6.2 and 1.7% organic matter. The experimental design was a randomized complete block with three replications and experimental units were 12 by 30 ft.

Control of tansymustard 2 to 4 weeks after herbicide application was greater for most treatments applied on April 1 than on March 20 (Table). However, 2,4-D ester alone at 6 oz/A was more effective when applied March 20, and control with metsulfuron at 0.06 oz/A plus 2 or 4 oz/A 2,4-D ester plus 0.25% v/v surfactant, and DPX-R9521 plus surfactant at 0.3 oz/A + 0.25% v/v did not differ between dates of application. Tansymustard control with March 20 applications of metsulfuron plus surfactant, and DPX-M6316 plus metsulfuron plus surfactant were unacceptable. There was a trend of higher wheat yields for the earlier treatment date despite poorer weed control for many treatments. (Fort Hays Branch, Kansas Agric. Exp. Sta., Hays).

Table. Control of tansymustard with herbicides applied postemergence on two dates and herbicide effect on wheat, Hays, KS., 1985-86. (Stahlman).

Treatments	Rate (oz ai/A)	% tansymustard control 4/1	4/15	4/30	Wheat yield (bu/A)
Applied March 20, 1985; tansymustard 1 to 5-inch diameter rosettes					
Metsulfuron + S[a]	.06	22	23	--	35.8
Metsulfuron + 2,4-D ester + S	.06 + 2.0	65	88	--	38.0
Metsulforon + 2,4-D ester + S	.06 + 4.0	72	96	--	36.9
DPX-R9521 + S	.188	62	83	--	33.2
DPX-R9521 + S	.25	70	82	--	34.9
DPX-R9521 + S	.30	73	95	--	33.8
DPX-M6316 + metsulfuron + S	.08 + .04	58	60	--	34.8
DPX-M6316 + metsulfuron + S	.10 + .05	57	55	--	31.9
DPX-M6316 + metsulfuron + S	.12 + .06	58	58	--	35.2
2,4-D ester	6.0	73	99	--	37.9
Applied April 1, 1986; tansymustard 4 to 12-inches tall					
Metsulfuron + S[a]	.06	--	87	88	32.8
Metsulfuron + 2,4-D ester + S	.06 + 2.0	--	92	92	35.0
Metsulfuron + 2,4-D ester + S	.06 + 4.0	--	92	96	35.3
DPX-R9521 + S	.188	--	87	95	34.0
DPX-R9521 + S	.25	--	92	96	31.9
DPX-R9521 + S	.30	--	93	96	27.8
DPX-M6316 + metsulfuron + S	.08 + .04	--	83	92	32.3
DPX-M6316 + metsulfuron + S	.10 + .05	--	90	93	30.6
DPX-M6316 + metsulfuron + S	.12 + .06	--	92	93	33.1
2,4-D ester	6.0	--	65	80	34.7
Untreated control	---	0	0	0	29.3
LSD (0.05)		8	7	5	4.1

[a]Triton AG98 surfactant at .25% v/v.

Catchweed bedstraw control in winter wheat. Spinney, R.L., A.P. Appleby, and B.D. Brewster. Catchweed bedstraw has become a major broadleaf weed problem in Oregon. This research was conducted at Corvallis in winter wheat to compare the efficacy of five herbicide treatments.

The experiment was a randomized complete block design with four replications. Plots were 2.5 m wide by 7.5 m long. Carrier volume was 234 l/ha delivered at 138 kPa pressure through 8002 flat fan nozzles set in a double-overlap pattern. Herbicides were applied on February 27, 1986, when the wheat had two to three tillers and the bedstraw had two to six whorls. Visual evaluations were conducted on April 3, 1986.

Fluroxypyr completely controlled catchweed bedstraw, while diflufenican provided excellent control (see table). The combination of chlorsulfuron and metsulfuron-methyl was comparable to DPX R9674 in controlling catchweed bedstraw, but DPX L5300 was less effective. None of the treatments caused visible injury to the wheat. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Wheat injury and catchweed bedstraw control
at Corvallis, Oregon

Herbicide	Rate	Wheat injury	Catchweed bedstraw control
	(kg ai/ha)	(%)	
fluroxypyr	0.34	0	100
diflufenican	0.14	0	93
DPX L5300	0.035	0	65
DPX R9674	0.035	0	76
chlorsulfuron +[1] metsulfuron-methyl	0.022 + 0.004	0	80
Check	0	0	0

[1]Surfactant X-77 added at 0.25% v/v.

Ivyleaf speedwell control with ethiozin and DPXR9674 in winter wheat in northern Idaho. Lish, J. M. and D. C. Thill. Ethiozin and DPXR9674 were evaluated for ivyleaf speedwell (VERHE) control in 'Hill 81' winter wheat. Treatments were applied in April with a CO_2 pressurized plot sprayer at 42 psi and 20 gpa. The experiment was a randomized complete block design with four replications. Plots were 10 by 25 ft. All treatments were applied on April 3 when the crop was in the early tiller stage of development except metribuzin + terbutryn, which were applied April 9, after the wheat had developed 2 in adventitious roots. Ivyleaf speedwell control was evaluated visually on June 26. Environmental data is in Table 1. Grain was harvested in late July.

Table 1. Environmental data for ivyleaf speedwell control experiment in winter wheat

Date	April 4, 1986	April 9, 1986
Barley growth stage	early tiller	2 in adventious roots
Air temperature (F)	60	52
Soil temperature at 2 in (F)	54	58
Relative humidity (%)	58	75
Soil pH	5.2	
CEC (meq/100 g soil)	21.5	
OM (%)	3.5	
Texture	silt loam	

Ivyleaf speedwell control was fair to excellent with all treatments except with ethiozin (0.75 lb ai/a) or DPXR9674 + Frigate (Table 2). Grain yield was best in ethiozin + DPXR9674 (0.75 + 0.013 oz ai/a), ethiozin + DPXR9674 + Frigate (0.75 + 0.013 oz ai/a + 0.05 % v/v), and DPXR9674 + Frigate (0.025 lb ai/a + 0.05 % v/v) treated plots. However, grain yield was highly variable as the yields in check plots ranged from 61 to 78 bu/a and some treatments with the poorest weed control had some of the highest grain yields. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Ivyleaf speedwell control in winter wheat.

Treatment[1]	Formulation	Rate[2]	VERHE Control	Grain yield
		(lb ai/a)	(%)	(bu/a)
check		0	-	61
ethiozin	50 WP	0.75	60	71
ethiozin + DPXR9674	50 WP 75 DF	0.75 + 0.013	73	81
ethiozin + DPXR9674+ Frigate	50 WP 75 DF SF	0.75 + 0.013 + 0.5%	95	92
ethiozin + DPXR9674	50 WP 75 DF	0.75 + 0.025	89	64
ethiozin + DPXR9674 + Frigate	50 WP 75 DF SF	0.75 + 0.025 + 0.5%	80	67
ethiozin	50 WP	1.0	88	58
ethiozin DPXR9674	50 WP 75 DF	1.0 + 0.013	90	69
ethiozin + DPXR9674 + Frigate	50 WP 75 DF SF	1.0 + 0.013 + 0.5%	70	65
ethiozin + DPXR9674	50 WP 75 DF	1.0 + 0.025	96	74
ethiozine + DPXR9674 + Frigate	50 WP 75 DF SF	1.0 + 0.025 + 0.5%	96	71
DPXR9674 + Frigate	75 DF SF	0.013 + 0.5%	20	80
DPXR9674 + Frigate	75 DF SF	0.025 + 0.5%	56	64
metribizin + terbutryn	75 DF 80 WP	0.25 + 0.6	87	68
check		0	-	78
LSD (0.05)			33	17

[1]Treatments were applied postemergence in April, 1986.
[2]Frigate (nonionic surfactant) rate is expressed as % v/v.

Speedwell competition in winter wheat. Rydrych, D.J. Ivyleaf speedwell (*Veronica hederaefolia* L.) is found in mixed or solid populations in winter wheat and can be a severe competitor in eastern Oregon grain fields. Ivyleaf speedwell can compete throughout the winter and early spring and will often produce flowers by the end of March. The flowering pattern is much earlier than most broadleaf weeds in eastern Oregon. Information on the competitive ability of this weed is limited. A trial was established in the fall of 1985 in a field infested with ivyleaf speedwell to determine the competitive effect of the weed on winter wheat (var. Stephens). Plots were 8 by 20 feet and replicated three times in a randomized block design. Ivyleaf speedwell populations of 8 plants/ft^2 were established in winter wheat that was planted at 60 lb/A using 7-inch row spacings. Ivyleaf speedwell was removed from selected plots in November and kept weed free until harvest. Ivyleaf speedwell totally dominated the plot area and other weeds were removed as they appeared. The results of the competition study are recorded in the table.

Ivyleaf speedwell populations of 8 plants/ft^2 reduced winter wheat yield by 43 percent. A reduction of one ton of grain in the control plots was a result of ivyleaf speedwell competition. (Oregon State University, CBARC, Pendleton, OR 97801)

Ivyleaf speedwell control in winter wheat--1986

Treatment	Ivyleaf speedwell control (%)	Winter wheat grain yield1/ R1	R2	R3	Avg.
weeded control	100	4650	3740	5630	4673
control	0	2590	2340	3130	2653

1/ Winter wheat yield - lb/A.

Ivyleaf speedwell--8 plants/ft^2.

Ivyleaf speedwell control in winter wheat. Spinney, R.L., A.P. Appleby, and B.D. Brewster. Ivyleaf speedwell is a difficult-to-control weed in winter wheat. This trial was conducted to compare herbicide treatments for control of ivyleaf speedwell and safety in winter wheat. The experiment was a randomized complete block design with four replications. Plots were 2.5 m wide and 7.5 m long. Herbicides were applied in water at a spray volume of 234 l/ha, delivered at 138 kPa pressure through 8002 flat fan nozzles set in a double-overlap pattern. Herbicides were applied on February 26, 1986, and visual evaluations taken on April 22, 1986. Wheat grain was harvested on July 31, 1986 with a Hege combine.

All treatments with diflufenican provided excellent control of ivyleaf speedwell and produced significantly higher wheat yields than the check (see table). Bromoxynil plus MCPA and bromoxynil plus DPX R9674 did not adequately control ivyleaf speedwell. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Ivyleaf speedwell control and winter wheat injury and yield with herbicide treatments at Rickreall, Oregon

Herbicide	Rate	Visual evaluations: Ivyleaf speedwell control	Visual evaluations: Wheat injury	Wheat grain yield
	(kg/ha)	(%)	(%)	(kg/ha)
bromoxynil + MCPA	0.28 + 0.28	50	0	8602
bromoxynil + MCPA + diflufenican	0.21 + 0.21 + 0.07	99	0	9341
bromoxynil + MCPA + diflufenican	0.21 + 0.21 + 0.22	98	0	9005
bromoxynil + MCPA + diflufenican	0.28 + 0.28 + 0.07	99	0	9341
bromoxynil + MCPA + diflufenican	0.28 + 0.28 + 0.11	100	0	9005
bromoxynil + diflufenican	0.28 + 0.14	98	0	9341
bromoxynil + DPX R9674	0.28 + 0.009	0	0	8467
Check	0	0	0	7190
			$LSD_{0.05}$ =	653
			$LSD_{0.01}$ =	888

Wild oat and broadleaf weed control in winter wheat. Swensen, J. B. and D. C. Thill. The objective of this trial was to determine the effects of tank mixed broadleaf herbicides on efficacy of diclofop in winter wheat. The trial was located 3 miles north of Moscow, Idaho on a silt loam soil with 3.4% organic matter, pH 5.3 and C.E.C. of 16.5 meq/100g. All herbicide treatments were broadcast over a mixed stand of Stephens, Dawes, and Hill 81 winter wheat on April 16,1986. Each treatment area measured 10 by 30 feet and the design of the experiment was a randomized complete block with 4 replications.

At the time of herbicide application, wild oat seedlings averaged 2.6 leaves per plant, with a population density of 1.4 plants/ft^2. Other weed populations and growth stages are noted in Table 1. Temperature of the soil surface and at 2 inch depth was 58 and 54 F,respectively, at time of application. Cloud cover was 75% with 54% relative humidity and wind speed was 7 mph. Four hours after treatments were broadcast over the plots the plot area received 0.1 to 0.2 inches of precipitation.

Leaf burn was noted on wheat plants on April 24, eight days after treatment application, and was scored as a percentage of total leaf area. Weed control, based on visible injury relative to the untreated check, was evaluated May 14 for wild oat (AVEFA), mayweed chamomile (ANTCO), henbit (LAMAM), prostrate knotweed (POLAU)and common lambsquarters (CHEAL). Weed control was evaluated again on June 13 and the two evaluations averaged. Number of wild oat panicles per 200 ft^2 was counted June 15, 20, 28 and July 11. Wild oat panicle density in diclofop-treated plots on June 28 and July 11 was analyzed separately to test diclofop efficacy.

Field bindweed in the plot areas was controlled by spot application of a 5:1 v/v dilution of Roundup + 2,4-D (Landmaster) applied to wetness on May 23, and followed by spot applications with dicamba + 2,4-D in a 1:3 v/v mixture at a rate of 0.5 lb ai dicamba and 1.0 lb ae 2,4-D per acre as needed. Prior to machine harvest, areas treated for bindweed were removed with a Jari mower. The remaining plot area was measured and grain was harvested with a Hege small plot combine July 25.

Leaf area burned ranged from 6 to 9% in plots treated with bromoxynil ME4 at 0.37 lb/a, while plots treated at 0.25lb/a ai had 4 to 6% leaf burn (Table 2). Burned area increased to 15% when crop oil (Moract) was included with bomoxynil ME4 at the high rate. Bromoxynil in commercial mixtures (One Shot, and Certrol) had 7 to 9% leaf area burned. Leaf burn in plots treated with diclofop alone or tank mixed with chlorsulfuron, and plots treated with AC222,293 and DPX-R9674 both alone and in combination was not different from the untreated check.

Common lambsquarters and prostrate knotweed were controlled with all broadleaf herbicides tested, whether tank mixed with diclofop or AC2222,943 (Table 2). Mayweed chamomile and henbit control was poorer. Bromoxinyl ME4 tank mixed with chlorsulfuron, DPX-M6316, or DPX-R9674 controlled 78 to 95% of the mayweed chamomile, while commercial mixtures of bromoxynil resulted in less control. Henbit control ranged from 40 to 74% in plots treated with broadleaf herbicides and was highly variable. AC222,293 applied alone resulted in moderate levels of broadleaf weed control.

Wild oat control, estimated May 14, ranged from 63 to 87% in diclofop treatments and did not vary with broadleaf herbicide used in the tank mix (Table 2). The wild oat herbicide,AC222,293, had caused little visible injury at this early date and percent control appeared no better than the untreated check. However, stunting resulting from AC222,293 delayed heading in wild oat (Fig.1). Whilethe number of wild oat plants that flowered eventually equaled the untreated check, the panicles produced by wild oats treated with AC222,293 contained only one to four seed. This compares with 50 to 150 seed per panicle in the untreated check (data not shown).

Wild oat control with diclofop was excellent, whether tank mixed or alone. No wild oat panicles were observed in diclofop-treated plots until June 28, and the number of panicles remained constant until harvest (Fig. 1). The number of wild oat plants eventually flowering was less than 10% that of the plots treated with AC222,293 or no wild oat herbicide. Similar to AC222,293, wild oat that flowered in the diclofop-treated plots were stunted and set few seeds. Number of wild oat panicles observed in diclofop-treated plots on June 28 and July 11 were averaged and are presented in Table 2. While the F-test was significant only at the 0.10 level, there appeared to be no decreased efficacy in diclofop tank mixes containing chlorsulfuron, DPX-M6316, or DPX-R9674, which had from 6 to 10 wild oat panicles per 200 ft^2. Interestingly, tank mixes containing bromoxynil averaged 13 panicles per 200ft^2.

These data indicate that the control of wild oat with diclofop was not significantly affected by tank mixing with the broadleaf herbicides tested. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Species density and growth stage at time of application.

Common name	Growth stage	Plants/ft^2
winter wheat	2.8 tillers/plant	3.3
wild oat	2.6 leaves/plant	1.4
common lambsquarters	2.0 leaves/plant	35.0
prostrate knotweed	3.0 leaves/plant	1.2
field pennycress	1-inch rosette	0.3
henbit	1 leaf/plant	0.3
mayweed chamomile	2 leaves/plant	0.3

Table 2. Percent leaf area burned one week after treatment application, annual weed control and wild oat panicle density in winter wheat.

Herbicide(s)	Rate(s)	Leaf burn	Weed control ANTCO	Weed control LAMAM	Weed control CHEAL	Weed control POLAV	Weed control AVEFA	AVEFA PANICLES
	(lb ai/a)	(%)						200/ft[2]
diclofop[1]	0.75	15	95	58	97	95	67	13
+ bromoxynil ME4	0.38							
diclofop	1.00	4	5	18	18	21	87	6
+ One Shot[2]	1.10	7	67	69	92	75	63	11
diclofop	0.80	7	58	73	93	70	78	15
+ Certrol[3]	0.3							
diclofop	1.00	9	70	63	96	78	87	14
+ Certrol[3]	0.37							
diclofop[4]	1.00	4	78	55	98	73	83	6
+ chlorsulfuron	0.012							
diclofop	1.00	6	80	66	95	82	82	12
+ bromoxynil ME4	0.38							
diclofop[4]	1.00	6	82	62	98	92	77	9
+ DPX-M6316	0.016							
diclofop[4]	1.00	5	73	65	94	90	78	14
+ DPX-L5300	0.008							
diclofop[4]	1.00	6	87	68	95	87	83	10
+ DPX-R9674	0.023							
diclofop	1.00	6	88	72	97	88	82	12
+ bromoxynil ME4	0.25							
+ chlorsulfuron	0.0006							
diclofop	1.00	4	78	47	98	84	77	11
+ bromoxynil ME4	0.25							
+ chlorsulfuron	0.0019							
diclofop	1.00	4	83	74	96	92	77	14
+ bromoxynil ME4	0.25							
+ DPX-R9674	0.0056							
DPX-R9674[4]	0.023	1	78	60	92	88	52	.
AC 222,293[4]	0.47	2	17	53	59	53	23	.
AC 222,293[4]	0.47	4	50	40	83	87	17	.
+ DPX-R9674	0.023							
	LSD(0.05)	4	18	26	14	23	26	7

[1] Applied with 0.6% v/v Moract crop oil concentrate
[2] One Shot Premix = Diclofop, Bromoxynil, MCPA (225:70:14 w/w/w)
[3] Certrol = Bromoxynil + MCPA ester (2.95 EC)
[4] Applied with 0.6% v/v nonionic surfactant

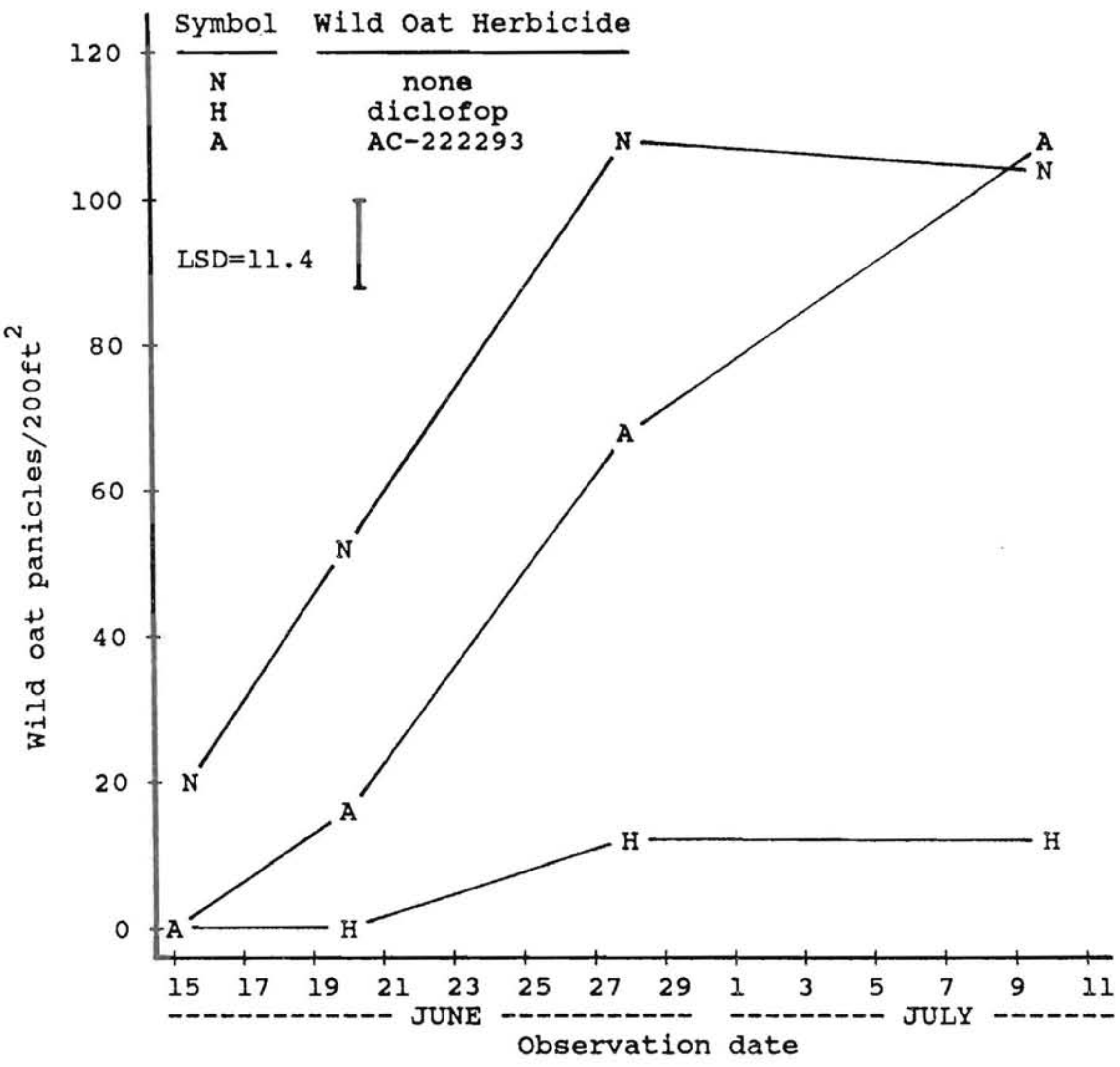


Figure 1. The effects of wild oat herbicide on number of wild oat panicles per 200 ft^2 observed on June 15, 20, 28 and July 11, 1986 at Moscow, Idaho.

Wild oat control in winter wheat with difenzoquat and AC 222,293 tank mixed with uran. Sattler, C. A., S. P. Yenne, and D. C. Thill. A field experiment was established near Deary, Idaho to evaluate wild oat (AVEFA) control in winter wheat (var. Stephens) with difenzoquat and AC 222,293 tank mixed with uran. The experiment was designed as a randomized complete block with four replications. Plots were 10 by 30 ft. The treatments were applied May 23, 1986 with a CO_2 pressurized sprayer calibrated to deliver 10 gpa at 40 psi and 3 mph. Environmental and edaphic conditions are in Table 1. Wild oat control was evaluated July 9 and the crop harvested July 25 with a small plot combine.

