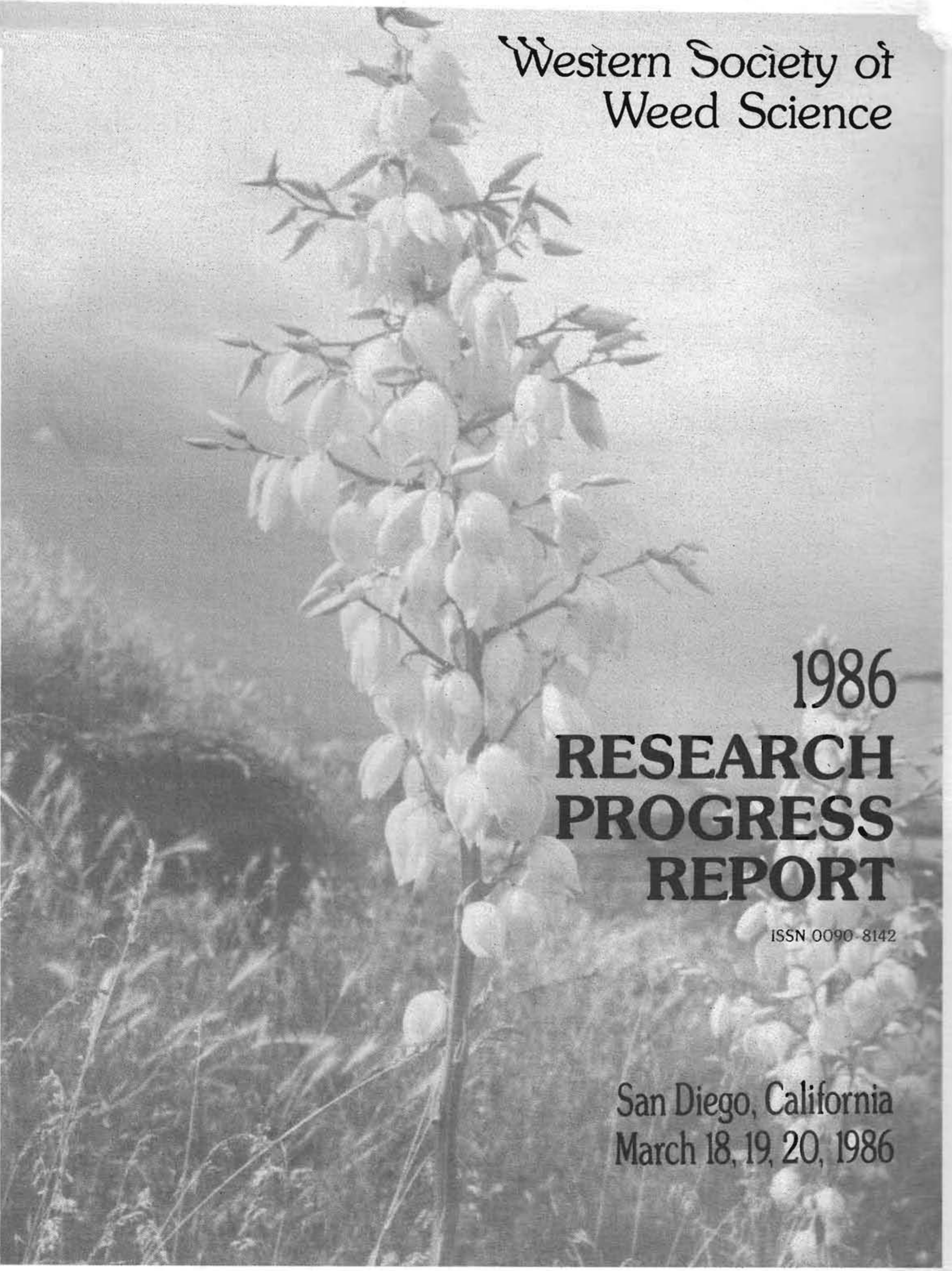

Western Society of Weed Science

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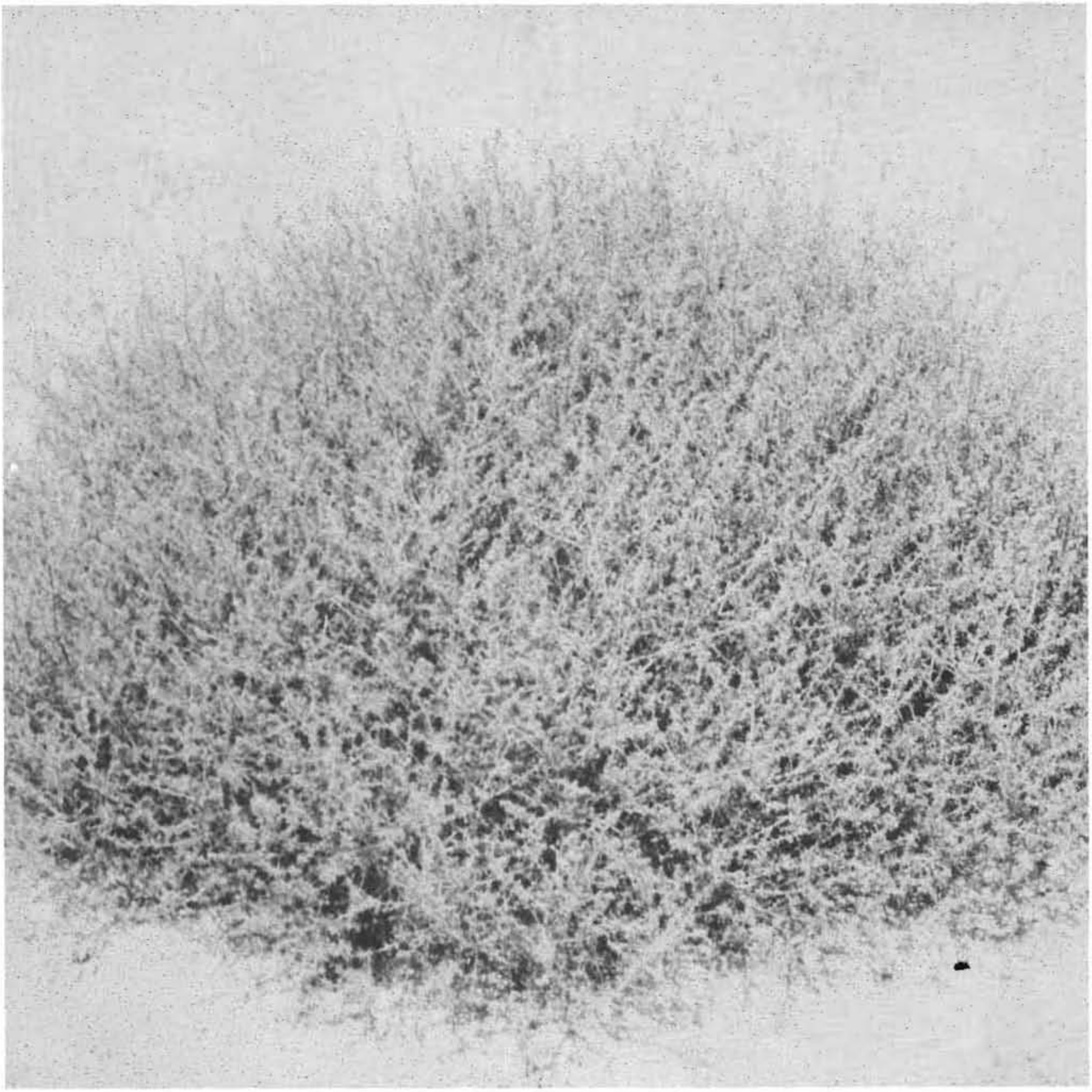

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FOREWORD

The Western Society of Weed Science (WSWS) 1986 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 In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION.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 1986 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.

Ralph E. Whitesides
Chairman, Research Section
Western Society of Weed Science
1986

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PROJECT 1.