Table 1. Application and soil data

Date applied	May 23, 1986
Wild oat leaf stage	4 to 5
Method of application	broadcast
Air temperature (F)	51
Soil temperature (F, 2 in)	48
Relative humidity (%)	75
Cloud cover (%)	50
Wind (mph)	4 to 6
Soil texture	silt loam
Organic matter (%)	3.4
pH	5.3
CEC (meq/100 g soil)	17.2

All difenzoquat treatments controlled the wild oat (>91%) while none of the AC 222,293 treatments controlled more than 80% of the wild oat (Table 2). However, the treatments were applied later than the 1 to 4 leaf stage recommended for AC 222,293, which may have caused the decreased control. There was little or no difference in control between the uran tank mixes and the wild oat herbicides applied alone. Yield was higher than the check with all herbicide treatments except the AC 222,293 + 20% v/v uran. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 2. Wild oat control in winter wheat near Deary, Idaho

Treatment	Rate[1]	AVEFA Control	Yield
	(lb ai/a)	(%)	(bu/a)
check	0.00	-	18
difenzoquat	1.00	91	31
difenzoquat + uran	1.00 + 50%	92	30
difenzoquat + uran	1.00 + 100%	92	30
AC 222,293	0.47	68	30
AC 222,293 + uran	0.47 + 20%	74	26
AC 222,293 + uran	0.47 + 50%	80	31
AC 222,293 + uran	0.47 + 100%	66	30
uran	20% (2 gal/a)	0	23
uran	50% (5 gal/a)	0	24
uran	100% (10 gal/a)	0	21
LSD (0.05)		10	12

[1] Rates for uran are expressed as % v/v.

<u>The effect of downy brome control with ethyl metribuzin and metribuzin on winter wheat yield</u>. Westra, P. Ethyl metribuzin and metribuzin were applied postemergence in the fall of 1985 and the spring of 1986 to centurk winter wheat infested with downy brome (BROTE). Weed density averaged 380 plants per square yard. A randomized complete block with three replications of 10 by 30 foot plots was used. Applications were made in 26 gpa with a carbon dioxide powered backpack sprayer using 11002LP nozzles. Downy brome control was rated mid-summer and at harvest when wheat yields were obtained. The experiment was on a Platner sandy loam near Akron, CO.

No noticable crop injury resulted from any of the treatments. In general, fall treatments were more effective than spring treatments, emphasizing the necessity of treating downy brome when it is small, and presumably more vulnerable to chemical control. The best treatments produced yield increases of 20 bu/a, which would justify a moderate herbicide expense. Good moisture soon after application is important for the activation of these herbicides.

When downy brome control at harvest was in the 60 to 80 % range, yields were still increased 10 bu/A. This would suggest that with limited control, when downy brome levels are lowered to a threshold level, yields can be dramatically improved. This threshold level may be in the 50 to 60 % control range at harvest. (Weed Research Laboratory, Colorado State University, Ft. Collins, CO 80523)

Control of downy brome with ethyl-metribuzin and metribuzin and its effect on winter wheat yield.

Herbicide	Rate (lb/a)	Timing	Mid Summer	Harvest	Yield (bu/a)
			- % control -		
untreated			0 f	0 g	25 d
ethyl metribuzin	0.75	Fall	12 e	65 d	35 abcd
ethyl metribuzin	0.875	Fall	20 d	75 bc	40 abc
ethyl metribuzin	1.00	Fall	52 b	72 cd	36 abcd
ethyl metribuzin	1.25	Fall	67 a	83 ab	45 a
metribuzin	0.25	Fall	5 ef	13 f	30 cd
ethyl metribuzin	0.75	Fall			
metribuzin	0.063	Fall	58 b	80 bc	46 a
ethyl metribuzin	1.00	Fall			
metribuzin	0.063	Fall	72 a	90 a	45 a
ethyl metribuzin	0.75	Spring			
metribuzin	0.125	Spring	12 e	53 e	33 bcd

Postemergence grass and broadleaf weed control in winter wheat. Dial, M. J., D. C. Thill, and D. W. Morishita. Fourteen herbicide combinations were tested near Potlatch, Idaho for control of grass and broadleaf weeds in winter wheat (var. Hill 81). All treatments except metribuzin + terbutryn were applied during the fall after the crop emerged, but before most weeds had emerged. The metribuzin + terbutryn treatment was applied the following spring after the development of 2 in adventitious roots by the wheat. The plots were 10 by 30 ft and the experiment was designed as a randomized complete block with four replications. The herbicide treatments were applied in a 20 gpa water carrier, delivered at 38 psi and 3 mph with a CO_2 pressurized backpack sprayer. The soil type was a silt loam with a pH of 5.2, organic matter was 4.1% and CEC of 18.8 meq/100 g of soil. The application and weather data are summarized in Table 1.

Table 1. Application and weather data

Date of application	October 4, 1985	April 11, 1986
Crop growth stage	1 to 3 lf	2 in adventitious roots
Air temperature(F)	55	50
Soil temperature at 2 in(F)	72	52
Relative humidity(%)	30	68
Cloud cover(%)	0	100
Wind speed(mph)	0	5
Dew	none	none

None of the herbicide treatments adequately controlled downy brome (BROTE) (Table 2). AC222293 alone and mixed with DPXR9674 controlled over 93% of the wild oat (AVEFA) when compared to the check plots. Diclofop and metribuzin + terbutryn controlled wild oat statistically as well as the AC222293 treatments, but the level of control would not be acceptable in commercial use (Table 2). All treatments except bromoxynil and DPXR9674 controlled interrupted windgrass (APEIN). However, treatments containing ethiozin, AC222293 or diclofop + DPXR9674 controlled at least 85% of the windgrass when compared to the check (Table 2). All treatments, except diclofop alone, bromoxynil, and AC222293 controlled at least 85% of the mayweed chamomile (ANTCO) (Table 2). Field pennycress (THLAR) was controlled by all treatments except diclofop and bromoxynil (Table 2). The herbicide treatments that best controlled all weeds were AC222293 + DPXR9674 and metribuzin + terbutryn tank mixtures (Table 2). Grain yield ranged from 57 to 100 bu/a. The treatment with the highest grain yield was diclofop + DPXR9674 followed by AC222293 + DPXR9674 and diclofop + bromoxynil (Table 2). (Idaho Agricultural Experiment Station, Moscow , Idaho 83843)

Table 2. Postemergence grass and broadleaf weed control in winter wheat

Treatments[1]	Rate[2]	Time of application	Weed control BROTE	AVEFA	APEIN	ANTCO	THLAR	Grain[3] yield
	(lb ai/a)		------(% of check)-------					(bu/a)
check	0	-	-	-	-	-	-	57
diclofop	1.0	1-3 lf	46	71	70	0	0	77
diclofop + bromoxynil	1.0+.38	1-3 lf	38	64	71	95	95	94
bromoxynil	0.38	1-3 lf	0	0	0	0	0	81
diclofop + DPXR9674	1.0+0.02	1-3 lf	59	79	91	95	95	100
DPXR9674 + X-77	0.02+0.05	1-3 lf	0	0	0	93	93	83
ethiozin	0.75	1-3 lf	50	7	85	95	95	83
ethiozin	1.0	1-3 lf	59	29	91	95	95	93
ethiozin + metribuzin	0.75+.06	1-3 lf	70	53	88	95	95	87
ethiozin + metribuzin	1.0+.06	1-3 lf	60	20	94	95	95	89
ethiozin + DPXR9674	0.75+0.02	1-3 lf	30	0	91	95	95	92
ethiozin + DPXR9674	1.0+0.02	1-3 lf	35	20	93	95	95	83
AC222293 + X-77	0.5+0.5	1-3 lf	28	93	91	0	94	88
AC222293 + DPXR9674	0.5+0.02	1-3 lf	40	92	93	95	95	94
metribuzin + terbutyn	0.25+0.6	ADV.	79	73	73	85	94	87
check	0	-	-	-	-	-	-	-
LSD 0.05			n.s.	39	24	5	2	16

1 X-77 is a nonionic surfactant added at 0.5% v/v.
2 Rates for DPXR9674 are in oz ai/a.
3 Grain yield calculated based on 60 lb/bu.

Annual brome control in winter wheat. Gleichsner, J.A., B.D. Brewster, R.L. Spinney, and A.P. Appleby. Annual bromes in winter wheat continue to be an unsolved problem in western Oregon. Five brome species were broadcast in 1-m-wide strips across each plot and soil-incorporated with a tractor-drawn harrow. Species included were California brome, cheat, downy brome, field brome, and soft brome. Winter wheat ('Stephens') was seeded along the back of the plots separate from the bromes. The trial was established October 14, 1985, at Hyslop Experimental Research Farm, OSU, Corvallis, OR. Plot size was 2.5 m by 13.7 m, arranged in a randomized complete block design with three replications. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha at 138 kPa pressure. Wheat injury and brome control were visually evaluated February 13 and April 23, 1986. Plots were harvested July 25, 1986, with a small plot combine.

Lodging reduced wheat grain yields in the check and January-treated plots. Treatments applied in October or November caused slight to severe (2-35%) wheat injury early in the season; however, plots had largely recovered by harvest and all outyielded the check. Early season herbicide injury reduced both wheat density and growth, thus lowering lodging potential.

Brome control varied with treatment and among species within a treatment. For example, the triazines were very effective on soft brome but weak on cheat and California brome. Simazine and cyanazine (0.9 kg ai/ha) did not effectively control downy or field brome; however, at the higher rate (1.8 kg ai/ha) control of both species was considerably better, especially downy brome. Ethyl-metribuzin (0.84 kg ai/ha) controlled downy and soft brome, but a higher rate (1.7 kg ai/ha) was required for control of cheat and field brome. Ethyl-metribuzin was not effective on California brome. Cinmethylin provided excellent control of all brome species. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Annual brome control in winter wheat

Treatment	Rate	Brome control[1]										Wheat[1] injury		Wheat grain yield
		CA		Cheat		Downy		Field		Soft				
		E	L	E	L	E	L	E	L	E	L	E	L	
	(kg ai/ha)	(%)												(kg/ha)
PoPI/PE[2]														
triallate/diuron	1.4/1.8	57	63	78	48	94	82	95	75	100	98	5	0	8266
trifluralin/diuron	1.1/1.8	83	85	50	45	92	80	88	55	99	98	12	0	9072
diclofop-methyl/diuron	1.4/1.8	87	78	82	87	100	87	88	43	97	97	3	0	7661
PE														
diuron	1.8	42	23	22	17	70	30	70	15	95	85	7	0	8266
simazine	0.9	25	23	17	23	57	50	72	17	98	95	3	0	7258
simazine	1.8	58	70	48	32	93	96	93	95	100	100	15	0	9005
cyanazine	0.9	43	33	53	18	80	48	72	13	96	87	5	0	8664
cyanazine	1.8	70	63	77	32	95	73	92	42	99	92	13	2	9744
PE/EPost														
diuron/pendimethalin	1.8/1.1	87	73	40	35	87	67	78	30	100	96	8	0	8669
EPost														
cinmethylin	0.56	95	100	87	99	100	100	92	100	100	100	13	8	8803
simazine	0.9	43	23	27	17	70	65	75	38	98	100	7	0	8333
simazine	1.8	50	63	53	50	70	95	92	88	97	93	13	3	9610
cyanazine	0.9	57	40	52	13	87	37	82	13	100	93	8	0	8870
cyanazine	1.8	82	85	80	52	100	87	93	77	100	98	35	3	9946
Post														
metribuzin	0.56	40	90	35	90	86	100	78	96	85	100	8	0	8938
ethyl-metribuzin	0.84	23	48	18	37	27	95	42	72	85	100	2	0	7795
ethyl-metribuzin	1.7	28	73	23	88	83	100	53	98	85	100	2	0	7997
Check	-	0	0	0	0	0	0	0	0	0	0	0	0	6451

$LSD_{0.05}$ = 129
C.V. = 9.2%

[1]Brome control and wheat injury: 0 = no brome control or wheat injury, 100 = complete brome control or wheat kill. Early evaluations (E) were taken February 13, 1986, and late evaluations (L) on April 23, 1986.

[2]PoPI = post plant incorporated, applied October 15, 1985; PE = preemergence, applied October 15, 1985; EPost = early postemergence, applied November 13, 1985; Post = postemergence, applied January 23, 1986.

Downy brome control in winter wheat. Miller, S.D. and J.M. Krall. Research plots were established at the Torrington Research and Extension Center, Torrington, WY to evaluate the efficacy of herbicide treatments for downy brome control in winter wheat when applied at several stages. Winter wheat (var. Archer) was seeded in a sandy loam soil (74% sand, 16% silt and 10% clay) with 1.9% organic matter and a 7.2 pH September 16, 1985. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi to 1.5 to 2-leaf downy brome and 3-leaf wheat October 25, 1985 (air temp. 75 F, relative humidity 38%, wind SW 10 mph, sky clear and soil temp. - 0 inch 86 F, 2 inch 80 F and 4 inch 65 F), 1 to 2-tiller downy brome and 4 to 5-tiller winter wheat March 7, 1986 (air temp. 63 F, relative humidity 33%, wind SE 5 mph, sky clear and soil temp. - 0 inch 65 F, 2 inch 62 F and 4 inch 56 F) and 3 to 4-tiller downy brome and 5 to 6-tiller winter wheat March 14, 1986 (air temp. 46 F, relative humidity 68%, wind calm, sky clear and soil temp. - 0 inch 64 F, 2 inch 50 F and 4 inch 46 F). Plots were established under irrigation and were 9 by 30 ft. in size with three replications arranged in a randomized complete block. Visual weed control and crop damage evaluations were made April 17, wheat height measured June 19 and plots harvested July 15, 1986. Downy brome (BROTE) infestations were moderate and tansymustard (DESPI) infestations light but uniform throughout the experimental area.

SMY-1500 at rates up to 1.25 lb/A generally had little effect on wheat at any stage of application. Wheat stands were reduced 25 to 75% and surviving plants injured 27 to 35% with metribuzin alone or wheat stands reduced 2 to 27% and surviving plants injured 3 to 25% when applied at lower rates in combination with SMY-1500. Crop damage with metribuzin alone or in combination with SMY-1500 increased with rate and stage of application. Wheat yields reflected weed control and/or crop damage. SMY-1500 consistently increased wheat yields at all three stages of application when applied alone; however when applied with metribuzin only the early application and low metribuzin rate increased wheat yields. Downy brome control was 90% or higher with metribuzin alone or in combination with SMY-1500 at all stages of application; however, downy brome control with SMY-1500 alone decreased as downy brome maturity increased. Tansymustard control was good (85% or greater) with all treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1439.)

Downy brome control in winter wheat

Treatment[1]	Rate lb ai/A	Wheat[2] injury %	stand red %	height inch	yield bu/A	Control[3] BROTE %	DESPI %
1 to 2-leaf downy brome							
SMY-1500	0.75	0	0	37	90.4	80	88
SMY-1500	1.0	0	0	37	93.6	93	97
SMY-1500	1.25	3	0	37	91.2	100	98
SMY-1500 + metribuzin	0.75 + 0.063	3	2	38	92.0	100	98
SMY-1500 + metribuzin	0.75 + 0.125	8	11	36	83.9	100	97
SMY-1500 + metribuzin	1.0 + 0.063	8	5	37	93.6	100	98
metribuzin	0.25	27	25	36	81.5	100	100
1 to 2-tiller downy brome							
SMY-1500	0.75	0	0	36	86.3	77	85
SMY-1500	1.0	0	0	37	88.0	80	87
SMY-1500	1.25	2	2	37	87.2	90	95
SMY-1500 + metribuzin	0.75 + 0.063	12	15	35	83.1	97	100
SMY-1500 + metribuzin	0.75 + 0.125	22	25	35	82.3	100	100
SMY-1500 + metribuzin	1.0 + 0.063	18	13	36	76.7	100	100
metribuzin	0.25	30	37	32	54.9	100	100
cyanazine	1.0	13	10	36	72.6	73	95
3 to 4-tiller downy brome							
SMY-1500	1.0	0	0	36	88.0	62	87
SMY-1500	1.25	0	0	35	85.3	83	98
SMY-1500 + metribuzin	0.75 + 0.063	7	2	36	75.9	93	100
SMY-1500 + metribuzin	0.75 + 0.125	20	27	36	65.4	99	100
SMY-1500 + metribuzin	1.0 + 0.063	12	11	35	74.2	100	100
SMY-1500 + metribuzin	1.0 + 0.125	25	30	34	61.3	100	100
metribuzin	0.375	35	73	29	31.5	100	100
weedy check	-----	0	0	35	79.1	0	0

[1] Treatments applied October 25, 1985 and March 7 and March 14, 1986
[2] Wheat injury and stand reduction visually evaluated April 17, plant height measured June 19 and plots harvested July 15, 1986
[3] Weed control visually evaluated April 17, 1986

Control of downy brome and wild oat in no-till winter wheat. Dial, M. J., D. C. Thill, and D. W. Morishita. The control of downy brome (BROTE) and wild oat (AVEFA) was evaluated in no-till winter wheat (variety Hatton) near Lewiston, Idaho. The weed control efficacy of two formulations of diclofop also was tested at the same location. The two formulations of diclofop were the commercial 3 lb/gal emulsifiable concentrate(EC) and a 3 lb/gal microencapsulated flowable(ME). Both experiments were designed as randomized complete blocks with four replications. The treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Plots were 10 by 30 ft. The soil type was a silt loam, pH 5.3, organic matter 3.3% and CEC 23.0 meq/100 g soil. The plots were harvested August 7, 1986 with a small plot combine. Application and weather data are summarized in Table 1.

Table 1. Application and weather data

	Date of Application			Diclofop formulations
Date of application	October 26,85	March 3,86	April 11,86	March 3,86
Type of application	PPS	EPOST	ADV	EPOST
Air temperature	42	48	50	48
Soil temperature at 2 in (F)	48	48	52	48
Relative humidity(%)	86	90	68	90
Cloud cover(%)	100	95	100	95
Surface soil condition	moist	moist	dry	moist
Wind speed	3-5	0-2	0-5	0-2

All treatments in both experiments did not adequately control downy brome (Table 2). However, all early post (EPOST) treatments were scheduled to be applied post-plant preemergence surface, but snow and subfreezing temperatures in early November prevented the application of these treatments until spring. Weed control was not different among diclofop formulations or rates, and downy brome control ranged from 10 to 30%. Wild oat control was not acceptable in either experiment. Grain yield was not affected by herbicide treatment in either experiment. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table2. Percent control of downy brome and wild oat in no-till winter wheat

Treatments[1]	Rate[2]	Type of application[3]	BROTE	AVEFA	Grain yield[4]
	(lb ai/a)		(% control)		(bu/a)
diclofop	1.0	PPS	38	23	39
chlorsulfuron	0.25	PPS	18	22	30
diclofop + chlorsulfuron	1.0+0.25	PPS	18	36	34
diclofop	1.0	EPOST	39	49	36
chlorsulfuron	0.25	EPOST	25	24	32
diclofop + chlorsulfuron	1.0+0.25	EPOST	44	33	41
triallate	1.25	PPS	5	25	28
trifluralin	0.5	PPS	38	57	33
triallate + trifluralin	1.25+0.5	PPS	43	49	29
EL-107	2.0	EPOST	21	25	33
EL-107 + diclofop	2.0+1.0	EPOST	43	38	33
metribuzin + terbutryn	0.25+0.6	ADV	68	31	32
atrazine	0.80	ADV	70	0	29
check	0	-	-	-	-
check	0	-	-	-	-
LSD 0.05			45	45	ns
weed density(plants/ft^2)			8	2	-
diclofop(ME)	1.0	EPOST	13	25	30
diclofop(ME)	1.25	EPOST	10	13	27
diclofop(EC)	1.0	EPOST	30	25	31
diclofop(EC)	1.25	EPOST	20	15	33
check	0	-	-	-	30
LSD 0.05			ns	ns	6
weed density(plants/ft^2)			5	1	

[1] A nonionic surfactant was added at 0.25% v/v to the chlorsulfuron treatments.
[2] Rates for chlorsulfuron treatments are in oz ai/a.
[3] PPS = preplant surface, EPOST = early postemergence to weeds and crop, and ADV = 2 in adventitious roots on wheat.

Weed control in no-tillage planted winter wheat in northern Idaho. Lish, J. M., D. C. Thill, and D. W. Morishita. Pre-emergence and postemergence herbicide applications were evaluated for weed control in no-tillage planted winter wheat (var. Stephens). Treatments were applied to the soil surface on October 18, 1985 pre-emergence to the wheat except for metribuzin + terbutryn and bromoxynil + MCPA which were applied postemergence on April 3, 1986. Herbicides were applied with a CO_2 pressurized sprayer in water at 20 gpa and 42 psi. The experiment was a randomized complete block design with four replications. Plots were 10 by 25 ft. Interrupted windgrass (APEIN), wild oat (AVEFA), catchweed bedstraw (GALAP), and mayweed chamomile (ANTCO) were evaluated visually on June 30. Grain was harvested with a small plot combine on July 22.

Table 1. Application data for weed control in no-tillage planted winter wheat

Date	10/18/85	4/3/86
Air temperature (F)	58	60
Soil temperature at 2 in (F)	45	54
Relative humidity (%)	75	58
Dew present	none	none
Soil pH	5.5	
OM (%)	3.8	
CEC (meq/100 g soil)	22.7	
texture	silt	

Interrupted windgrass was controlled with all treatments except bromoxynil + MCPA (Table 2). Wild oat control was good only with diclofop/metribuzin + terbutryn sequential treatment. Catchweed bedstraw was controlled with chlorsulfuron or bromoxynil + MCPA. Mayweed chamomile was controlled with chlorsulfuron applied alone, ethiozine (1 lb ai/A), or diclofop/metribuzin + terbutryn sequential treatment. There was no difference in wheat yield between treatments. (Idaho Agricultrual Experiment Station, Moscow, Idaho 83843)

Table 2. Weed control in no-tillage winter wheat

Treatment	Rate	Weed control AVEFA	GALAP	APEIN	ANTCO	Yield
	(lb ai/A)	-------(% of check)-------				(bu/A)
diclofop	1.0	78	17	100	18	71
diclofop+chlorsulfuron	1.0 + 0.25	68	99	100	66	81
chlorsulfuron	0.25	75	100	100	99	73
ethiozine	0.75	5	46	100	74	74
ethiozine	1.0	38	80	100	90	75
ethiozine+metribuzin	0.75 + 0.06	28	24	100	62	76
ethiozine+metribuzin	1.0 + 0.06	45	59	100	75	70
diclofop/metribuzin+ terbutryn	1.0/0.25 + 0.6	94	46	100	100	80
bromoxynil/MCPA	0.38	40	98	25	96	74
bromoxynil/MCPA	0.38	15	90	50	88	72
check	0	-	-	-	-	72
LSD (0.05)		40	39	73	48	ns
plants/sq yd		4	2	few	1	-

Broadleaf weed control in no-till winter wheat. Dial, M. J., D. C. Thill and S. P. Yenne. Broadleaf weed control in no-till winter wheat (variety Stephens) was visually evaluated in two field experiments near Troy, Idaho. SC0051 was applied preplant surface (PPS), preemergence surface (PES), and early postemergence (EPOST) along with PES treatments of fluorochloridone and chlorsulfuron. EL-107 alone, in tank mixture, and as sequential treatments were applied PES in the fall and EPOST in the spring; terbutryn + MCPA amine was applied after the wheat crop developed 2 in adventitious roots (ADV). Both experiments were designed as randomized complete blocks with four replications. The plots were 10 by 30 ft. The SC0051 treatments were applied in 10 gpa water carrier at 40 psi and 3 mph with a CO_2 pressurized backpack sprayer. The EL-107 treatments were applied at 20 gpa, 40 psi and 3 mph. Percent control of mayweed chamomile (ANTCO) was visually evaluated on July 9. The plots were harvested on July 23 with a small plot combine. Application and weather data for both experiments are in Table 1.

Table 1. Application and weather data

Date applied[1]	09/26/1985	10/1/1985	10/18/1985	04/24/1986
Type of application	PPS	PES	PES	EPOST
Air temperature (F)	64	60	40	41
Soil temperature at 2 in(F)	64	56	45	52
Relative humidity (%)	42	30	30	75
Wind (mph)	0	0	0	3

Date applied[2]	09/30/1985	04/24/1986	05/9/1986
Type of application	PES	EPOST	ADV
Air temperature (F)	52	50	41
Soil temperature at 2 in (F)	56	52	52
Relative humidity (%)	90	58	75
Cloud cover (%)	10	100	90
Wind (mph)	0	3	3

[1] Application and weather data for SC0051.
[2] Application and weather data for EL-107.

SC0051 treatments controlled 75 to 93% of the mayweed chamomile (Table 2). Control tended to be better with EPOST treatments than with PPS or PES treatments (Table 2). Chlorsulfuron controlled 95% of the mayweed chamomile. Grain yields ranged from 61 to 70 bu/a.

All treatments in the EL-107 experiment controlled mayweed chamomile (Table 3). (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Broadleaf weed control in no-till winter wheat with SC0051

Treatment[1]	Rate[2]	Time of application	Weed control ANTCO	Grain yield[3]
	(lb ai/a)		(% of check)	(bu/a)
check	0	--	--	68
check	0	--	--	65
SC0051	0.5	PPS	78	66
SC0051	1.0	PPS	86	61
fluorochloridone	0.38	PES	70	62
chlorsulfuron	0.0156	PES	95	67
SC0051	0.5	PES	75	65
SC0051	0.75	PES	80	62
SC0051	1.5	PES	85	69
SC0051	0.25	EPOST	93	70
SC0051	0.5	EPOST	90	61
SC0051	1.0	EPOST	81	61
SC0051 + Tween 20	0.25+0.5	EPOST	88	63
SC0051 + Tween 20	0.5+0.5	EPOST	91	66
LSD 0.05			n.s.	n.s.

[1] Tween 20 is a nonionic surfactant and the rate is expressed as % v/v.
[2] Chlorsulfuron rate is expressed in oz ai/a.
[3] Grain yield based on 60 lb/bu.

Table 3. Broadleaf weed control in no-till winter wheat with EL-107

Treatment[1]	Rate[2]	Time of application	Weed control ANTCO	Grain yield[3]
	(lb ai/a)		(% of Control)	(bu/a)
check	0	--	--	72
EL-107	0.06	PES	66	77
EL-107	0.13	PES	61	77
EL-107	0.19	PES	91	80
EL-107 + chlorsulfuron	0.13+0.06	PES	83	79
EL-107 + chlorsulfuron	0.13+0.13	PES	95	79
chlorsulfuron	0.13	PES	92	73
EL-107 + ethiozin	0.13+0.75	PES	84	68
EL-107 + ethiozin	0.13+1.0	PES	84	82
ethiozin	1.0	PES	54	84
EL-107 + bromoxynil/MCPA	0.13+0.25	EPOST	95	75
bromoxynil/MCPA	0.25	EPOST	93	78
EL-107 + DPXR9674	0.13+0.20	EPOST	92	76
DPXR9674 + R-77	0.2+0.5	EPOST	90	79
terbutryn + MCPA amine	0.8+0.5	ADV	95	77
LSD 0.05			n.s.	n.s.

[1] R-77 is a nonionic surfactant; rate is expressed as % v/v.
[2] The rate for chlorusulfuron and DPXR9674 is in oz ai/a.
[3] Grain yield is based on 60 lb/bu.

Postemergence control of interrupted windgrass in winter wheat. Dial, M. J., D. C. Thill, and D. W. Morishita. Two experiments were conducted during 1986 near Potlatch, Idaho to compare interrupted windgrass (APEIN) control with four ethiozin rates to metribuzin, terbutryn, and atrazine. Also, ethiozin was tank mixed with metribuzin, Frigate (an agricultural adjuvant), and urea-ammonium nitrate (UAN). In both experiments, treatments were applied at 20 gpa at 40 psi and 3 mph with a CO_2 pressurized backpack sprayer to an established stand of winter wheat (variety Hill 81). Experimental design for both experiments was a randomized complete block with four replications. The plots were 10 by 30 ft. The soil type was a silt loam with 5.4 pH, 2.8% organic matter, and 17.3 to 17.6 CEC meq/100 g soil. The plots were harvested on August 24 with a small plot combine. Application and weather data are in Table 1.

Table 1. Application and weather data

Application date	April 8	April 9	April 21
Air temperature(F)	64	50	67
Soil temperature at 2 in(F)	70	52	68
Relative humidity(%)	40	88	64
Cloud cover(%)	0	90	0
Wind speed(mph)	6	5	0

All treatments controlled at least 83% of the interrupted windgrass compared to the check (Table 2). Ethiozin at 1.5 lb ai/a controlled 95% of the windgrass with little crop injury. The highest rate of ethiozin + metribuzin controlled 96% of the windgrass, but also resulted in 25% crop injury. Addition of Frigate and/or UAN to ethiozin did not increase control of interrupted windgrass (Table 2). Plots treated with ethiozin at 0.75 lb ai/a had the highest grain yield even though interrupted windgrass control was less than the other treatments (Table 2). Grain yield was not increased when Frigate or UAN were added to the spray solution. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 2. Postemergence control of interrupted windgrass in winter wheat

Treatment	Rate	Time of application[1]	APEIN control	Grain yield[2]
	(lb ai/a)		(%)	(bu/a)
check	0	--	-	59
ethiozin	0.75	early tiller	89	75
ethiozin	1.0	early tiller	93	65
ethiozin	1.5	early tiller	95	68
ethiozin	2.0	early tiller	93	61
ethiozin + metribuzin	0.75+0.06	early tiller	93	67
ethiozin + metribuzin	0.75+0.13	early tiller	95	60
ethiozin + metribuzin	1.0 +0.06	early tiller	93	59
ethiozin + metribuzin	1.0 +0.13	early tiller	93	61
ethiozin + metribuzin	1.5 +0.06	early tiller	94	58
ethiozin + metribuzin	2.0 +0.13	early tiller	96	53
metribuzin	0.38	2 in adv. roots	93	59
metribuzin + terbutryn	0.25+0.6	2 in adv. roots	91	50
atrazine	0.8	2 in adv. roots	93	57
check	-	-	-	61
LSD 0.05			n.s.	n.s.
check	0	-	-	60
ethiozin	0.75	early tiller	83	72
ethiozin + Frigate[3]	0.75+0.5	early tiller	93	65
ethiozin + UAN[4]	0.75+18.0	early tiller	93	70
ethiozin + Frigate	1.0 +0.5	early tiller	94	63
ethiozine + UAN	1.0 +18.0	early tiller	91	67
ethiozine	1.0	early tiller	94	61
metribuzin + terbutyn	0.25+0.6	2 in adv. roots	93	60
LSD 0.05			n.s.	n.s.

[1] Stage of growth for both crop and weed.
[2] Bushels per acre determined by using 60 lb/bu.
[3] Rate expressed as % v/v.
[4] Low pressure nitrogen solution, 32% nitrogen, rate expressed as lb N/a (3.54 lb N/gal solution).

Bulbous bluegrass control in winter wheat. Rydrych, D.J. Bulbous bluegrass (*Poa bulbosa* L.) is a serious weed competitor in dryland grain fields in eastern Oregon. It is difficult to control with selective herbicides once the plants start to tiller. Bulbous bluegrass thrives in cold wet soils that remain saturated throughout the growing season. A trial was established in the spring of 1986 to evaluate three herbicides for the selective control of bulbous bluegrass in winter wheat. The herbicides metribuzin, ethyl metribuzin, and chlorsulfuron were applied postemergence on bulbous bluegrass (3-leaf to 3-inch clumps) on March 14, 1986. Winter wheat (Stephens) had 3 to 4 leaves with 1 tiller. Plots were 8 by 20 feet and replicated three times in a randomized block design. Ethyl metribuzin (3.00, 1.50, and 1.00 lb ai/A), metribuzin (.50 and .33 lb ai/A) and chlorsulfuron (.50 oz ai/A) were applied using 8002 nozzles @ 20 GPA at 30 PSI. Wheat tolerance and crop injury were evaluated in June and the results are recorded in the table.

Ethyl metribuzin gave good control (85 percent) of bulbous bluegrass with excellent crop safety. Ethyl metribuzin was less active than metribuzin in these tests. Metribuzin caused considerable crop injury at rates from .33 to .50 lb ai/A. Chlorsulfuron was only slightly active on bulbous bluegrass (38 percent) but it did cause considerable suppression. Crop safety using chlorsulfuron was excellent. Combinations of the three herbicides did not improve bulbous bluegrass control.

Ethyl metribuzin has excellent selectivity on winter wheat and early timing may improve the control efficiency. (Oregon State University, CBARC, Pendleton, OR 97801)

Bulbous bluegrass control in winter wheat at Pilot Rock, Oregon--1986

Treatment[1/]	Rate (lb/A)	Bulbous bluegrass control R1	R2	R3	Avg.	Avg. crop injury
ethyl metribuzin	3.00	80	80	95	85	0
ethyl metribuzin	1.50	90	90	75	85	0
ethyl metribuzin	1.00	45	30	40	38	0
ethyl metribuzin	1.00 + .25	50	80	98	76	8
metribuzin	.50	99	98	99	99	20
metribuzin	.33	75	30	75	60	8
*metribuzin-chlorsulfuron	.33 + .50 oz	60	40	60	53	5
*chlorsulfuron	.50 oz	40	40	35	38	0
control	---	0	0	0	0	0

1/ Treated - postemergence March 14, 1986 with 5-7 bulbous bluegrass plants/ft^2.

* chlorsulfuron applied in oz ai/A only.

Cereal rye competition in winter wheat in eastern Oregon. Rydrych, D.J. Cereal rye is raised as a crop in many areas of the United States but can be a serious competitor in most areas of the Pacific Northwest. Rye is classified as a weed in Oregon because it volunteers freely, has dormant seed, and contaminates winter wheat at harvest. This contamination can result in dockage at the elevator and reduced quality of grain. A competition trial was established on the Pendleton Station in the fall of 1985 to determine the competitive effect of cereal rye in winter wheat (var. Stephens). Plots were 8 by 20 feet and replicated three times in a randomized block design. Cereal rye populations of 18 plants/ft^2 were established in winter wheat that was planted at 60 lb/A in 14-inch row spacings. Cereal rye was removed from selected plots in November and February and kept weed free until harvest. Ethyl metribuzin was applied November 15, 1985 (wheat, 2 to 3 leaf; rye, 1 to 3 leaf) at the rate of 1.50 lb ai/A. The results of the study are recorded in the table.

Cereal rye populations of 18 plants/ft^2 reduced winter wheat yield by 33 percent when removed in February and 69 percent when allowed to remain until harvest (July). The addition of ethyl metribuzin as a chemical control was partially effective and cereal rye grain contamination was reduced by 91 percent. Cereal rye produced an average of 1160 lb/A of seed grain in the control plots which was over half of the total grain volume. Cereal rye is a serious competitor in winter wheat as well as a contaminant in the grain itself. More experiments are being established to develop a chemical control for selective cereal rye control in winter wheat. (Oregon State University, CBARC, Pendleton, OR 97801)

Cereal rye competition in winter wheat in eastern Oregon--1986

Treatment[1/]	Time	Winter wheat yield (lb/A)	Cereal rye yield (lb/A)
weeded control	Fall	3540	0
weeded control	Feb	2360	0
ethyl metribuzin	Fall	2560	100
control	----	1090	1160

Treated Fall - November 15, 1985 (wheat, 2 to 3 leaf; rye, 1 to 3 leaf).

cereal rye 18 plants/ft^2.

1/ Ethyl metribuzin applied @ 1.50 lb ai/A.

Selective volunteer cereal rye control in winter wheat with combination treatments of ethyl-metribuzin and metribuzin. Diener, P.R., D.J. Rydrych, and A.P. Appleby. In field trials, ethyl-metribuzin has selectively controlled volunteer cereal rye in winter wheat. In some cases, metribuzin enhanced the activity of ethyl-metribuzin, thus reducing the amount of ethyl-metribuzin required. Field trials were conducted in the Columbia River Plateau region of eastern Oregon to gain a better understanding of selective rye control with combination treatments.

The trial was established on the Columbia Basin Agricultural Research Station near Pendleton, Oregon, in September, 1985. Cereal rye was broadcast at approximately 72 kg/ha and 'Stephens' winter wheat was planted with deep-furrow drill in 36-m rows at 78 kg/ha. A split-plot randomized complete block design was used with five replications. Main plots were timing and subplots were combination treatments of ethyl-metribuzin and metribuzin. Preemergence treatments were made on 25 September 1985, 1-leaf on 18 October 1985, and 2- to 4-leaf, 1 tiller on 26 January 1986. Two treatments were added to the 2-leaf timing, 2.2 + 0.14 and 3.4 + 0.0 kg ai/ha ethyl-metribuzin and metribuzin, respectively.

Visual evaluations for percent injury were recorded on 3 May and 15 July 1986. Quantitative data were taken to measure selectivity differences among treatments. Biomass of rye was determined within a .28 m^2 area in selected plots on 3 May 1986. The samples were oven-dried at 70 C for 24 hours, and dry weights were taken. Culms of rye were counted in the same areas on 17 July 1986. On 28 July, two rows of wheat were harvested with a small-plot combine to determine grain yield. All rye plants were removed from the harvest area with a hand-sickle to avoid contamination of the wheat samples. The data collected were subjected to analysis of variance.

The addition of metribuzin improved rye control while preserving selectivity. The timing for best control was at the 2- to 4-leaf stage of rye. As earlier studies have indicated, rye control is best at early postemergence. A possible explanation for less control at the 1-leaf stage is that a considerable amount of rye had not emerged, whereas at the 2- to 4-leaf stage, coverage of the foliage was more complete. Preemergence activity was minimal. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Various parameters showing volunteer cereal rye control with combination treatments of ethyl-metribuzin and metribuzin

Treatment	Timing (rye)	Rate	Rye injury	Wheat grain yield	Rye culm density	Rye biomass dry wts
		(kg/ha)	(%)	(kg/ha)	(#/.28m^2)	(g/.28m^2)
ethyl-metribuzin	Pre	1.7	5	1629	--	--
metribuzin	Pre	0.14	0	1753	--	--
ethyl-metribuzin + metribuzin	Pre	0.07	0	1895	--	--
ethyl-metribuzin + metribuzin	Pre	0.8 + 0.14	7	1519	--	--
ethyl-metribuzin + metribuzin	Pre	1.1 + 0.07	4	1578	--	--
ethyl-metribuzin + metribuzin	Pre	1.1 + 0.14	7	1639	--	--
ethyl-metribuzin + metribuzin	Pre	1.7 + 0.07	11	1578	--	--
ethyl-metribuzin + metribuzin	Pre	1.7 + 0.14	28	2328	82	--
Control	-	0	-	1612	141	145
ethyl-metribuzin	1-leaf	1.7	41	2329	66	73
metribuzin	1-leaf	0.14	0	1567	--	--
ethyl-metribuzin + metribuzin	1-leaf	0.8 + 0.07	7	1995	--	--
ethyl-metribuzin + metribuzin	1-leaf	0.8 + 0.14	26	2189	--	--
ethyl-metribuzin + metribuzin	1-leaf	1.1 + 0.07	18	1960	--	--
ethyl-metribuzin + metribuzin	1-leaf	1.1 + 0.14	31	2011	--	--
ethyl-metribuzin + metribuzin	1-leaf	1.7 + 0.07	34	2323	--	--
ethyl-metribuzin + metribuzin	1-leaf	1.7 + 0.14	47	2522	56	--
Control	-	0	-	1295	141	145
ethyl-metribuzin	2-leaf	1.7	66	3019	36	33
metribuzin	2-leaf	0.14	3	1699	127	102
ethyl-metribuzin + metribuzin	2-leaf	0.8 + 0.07	48	2898	--	--
ethyl-metribuzin + metribuzin	2-leaf	0.8 + 0.14	54	3099	--	--
ethyl-metribuzin + metribuzin	2-leaf	1.1 + 0.07	69	3322	--	--
ethyl-metribuzin + metribuzin	2-leaf	1.1 + 0.14	66	3496	--	--
ethyl-metribuzin + metribuzin	2-leaf	1.7 + 0.07	76	4077	--	--
ethyl-metribuzin + metribuzin	2-leaf	1.7 + 0.14	81	4035	25	21
ethyl-metribuzin + metribuzin	2-leaf	2.2 + 0.14	89	4414	17	14
ethyl-metribuzin	2-leaf	3.4	95	4087	8	9
Control	-	0	-	1664	141	145
$LSD_{0.05}$ (between timings)				311		
$LSD_{0.05}$ (rate within same timing)				626		

Winter cereal tolerance to herbicides. Valverde, B.E., B.D. Brewster, A.P. Appleby, and R.L. Spinney. Eight experiments were established at Hyslop Research Farm, Corvallis, Oregon, in 1985-86 to determine the tolerance of winter cereals to selected herbicides. A randomized complete block design with four replications was used with each variety. Six winter wheat varieties (Stephens, Elite No. 11, Hill 81, Yamhill, Dusty, and Malcolm), one barley variety (Scio), and a triticale (Flora) were planted at 100 kg/ha on 18-cm rows on October 14, 1985. Herbicide treatments were applied with a unicucle plot sprayer calibrated to deliver 234 l/ha on November 13, 1985 (growth stage: 2 to 3 leaves). Two visual evaluations were made in December, 1985 and March, 1986. Plots were harvested on July 24, 1986, with a small-plot combine.

During the first visual evaluation (Table 1), low injury ratings (below 10%) were given to plots treated with either AC-222,293 or diclofop-methyl. Diuron was phytotoxic (10 to 40%) to all varieties. All varieties were more sensitive to metribuzin than to ethyl-metribuzin, but both herbicides severely injured Yamhill wheat. Severe injury to Hill 81 and Elite No. 11 also occurred in metribuzin-treated plots.

During the second evaluation (Table 2), herbicide toxicity was more noticeable. Higher injury ratings were given to all herbicides except AC-222,293 to which all varieties exhibited tolerance at the rate applied. Differential selectivity to metribuzin and ethyl-metribuzin also was observed. Hill 81 and Yamhill wheat were severely injured by both herbicides. As in the first evaluation, Elite No. 11 was more tolerant to ethyl-metribuzin than to metribuzin, although no differences in yield were detected at harvest (Table 3). Metribuzin and ethyl-metribuzin significantly reduced yields in Hill 81 and Yamhill wheat. Yield reductions were similar for both herbicides within the two varieties. Lodging was observed in both diclofop-methyl and check plots in Dusty, which probably lowered grain yields. (Crop Science Dept., Oregon State University, Corvallis, OR 97331).

Table 1. Herbicide tolerance in winter cereals. Evaluation of crop injury on December 9, 1985.

Treatment	Rate (kg/ha)	Variety Stephens	Elite No. 11	Hill 81	Yamhill	Dusty	Malcolm	Scio	Flora
		Injury (%)[a]							
AC-222293	0.6	3	0	1	5	0	4	0	1
Diclofop-methyl	1.4	3	3	3	8	5	4	4	4
Diuron	1.8	10	15	6	24	10	13	39	14
Ethyl-metribuzin	2.3	1	5	13	43	0	1	0	3
Metribuzin	0.6	6	43	34	61	10	10	5	5
Check	-	0	0	0	0	0	0	0	0

[a]Values presented are means of four replications.

Table 2. Herbicide tolerance in winter cereals. Evaluation of crop injury on March 26, 1986.

Treatment	Rate (kg/ha)	Variety Stephens	Elite No. 11	Hill 81	Yamhill	Dusty	Malcolm	Scio	Flora
		Injury (%)[a]							
AC-222293	0.6	5	10	3	5	8	5	9	4
Diclofop-methyl	1.4	18	21	13	29	14	24	40	24
Diuron	1.8	30	63	24	48	50	34	40	36
Ethyl-metribuzin	2.3	6	18	63	93	8	5	16	4
Metribuzin	0.6	50	83	68	95	58	48	48	40
Check	-	0	0	0	0	0	0	0	0

[a]Values presented are means of four replications.

Table 3. Herbicide tolerance in winter cereals, grain yield data.

Treatment	Rate (kg/ha)	Variety: Stephens	Elite No. 11	Hill 81	Yamhill	Dusty	Malcolm	Scio	Flora
		Grain Yield (kg/ha)[a]							
AC-222293	0.6	10855	7215	9775	8090	8025	9775	7620	9100
Diclofop-methyl	1.4	10385	6810	9440	8290	6945	9235	6740	8970
Diuron	1.8	10180	6540	9710	7890	8430	9640	7280	9170
Ethyl-metribuzin	2.3	10655	6405	8430	3170	7415	9845	6675	9035
Metribuzin	0.6	10250	6000	8630	4045	8765	9775	6605	9100
Check	-	10315	6540	9775	7685	7415	9775	7080	9370
$LSD_{.05}$		ns	ns	760	1130	ns	ns	ns	ns

[a]Values presented are means of four replications.

Evaluation of postemergence herbicide treatments in fallow. Miller, S.D. Research plots were established near Chugwater, WY to evaluate the efficacy of individual and/or herbicide combinations for weed control in fallow when applied postemergence. 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 six-nozzle knapsack unit delivering 10 gpa at 40 psi May 19, 1986 (air temp. 75 F relative humidity 23%, wind calm, sky overcast and soil temp. - 0 inch 83 F, 2 inch 74 F and 4 inch 64 F) to 12 inch winter wheat and 1.5 inch Russian thistle. The soil was classified as a sandy loam (65% sand, 20% silt and 15% clay) with 1.4% organic matter and a 7.9 pH. Visual weed control evaluations were made July 1, 1986. Volunteer wheat (VOWHT) infestations were moderate and Russian thistle (SASKR) infestations light but uniform throughout the experimental area.

Russian thistle control exceeded 90% with all treatments except clopyralid or clopyralid plus fluroxypyr in combination with haloxyfop. Volunteer wheat control was excellent (95% or greater) with all treatments containing haloxyfop or glyphosate. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1430 .)

Weed control in fallow with postemergence treatments

Treatment[1]	Rate lb ai/A	Control[2] VOWHT %	Control[2] SASKR %
CGA-131036 + X-77	0.009	0	93
CGA-131036 + X-77	0.018	0	95
CGA-131036 + X-77	0.027	0	98
CGA-131036 + X-77	0.036	0	99
terbutryn + X-77	1.5	53	99
terbutryn + X-77	2.0	58	100
terbutryn + CGA-131036 + X-77	1.5 + 0.018	53	100
terbutryn + CGA-131036 + X-77	2.0 + 0.018	63	100
CGA-131036 + 2,4-D + dicamba + X-77	0.018 + 0.5 + 0.125	0	99
clopyralid + haloxyfop + oc	0.125 + 0.1	95	45
clopyralid + glyphosate + X-77	0.125 + 0.375	98	94
clopyralid + fluroxypyr + glyphosate + X-77	0.125 + 0.125 + 0.375	98	98
clopyralid + fluroxypyr + haloxyfop + oc	0.175 + 0.125 + 0.1	99	80
clopyralid + fluroxypyr + glyphosate + 2,4-D (PM)	0.125 + 0.125 + 0.375 + 0.67	99	99
clopyralid + 2,4-D (PM) + haloxyfop + oc	0.125 + 0.5 + 0.1	95	97
clopyralid + 2,4-D (PM) + glyphosate + X-77	0.125 + 0.5 + 0.375	99	99
glyphosate + 2,4-D (PM) + dicamba	0.375 + 0.67 + 0.125	98	100
XRM-4813 + glyphosate + X-77	0.185 + 0.375	100	93
weedy check	-------------	0	0

[1] Treatments applied May 19, 1986; X-77 applied at 0.5% v/v, OC = At Plus 411 F at 1 qt/A and PM = package mix

[2] Plots visually evaluated July 1, 1986

Chemical fallow weed control in Idaho. Lish, J. M and D. C. Thill. Herbicides were applied in the fall and spring near Lewiston and in the spring near Soda Springs to evaluate weed control in chemical fallow. Both experiments were designed as a randomized complete block with four replications. Plots were 10 by 30 ft at Lewiston and 20 by 30 ft at Soda Springs. Herbicides were applied with a CO_2 pressurized plot sprayer in water at 10 gpa and 42 psi. Environmental data is in Table 1.

Table 1. Application data for chemical fallow

Location	Lewiston		Soda Springs
Date of application	10/26/85	4/6/86	5/26/86
Air temperature (F)	42	58	64
Soil temperature, 2 in (F)	48	50	60
Relative humidity (%)	86	58	62
Dew	yes	no	no
Soil pH	6.0		7.6
OM (%)	3.4		3.4
CEC (meq/100 g)	21.0		19.4
Texture	silt		silt loam

Volunteer wheat (TRIAE), downy brome (BROTE), prickly lettuce (LACSE), wild oat (AVEFA), coast fiddleneck (AMSIN), catchweed bedstraw (GALAP), and hedgeparsley (TOIAR) were evaluated on June 5 at Lewiston. Tansy mustard (DESPI), prickly lettuce, volunteer wheat, and meadow salsify (TRODM) were evaluated 30 and 50 d after application at Soda Springs.

Weed control over all species at Lewiston was better with April applications than October applications (Table 2). Prickly lettuce was controlled adequately in the fall only with chlorsulfuron + glyphosate/2,4-D (0.016 + 1.01 lb ai/a). Coast fiddleneck was not controlled with any of the fall applications. Volunteer wheat, downy brome, catchweed bedstraw, and hedgeparsley control was not statistically different among treatments. However, volunteer wheat, downy brome, and hedgeparsley control was generally good over all treatments whereas no treatment controlled catchweed bedstraw.

Weed control at Soda Springs was good to excellent (80 to 100%) with all treatments except glyphosate applied alone (Table 3). Volunteer wheat control was reduced with glyphosate + R900XC compared to glyphosate + R-11. The trend was similar for meadow salsify and prickly lettuce. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Chemical fallow weed control at Lewiston, Idaho

Treatment	Rate	Date applied	Weed control					
			TRIAE	BROTE	LACSE	AMSIN	GALAP	TOIAR
	(lb ai/a)		--------------(% of check)-------------					
dimethazone+ glyphosate/2,4-D	0.13 + 1.01	10/26	100	59	22	38	28	75
dimethazone+ glyphosate/2,4-D	0.25 + 1.01	10/26	100	80	22	0	35	98
dimethazone+ glyphosate/2,4-D	0.50 + 1.01	10/26	100	58	30	50	44	90
pronamid+ glyphosate/2,4-D	0.25 + 1.01	10/26	54	96	30	75	15	85
chlorsulfuron+ glyphosate/2,4-D	0.016 + 1.01	10/26	95	78	98	75	40	100
chlorsulfuron+ glyphosate/2,4-D	0.016 + 1.01	4/6	100	96	100	100	48	100
glyphosate/2,4-D	1.01	4/6	100	98	88	100	64	98
check	0	-	-	-	-	-	-	-
LSD (0.05)			ns	ns	34	49	ns	ns
plants/sq ft			3	4	0.1	0.1	0.2	1

Table 3. Chemical fallow at Soda Springs, Idaho

Treatments	Rate	DESPI	LACSE		TRODM		TRIAE
		6/24	6/24	7/10	6/24	7/10	6/24
	(lb ai/A)[1]	(% of check)					
glyphosate/2,4-D	0.31	98	95	98	96	93	100
glyphosate/2,4-D	0.23	96	93	94	96	91	100
glyphosate+R-11	0.5+0.5	95	80	63	86	71	100
glyphosate+R-11	0.38+0.5	89	79	45	89	43	96
glyphosate+R900XC	0.5+0.5	91	75	54	56	41	95
glyphosate+R900XC	0.38+0.5	91	78	51	55	33	75
glyphosate/2,4-D+ dicamba	0.31+0.5	100	98	100	99	98	99
glyphosate/2,4-D+ dicamba	0.23+0.5	100	100	100	98	93	98
glyphosate/2,4-D+ chlorsulfuron	0.31+0.031	100	99	99	100	94	100
glyphosate/2,4-D+ metsulfuron	0.31+0.0062	91	96	98	80	95	100
check	0	-	-	-	-	-	-
LSD (0.05)		12	12	16	28	21	5
plants/sq ft		3	3		1		0.1

[1]Rates for R-11 and R900XC (nonionic surfactants) are expressed as % v/v.

Evaluation of early spring herbicide treatments in fallow. Miller, S.D. Research plots were established at the Archer Research and Extension Center, Archer, WY to evaluate the efficacy of individual and/or herbicide combinations for weed control in fallow when applied in the early spring. Plots were 9 by 30 ft. in size with three replications arranged in a randomized complete block. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 20 gpa at 40 psi March 26, 1986 (air temp. 62 F, relative humidity 20%, wind NW 10 mph, sky clear and soil temp. - 0 inch 66 F, 2 inch 56 F and 4 inch 49 F). Volunteer barley had 3 to 4 leaves and downy brome 2 to 3 tillers at the time of treatment. The soil was classified as a loam (46% sand, 28% silt and 26% clay) with 1.2% organic matter and a 7.3 pH. Visual weed control evaluations were made July 1, 1986. Volunteer barley (VOBLY) and downy brome (BROTE) infestations were heavy and wild buckwheat (POLCO) infestations light but uniform in the experimental area.

Spring applications of FMC-57020 alone at 0.5 and 1.0 lb/A were not sufficient to control emerged volunteer barley or downy brome. The only treatments providing excellent broad-spectrum weed control were FMC-57020 combinations with atrazine, metribuzin and cyanazine or cyanazine combinations with metribuzin. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1429.)

Weed control in fallow with early spring herbicide treatments

		Control[2]		
Treatment[1]	Rate lb ai/A	VOBLY %	BROTE %	POLCO %
FMC-57020	0.5	43	43	10
FMC-57020	1.0	87	63	60
FMC-57020 + atrazine	0.5 + 0.5	99	99	100
FMC-57020 + metribuzin	0.5 + 0.5	100	99	100
FMC-57020 + metsulfuron	0.5 + 0.012	50	50	100
FMC-57020 + metsulfuron	0.5 + 0.024	70	70	100
FMC-57020 + chlorsulfuron	0.5 + 0.024	43	50	100
FMC-57020 + metsulfuron + picloram	0.5 + 0.012 + 0.125	33	43	100
FMC-57020 + cyanazine	0.5 + 2.0	99	99	100
FMC-57020 + picloram	0.5 + 0.125	43	53	100
cyanazine + metsulfuron	2.0 + 0.024	60	47	100
cyanazine + metribuzin	2.0 + 0.5	99	99	100
weedy check	---------	0	0	0

[1]Treatments applied March 26, 1986
[2]Plots visually evaluated July 1, 1986

Evaluation of post harvest herbicide treatments in fallow. Miller, S.D. Research plots were established at the Archer Research and Extension Center, Archer, WY to evaluate the efficacy of individual and/or herbicide combinations for weed control in fallow when applied immediately after harvest. Plots were 9 by 30 ft. in size with three replications arranged in a randomized complete block. The herbicide treatments were applied broadcast with a CO_2 pressurized six-nozzle knapsack unit delivering 40 gpa at 40 psi on August 20, 1985 (air temp. 88 F, relative humidity 11%, wind SW 5 mph and soil temp. - 0 inch 106 F, 2 inch 98 F and 4 inch 86 F). The soil was classified as a loam (46% sand, 28% silt and 26% clay) with 1.2% organic matter and a 7.3 pH. Volunteer barley was emerging at the time of treatment. Visual weed control evaluations were made July 1, 1986. Downy brome (BROTE) and volunteer barley (VOBLY) infestations were moderate and wild buckwheat (POLCO), kochia (KCHSC) prostrate knotweed (POLAV), cutleaf nightshade (SOLTR) and tansymustard (DESPI) infestations light but uniform throughout the experimental area.

Broad-spectrum weed control was excellent with atrazine at 0.625 lb/A alone or 0.5 lb/A in combination with cyanazine or FMC-57020. In addition, metribuzin combinations with cyanazine or FMC-57020 provided good broad-spectrum weed control. FMC-57020 and pronamide combinations with chlorsulfuron or metsulfuron provided inadequate control of cutleaf nightshade. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1427.)

Weed control in fallow with post harvest herbicide treatments

		Control[2]						
Treatment[1]	Rate lb ai/A	BROTE %	VOBLY %	POLCO %	KCHSC %	POLAV %	SOLTR %	DESPI %
atrazine	0.625	100	96	100	100	100	100	100
cyanazine + metribuzin	2.0 + 0.625	100	98	97	88	100	93	100
cyanazine + atrazine	2.0 + 0.5	100	93	100	100	100	100	100
FMC-57020	0.5	85	63	0	0	53	67	43
FMC-57020	0.75	93	80	7	20	83	77	53
FMC-57020	1.0	100	97	47	50	83	90	85
FMC-57020 + metribuzin	0.5 + 0.625	98	92	75	98	100	88	100
FMC-57020 + metsulfuron	0.5 + 0.023	90	89	100	97	100	68	93
FMC-57020 + chlorsulfuron	0.5 + 0.03	99	90	100	100	100	60	100
FMC-57020 + picloram	0.5 + 0.25	80	70	97	20	97	83	97
FMC-52070 + dicamba	0.5 + 0.5	83	73	50	37	63	68	60
FMC-57020 + atrazine	0.5 + 0.5	100	100	100	100	100	100	100
pronamide + chlorsulfuron	0.25 + 0.025	93	75	97	98	100	0	100
pronamide + metsulfuron	0.25 + 0.015	88	82	100	90	100	0	95
weedy check	------------	0	0	0	0	0	0	0

[1]Treatments applied August 20, 1985
[2]Plots visually evaluated July 1, 1986

Evaluation of post harvest herbicide treatments for field bindweed control in fallow. Miller, S.D. Research plots were established near Dwyer, WY to evaluate the efficacy of herbicide treatments applied after harvest for field bindweed 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 six-nozzle knapsack unit delivering 10 gpa at 40 psi August 20, 1985 (air temp. 85 F, relative humidity 20%, wind SE 5 mph, sky partly cloudy and soil temp. - 0 inch 95 F, 2 inch 85 F and 4 inch 80 F) to field bindweed (CONAR) 12 to 14 inch long and in full bloom. The soil was classified as a sandy loam (65% sand, 21% silt and 14% clay) with 1.1% organic matter and a 7.8 pH. Visual weed control evaluations were made May 7 and July 29, 1986. Field bindweed infestations were heavy and uniform in the experimental area.

All post harvest treatments initially suppressed emergence of field bindweed in the spring; however, 10.5 months after application only picloram plus 2,4-D was maintaining control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1428 .)

Field bindweed control in fallow

Treatment[1]	Rate lb ai/A	CONAR control[3] May 7 %	CONAR control[3] July 29 %
picloram + 2,4-D	0.25 + 1.0	98	92
clopyralid + 2,4-D (PM)	0.25 + 1.0	67	0
fluroxypyr + 2,4-D	0.5 + 1.0	83	0
glyphosate + 2,4-D (PM)	0.56 + 1.1	57	0
glyphosate + dicamba	0.37 + 0.25	65	10
glyphosate + dicamba	0.56 + 0.25	88	30
glyphosate + 2,4-D (PM) + dicamba	0.37 + 0.67 + 0.25	83	15
triclopyr + 2,4-D	0.5 + 1.0	78	0
2,4-D	1.0	67	0
weedy check	---	0	0

[1]Treatments applied August 20, 1985; 2,4-D = dimethylamine and PM = package mix
[2]Field bindweed control visually evaluated May 7 and July 29, 1986

Field bindweed control with metsulfuron and other herbicides. Mashhadi, H.R. and J.O. Evans. Field bindweed still remains one the hardest to control weeds in fallowland. A field study was initiated July 13, 1985, in a fallow field in Cache County, Utah, on silty loam soil, pH 8.2 and 1.32% organic matter. All treatments were applied with a boom type hand-held sprayer calibrated to deliver 70 L/ha at 200 kilo pascals (30 psi). Plot size was 2.4 x 6.1 m with three replications in a complete randomized block design. All treatments were applied to field bindweed at bloom stage. The interval between the two herbicide treatments in split applications was three days. The plots were evaluated visually for percent biomass reduction one month and ten months after treatment. The results were analyzed as a factorial design with treatment means compared using LSD values.

The results indicate that metsulfuron increases activity of other herbicides regardless of the method of combining them. When averaged over methods of treatment, 2,4-D at 1,120 g/ha gave the best and picloram at 140 g/ha gave the least control (Table 2). 2,4-D or glyphosate combined with metsulfuron resulted in longer lasting field bindweed control. MCPA or dicamba when combined with metsulfuron were not as persistant as 2,4-D and glyphosate on field bindweed. Metsulfuron applied alone resulted in a lower level of control than other treatments. Although pretreatment of field bindweed plots with growth regulators (2,4-D or ethephon) did not result in satisfactory control, such pretreatments increased the level of control over metsulfuron alone. Metsulfuron at 70 g/ha when applied to the weeds in two 35 g/ha dosages in three day intervals, indicated higher levels of bindweed control but it was not statistically significant (Table 1.) (Utah Agricultural Experiment Station, Logan, UT 84322).

Table 1. Percent bindweed control in the first and second year following herbicide treatments; Hyrum, Utah.

Treatment	Rate* g/ha	Year 1 8-14-85	Year 2 5-14-86
metsulfuron	70		
picloram	140	66.7	53.3
metsulfuron	70		
dicamba	560	83.3	48.3
metsulfuron	70		
2,4-D ester	1,120	89.0	78.3
metsulfuron	70		
glyphosate	840	63.3	73.3
metsulfuron	70		
MCPA	1,120	91.3	73.3
picloram	140		
metsulfuron	70	51.6	40.0
dicamba	560		
metsulfuron	70	84.0	45.0

2,4-D ester metsulfuron	1,120 70	96.0	75.0
glyphosate metsulfuron	840 70	50.0	76.7
MCPA metsulfuron	1,120 70	89.3	51.6
metsulfuron picloram	70+ 140	56.6	61.6
metsulfuron dicamba	70+ 560	80.0	46.7
metsulfuron 2,4-D ester	70+ 1,120	88.3	76.7
metsulfuron glyphosate	70+ 840	67.6	68.3
metsulfuron	70+		
MCPA	1,120	76.0	45.0
picloram	140	26.6	26.6
dicamba	560	63.3	6.6
2,4-D ester	1,120	86.7	10.0
glyphosate	840	5.0	28.3
MCPA	1,120	84.0	6.6
metsulfuron	70	45.0	45.0
metsulfuron metsulfuron	35 35	53.3	53.3
2,4-D ester metsulfuron	37 70	68.3	58.3
2,4-D ester metsulfuron	75 70	50.0	53.3
ethephon metsulfuron	2,200 70	46.7	51.6
control	0	0	0
LSD	-	15.8	15.8

* All treatments included 0.25% v/v wk surfactant.

Table 2. Two-year average percent bindweed control when metsulfuron was applied three days before, three days after or tank mixed with other herbicides. Hyrum, Utah.

Treatments[1]	Rate[2] g/ha	Picloram 140	Dicamba 560	2,4-D ester 1,120	Glyphosate 840	MCPA 1,120	TOTAL
<u>Metsulfuron</u>							
3 days before	70	60.0	65.8	83.6	68.3	82.3	72.0 a
3 days after	70	45.8	64.5	85.5	63.3	70.5	65.9 a
tank mixed	70	59.2	63.3	82.5	68.0	60.5	66.7 a
none	0	26.6	35.0	48.3	16.6	45.3	34.4 b
TOTAL[3]		47.3 d	56.4 bc	72.6 a	53.6 cd	61.6 b	

1 LSD among all treatments is 14.60.
2 All treatments included 0.25% v/v wk surfactant.
3 Mean totals within a row or column followed by the same letter are not significantly different at .01 level.

Herbicide combinations for no-till chemical fallow in the Central Great Plains. R. L. Anderson. Atrazine is presently the prevalent herbicide used for initiating a chemical fallow program in a winter wheat-fallow rotation. Weed control (>85% of the soil surface being weed free) by atrazine applied in July after wheat harvest generally lasts until June of the next year, resulting in a 3-month period where either tillage or postemergence contact herbicides are required. This study was conducted to determine if pendimethalin, acetochlor, or metolachlor would be suitable for short term residual weed control during this 3-month period. Atrazine at 1.1 kg/ha was applied on August 1, 1985 to a winter wheat stubble field. Pendimethalin, acetochlor, and metolacher at 0.6, 1.1, and 1.6 kg/ha were applied on May 13, 1986. The time period of May 10-20 represents the period of the highest probability of rainfall occurring, thus insuring herbicide movement into the soil. The soil type for this experiment was a Platner loam with 1.2% organic matter and a pH of 6.6.

Atrazine alone maintained weed control until July 10 (See Table). The addition of pendimethalin extended weed control to August, an increase of 25 to 40 days, depending on rate. With acetochlor, only the 1.1 and 1.6 kg/ha rates extended weed control. The 0.6 kg/ha rate of acetochlor apparently degraded sufficiently by July 10 and did not affect weed germination or growth. All rates of metolachlor increased the duration of weed control, ranging from 29 to 40 days as affected by metolachlor rate. At the end of the effective weed control period (dates listed in Table), the plots were sprayed with paraquat at 0.5 kg/ha. Winter wheat was planted September 12. No observable effect on wheat germination or seedling growth was detected in October. The study site experienced a severe drought during July and August, receiving only 29% of the normal precipitation, yet, residual carryover injury to winter wheat did not occur with any treatment. Thus, pendimethalin and and metolachlor at 0.6 or 1.1 and acetochlor at 1.1 kg/ha can maintain weed control during the summer months before winter wheat planting without affecting winter wheat stand establishment. The date of application of these herbicides could be delayed 2 weeks, thus possibly maintaining weed control until winter wheat planting without injuring the wheat seedlings. (USDA-ARS, Akron, CO 80720).

Period of effective weed control (treated area greater than 85% weed free). Atrazine was applied on August 1, 1985 and pendimethalin, acetochlor, and metolachlor was applied on May 13, 1986.

Herbicides	Rate	Period of 85% weed control		Period precipitation	78-yr ave.
	kg/ha	days	date	cm	cm
Atrazine	1.1	344	July 10	38.1	37.1
Atrazine + pendimethalin	1.1 + 0.6	369	August 5	39.3	42.4
Atrazine + pendimethalin	1.1 + 1.1	384	August 20	40.4	44.9
Atrazine + pendimethalin	1.1 + 1.6	382	August 18	40.4	44.6
Atrazine + acetochlor	1.1 + 0.6	344	July 10	38.1	37.1
Atrazine + acetochlor	1.1 + 1.1	387	August 23	40.5	45.4
Atrazine + acetochlor	1.1 + 1.6	391	August 27	40.6	46.1
Atrazine + metolachlor	1.1 + 0.6	373	August 9	39.3	43.0
Atrazine + metolachlor	1.1 + 1.1	384	August 20	40.4	44.9
Atrazine + metolachlor	1.1 + 1.6	379	August 15	40.4	44.0

Evaluation of sodium methyldithiocarbamate as a fumigant to decrease viability of goatsrue seed in the field. Evans, J.O. and B.G. Peitersen. Goatsrue seed has been shown to remain viable in the soil for six or more years. It also has an extremely high incidence of hard seed that apparently contributes to its survival as a weed. The principles of overcoming seed dormancy and subsequent germination of the species are poorly understood. Scarification of goatsrue seed by simple abrassive procedures like sandpaper or metal filing eliminates and mechanical barrier(s) and aged or fresh seed germinates near 100 percent. Less than 2 percent of unscarified seed germinates under faborable germination conditions. Sodium methyldithiocarbamate (Vapam®) has been shown to inhibit germination of other weed species under field conditions. The trial was initiated 8 October 1986, on a thoroughly tilled, fallow field at the Greenville research farm in North Logan, Utah. Soil moisture was near field capacity during the experiment and soil tmeperature ranged from 21°C at one inch depth to 16°C 4 inches deep. Straw was applied to the soil surface to simulate stubble fields while the thoroughly tilled field represented fallowland. Immediately after spraying, plots were either sprinkled with approximately one-quarter inch water to move the fumigant into the soil or covered with black plastic and sealed to prevent chemical volatilization. Freshly scarified seed was placed in nylon seed packets and buried in each plot at depths of 0, 0.5, 1.0, 2.0 and 3.0 inches. Each seed packet contained 100 seeds. The plastic was removed after 48 hours and the seed was recovered from the plots nine days after treatment. Germination was tested by placing the freshly recovered seed in blotter paper lined petri dishes on a laboratory bench. Germinated seed was recorded and removed daily for a two week period. Percent germination of the seed prior to burying in the soil in preparation for fumigation was 98.6 percent.

Some seed viability loss was associated with exposing scarified seed to field conditions. Loss of germination ranged from 16 to 72 percent in the absence of fumigation. Seed buried to greater soil depths exhibited lower germination. Fumigation reduced germination about 50 percent as compared to unfumigated seed. Fumigation did not reduce the viability of goatsure seed in these studies sufficiently to decrease the field population of the weed. (Utah Agricultural Experiment Station, Logan, Utah 84322-4820).

Table 1. Germination of scarified goatsrue seed 9 days after fumigation with sodium methyldithiocarbamate.

Treatment and seed depth	Germination percent of scarified seed	
	Stubble field	Fallowland
Untreated control		
0 inches deep	80.6	68.0
0.5 inches deep	58.0	55.6
1.0 inches deep	34.6	61.0
2.0 inches deep	24.0	39.6
3.0 inches deep	--	39.3
Tarped after treatment		
0 inches deep	35.3	38.3
0.5 inches deep	21.3	37.0
1.0 inches deep	10.6	11.3
2.0 inches deep	6.6	12.0
3.0 inches deep	--	9.6
Sprinkled after treatment		
0 inches deep	33.6	40.3
0.5 inches deep	62.6	26.0
1.0 inches deep	24.0	21.0
2.0 inches deep	13.6	14.6
3.0 inches deep	--	18.6

Control of roughstalk bluegrass in perennial ryegrass raised for seed. Mueller-Warrant, G.W. Roughstalk bluegrass (POATR) has become a serious weed in perennial ryegrass grown for seed production in western Oregon, spreading mainly through prolific seed production but also through stolons. Response of this weed to currently registered herbicides and to experimental compounds was evaluated in field trials conducted in 1985-86. Control of seedlings of this weed was studied at the Hyslop Field Laboratory, while control of natural mixtures of established plants and new seedlings was studied at Tangent and Shedd, Oregon, in two established ryegrass stands.

Fall applications of herbicides were made to dry soil surfaces in early October, 1985, preemergence to seedling weeds in the case of all herbicides except ethofumesate, which was applied in late October after rains had begun. Spring applications of dalapon, fenoxaprop, diuron, and SC-1084 were made in late March, 1986, shortly after grasses had resumed vigorous growth.

Control of roughstalk bluegrass with currently registered herbicides was generally unsatisfactory. Both chlorpropham and ethofumesate failed to control even seedling roughstalk bluegrass, although they did control annual bluegrass. Results with triazine herbicides were better, but the level of control achieved was strongly dependent on the specific rate and timing of herbicide treatment. The maximum rate of atrazine labelled for use in perennial ryegrass, 1.4 kg/ha, provided only 72% season-long control of roughstalk bluegrass in a clean-tilled seedbed. Use of a higher rate of atrazine or 2.2 kg/ha of simazine was required for good control of seedling roughstalk bluegrass there. Triazine herbicides provided somewhat poorer control of seedlings in established production fields, where the presence of carbon and unburned crop residues on the soil surface interfered with herbicide effectiveness. Ethofumesate was not very effective at 1.1 kg/ha applied preemergence to seedlings. Prodiamine was effective in controlling seedlings, but reduced ryegrass seed yield.

Given the difficulty of controlling even seedling roughstalk bluegrass with currently registered treatments, the acute need for ways to control established roughstalk bluegrass becomes obvious. Dalapon has been successfully used for this purpose in England, but ryegrass injury has occasionally occurred. In our tests, dalapon treatment did delay heading and increase the proportion of small, green, immature tillers at harvest, but seed yield was not significantly different from yield with standard registered treatments.

At one of the sites, however, yield with dalapon was significantly lower than yield with the best treatment there, fenoxaprop applied at 0.14 kg/ha. Fenoxaprop provided excellent control of established roughstalk bluegrass, and appeared to possess slightly better crop safety than dalapon in perennial ryegrass. Research is continuing into details of best timing and rate of fenoxaprop and dalapon application to maximize roughstalk bluegrass control and minimize crop injury. (USDA-ARS and Crop Science Department, Oregon State University, Corvallis, OR 97331)

(A more detailed presentation of the results from these and other related experiments is being published in the Journal of Applied Seed Production, Vol. IV, 1986, available through the Crop Science Department, Oregon State University, Corvallis, OR 97331.)

Roughstalk bluegrass control and perennial ryegrass seed yield as affected by herbicide treatment.

Herbicide[1]	Rate	Roughstalk bluegrass control ratings one month before harvest: Seedling weeds only — Hyslop	Roughstalk bluegrass control ratings one month before harvest: Established weeds + new seedlings — Tangent	Established weeds + new seedlings — Shedd	Perennial ryegrass seed yield — Tangent	Perennial ryegrass seed yield — Shedd
	(kg/ha)	(%)	(%)	(%)	(kg/ha)	(kg/ha)
check	---	0 e*	0 d	0 f	420 d	1420 abc
chlorpropham	2.2	18 e	10 d	18 f	1120 ab	1540 abc
prodiamine	0.84	99 a	36 c	58 de	540 cd	1330 abc
ethofumesate	1.1	0 e	30 c	5 f	1070 abc	1570 abc
atrazine	1.4	72 d	39 c	79 cd	820 a-d	1710 ab
atrazine	2.0	93 bc	65 b	83 bc	800 a-d	1590 abc
simazine	2.2	99 a	78 b	83 bc	790 a-d	1560 abc
diuron	2.7	99 a	68 b	53 e	880 a-d	1510 abc
atrazine / diuron	1.4 / 1.3	100 a	76 b	82 bc	820 a-d	1250 cd
atrazine / SC-1084	1.4 / 0.14	84 c	95 a	74 cde	460 d	1330 bcd
atrazine / SC-1084	1.4 / 0.28	96 ab	99 a	60 cde	590 bcd	950 d
atrazine / dalapon	1.4 / 1.7	92 bc	95 a	100 a	1240 a	1320 bcd
atrazine / dalapon	1.4 / 2.2	97 ab	98 a	100 a	1020 abc	1340 bcd
atrazine / fenoxaprop	1.4 / 0.14	99 a	97 a	99 a	880 a-d	1800 a
atrazine / fenoxaprop	1.4 / 0.28	100 a	100 a	100 a	1030 abc	1680 ab
dicamba / fenoxaprop	2.2 / 0.28	100 a	100 a	95 ab	930 a-d	1490 abc

* Means followed by the same letter within a column do not differ at the P = .05 level by Duncan's multiple range test. Some responses did not possess normally distributed errors, and were analyzed by squareroot transformation.

[1] All treatments consisting of a single herbicide were applied in Oct. 1985 preemergence to new weed seedlings. The first herbicide listed in all other multiple treatments was also applied then, while the second herbicide was applied in late March 1986, after weeds and crop has resumed vigorous growth.

Herbicide tolerance of California brome currently invading orchardgrass and tall fescue raised for seed. Mueller-Warrant, G.W. California brome (BROCA), a short-lived perennial grass, has been increasing in tall fescue and orchardgrass seed production fields, apparently tolerating normal use rates of diuron and triazine herbicides. Herbicides were applied to seedling California brome at Hyslop Field Laboratory and to established stands of orchardgrass and tall fescue, which contained California brome, in Corvallis, Tangent, and Brownsville, Oregon. Materials tested included herbicides currently registered for use in these crops as well as experimental compounds, and were applied during the fall, winter, and spring of 1985-86.

Brome species typically possess moderate tolerance to diuron, but California brome is exceptionally tolerant, and its seedlings were able to successfully establish even when treated with a preemergence application of 2.7 kg/ha of diuron. Seedling tolerance to atrazine also appeared to be quite high until the onset of freezing weather in late November. Before arrival of that severe weather, control of California brome with atrazine was incomplete even at a rate of 4.5 kg/ha. Following a month of alternate freezing and thawing of the soil, seedling control was excellent at 4.5 kg/ha of atrazine and 2.2 kg/ha of simazine, and good at 2.2 kg/ha of atrazine. Given this pattern of response to the herbicide, it is likely that control of California brome with atrazine would be poorer in more typical years having more favorable growing conditions during late fall.

Control of seedling California brome with ethofumesate at 1.1 kg/ha, propham at 3.4 kg/ha, and cinmethylin at 0.56 kg/ha varied widely between locations: control was close to 100% at Hyslop in a clean-tilled seedbed, but dropped to near 0% at Tangent, where density of weed seedlings and quantity of unburned crop residues were both very high. Control with propham appeared to be strongly influenced by relative timing of application and California brome seed germination; early application was vital for successful control of seedlings.

Pronamide applied at 0.56 kg/ha in the winter provided good control of California brome, regardless of growth stage of the weed, but crop tolerance was marginal. Injury to orchardgrass was much less severe than injury to tall fescue, which resulted in serious reductions in number of heads per area. Likewise, diclofop applied in the fall was tolerated well by orchardgrass but not by tall fescue, which remained stunted through harvest. Control of California brome seedlings with 1.1 kg/ha of diclofop was only marginal, and future research will need to employ higher rates.

All other graminicides tested, sethoxydim, fluazifop-P, and SC-1084, generally lacked sufficient selectivity between crops and California brome to be of any use. Indeed, sethoxydim applied in the early spring at 0.28 kg/ha was tolerated better by California brome than by tall fescue, which was killed.

No completely satisfactory methods to control established California brome were found in these tests. The best available program for controlling new seedlings would start with early fall application of propham just as rains are beginning and weed seed germination is imminent. In heavily infested fields, this treatment would need to be followed by ethofumesate application later in the fall to control escapes from the first treatment as well as any seedlings germinating late in the fall.

While attempting to establish new stands of tall fescue and orchardgrass in fields likely to be invaded by California brome, it is important to consider the fact that the carbon-banding, broadcast-diuron planting system will not control California brome seedlings. Ethofumesate could be applied later in the fall to control California brome seedlings in new stands of tall fescue but not orchardgrass. A more satisfactory program to control California brome during establishment of new stands might involve substituting an alternate herbicide capable of controlling this weed for the diuron normally used as the broadcast herbicide in the carbon-banding system. Unfortunately, no other herbicides are presently registered for such a use.

Since tall fescue and orchardgrass seldom produce seed crops the first year after planting, the best method to establish clean stands of these crops free from California brome might be use of a chemical seedbed treatment such as propham + 2, 4-D applied in the fall, followed by paraquat or glyphosate treatment at time of planting in late winter to control any escapes. Crop rotation is also a viable alternative, since bromes generally possess little seed dormancy and can be eradicated from a field in as little as two years if none of the weeds are allowed to go to seed. (USDA-ARS and Crop Science Department, Oregon State University, Corvallis, OR 97331)

Visual ratings of California brome control and orchardgrass and tall fescue injury in late spring 1986.

		California brome control				Crop injury		
		Seedlings only	Established weeds + new seedlings			Tall fescue		Orchardgrass
Herbicide	Rate	Loc1	Loc2	Loc3	Loc4	Loc2	Loc3	Loc4
	(kg/ha)				(%)			
Check	-	0	0	0	0	0	0	0
diuron	2.7	27	0	0	33	0	0	0
atrazine	1.1	17	0	0	33	0	0	3
atrazine	2.2	77	0	5	33	0	0	3
atrazine	4.5	99	60	30	0	0	0	3
simazine	2.2	98	0	20	33	0	0	3
propham	3.4	85	50	13	50	0	0	4
ethofumesate	1.1	100	50	10	67	0	0	4
metribuzin	0.56	40	0	13	33	0	0	4
ethiozine	2.2	22	0	20	67	0	0	3
pendimethalin	1.1	67	0	25	33	0	0	6
cinmethylin	0.56	98	50	25	67	0	0	8
diclofop	1.1	67	0	15	0	35	40	15
sethoxydim	0.28	93	60	79	33	98	100	91
fluazifop-P	0.07	88	30	64	60	61	63	53
fluazifop-P	0.14	100	40	81	67	83	83	85
SC-1084	0.14	100	80	74	93	61	73	65
SC-1084	0.28	100	100	93	100	79	95	94
pronamide	0.56	96	90	95	100	39	55	0

Loc1 = Only new seedlings of California brome at Hyslop Field Laboratory.
Loc2 and Loc3 = Established tall fescue with some established and seedling California brome at Brownsville and Tangent.
Loc4 = Established orchardgrass with some established and seedling California brome at Corvallis.
Due to the low levels of weed pressure at Loc2 and Loc4, weed control ratings at those two sites are less reliable than at Loc1 and Loc3.
Last 6 herbicides listed were applied in Feb., all other were applied in Oct.

The effect of tank mixing sulfonyl urea herbicides with diclofop-methyl on wild oat control. Downard, R.W. and J.O. Evans. A study was conducted in 1985 at two locations, Logan and Richmond, Utah, to evaluate the effect sulfonyl urea herbicides had on wild oat control when mixed with diclofop-methyl. The experiment was established May 23, 1985, at Logan and May 24, 1985, at Richmond. Plots were 2.7 m by 7.6 m and four replications in a complete randomized block design. Herbicides were applied with a backpack sprayer at 187 L/ha using 8002 Teejet nozzles at 207 kPa with compressed air as propellent.

Wild oat control by the different herbicides was calculated as percent control. Only diclofop-methyl plus bromoxynil at Richmond, Utah, gave satisfactory wild oat control. All treatments except DPX-M6316 and DPX-R9674 in combination with diclofop-methyl reduced the control of oats at Logan in comparison with the control given by diclofop-methyl alone at .84 kg/ha. All treatments except DPX-R9674 in combination with diclofop-methyl reduced wild oat control at Richmond in comparison with diclofop-methyl at .84 kg/ha.

A similar study was initiated 14 May 1986 in North Logan, Utah. Plots were 2.7 m by 7.6 m with four replications in a complete randomized block design. Herbicides were applied with a bicycle sprayer at 187 L/ha using 8002 Teejet nozzles at 207 kPa with compressed air as propellent.

Some herbicides showed good control on wild oats when tanked mixed with diclofop-methyl. Herbicide combinations with wild oat control ratings equal to diclofop methyl alone were: diclofop-methyl plus bromoxynil, diclofop-methyl plus chlorsulfuron and DPX-R9674 at both the high and low dosage, and diclofop-methyl plus DPX-M6316 at 18 g/ha. (Utah Agricultural Experiment Station, Logan, Utah 84322-4820).

Table 1. The effect of tank mixing sulfonyl urea herbicides with diclofop-methyl on wild oat control in 1985.

Herbicide	Rate (Kg ai/ha)	Percent Control of Oats[1] Logan Aug. 5, 1986	Percent Control of Oats[1] Richmond Aug. 7, 1985
diclofop-methyl	.84	26 hi	54 lm
diclofop-methyl	1.12	62 m	47 ijk
chlorsulfuron	.018	7 abce	20 abcd
metsulfuron	.018	3 abc	13 a
DPX-M6316	.018	3 abcd	14 ab
DPX-R9674	.018	1 ab	13 a
diclofop-methyl + bromoxynil	.84 +.42	69 n	83 n
diclofop-methyl + 2,4-D	.84 +.56	13 g	38 hi
diclofop-methyl + chlorsulfuron	.84 +.009	26 hi	33 fgh
diclofop-methyl + chlorsulfuron	.84 +.018	24 hi	33 fgh
diclofop-methyl + metsulfuron	.84 +.009	9 defg	18 abc
diclofop-methyl + metsulfuron	.84 +.018	8 cdef	25 bcdefg
diclofop-methyl + DPX-M6316	.84 +.009	23 h	23 abcdef
diclofop-methyl + DPX-M6316	.84 +.018	33 kl	39 hij
diclofop-methyl + DPX-R9674	.84 +.009	36 l	51 k
diclofop-methyl + DPX-R9674	.84 +.018	32 jk	58 klm
Check		0 a	21 abcde

[1]Numbers are average of four replications. Numbers followed by the same letter are not significantly different at 0.5 level.

Table 2. The effect of tank mixing sulfonyl urea herbicides with diclofop-methyl-methyl on wild oat control in 1986.

Herbicide	Rate (Kg ai/ha)	Percent Control[1] North Logan July 9, 1986
diclofop-methyl	.84	99
diclofop-methyl	1.12	98
chlorsulfuron	.018	28
metsulfuron	.018	18
DPX-M6316	.018	0
DPX-R9674	.018	1
diclofop-methyl + bromoxynil	.84 +.42	99
diclofop-methyl + 2,4-D	.84 +.56	22
diclofop-methyl + chlorsulfuron	.84 +.009	98
diclofop-methyl + chlorsulfuron	.84 +.018	96
diclofop-methyl + metsulfuron	.84 +.009	53
diclofop-methyl + metsulfuron	.84 +.018	55
diclofop-methyl + DPX-M6316	.84 +.009	100
diclofop-methyl + DPX-M6316	.84 +.018	70
diclofop-methyl + DPX-R9674	.84 +.009	100
diclofop-methyl + DPX-R9674	.84 +.018	94
Check		

[1]Numbers are the avearage of four replications.

Activity of ethyl-metribuzin and metribuzin as related to soil properties. Peek, D.C. and Arnold P. Appleby. Metribuzin and its analog, ethyl-metribuzin, are important herbicides for weed control in winter wheat. Both chemicals tend to be less active in eastern Oregon than in western Oregon. A greenhouse experiment was conducted to determine if this difference in activity is due to differences in soil properties.

Five soils (Table 1) plus washed quartz sand were treated with metribuzin or ethyl-metribuzin at rates from 0 to 9.0 ppm (w/w) in a tumbler sprayer. Treated soil was placed in 7.5 cm by 7.5 cm pots and 'Cayuse' spring oats were planted. Pots were arranged in a randomized complete block with four replications. Day and night temperatures were approximately 21 C and 15 C, with no supplemental light provided. Pots were subirrigated as needed. At 21 days after planting, the oats were harvested and foliage fresh weight per pot was recorded. All data were converted to percent of check within each block and analyzed by regression analysis to determine the GR_{50} for both herbicides on each soil.

Metribuzin had a higher activity than ethyl-metribuzin on all soils examined (Table 2). Surprisingly, both herbicides were less active in soils with a higher sand content (Table 3). A possible explanation is that there was more leaching from the pots containing soils with higher sand content, thus reducing activity. The low level of activity of both materials found in quartz sand supports this hypothesis.

An additional bioassay, using Chehalis and Ontko soils, was conducted. In this experiment, duplicate pots that had been sealed to prevent leaching also were included. Unsealed pots were subirrigated and sealed pots were top-irrigated as needed. Sealed pots produced higher activity levels for both soils and both herbicides (Table 4). In Chehalis soil, sealing the pots increased metribuzin activity by 30%, and ethyl-metribuzin by 23%. In the Ontko soil, activity was increased by 14% and 10%, respectively. The greater increase in activity, as a result of sealing the pots, found in the sandier Chehalis soil further indicates that in sandy soils, loss of activity of metribuzin and ethyl-metribuzin is due to herbicide leaching. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Selected properties of the soils studied

Soil	pH	Clay	Sand	O.M.	oxAl[1]	CEC
		(%)				cmol(+)/kg
Woodburn sicl	4.6	32.7	16.1	2.4	0.26	13.2
Chehalis sl	6.0	19.2	56.6	2.4	0.21	19.5
Ontko l	6.2	18.9	30.4	5.5	0.16	44.2
Crooked sl	8.2	16.7	70.1	1.1	0.09	13.7
Bashaw cl	6.2	38.4	40.4	1.0	0.14	35.1

[1]oxAl = ammonium oxalate extractable Al.

Table 2. GR_{50} of metribuzin and ethyl-metribuzin for the soils studied

Soil	GR_{50}	
	ethyl-metribuzin	metribuzin
	(ppm)	
Woodburn sicl	1.25	0.26
Chehalis sl	1.85	0.70
Ontko l	1.27	0.33
Crooked sl	2.40	0.64
Bashaw cl	1.44	0.55
Sand	4.03	3.35

Table 3. Simple correlation coefficients relating soil properties to GR_{50} of five soils

Soil property	Correlation coefficient (r)	
	GR_{50} ethyl-metribuzin	GR_{50} metribuzin
Clay	-.33	-.59
Sand	.91*	.97**
oxAl[1]	-.46	-.64
pH	.63	.87
OM	-.56	-.50
CEC	-.24	-.25

[1]oxAl = ammonium oxalate extractable Al

*,** = significant at .05 and .01 level, respectively.

Table 4. GR_{50} of metribuzin and ethyl-metribuzin under leaching and non-leaching conditions for two soils

Soil	GR_{50}	
	metribuzin	ethyl-metribuzin
	(ppm)	
Chehalis, leaching	1.81	0.75
Chehalis, non-leaching	1.26	0.58
Ontko, leaching	1.34	0.40
Ontko, non-leaching	1.08	0.36

The effect of low amounts of water on the incorporation of preemergence herbicides. A. F. Lourens and A. H. Lange. An understanding of the quantitative aspects of the incorporation of labile preemergence herbicides is important to their successful use in selective weed control in horticultural crops. We need to know the importance of light rains before and after herbicide application and how they affect initial and residual weed control as well as their effect on the margin of safety to the crop.

The objective of this experiment was to evaluate the effects of low amounts of rainfall on the activity of oxyfluorfen, oryzalin and a combination herbicide containing diuron and terbacil. Thirty-inch beds of a prepared Hanford fine sandy loam were planted June 9, 1986 and treated with three preemergence herbicides on July 9, 1986. Immediately after treatment and one day previously (in some treatments) water was applied with a rainfall simulator.

An evaluation of the weed control and effects on the crops was made August 11, August 20, 1986 and November 24, 1986.

The early weed control results showed little activity of all herbicides when applied to damp soil followed by only 2.5 mm of water. A later reading (August 20) indicated 5 mm after application was insufficient to cause maximum incorporation whereas 15 mm to 45 mm (.06-0.18 A") was closer to optimum. The amount of water necessary to incorporate oxyfluorfen appeared to be less than for the other two herbicides. Because of the activity of diuron plus terbacil the effect of water was not apparent in the readings up to August 20. The leter 4½ month reading suggested that the herbicide combination was better incorporated with greater amounts of water at the rates studied here. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of before and after moisture applications on the activity of three herbicide applications.

Grass Control at 1 month

	Herbicide Treatment			
Amounts of water	Oxyfluorfen 17ml/l	Oryzalin 7ml/l	Diuron/Terbacil 2g+2g/l	Check
No Water	9.0	7.5	10.0	0.0
5 mm after	7.8	9.5	9.5	0.8
15 mm after	10.0	10.0	9.8	0.0
45 mm after	7.8	9.5	10.0	2.5
2.5 mm before, 2.5 mm after	7.8	4.2	10.0	0.0
5 mm before, 0 after	6.2	8.5	10.0	0.0
5 mm before, 10 mm after	9.8	9.5	10.0	0.5
5 mm before, 40 mm after	9.8	9.8	10.0	0.0

Cotton Stand and Vigor at 1 month

	Herbicide Treatment			
Amounts of water	Oxyfluorfen 17ml/l	Oryzalin 7ml/l	Diuron/Terbacil 2g+2g/l	Check
No Water	7.0	3.0	0.2	4.5*
5 mm after	7.8	5.8	0.0	4.5*
15 mm after	3.2	1.2	0.0	1.2
45 mm after	5.2	3.5	0.0	4.8
2.5 mm before, 2.5 mm after	6.2	3.5	0.0	4.8
5 mm before, 0 after	7.0	2.5	0.0	2.8
5 mm before, 10 mm after	2.8	1.5	0.0	0.0
5 mm before, 40 mm after	5.2	7.2	0.0	4.0

Bluegrass and Redmaid Control at 4½ months 1/

	Herbicide Treatment			
Amounts of water	Oxyfluorfen 17ml/l	Oryzalin 7ml/l	Diuron/Terbacil 2g+2g/l	Check
No Water	9.0	4.8	5.2	0.0
5 mm after	9.5	5.5	4.8	2.5
15 mm after	9.2	6.0	5.5	0.5
45 mm after	9.5	6.8	5.5	1.8
2.5 mm before, 2.5 mm after	6.8	5.8	5.5	0.0
5 mm before, 0 after	8.2	3.0	3.5	0.5
5 mm before, 10 mm after	9.0	6.5	5.0	0.0
5 mm before, 40 mm after	9.2	7.2	7.5	0.0

* Weed competition.
Water applied 30 ml/sec and 4 sec/plot
Applied 7/9/86. Rated 8/20/86.
1/ Average of 4 replications where 0 = no control and 10 = total control.
Rated 11/24/86.

Influence of soil pH on activity of ethyl-metribuzin and metribuzin. Peek, D.C. and A.P. Appleby. A greenhouse experiment was conducted to determine the effect of soil pH on the activity of ethyl-metribuzin and metribuzin. Samples of Woodburn silty clay loam (Aquultic Argixeroll; 2.4% O.M.; 32.7% clay; pH 4.6) were mixed with 0 to 0.2 moles/kg $Ca(OH)_2$ and samples of Crooked sandy loam (Xerollic Durorthid; 1.1% O.M.; 16.7% clay; pH 8.2) were mixed with 0 to 0.6 moles/kg H_2SO_4. Soil pH after a 2-month incubation period ranged from 4.6 to 8.3 for Woodburn soil and 4.2 to 8.2 for Crooked soil. The soils were treated with 0, 0.25, or 2.5 ppm (w/w) of metribuzin or ethyl-metribuzin. Treated soil was placed in 7.5 cm by 7.5 cm pots and 'Cayuse' spring oats were planted. Pots were arranged in a randomized complete block with four replications. Day and night temperatures were approximately 21 C and 15 C, with no supplemental light provided. Twenty-one days after planting, the oats were harvested and foliage fresh weight per pot was recorded. All data were converted to percent of appropriate check within each block and analyzed by regression analysis.

Activity of metribuzin and ethyl-metribuzin increased as pH increased on Crooked soil. No pH effect was observed on Woodburn soil. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Metribuzin and ethyl-metribuzin activity
as a function of soil pH for two soils

Soil	Herbicide	Rate	Linear regression equation[1]	R^2	F(1,3 df)
		(ppm)			
Woodburn	metribuzin	0.25	$\hat{y}$ = 44.4-0.3 x	.13	0.5
	metribuzin	2.5	$\hat{y}$ = 21.5-1.3 x	.39	1.9
	ethyl-metribuzin	0.25	$\hat{y}$ = 73.3-0.6 x	.65	5.6
	ethyl-metribuzin	2.5	$\hat{y}$ = 47.6-2.8 x	.50	3.0
Crooked	metribuzin	0.25	$\hat{y}$ = 91.9-4.7 x	.98	127.6**
	metribuzin	2.5	$\hat{y}$ = 68.7-5.8 x	.93	38.9**
	ethyl-metribuzin	0.25	$\hat{y}$ = 87.2-2.0 x	.93	38.9**
	ethyl-metribuzin	2.5	$\hat{y}$ = 98.7-6.0 x	.94	47.9**

[1]$\hat{y}$ = % of check; x = pH

*,** = significant at .05 and .01 level, respectively

PROJECT 6.

AQUATIC, DITCHBANK AND NON-CROP WEEDS

Winn Winkyaw - Project Chairman

Response of aquatic weeds to short exposure of fluridone plus the ethylenediamine complex of copper. Anderson, L.W.J. and N. Dechoretz. The objective of this study was to determine whether or not the herbicidal activity of fluridone in combination with the ethylenediamine complex of copper (EDA-Cu) was significantly greater than the activity of either herbicide alone. Seven day old plants were placed in 18.5 L of water and treated with fluridone, EDA-Cu or fluridone plus EDA-Cu. Seven days after treatment the plants were removed from the treated water, rinsed for 30 minutes and then placed in 18.5 L jars containing Davis well water. Four weeks later plants were harvested, oven dried for 24 hours at 100C and weighed.

Growth of hydrilla and Eurasian watermilfoil was drastically reduced by the fluridone plus EDA-Cu combination. Furthermore, the phytotoxic activity may be synergistic rather than additive. The phytotoxic activity of fluridone plus EDA-Cu on American pondweed was significantly higher than either herbicide alone. However, the increase in activity is additive rather than synergistic. In contrast, the toxicity of fluridone plus EDA-Cu to sago pondweed was not significantly greater than with fluridone alone. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

Dry Weight of aquatic weeds four weeks after a seven day exposure to fluridone and copper.

Treatment	Rate (ppmw)	Dry Weight (mg)			
		Dioecious hydrilla	Eurasian Watermilfoil	Sago Pondweed	American Pondweed
Control	0	411±52 1/	372±30	319±21	422±42
Fluridone	0.25	110±17	92±17	42±8	159±20
EDA-Cu 2/	0.25	75±8	131±15	278±34	263±16
Fluridone + EDA-Cu	0.25+0.25	3±3	6±3	45±11	87±19

1/ Value represents mean ± standard error; n=4

2/ EDA-Cu = ethylenediamine complex of copper application base on total copper concentration.

Response of Eurasian watermilfoil to fluridone in combination with copper. Anderson, L.W.J. and N. Dechoretz. Fluridone and the ethylenediamine complex of copper (EDA-Cu) are two herbicides registered for the control of aquatic weeds. Fluridone is a systemic herbicide requiring long exposure periods for adequate control, whereas EDA-Cu is a contact herbicide which generally results in rapid control after relatively short periods of exposure. Studies have been conducted to determine whether or not the control of Eurasian watermilfoil after treatment with fluridone in combination with EDA-Cu is significantly greater than the control obtained with either herbicide alone. Apical segments of watermilfoil were planted in small pots containing modified UC Mix, placed in 90 L tanks containing Davis well water, and treated seven days later. Four pots were removed 1, 2, 4 and 7 days after treatment, placed in tanks and flushed with well water for 30 minutes. Four weeks after treatment, plants were harvested to determine herbicidal activity on a dry weight basis.

Eurasian watermilfoil exposed to fluridone plus EDA-Cu at 0.10 + 0.25 ppmw for 1, 2, 4 and 7 days was significantly higher than either herbicide alone. The increase in activity at this level appears to be synergistic rather than additive. Increase in herbicidal activity when EDA-Cu concentration is increased to 1.0 ppmw or fluridone concentration is decreased to 0.05 ppmw is additive. Additional studies pertaining to the activity of fluridone and copper on various other aquatic species are presently underway. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

Control of Eurasian watermilfoil after 1, 2, 4 or 7 day exposure of one week old plants to fluridone alone or in combination with the ethylenediamine complex of copper (EDA-Cu).

		% Control[1]			
Treatment	Rate (ppmw)	Exposure Period (Days) 1	2	4	7
fluridone	0.05	19.2±13.5[2]	12.0±6.3	8.5±8.0	7.6±5.4
fluridone	0.10	0	0	20.8±12.2	24.7±12.0
EDA-Cu	0.25[3]	11.4±4.4	10.1±4.8	15.3±5.4	28.9±14.2
EDA-Cu	1.0	38.0±9.0	44.2±4.0	71.5±4.6	72.4±6.7
fluridone + EDA-Cu	.05+.25	22.4±8.7	23.7±13.7	30.8±6.7	69.4±6.4
fluridone + EDA-Cu	.10+.25	42.5±10.8	27.3±8.3	66.3±4.9	71.2±7.5
fluridone + EDA-Cu	.05+1.0	42.1±7.6	39.5±3.5	55.4±9.0	76.0±5.8
fluridone + EDA-Cu	.10+1.0	48.5±13.8	49.5±4.0	82.9±3.6	91.7±2.1

[1] Determined four weeks after treatment; calculated on a dry weight basis.

[2] Values represent mean ± standard error: n=4.

[3] Treatment rate based on total copper concentration.

Giant burreed and water horsetail control in a fallowed wild rice field. Callihan, R. H., T.S. Prather, and D. C. Thill. Weed control in wild rice (*Zizania aquatica* L.) is difficult since there is a lack of highly selective herbicides available. The purpose of this study was to test the efficacy of eight herbicides on two major weed species, giant burreed (*Sparganium eurycarpum* Engelm.) and water horsetail (*Equisetum fluviatile* L.), infesting wild rice in Idaho. Herbicides were applied May 12, 1986 near St. Maries, Idaho in a fallowed wild rice field with one inch of standing water. The plots were 10 ft by 30 ft and replicated four times in a randomized complete block design. Herbicides were applied at 1.5 mph with a backpack CO_2 pressurized sprayer set at 40 psi with 8002 flat fan nozzles arranged parallel to the ground to minimize direct water contact. Visual estimates of foliar cover, expressed as a percentage of the check were recorded on July 22, 1986. Data were unchanged on August 29, 1986.

Dicamba, MCPA, and 2,4-D controlled water horsetail 91, 72, and 68% respectively. No other treatments significantly reduced water horsetail foliar cover. 2,4-D resulted in the best control of giant burreed. Four other herbicides reduced giant burreed cover; MCPA, glyphosate, dicamba, and chlorsulfuron by 35 to 69%. Bentazon, glyphosate, chlorsulfuron, and DPX-F5384-81 (0.03 and 0.13 lb ai/A) had no discernible effect on water horsetail; bentazon and DPX-F5384-81 had no discernible effect on giant burreed. Based on these results, further testing of herbicides for use in the control of both water horsetail and giant burreed in wild rice will include 2,4-D and MCPA using selective application techniques. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Efficacy of foliar applied herbicides
in the control of water horsetail and giant burreed

Herbicide	Rate	Foliar Cover W. horsetail	Foliar Cover G. burreed
	(lb ai/A)	%	%
dicamba	4.000	19a	41ab
MCPA	2.000	28a	31ab
2,4-D	2.000	32a	20a
bentazon	0.750	79b	95d
glyphosate	3.000	98b	38ab
chlorsulfuron	0.094	99b	54bc
chlorsulfuron	0.047	100b	65c
bentazon	1.000	100b	100d
bentazon	1.500	100b	100d
DPX-F5384-81	0.030	100b	99d
DPX-F5384-81	0.130	100b	95d
check	----	100b	100d

Numbers followed by the same letter are not significantly different at the 0.05 level using Fisher's LSD.

Giant burreed, water horsetail and wild rice tolerance to bentazon and 2,4-D. Prather, T. S., R. H. Callihan, and D. C. Thill. Wild rice (*Zizania aquatica* L.) is a relatively new crop to northern Idaho. Tolerance of wild rice to herbicides in Idaho is not well understood, thus a study was undertaken to determine tolerance as well as efficacy on weeds to 2,4-D and bentazon. The weed species of interest in this study were water horsetail (*Equisetum fluviatile* L.) and giant burreed (*Sparganium eurycarpum* Engelm.) Herbicides were applied May 12, 1986 near St. Maries, Idaho to a wild rice field with 10 inches of standing water. The plots were 10 by 30 ft, replicated three times in a randomized complete block design. Herbicides were applied at 1.5 mph with a backpack CO_2 pressurized sprayer at 40 psi with 8002 flat fan nozzles arranged parallel to the ground to minimize direct water contact and maximize foliar contact. Visual estimates of foliar cover, expressed as a percentage of the check were recorded on July 22, 1986. Data were unchanged on August 29, 1986.

Wild rice cover was severly reduced 94 and 90% by 2,4-D (0.90 and 1.90 lb ai/A) treatments. The high rate of bentazon (1.90 lb ai/A) reduced wild rice cover by 47%, but other bentazon treatments (1.40, 0.90, 0.70 lb ai/A) did not. None of the treatments reduced water horsetail cover. All treatments reduced giant burreed cover compared to the check (80 to 98%). 2,4-D (1.90 lb ai/A) reduced giant burreed more than bentazon at 0.90 and 0.70 lb ai/A. Bentazon at 1.40 lb ai/A reduced giant burreed cover more than did bentazon at 0.90 lb ai/A. Efficacy of bentazon in this experiment was attributed to moist conditions, vigorous plants, and large foliage for interception of the herbicide. Insufficient selectivity for control of giant burreed or water horsetail in wild rice was obtained by broadcast applications of either 2,4-D or bentazon. Selective application techniques may provide more satisfactory results. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Response of wild rice,
water horsetail, and giant burreed to 2,4-D and bentazon.

Herbicide	Rate	Foliar Cover		
		W. rice	W. horsetail	G. burreed
	(lb ai/A)	---------------	%	------------------
2,4-D	0.90	10a	68a	13abc
2,4-D	1.90	6a	83a	2a
bentazon	1.90	53b	100a	10abc
bentazon	1.40	65bc	100a	5ab
bentazon	0.90	72bc	100a	21c
bentazon	0.70	73bc	100a	20bc
check	----	100c	100a	100d

Numbers followed by the same letter are not significantly different at the 0.05 level using Fisher's LSD.

Effect of propagule type and size on germination and growth of monoecious and dioecious hydrilla. Ames, M.D., L.W.J. Anderson and D.F. Spencer. The objective of this study was to determine the relationship between size and type of vegetative propagules, their rate of germination and subsequent growth of several provenances of *Hydrilla verticillata* (L.f.) Royle which have caused serious weed infestations in the United States.

Propagules (turions and tubers) were separated into two size classes by passing them through a sieve. The experiment was initiated on January 28-30, 1986. A replicate consisted of a plastic container (12.5 by 12.5 by 6.5 cm) planted with nine propagules in UC Mix at a depth of three cm. There were three treatments: propagule type (turion or tuber), size (large tuber = 0.289 g, turion = 0.120 g, small tuber = 0.207 g, turion = 0.035 g; values are averages over all provenances for each propagule type), and provenance of hydrilla. Sixteen replicates were used per treatment combination for a total of 224 replicates. Because few dioecious turions were available, two treatment combinations were omitted. Two sets of the 14 treatment combinations were placed randomly in eight outdoor cement tanks (2.2 by 0.77 by 0.6 m). Each week the number of propagules in a container which had germinated were counted. Half of the replicates (eight) were harvested May 28-29, 1986, and the biomass (dry weight) of shoots, roots, axillary turions, stem turions and tubers was determined. The remainder of the replicates was harvested November 17-19, 1986 (data not yet available).

There was no difference in percent germination between large and small tubers of the dioecious variety (Imperial Valley); however, percent germination was higher in the monoecious varieties. Within each monoecious provenance, there was a trend for small tubers or large turions to have the highest percent germination. It would seem that the size of the propagule rather than its type (tuber or turion) had the greatest effect on subsequent germination. Individual plant weight (data not shown) was less affected by the propagule size or type than was the percent germination under these experimental conditions. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

Germination of hydrilla propagules grown outdoors (January 28, 30, 1986 to May 26, 1986).

		(Germination) Percent (%)[1]			
		Tuber		Turion	
Provenance	Variety	Large	Small	Large	Small
Imperial Valley (CA)	Dioecious	3.47	0.000	-	-
Aquatic Gardens (VA)	Monoecious	43.75	88.19	79.86	24.31
Dyke Marsh (VA)	Monoecious	47.92	71.53	90.97	79.86
No. Carolina (NC)	Monoecious[2]	55.56	83.33	84.03	68.75

[1] Each value is the mean of 16 replicates.

[2] Though monoecious, this population may be a separate introduction from the other monoecious populations as indicated by isoenzyme studies (pers. commun., F. Ryan).

Control of aquatic weeds in an irrigation canal with bensulfuron methyl. Anderson, L.W.J. and N. Dechoretz. Laboratory and greenhouse studies have indicated bensulfuron methyl will effectively inhibit the growth of submersed aquatic weeds. As a result, a field study was conducted to evaluate the effects of a spring drawdown application of bensulfuron methyl on the growth of submersed weeds in an irrigation canal. Bensulfuron methyl was applied in April at 0.10 kg/ha to two plots which measured 4 m by 100 m. The herbicide was applied at 1870 l/ha with a power driven backpack sprayer.

Weed response to the herbicide treatments was evaluated in September by collecting the plant material within six 0.25 m^2 quadrats per plot and determining the dry weight of each species within the quadrat. Average dry weight from treated quadrats was compared with two designated control plots of equal size. Bensulfuron methyl provided excellent control of elodea and Eurasian watermilfoil. American pondweed and filamentous algae attached to the submersed weeds were not affected by the herbicide. However, total submersed weed regrowth was reduced by approximately 70%. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

Response of Aquatic Weeds to Drawdown Application of Bensulfuron Methyl

	Dry Weight (g/m^2)					
Treatment	Elodea	American Pondweed	Eurasian Watermilfoil	Filamentous Algae	Total Plant	Submersed Plants
Control 1	469±121[1/]	2±1	142±25	189±93	902±86	613±105
Control 2	395±128	154±42	25±7	137±39	695±86	558±106
Bensulfuron methyl 1	88±48	103±37	2±1	157±42	350±54	191±46
Bensulfuron methyl 2	66±29	114±15	0	36±14	217±46	180±35

1/ Value represents mean ± standard error; n=6; sample collected October 1986.

2/ Bensulfuron methyl applied at 0.10 kg/ha in April 1985.

Growth of sago and American pondweed from propagules exposed to sulfonylurea herbicides. Anderson, L.W.J., and N. Dechoretz. A greenhouse study was initiated to evaluate the potential phytotoxicity of DPX L5300, DPX R9674, and DPX M6316 to sago and American pondweed. Assays were conducted by placing five vegetative propagules of each species in Erlenmeyer flasks containing 300 ml of treated water for 24 hours. The treated propagules were removed from the herbicide solution and rinsed under flowing water for 60 seconds, planted in 7.5 by 7.5 cm plastic pots containing modified UC Mix, then placed in 20 L jars. Shoot length and plant dry weight were determined four weeks after treatment. All treatments were replicated four times.

Growth of both pondweed species were significantly reduced by all three herbicides. Generally, sago pondweed was more susceptible to the herbicides than American pondweed. For example, on a dry weight basis, 0.1 ppmw treatment reduced the growth of sago pondweed by more than 90%, whereas American pondweed growth was reduced by approximately 50%. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

Shoot length and dry weight of sago and American pondweed four weeks after exposing vegetative propagules to three sulfonyl urea herbicides for 24 hours.

Treatment Rate (ppmw)	Shoot Length (cm)		Dry Weight (mg)	
	Sago Pondweed	American Pondweed	Sago Pondweed	American Pondweed
Control	50.0 A[1]	41.3 A	779 A	235 A
DPX L5300				
0.1	26.4 B	42.6 A	45 B	140 B
1.0	3.8 C	5.5 C	17 CD	106 BC
10.0	2.6 C	4.2 C	26 CD	96 BCD
DPX R9674				
0.1	9.3 C	8.9 B	30 BC	106 BC
1.0	2.4 C	4.3 C	10 D	69 CD
10.0	2.4 C	3.6 C	9 D	82 BCD
DPX M6316				
0.1	24.0 B	9.4 B	65 A	123 BC
1.0	2.6 C	4.4 C	10 D	76 BCD
10.0	2.1 C	3.3 C	9 D	39 D

[1] Values followed by the same letter within a column are not significantly different at the 5% level according to Duncan's Multiple Range Test.

Response of sago and American pondweed to a preemergence water application of DPX M6316. Anderson, L.W.J. and N. Dechoretz. A greenhouse study was conducted to determine the herbicidal activity of DPX M6316 on sago and American pondweed when applied as a preemergence water treatment. Potted vegetative propagules were placed in 18.5 L jars containing water treated with DPX M6316 at rates ranging from 1.0 to 100 ppbw. Each treatment was replicated four times with three propagules of each species per replicate. Four weeks after treatment the treated plants were removed from the jars in order to measure shoot length and determine dry weight of each plant.

On a shoot length basis, growth of both species was significantly reduced in water treated at 1.0 ppbw. Maximum growth reduction occurred in jars treated with 50 ppbw. Evaluation of DPX M6316 on a dry weight basis was slightly different than the evaluation on a shoot length basis. Sago pondweed growth (dry weight) was not significantly reduced at the 1.0 ppbw level and maximum growth reduction occurred at 100 ppbw. Reduction in the biomass of American pondweed corresponded fairly well with reduction in shoot length. (U.S. Department of Agriculture, Agricultural Research Service, University of California, Davis, CA 95616)

SHOOT LENGTH AND DRY WEIGHT OF SAGO AND AMERICAN PONDWEED 4-WEEKS AFTER A PREEMERGENCE WATER APPLICATION OF DPX M6316.

TREATMENT RATE (PPBW)	SHOOT LENGTH (CM)		DRY WEIGHT (MG)	
	SAGO PONDWEED	AMERICAN PONDWEED	SAGO PONDWEED	AMERICAN PONDWEED
0	57.0 A [1]	40.5 A	141 A	253 A
1.0	38.9 B	27.0 B	102 A	186 B
5.0	11.7 C	16.9 C	43 B	132 BC
10.0	9.9 C	11.6 CD	31 B	100 C
50.0	6.0 D	6.5 DE	32 B	90 C
100.0	4.7 D	5.8 E	13 C	50 D

1 VALUE FOLLOWED BY THE SAME LETTER WITHIN A COLUMN ARE NOT SIGNIFICANTLY DIFFERENT AT THE 5% LEVEL ACCORDING TO DUNCAN'S MULTIPLE RANGE TEST.

PROJECT 7.

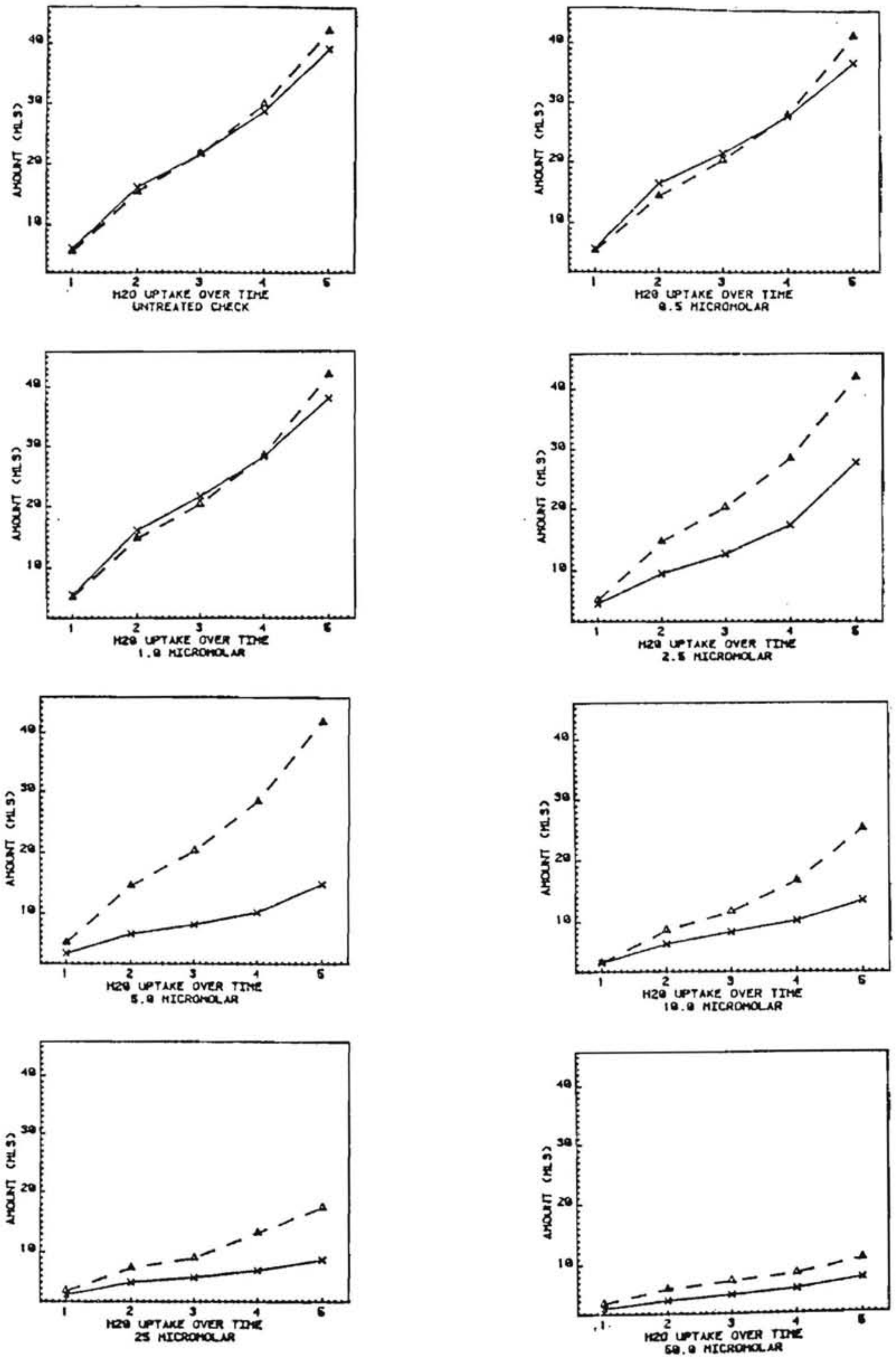
CHEMICAL AND PHYSIOLOGICAL STUDIES

Fred Ryan - Project Chairman

Differential susceptibility of winter wheat and volunteer cereal rye to ethyl-metribuzin in nutrient solution. Diener, P.R., D.J. Rydrych, and A.P. Appleby. Field studies have shown selective volunteer rye control in winter wheat with ethyl-metribuzin. A nutrient solution bioassay was conducted to determine if this selectivity was related to physiological differences between species.

Seeds of 'Stephens' winter wheat and cereal rye were pregerminated 3 days prior to transplanting in 25 mm by 150 mm culture tubes. The tubes contained 15% Hoagland's No. 2 nutrient solution, and 0 to 50 μM ethyl-metribuzin to give a final volume of 50 ml. The roots were suspended in solution and plants were supported by foam rubber blocks. Supplemental greenhouse lighting provided approximately 200 $\mu Em^{-2}s^{-1}$ and daylength was 16 h. The tubes were arranged in a completely randomized block design with six replications. Water was added every 4 days to return the volume to 50 ml. The amount added at each watering was recorded to obtain a cumulative water uptake for each treatment. At 21 days, the plants were harvested and foliage fresh weights recorded. Data were converted to percent of check within each block and subjected to regression analysis. GR_{50} values were generated for each species.

Stephens winter wheat was 6X more tolerant to ethyl-metribuzin than cereal rye, with GR_{50} values averaging 16.62 for wheat and 2.50 for rye. Water uptake for rye was reduced starting at 2.5 μM ethyl-metribuzin, whereas water uptake reduction for wheat began at 10 μM (see figure). These data indicate that selectivity in the field is physiologically related. (Crop Science Department, Oregon State University, Corvallis, OR 97331)



Differential water uptake between 'Stephens' winter wheat and volunteer cereal rye at various rates of ethyl-metribuzin (Δ--Δ = x—x = rye).

Adsorption and mobility of metribuzin and ethyl-metribuzin. Peek, D.C. and A.P. Appleby. Laboratory experiments were conducted to determine the influence of soil properties on the adsorption and mobility of metribuzin and ethyl-metribuzin. Five soils were used in the studies (Table 1). Adsorption was determined by equilibrating 2.5 g soil with from 1.0 x 10^{-9} moles to 5.0 x 10^{-6} moles of unlabeled, plus 1.14 x 10^{-11} moles ^{14}C-labeled, metribuzin or ethyl-metribuzin in 1.25 ml water for 24 h. After centrifugation, the soil solution was analyzed for ^{14}C using liquid scintillation counting. Data were analyzed by use of the Freundlich adsorption isotherm equation, $X = KC^{1/n}$, where X = amount of herbicide absorbed (μM/kg), C = amount of herbicide in solution (μM/L) and K and n are constants. Mobility was determined by soil thin-layer chromatography. Soil layers (0.5 mm thick) were prepared on 5 cm by 20 cm glass plates. Labeled metribuzin or ethyl-metribuzin (4.6 x 10^{-11} moles) were spotted 5 cm from the base of the plate, and the plate was placed in 2 cm water. When the water front had reached 15 cm, the plates were dried, the soil was scraped off in 0.5 cm sections, and the ^{14}C in each section was determined by liquid scintillation counting. Mobility was expressed in terms of R_f (distance of maximum ^{14}C/distance of the water front). All experiments were conducted twice with two replications per experiment.

Ethyl-metribuzin was adsorbed more and moved less than metribuzin for all soils (Table 2). Soils of lighter texture exhibited the greatest herbicide movement and lowest adsorption for both chemicals (Table 3). This suggests that leaching may be an important cause of loss in activity of metribuzin and ethyl-metribuzin. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Selected properties of the soils studied

Soil	pH	Clay	Sand	O.M.	oxAl[1]	CEC
		(%)				cmol(+)/kg
Woodburn sicl	4.6	32.7	16.1	2.4	0.26	13.2
Chehalis sl	6.0	19.2	56.6	2.4	0.21	19.5
Ontko l	6.2	18.9	30.4	5.5	0.16	44.2
Crooked sl	8.2	16.7	70.1	1.1	0.09	13.7
Bashaw cl	6.2	38.4	40.4	1.0	0.14	35.1

[1]oxAl = ammonium oxalate extractable Al.

Table 2. Freundlich K and soil-thin layer chromatography R_f values for the soils studied

Soil	Freundlich K		R_f	
	ethyl-metribuzin	metribuzin	ethyl-metribuzin	metribuzin
	μM/kg			
Woodburn sicl	8.4	7.0	0.33	0.34
Chehalis sl	2.5	2.4	0.50	0.60
Ontko l	3.4	3.3	0.31	0.41
Crooked sl	1.2	1.1	0.65	0.68
Bashaw cl	2.9	2.1	0.43	0.55

Table 3. Simple correlation coefficients relating soil properties to R_f and Freundlich K

Soil property	Correlation coefficient (r)			
	Freundlich K		R_f	
	ethyl-metribuzin	metribuzin	ethyl-metribuzin	metribuzin
Clay	.51	.41	-.42	-.39
Sand	-.87	-.88	.95*	.98**
oxAl[1]	.82	.84	-.61	-.68
pH	-.87	-.87	.82	.83
OM	.18	.30	-.64	-.59
CEC	-.23	-.20	-.52	-.25

[1]oxAl = ammonium oxalate extractable Al.

*,** = significant at .05 and .01 level, respectively.

<u>Activity of metribuzin and ethyl-metribuzin in nutrient solution.</u> Peek, D.C. and A.P. Appleby. In field experiments, metribuzin has been several times more active than its analog, ethyl-metribuzin. Nutrient solution studies were conducted to see if this difference in activity is due to differences in herbicide availability to plants or to physiological differences.

Three-day-old seedlings of 'Cayuse' oats or 'Malcolm' wheat were transferred to 25 mm by 150 mm culture tubes containing 50 ml of 15% Hoagland's No. 2 nutrient solution plus metribuzin or ethyl-metribuzin. Herbicide concentration ranged from 0 to 50 $\mu\underline{M}$ for the wheat experiment and 0 to 5 $\mu\underline{M}$ for the oat experiment. Plants were supported, with roots in the solution, by foam blocks placed in the top 15 mm of the tubes. Plants were placed in a growth chamber supplying approximately 200 $\mu E\ m^{-2}s^{-1}$. Daylength was 16 h and temperature held constant at 20 C. Water was replaced in the tubes daily to keep solution volume at 50 ml. Tubes were arranged in a randomized complete block with four replications. At 21 days after planting, plants were harvested and foliage fresh weight per plant was recorded. All data were converted to percent of check within each block and analyzed by regression analysis to determine the GR_{50} for both herbicides against each species.

Both herbicides were greater than 10x more active against oats than against wheat. Metribuzin was more active than ethyl-metribuzin against both species in about the same ratio as found in the field, indicating that differences in activity levels in the field are due to physiological, rather than soil, factors. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

GR_{50} of metribuzin and ethyl-metribuzin against 'Cayuse' oats and 'Malcolm' wheat

Plant	GR_{50}			
	metribuzin		ethyl-metribuzin	
	$\bar{x}$	s	$\bar{x}$	s
	$\mu\underline{M}$			
Oats	0.21	0.04	0.91	0.08
Wheat	2.36	0.54	13.88	2.25

Effect of soil pH or added phosphorus on soil adsorption isotherms of glyphosate. Kawate, M.K. and A.P. Appleby. Several researchers have suggested that glyphosate is bound to soil by the phosphonic acid moiety, and that this group behaves like inorganic phosphate in soil. The objective of this study was to determine if glyphosate adsorption could be changed by altering soil pH or adding phosphorus. Some chemical and physical characteristics of three Oregon soils are given in Table 1.

Tables 2 and 3 show the adjusted pH and phosphorus treatments for the three soils, respectively. Equilibration time for pH adjustment and phosphorus treatments was 6 weeks.

Air-dried soil (2.5 g) was weighed into 10-ml beakers. Eight concentrations of nonradioactive glyphosate (isopropylamine salt) were formulated, ranging from 2.5×10^{-6} to 1.25×10^{-2} g/ml. One ml of each concentration was placed in 10-ml test tubes. One uL of radioactive glyphosate (0.925 kBq/uL) was added to each tube to obtain the same level of radioactivity in each sample. Additional water (amount depended on soil type) was added to obtain at least 0.5 ml of soil solution after centrifugation. Each tube was emptied into the appropriate beaker and the treated soil was equilibrated for 24 h in 100% RH chambers.

Treated soil was centrifuged, and a 0.5-ml sample of soil solution was put into a scintillation vial containing 15 ml of scintillation solution. Vials were assayed for radioactivity.

Treatments were replicated twice and experiments were repeated. The data presented were combined from repeated experiments.

The data were fitted to the Freundlich equation ($x/m=KCeq^{1/n}$); the linear form, $\log x/m = \log K + (1/n)\log Ceq$, where x/m = ug glyphosate adsorbed per g soil, K = Freundlich constant, Ceq = equilibrium concentration of glyphosate (ug/ml), and $1/n$ = linear constant. Regression analysis was performed and K-values were determined at $\log Ceq = 0$ ug/ml.

In both the Chehalis and Crooked soils, as soil pH increased, glyphosate adsorption decreased (Table 4). Soil pH did not affect glyphosate adsorption in the organic soil.

Added phosphorus did not influence glyphosate on any soil (Table 5).

Glyphosate adsorption was greatest in the Semiahmoo-2 (organic) soil and least in the Crooked soil in both pH and phosphorus experiments. (Crop Science Department, Oregon State University, Corvallis, OR, 97331)

Table 1. Selected chemical and physical properties of three Oregon soils

Soil type[a]	pH	P	Organic matter	CEC	Particle size analysis Clay	Silt	Sand
		(ppm)	(%)	(meq/100 g)	----------(%)---------		
Chehalis sl	6.0	6	2.4	19.5	19	24	57
Semiahmoo-2 muck	4.9	188	45.0	68.5			
Crooked sl	8.2	22	1.1	13.7	17	13	70

[a]Soil family classification:
Chehalis = Fine-silty, mixed, mesic, Cumulic Ultic Haploxeroll;
Semiahmoo = Euic, mesic Typic Medisaprist;
Crooked = Loamy, mixed, mesic, shallow Xerollic Durorthid.

Table 2. pH adjustment of three Oregon soils

Soil type	meq $Ca(OH)_2$ per 100 g soil	meq H_2SO_4 per 100 g soil	soil pH[a]
	0	-	5.7
Chehalis	7.5	-	7.4
	15	-	8.0
	30	-	8.4
	0	-	5.1
Semiahmoo-2	10	-	5.4
	20	-	6.0
	40	-	6.9
	-	0	7.9
Crooked	-	1	7.3
	-	2.5	6.3
	-	5	5.0

[a]Soil pH was determined using a 1:2 soil:water (w/v) ratio.

Table 3. Phosphorus as potassium phosphate, monobasic, added to three Oregon soils

Treatment no.[a]	P rate	K rate[b]
	(ppm w/w)	(ppm w/w)
P0	0	0
P1	0	63
P2	25	31
P3	50	0

[a]Treatment P0 is the nonfertilized check.
[b]Potassium as potassium chloride was added to equalize the amount of potassium in treatments P1 and P2 with P3.

Table 4. Effect of soil pH on Freundlich isotherm constants in three Oregon soils

Soil type	pH	K	log K	95% C.I.	1/n	R^2
		(ug/g soil)	(ug/g soil)	(for log K)		
	5.7	112	2.05	1.96 to 2.14	.52	.95
Chehalis	7.4	30	1.48	1.42 to 1.54	.68	.98
	8.0	32	1.51	1.44 to 1.58	.66	.97
	8.4	16	1.19	1.14 to 1.25	.72	.99
	5.1	241	2.38	2.31 to 2.45	.76	.98
Semiahmoo-2	5.4	361	2.58	2.46 to 2.65	.81	.96
	6.0	554	2.74	2.56 to 2.92	.86	.89
	6.9	349	2.54	2.44 to 2.64	.81	.96
	7.9	6	.81	.68 to .94	.67	.94
Crooked	7.3	9	.94	.89 to .98	.70	.99
	6.3	18	1.25	1.20 to 1.30	.67	.99
	5.0	23	1.37	1.30 to 1.44	.64	.97

Table 5. Effect of added phosphorus on Freundlich isotherm constants in three Oregon soils

Soil type	Phos. treat.	K	log K	95% C.I.	1/n	R^2
		(ug/g soil)	(ug/g soil)	(for log K)		
	P0	80	1.90	1.81 to 2.00	.53	.94
Chehalis	P1	30	1.91	1.84 to 1.99	.56	.96
	P2	32	1.90	1.83 to 1.97	.60	.97
	P3	16	1.88	1.82 to 1.93	.65	.98
	P0	260	2.42	2.33 to 2.50	.64	.96
Semiahmoo-2	P1	462	2.66	2.47 to 2.85	.68	.86
	P2	1032	3.01	2.66 to 3.37	.77	.70
	P3	999	3.00	2.64 to 3.36	.76	.68
	P0	3	.54	.42 to .66	.65	.95
Crooked	P1	4	.57	.50 to .64	.68	.99
	P2	3	.48	.37 to .59	.78	.97
	P3	3	.49	.34 to .64	.85	.95

Electrophoretic analysis of isozymes in leafy spurge (Euphorbia spp.). Torell, J.M. and J.O. Evans. This study was initiated to determine isozyme variation within populations of leafy spurge. Accessions collected from ten North American populations and five Eastern European populations were grown in a greenhouse at Utah State University. Leaves were collected 1.5 to 2.0 cm from the shoot apex and ground in Carlson's modified extraction buffer (120 mg leaf/400ul extraction buffer). The crude squeezate was applied to filter paper wicks (Whatman 3mm) for electrophoresis on starch gels and injected into preformed wells (100ul/well) for electrophoresis on polyacrylamide gels. Starch gels were 12 percent while polyacrylamide gels were 3.1 percent for the stacking gel and 7 to 10 percent for the separating gel. Several buffer systems were used. Gels were stained for acid phosphatase, esterase, aminopeptidase, endopeptidase, glutamic oxaloacetic transaminase, and shikimate dehydrogenase.

Isozyme resolution was better on polyacrylamide than on starch for all isozymes except acid phosphatase. Very little polymorphism was observed within populations but some differences are apparent between accessions representing populations identified as *E. esula* and *E. cyparissias*. (Utah Agricultural Experiment Station, Logan, Utah 84322-4820).

Influence of spray volume on efficacy of sethoxydim. Bell, C.E. Populations of junglerice and prairie cupgrass (*Eriochloa contracta* Hitchc.) were treated with two rates of sethoxydim (.2 and .3 lb ai/A) at two spray volumes. Application was made with CO_2 pressured sprayer using flat fan nozzles. A spray volume of 5.8 GPA was acheived with 800067 nozzles and a spray volume of 46 GPA was acheived with 8008 nozzles. Crop oil surfactant was added to each mix at 1 quart per acre. Plot size was 5 ft. by 25 ft. with six replications in a randomized complete block design. The grasses were 4 to 6 inches tall at time of treatment. Soil moisture was near field capacity. Results shown in the table below indicate that decreased spray volume will increase efficacy of this herbicide. In the case of prairie cupgrass, the effect of spray volume was more important than herbicide rate for control of this grass. (University of California Cooperative Extension, El Centro, California 92243.)

SETHOXYDIM: EFFICACY VS. SPRAY VOLUME

Treatment	Rate	Spray Volume (GPA)	Junglerice Control (%)	Prairie Cupgrass Control(%)
sethoxydim	.2	5.8	73 b	77 a
sethoxydim	.3	5.8	95 a	91 a
sethoxydim	.2	46	21 c	23 b
sethoxydim	.3	46	50 b	42 b
untreated control			0 d	0 c

Numbers followed by the same letter are not significantly different at the 5% level according to DMRT.

Preparation of antibodies against a major soluble protein of subterranean turions of Hydrilla verticillata. Ryan, F.J. Subterranean turions of the dioecious biotype of *Hydrilla verticillata* (L.f.) Royle have what appears to be a single major component in its complement of buffer soluble proteins, judged by the appearance of protein bands after non-denaturing electrophoresis on polyacrylamide gels. This protein has been characterized by gel-permeation chromotography and non-denaturing eletrophoresis. The molecular mass of this protein determined by gel-permeation chromotography appeared to be approximately 58,000 D. Denaturing electrophoresis in the presence of sodium dodecyl sulfate indicated, however, that there were two proteins of slightly different molecular weight in the major component after gel-permeation chromotography, with molecular masses of 58,800 and 55,440 D. Isoelectric focussing of these proteins indicated that they had isoelectric points somewhat more acidic than phycocyanin (pI=4.65). Further efforts to separate or purify these proteins by conventional ion-exchange or hydrophobic-interaction chromotography were unsuccessful.

The proteins could be purified by preparative non-denaturing eletrophoresis on polyacrylamide gels. The gel band containing the proteins of interest was excised, pulverized in liquid N_2, and injected into rabbits, using conventional techniques to raise antibodies. The sera from several rabbits after a 2 month schedule of sensitization was sufficiently reactive to be used in immunological techniques. Buffered extracts from subterranean turions of monoecious and dioecious biotypes of *H. verticillata* were run on non-denaturing acrylamide gels and then electrophoretically transferred to nitrocellulose paper (the so-called Western blot). The blots were treated with serum from the rabbits sensitized to the protein from the turion. Binding of rabbit antibodies was detected by treating the blot with goat anti-rabbit serum labelled with alkaline phosphatase; the alkaline phosphatase activity was detected by a colorimetric reaction. By these means, the extracts of the dioecious turions had a single antigenically reactive band, while extracts of the monoecious plants had one band which had an R_f similar to that of the dioecious, plus one additional band. Control serum from non-sensitized rabbits, was non-reactive. Electrophoresis and probing of Western blots of extracts of leaves and stems of plants of either biotype indicated that the proteins were present in these tissues as well, although in much reduced concentrations.

Antigenically cross-reactive proteins were detected in extracts from leaves and stems of other members of the family Hydrocharitaceae: *Egeria densa* Planch., *Elodea canadensis* L.C. Rich., and *Elodea nuttallii* (Planch.) St. John had one or more cross-reactive proteins. Less closely related aquatic plants also had antigenically similar proteins. Winterbuds of *Potamogeton nodosus* Poir, and tubers of *P. pectinatus* L. had a number of strongly cross-reactive proteins. Other related but non-aquatic families have not yet been tested so it cannot be determined if these proteins are peculiar to plants of the aquatic habitat. A number of terrestrial plants have been tested; leaves of *Spinacea oleracea*, tubers of *Solanum tuberosum*, the rhizome of *Allium cepa*, and leaves of *Zea mays* all lacked detectable cross-reactive proteins.

Antibodies against these proteins may be useful in establishing a serological means of determining the biotype of specimens of *H. verticillata*. In addition, these antibodies may be used to study the synthesis of these proteins during the tuberization process. (USDA-ARS Aquatic Weed Research Laboratory, Botany Dept., University of California, Davis, CA 95616).

Late preemergence weed control in potatoes. Haderlie, L.C. and P.J. Petersen. Comparison of several herbicides, applied preplant or late preemergence, to potatoes was made to determine weed control and potato tolerance. The study was conducted at the Research & Extension Center in Aberdeen, Idaho, in 1984. The soil was a Declo loam, pH 8.19, and 1.25% organic matter.

A randomized complete block design was used with four replications and a plot size of 12 by 40 ft (3.7 by 12.2 m). Russet Burbank potatoes were planted on 10 and 11 May 84. Hilling was done 5 Jun 84. Treatments were applied using a tractor-mounted, compressed air field sprayer at 17.5 gpa (164 L/ha) and 28 psi (193 kPa) using TJ11002 flat fan nozzles spaced 18 inches (45.7 cm) apart on a 12 ft (3.7 m) boom. One preplant (PPI) treatment was incorporated by double disking within 15 min. of spraying. Other treatments (late preemergence) were incorporated with 0.53 inches of water from rain on 11 June 84 and an additional 0.65 inches on 13 June from irrigation.

Only 1% of the crop had emerged at the treatment date (7 June 19) for the late preemergence herbicides. No weeds were present.

Crop injury and control of green foxtail, barnyardgrass, redroot pigweed, common lambsquarters, volunteer grain, and buckwheat was determined on 2 Jul 84 by visual ratings. The predominate weeds were green foxtail, barnyardgrass and redroot pigweed. The only significant injury to potatoes occurred in treatments including fluorochloridone (Table 1). Fluorochloridone symptoms included a bright yellow chlorosis which progressed to necrosis of the leaf tissue. Excellent control of green foxtail, redroot pigweed, and common lambsquarters was achieved with acetochlor, the MEA formulation of alachlor, alachlor + metribuzin, cinmethylin + metribuzin, fluorochloridone + alachlor, and metribuzin alone at 0.38 lb a.i./A. Cinmethylin applied PPI failed to control the weeds to any degree. Cinmethylin applied late preemergence controlled the foxtail but was weak on the broadleaf weeds. Fluorochloridone at 0.5 lb a.i./A was weak on the grasses but gave good redroot pigweed and common lambsquarters control.

Season-long weed control, as evaluated on 18 Sep 84, was 96% or better for all weeds from the acetochlor treatment (Table 1). Metribuzin alone at 0.38 lb a.i./A and alachlor (4 EC) were the next best overall treatments with 86% or better control for each weed. Alachlor 4 EC gave somewhat better control of redroot pigweed and barnyardgrass than did alachlor (MEA) though it was not statistically significant (α = 0.05). Grass control by cinmethylin (preemergence) continued to be good at the end of the season. Fluorochloridone + alachlor and metribuzin + cinmethylin gave generally good control for all weeds at the end of the season.

Tuber yields were much better in treatments without weeds than in weedy plots, but there were less malformed tubers as a percentage of the total, in the weedy plots, than in others (Table 2). Most malformed tubers were due to knobs. Fluorochloridone and cinmethylin (preemergence) gave lower yields than the highest yielding treatments, but percentage of number ones were not reduced. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Table 1. Potato injury and weed control as visually evaluated following one preplant incorporated (PPI) herbicide treatment (sprayed 8 May 84) and several late preemergence herbicide treatments (sprayed 7 June 84). Data are means of four replications

Chemical	Formulation	Rate Lb a.i./A)	% Potato Injury	2 July 1984 Green Foxtail/ Barnyard-grass	Redroot Pigweed	Lambs-quarters	Volunteer Grain	Buck-wheat	18 Sept. 1984 Redroot Pigweed	Green Foxtail	Barnyard Grass
				%					%		
1. untreated (weedy)			0	0	0	0	0	0	0	0	0
2. untreated (hand weeded)			0	100	100	100	100	100	100	100	100
3. acetochlor	8 EC	2.5	1	98	99	99	61	87	99	99	96
4. alachlor	4 EC	2.5	0	95	99	80	54	35	86	98	86
5. alachlor	4 ME	2.5	0	94	97	97	45	60	71	94	68
6. metribuzin	75 DF	0.5	1	83	98	93	50	49	80	86	66
7. alachlor + metribuzin		2.0 + 0.38	0	94	99	99	71	94	73	92	72
8. cinmethylin (PPI)	7 EC	0.7	0	0	0	20	0	25	0	0	0
9. cinmethylin		0.7	0	90	38	39	20	40	13	94	85
10. cinmethylin + metribuzin		0.6 + 0.38	0	94	98	98	71	97	80	97	87
11. fluorochloridone	2 E	0.38	4	44	69	89	35	71	23	26	15
12. fluorochloridone		0.5	6	68	90	90	0	67	45	78	28
13. fluorochloridone + alachlor		0.38 + 2.0	5	97	98	100	38	96	83	98	79
14. metribuzin	75 DF	0.38	1	92	98	98	69	100	87	97	89
	LSD (0.05)		3	14	18	25	42	44	24	14	25
	CV		163	13	16	23	68	47	28	13	28

Table 2. Tuber yield and grade (% of total) after late preemergence herbicides were used in potatoes at the University of Idaho Research and Extension Center at Aberdeen, Idaho. All treatments except Trt. #8 cinmethylin (PPI) were applied on 7 June 84. Cinmethylin (PPI) was applied 8 May 84. Potatoes were harvested on 25 Sept. 84

Chemical	Formulation	Rate Lb a.i./A	Total Yield cwt/A	Total Yield t/ha	% of Total <4 oz	% of Total 4-10 oz	% of Total >10 oz	% of Total #1	% of Total Malformed
1. untreated (weedy)			171	19.2	32	44	9	53	14
2. untreated (hand weeded)			231	25.9	23	31	17	48	29
3. acetochlor	8 EC	2.5	222	24.9	22	29	16	45	33
4. alachlor	4 EC	2.5	231	25.9	21	33	17	50	29
5. alachlor	4 ME	2.5	223	25.0	20	35	21	56	24
6. metribuzin	75 DF	0.5	216	24.3	21	34	21	55	24
7. alachlor + metribuzin		2.0 + 0.38	216	24.3	21	31	17	48	31
8. cinmethylin (PPI)	7 EC	0.7	135	15.1	39	42	5	47	14
9. cinmethylin		0.7	184	20.7	25	34	15	49	26
10. cinmethylin + metribuzin		0.6 + 0.38	233	26.2	18	34	20	54	28
11. fluorochloridone	2 E	0.38	176	19.8	32	35	14	49	19
12. fluorochloridone		0.5	201	22.6	21	34	16	50	29
13. fluorochloridone + alachlor		0.38 + 2.0	220	24.7	22	36	17	53	25
14. metribuzin	75 DF	0.38	240	26.9	20	36	17	53	27
LSD (0.05)			34	3.8	9	8	9	10	8
CV			11	11	27	16	39	13	22

Annual weed control in potatoes with preemergence herbicides. Haderlie, L.C. and D.K. Harrington. Seven preemergence herbicides were applied to Russet Burbank potatoes to compare weed control and crop yields. Treatments were made to field-grown potatoes at the Aberdeen Research and Extension Center on a declo silt loam soil with pH 8.2, 1.2% organic matter, and 11.2 meq. CEC. Herbicides were applied 3 June with a tractor-mounted compressed-air sprayer with a 12 ft boom at 17.5 gpa and 20 psi with TJ8002 nozzles. Potatoes were planted 6,8 May 85 and hilled on 24 and 30 May. Soil surface was powder dry to 2 inches. Plot size was 12 by 40 ft. Each treatment was replicated four times and designed in a randomized complete block.

Overall weed control was excellent (94% or better) as evaluated 13 July for cinmethylin and metribuzin, SC-5676/R-25788, metolachlor + fluorochloridone, and acetochlor (Table 1). These treatments gave season-long control as well. Cinmethylin, alone, gave good weed control of green foxtail but not of redroot pigweed or other broadleaved weeds. By 24 Sept 1985 cinmethylin at 1.2 lb a.i./A gave good green foxtail control, but the lower rate did not.

Fluorochloridone, alone, gave good early control of volunteer grain and hairy nightshade but was not adequate for other weeds. Full-season control was also inadequate.

Weed populations were not dense throughout this experiment. Redroot pigweed and green foxtail were about 20 plants/m^2 or less and volunteer grain and common lambsquarters were about 5 plants/m^2. Hairy nightshade density was only 1 to 3 plants/m^2 and was not uniform throughout experimental area.

There was little crop injury by 13 July, but fluorochloridone caused a bleaching effect on the potatoes for about one week after treatment.

Potato yields and quality were not statistically different for any treatment including the weedy check (Table 2). Weed population was light enough to not affect yields and the herbicides did not severly injure the potatoes. The lowest yield tendency was from acetochlor. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Table 1. Weed control in potatoes following late preemergence (3 June 1985) treatments of several new herbicides. Evaluation by visual ratings was made twice. Data are means of four replications

Chemical	Formulation	Rate lb a.i./A	% Injury	13 July 1985 % Control Overall Weed Cntrl	Fox tail	Vol. Grain	Redroot Pigweed	Lambs qrtrs	Night shade	24 Sept 85 Redroot Pigweed	Green Foxtail
1. untreated (weedy)			0	0	0	0	0	0	0	0	0
2. untreated (hand weeded)			0	100	100	100	100	100	100	69	79
3. cinmethylin	7 EC	1.0	0	74	83	86	43	70	81	40	70
4. cinmethylin		1.2	1	71	81	89	73	90	58	53	91
5. cinmethylin+metribuzin	75 DF (metr)	0.8 + 0.38	3	96	98	98	95	85	61	93	94
6. cinmethylin + lactofen	2 E	0.8 + 0.25	3	86	91	91	78	75	80	47	94
7. SC-5676/R25788	7 E	1.5	4	95	95	95	93	79	100	91	96
8. SC-5676/R25788		3.0	0	98	97	85	96	93	100	97	93
9. fluorochloridone	2 E	0.38	0	83	78	94	71	100	90	59	74
10. fluorochloridone		0.5	1	88	84	96	81	81	90	65	84
11. metolachlor	8 E	2.0	5	88	95	98	76	74	92	73	94
12. metolachlor+fluorochloridone		1.75 + 0.38	0	94	91	96	88	85	100	81	95
13. acetochlor	8 E	2.5	6	97	97	96	89	81	100	88	94
LSD (0.05)			4	8	7	14	16	32	29	31	18
CV			158	7	6	11	15	29	25	33	15

Table 2. Potato tuber yield and percent in each grade following late preemergence treatments of several new herbicides. Harvested 1 Oct 85. Data are means of four replications

Chemical	Formulation	Rate (Lb) a.i./A	Total yield cwt/A	Total yield t/ha	% of Total <4 oz	% of Total 4-10 oz	% of Total >10 oz	% of Total 1's*	% of Total Malformed
1. untreated (weedy)			268	30.1	22	42	22	64	15
2. untreated (hand weeded)			287	32.2	20	37	27	65	15
3. cinmethylin	7 EC	1.0	286	32.1	22	40	21	62	16
4. cinmethylin		1.2	283	31.8	25	41	19	61	14
5. cinmethylin + metribuzin	75 DF (metrib)	0.8 + 0.38	318	35.7	19	35	26	61	20
6. cinmethylin + lactofen	2 E	0.8 + 0.25	278	31.2	17	36	31	67	16
7. SC-5676/R25788	7 E	1.5	284	31.9	20	36	26	62	18
8. SC-5676/R25788		3.0	304	34.1	20	42	25	67	13
9. fluorochloridone	2 E	0.38	308	34.5	20	44	21	66	15
10. fluorochloridone		0.5	269	30.2	20	39	25	64	16
11. metolachlor	8 E	2.0	277	31.1	22	36	25	61	17
12. metolachlor+fluorochloridone		1.75 + 0.38	275	30.9	19	34	32	66	16
13. acetochlor	8 E	2.5	241	27.1	20	31	32	63	17
	LSD (0.05)		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	CV		19	19	19	21	25	9	37

*No. 1's = 4-10 oz + >10 oz.

Metribuzin rate and potato tolerance. Haderlie, L.C. and P.J. Petersen. Several rates of preemergence and postemergence applications of metribuzin to potatoes were evaluated for crop tolerance, yield, and weed control. The study was conducted at the Research and Extension Center at Aberdeen, Idaho.

A randomized complete block design with four replications per treatment was used. Plots were 12 by 40 ft (3.65 by 12.19 m). All treatments were applied using a tractor-mounted, compressed air field sprayer, with a 12 ft (3.7 m) boom. Treatments were applied in 17.5 gpa (163.7 L/ha) water carrier at 28 psi (193 kPa) using TJ11002 nozzles spaced 18 inches (45.7 cm) apart. The soil was a Declo loam, pH 8.19 and 1.25% organic matter. Preemergence treatments were applied 7 Jun 84 when 1% of the crop was just emerging. No weeds were present at treatment time. Postemergence treatments were applied 25 Jun 84 when the potatoes were at the 20% ground cover stage. The dominant weed species and their size follow: green foxtail, 3 to 4 inches; common lambsquarters, 4 to 5 leaf; redroot pigweed, 2 to 3 leaf. Postemergence treatments were applied at 90°F (32.2°C) on a slightly hazy day.

Metribuzin at 0.12 lb a.i./A gave poor control (51, 64, and 51%, respectively) of green foxtail, common lambsquarters, and redroot pigweed, when applied preemergence as evaluated on 5 Jul 84 visually (Table 1). Postemergence applications at the same rate controlled 80, 99, and 99%, respectively, of the same weed species. The higher rates of metribuzin, regardless of the time of application, produced control from 91 to 100% of the weeds present. The only significant visible potato injury was caused by 2 lb a.i./A of postemergence applied metribuzin. Over all, green foxtail was less susceptible to metribuzin than the broadleaf weeds. This data would suggest that under the conditions of the study, 0.25 lb a.i./A metribuzin was, for all practical purposes, as effective as the higher rates.

Weed control evaluated on 18 Sep was generally retained at metribuzin rates of 0.25 lb a.i./A or higher (Table 1). Redroot pigweed control from preemergence treatments of 0.25 and 0.5 lb a.i/A rates was less in Sept. than it was earlier. Green foxtail control was better at the end of the season than was redroot pigweed.

Tuber yields were low where weed interference was very strong and in the metribuzin postemergence treatment at 2.0 lb a.i./A (Table 2). Yields tended to be less in postemergence than in preemergence treatments.

Specific gravity was highest for the low yielding treatments, namely metribuzin (2.0 lb a.i./A) applied postemergence and the weedy check. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Table 1. Effect of various rates of preemergence and postemergence treatments of metribuzin on weed control and potato injury

	Chemical	Formulation	Time Applied	Rate (Lb) a.i./A	5 July 1984				18 Sept 1984		
					Potato Injury	Green Foxtail	Lambs-quarters	Redroot Pigweed	Redroot Pigweed	Green Foxtail	Barnyard grass
					%	%	%	%	%	%	%
1.	untreated (weedy)				0	0	0	0	0	0	0
2.	untreated (hand Weeded)				0	100	100	100	100	100	100
3.	metribuzin	75 DF	Pre (7 Jun 84)	0.12	1	51	64	51	35	28	20
4.	metribuzin			0.25	1	91	98	91	53	91	81
5.	metribuzin			0.5	3	95	99	96	75	95	81
6.	metribuzin			1.0	1	96	100	100	99	98	85
7.	metribuzin			2.0	3	95	100	100	90	96	89
8.	metribuzin		Post (25 Jun 84)	0.12	1	80	99	99	80	76	84
9.	metribuzin			0.25	1	93	100	100	91	90	90
10.	metribuzin			0.5	1	97	100	100	99	95	98
11.	metribuzin			1.0	8	99	100	100	98	99	99
12.	metribuzin			2.0	20	99	100	100	98	99	98
			LSD (0.05)		5	12	16	15	22	18	18
			CV		95	10	13	12	20	15	17
	Weed Counts/m^2 (27 June 1984)					110	7	108			

Table 2. Potato tuber yield, percentage in each grade, and specific gravity. metribuzin was applied at various rates on 7 Jun (Pre), 25 Jun (Post). Planting was on 11 May 84 and harvest was on 26 Sep 84. Data are means of four replications (Haderlie & Petersen).

Chemical	Formulation	Time Applied	Rate lb ai/A	Total Yield cwt/A	t/ha	% Total <4 oz	4-10 oz	>10 oz	#1	Malformed	Specific Gravity
1. untreated (weedy)				129	14.5	34	35	8	43	23	1.086
2. untreated (hand weeded)				254	28.5	15	27	21	48	37	1.084
3. metribuzin	75 DF	Pre (7 Jun 84)	0.12	173	19.4	31	33	8	41	28	1.085
4. metribuzin			0.25	243	27.3	17	28	20	48	35	1.085
5. metribuzin			0.5	244	27.4	17	28	20	48	35	1.085
6. metribuzin			1.0	215	24.1	20	29	23	52	28	1.084
7. metribuzin			2.0	222	24.9	20	29	17	46	35	1.082
8. metribuzin		Post (25 Jun 84)	0.12	217	24.4	19	27	19	46	35	1.085
9. metribuzin			0.25	226	25.4	21	27	21	49	31	1.085
10. metribuzin			0.5	217	24.3	22	33	14	47	31	1.085
11. metribuzin			1.0	218	24.4	20	26	18	44	35	1.084
12. metribuzin			2.0	194	21.7	25	32	22	54	21	1.089
LSD				47	5.2	10	10	9	13	10	.004
CV				15	15.2	31	24	34	20	23	.27

Potato tolerance and weed control with metribuzin and metolachlor. Haderlie, L.C. and D.K. Harrington. Annual weed control and potato tolerance was determined following application of metribuzin at several rates and of metolachlor, with or without metribuzin, in 1985 under field conditions.

Metribuzin was applied from 0.12 to 2.0 lb a.i./A and metolachlor at 2.0 lb a.i./A, alone or with metribuzin, at 0.5 lb a.i./A at two times. The first was late preemergence (3 June 85) when 25 to 30% of the potatoes had emerged and 26 June 85 when potatoes were 6 to 10 inches tall.

Herbicides were applied with a tractor-mounted sprayer with a 12 ft boom at 17.5 gpa with TJ8002 nozzles and 20 psi. Plot size was 12 by 40 ft and experimental design was randomized complete block with four replications. Soil was a declo silt loam with 8.2 pH, 1.2% organic matter and 11.2 CEC.

The first treatment was applied to very dry soil, 1.5 to 2.0 inches deep. Potatoes had been hilled with a rolling cultivator 3 days earlier. Water was applied by sprinkler irrigation on 6 June at 1.0 inch.

Crop injury was caused by metribuzin at 2.0 lb a.i./A applied preemergence and at 1.0 and 2.0 lb a.i./A applied postemergence (Table 1). Metolachlor and metolachlor + metribuzin applied postemergence caused some injury but only about 20% as much as the 2.0 lb a.i./A metribuzin treatment.

Overall weed control by July 13 was excellent (95% or better) for all treatments, except metribuzin, at 0.12 lb a.i./A pre- or postemergence and metolachlor postemergence (Table 1). Metribuzin rates of 0.25 lb a.i./A or higher gave consistently good control of all weeds whether applied pre- or postemergence.

Metolachlor alone postemergence resulted in the lowest weed control which is understood since weeds had already germinated.

Most treatments maintained weed control through the whole season (Table 1). The hand weeded check was not weeded after the middle of July.

Tuber yields and grades were reduced by metribuzin at 2.0 lb a.i./A compared to lower rates for both pre- and postemergence (Table 2). Metolachlor or metolachlor + metribuzin were among the highest yielding treatments. Metribuzin at 0.12 lb a.i./A preemergence yielded significantly higher than the hand weeded check. (University of Idaho Research & Extension Center, Aberdeen, ID 83210)

Table 1. Weed control determined two times and potato tolerance evaluated once after application of metribuzin and metolachlor preemergence (3 June) and postemergence (26 June) in 1985. The first waterings were 1.0 and 1.6 inches on 6 and 29 June 1985, respectively. Data are means of four replications

Chemical	Formulation	Rate lb ai/A	Type of Application	% Crop Injury	July 13 — % Control: Overall Weed Control	July 13 — % Control: Fox-tail	July 13 — % Control: Vol. grain	July 13 — % Control: Redroot Pigweed	Sept. 24 — % Control: Fox-tail	Sept. 24 — % Control: Redroot Pigweed
1. untreated (weedy)				0	0	0	0	0	0	0
2. untreated (hand weeded)				0	100	100	100	100	81	61
3. metribuzin	75 DF	0.12	Pre	0	90	83	79	91	81	82
4. metribuzin		0.25	Pre	1	95	96	96	97	95	86
5. metribuzin		0.5	Pre	3	94	95	94	99	92	91
6. metribuzin		1.0	Pre	3	98	99	95	98	88	96
7. metribuzin		2.0	Pre	9	97	100	96	100	94	100
8. metolachlor	8 E	2.0	Pre	1	95	97	92	88	90	83
9. Metolachlor + metribuzin		2.0 + 0.5	Pre	2	98	100	97	98	94	96
10. metribuzin		0.12	Post	3	89	84	87	95	70	79
11. metribuzin		0.25	Post	0	98	99	97	99	93	95
12. metribuzin		0.5	Post	3	98	99	97	100	92	100
13. metribuzin		1.0	Post	10	98	100	98	99	99	100
14. metribuzin		2.0	Post	28	98	100	97	100	98	100
15. metolachlor		2.0	Post	5	80	86	87	68	90	34
16. metolachlor + metribuzin		2.0 + 0.5	Post	6	99	100	76	100	93	99
LSD (0.05)				4	6	8	17	7	12	15
CV				63	5	6	14	6	8	13

Table 2. Potato tuber yields and percentages in each grade. Various treatments were applied late preemergence, June 3, and postemergence, June 26. Potatoes were planted May 6 and harvested Sept. 30, 1985. Data are means of four replications

Chemical	Formulation	Rate	Type of	Total Yield		% of Total				
		lb ai/A	Application	cwt/A	t/ha	<4 oz	4-10 oz	>10 oz	No. 1's	Malformed
1. untreated (weedy)				195	21.9	25	36	25	60	15
2. untreated (hand weeded)				256	28.7	21	28	30	58	21
3. metribuzin	75 DF	0.12	Late Pre	292	32.8	18	27	34	62	21
4. metribuzin		0.25	Late Pre	275	30.8	18	30	31	61	21
5. metribuzin		0.5	Late Pre	282	31.7	17	30	36	66	17
6. metribuzin		1.0	Late Pre	247	27.7	19	33	33	66	15
7. metribuzin		2.0	Late Pre	247	27.7	22	27	25	52	26
8. metolachlor	8 E	2.0	Late Pre	287	32.3	16	32	38	70	13
9. metolachlor + metribuzin		2.0 + 0.5	Late Pre	286	32.2	19	30	35	64	17
10. metribuzin		0.12	Post	268	30.1	18	29	34	62	19
11. metribuzin		0.25	Post	276	31.0	19	33	30	63	18
12. metribuzin		0.5	Post	273	30.6	16	36	31	66	18
13. metribuzin		1.0	Post	248	27.9	22	33	24	57	21
14. metribuzin		2.0	Post	185	20.8	34	25	14	38	27
15. metolachlor		2.0	Post	272	30.5	19	35	31	66	15
16. metolachlor + metribuzin		2.0 + 0.5	Post	273	30.6	21	33	29	62	18
LSD (0.05)				34	3.8	6	7	10	10	7
CV				9	9	20	15	22	11	26

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This table was compiled from approved nomenclature adopted by the Weed Science Society of America (Weed Science 26 (6):1978) and the Herbicide handbook of the WSSA (5th edition). "Page" refers to the page where a report about the herbicide begins; actual mention may be on a following page. A herbicide name occupying two or more lines and separated by an equal (=) sign is written as one word when written on one line.

ABBREVIATIONS USED IN THIS REPORT

A	....	acre(s)
A"	....	acre inch
a	....	acre
AB	....	annual bluegrass (Poa annua L.)
a.e.	....	acid equivalent
ai	....	active ingredient
a.i.	....	active ingredient
a.i./A	....	active ingredient(s) per acre
AMARE	....	pigweed, redroot
AMS	....	ammonium sulfate
AREHO	....	Arenaria hookeril Hook.
ARFMI	....	burdock, common (Arctium minus (Hill) Bernh.
ARTFR	....	Artemisia frigida Willd.
ASTSP	....	Astragalus spatulatus
AVEFA	....	oat, wild
AUD	....	animal unit days
BROCA	....	Bromus carinatus (brome, California)
BROTE	....	downy brome
bu/A	....	bushels per acre
BYG	....	barnyardgrass
Bygr	....	barnyardgrass
C	....	degree Centigrade or Celsius
CAPBP	....	shepherdspurse (Capsella bursa-pastoris (L.)Medic.
CDS	....	controlled droplet size
CEC	....	cation exchange capacity
C.E.C.	....	cation exchange capacity
CHEAL	....	Chenopodium album
CHRVI	....	Chrysothamnus viscidiflorus (Hook.) Nutt.
C.I.	....	confidence interval
CIRAR	....	Cirsium arvense (thistle, Canada)
cm	....	centimeter
COBTE	....	mustard, blue (Chorispora tennela DC.
COC	....	crop oil concentrate
CONAR	....	bindweed, field
CRYCA	....	Cryptantha caespitosa
CRYCE	....	Cryptantha celiodes
C.V.	....	coefficient of variation
CW	....	chickweed, common (Stellaria media (L.) Vill.)
cwt/A	....	hundred weitht(s) per acre
DAT	....	days after treatment
DESPI	....	mustard, tansy (Descurainia pinnata (Walt.)Britt.
DF	....	dry flowable
DMA	....	dimethylamine
Dobr	....	downy brome
E	....	ester (butoxyethyl)
EC	....	emulsifiable concentrate
ECHCG	....	barnyardgrass
encap	....	encapsulated

ABBREVIATIONS USED IN THIS REPORT (Cont'd)

EPost .... early postemergence
ERIOV .... Eriogonum ovilifolium
F .... degrees Fahrenheit
fl .... fluid
FRSTO .... bursage, skeletonleaf
ft .... feet
ft^2 .... square feet
Fxtl .... foxtail spp.
g .... grams and gravity
G .... granular
gal/A .... gallon(s) per acre
GPA .... gallons per acre
gpa .... gallons per acre
g/l .... grams per liter
GR .... granular
Grft .... green foxtail
GUESA .... Gutierrezia sarothrae (Pursh) Britt.
h .... hour
ha .... hectare
HAPAC .... Haplopappus acaulis
HAPNU .... Haplopappus Nuttalli Nutt.
HELAN .... sunflower, common (Helianthus annuus L.
hr .... hour
HRS/A .... hours per acre
In .... inch
in .... inches
ins .... inches
kBg .... kilobecquerel
KCHSC .... kochia
kg .... kilogram(s)
kg/h .... kilogram(s) per hectare
kg/ha .... kilogram(s) per hectare
kg ai/ha .... kilogram(s) active ingredient per hectare
Kocz .... kochia
KOHSC .... kochia (Kochia scoparia (L.) Schrad.
kPa .... kilo pascal
l .... liter(s)
L/ha .... liters per hectare
LB/A .... pounds per acre
lb/A .... pound(s) per acre
lb/Ac .... pounds per acre
lb/A ai .... pounds per acre active ingredient
lb ai/A .... pound(s) active ingredient per acre
lb/bu .... pound(s) per bushel
lb(s) .... pound(s)
lf .... leaf
L.P. .... low pressure
LSD .... least significant difference
LVE .... low volatile ester
m .... meter(s)

ABBREVIATIONS USED IN THIS REPORT (Cont'd)

m^2	meter square
meq	milliequivalents
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
ml/l	milliliters per liter
mm	millimeters
mo	month(s)
MOPNU	povertyweed
mph	miles per hour
MT	micro tech formulation
28%N	28% (w/w) Nitrogen
no./plt	number per plant
NS	non significant
ns	non significant
n.s.	non significant
OC	oil concentrate
oz	ounce(s)
oz ai/A	ounce(s) active ingredient per acre
P	phytotoxicity or phosphorus
PANMI	millet, proso wild
PE	preemergence
pe	preemergence
PES	post-plant preemergence
pes	preemergence surface
PH	pre-harrow
PHLHO	*Phlox hoodii*
PHYIX	*Physalis ixocarpa*
phyto	phytotoxicity
Plants/ft^2	plants per square foot
PM	package mix
POATR	*Poa trivialis*
POLAV	knotweed, prostrate
POLCO	buckwheat, wild
PoPI	post plant incorporated
Post	postemergence
ppbw	parts per billion weight
PPI	preplant incorporated
ppm	parts per million
ppmw	parts per million weight
PRNCE	cherry, sour (*Prunus cerasus* L.
Prpw	pigweed, prostrate
PSI	pounds per square inch
psi	pounds per square inch
Puvi	puncturevine
RH	relative humidity
Rrpw	pigweed, redroot
Ruth	Russian thistle
S	active ingredient of solution or surfactant
s	seconds

ABBREVIATIONS USED IN THIS REPORT (Cont'd)

SASKR .... thistle, Russian (Salsola Kali: L. var. tenuifolia Tausch
Setlu .... foxtail, yellow
SETVI .... foxtail, green
sf .... surfactants
Shpu .... shepherdspurse
SINAR .... mustard, wild
sl .... sandy loam
SOLSA .... nightshade, hairy
SOLTR .... nightshade, cutleaf
SONOL .... sowthistle, annual (Sonchus oleraceus L.)
sq.ft .... square feet
SSYAL .... mustard, tumble (Sisymbrium altissimum L.)
Tamu .... mustard, tansy
TAROF .... dandelion, common (Taraxacum officinale Weber)
T/A .... tons/acre
t/ha .... (metric) tons per hectare
TROPS .... salsify, common (Tragopogon porrifolius L.)
TRZAX .... volunteer wheat
UCCGC .... yucca, Great Plains
uE/m^2 .... microeinstein(s) per square meter
uq .... microgram
ul .... microliter(s)
V .... vigor
v/v .... volume by volume
var. .... variety
VERHE .... Veronica hederifolia L.
Vowh .... volunteer wheat
VOBLY .... barley, volunteer
VOWHT .... wheat, volunteer
wdg .... water dispersible granule
wk .... week
ws .... water soluble
WSWS .... Western Society of Weed Science
wt .... weight
Wts .... weights
w/v .... weight per volume
w/w .... weight per weight
Yeft .... yellow foxtail
% .... percent
%G .... percent active ingredient of ganular formulation
.... number