PERENNIAL HERBACEOUS WEEDS

Galen L. Schroeder - Project Chairman

<u>Dikegulac in combination with 2,4-D and picloram for leafy spurge control</u>. Lym, Rodney G. and C. G. Messersmith. Previous studies have shown dikegulac (the sodium salt of dikegulac, tradename Atrinal by Maag Agrochemicals, Vero Beach, Florida) to be synergistic with 2,4-D and picloram for leafy spurge control. Dikegulac causes temporary inhibition of plant growth, reduction or elimination of flowering and promotion of axillary plant growth. Leafy spurge response to dikegulac decreases as the plant matures. The purpose of these experiments was to evaluate the synergism of dikegulac with picloram or 2,4-D in the field both as a tank-mix and split application.

The experiments were established at Lisbon, ND in an unused quarry with a heavy infestation of leafy spurge. The first two experiments were established on 26 May 1982 when the leafy spurge was in the yellow bract growth stage and before true flower initiation. The plots were 10 by 30 ft, and treatments were replicated four times in a randomized complete block design. The treatments were applied in 8.5 gpa at 35 psi. Evaluations were based on visual percent stand reduction as compared to the control.

Dikegulac at 0.5, 1.0 and 2.0 lb/A was applied alone and tank-mixed with picloram at 1.0 or 2.0 lb/A and 2,4-D at 2.0 lb/A in the first experiment. Leafy spurge plants treated with dikegulac alone at one month after application were stunted and had many axillary branches, and most flowers had been aborted. In general, the number of axillary branches increased as the dikegulac rate increased. By the end of the growing season, plants treated with dikegulac at 2 lb/A still had many axillary branches but plants treated at the lower rates had resumed normal growth. Leafy spurge control was increased when picloram at 1.0 lb/A was applied with dikegulac (Table 1). Leafy spurge control was 19 and 26% at 15 and 29 months following application of picloram at 1.0 lb/A, respectively, but was 73 and 61%, respectively, when averaged across the tank mixtures of dikegulac at 0.5, 1.0, or 2.0 lb/A. Dikegulac tank-mixed with picloram at 2.0 lb/A or 2,4-D did not increase leafy spurge control compared to the herbicides applied alone.

Dikegulac was applied as a tank mix or split treatment with picloram and 2,4-D in the second experiment. Dikegulac alone at 0.5 and 1.0 lb/A was applied on 26 May 1983. Picloram or 2,4-D at 1.0 lb/A were applied on 30 June 1983, as a split treatment alone or as a tank mix treatment with dikegulac. The leafy spurge was in the true flower growth stage and beginning seed set. Dikegulac had no observable effect on leafy spurge when applied on 26 May 1983. However, leafy spurge control with picloram at 1.0 lb/A increased slightly when dikegulac was used as a pretreatment or a tank mix compared to picloram applied alone (Table 2). Leafy spurge control with 2,4-D was not affected by dikegulac.

The third experiment was similar to the second experiment with dikegulac alone applied on 7 September 1982 and 2,4-D or picloram applied on 4 October 1982 either alone for the split treatments or tank mixed with dikegulac. Leafy spurge was under moisture stress on 7 September, and the plants were red and yellow with slight frost damage by 4 October. Dikegulac alone did not affect leafy spurge growth or control with picloram and 2,4-D when applied as a fall treatment to mature plants (Table 3).

Dikegulac had plant growth regulator activity on leafy spurge only early in the growing season. Thus, an experiment was begun in 1984 in a pasture near Hunter, ND, to evaluate various combination treatments of picloram and dikegulac applied early in the growing season for leafy spurge control. Treatments were applied either on 10 May when leafy spurge was 4 to 6 inches tall and in the vegetative growth stage, or on 22 May when the plants were 12 to 14 inches tall with yellow bracts but not yet flowering. The experimental design and application methods were similar to those previously described.

Leafy spurge control following early spring application of picloram plus dikegulac was inconsistent (Table 4). Leafy spurge plants treated with dikegulac alone in 1984 were less stunted and had fewer axillary branches compared to similar treatments in 1982. Leafy spurge control tended to increase when dikegulac was applied with picloram at 0.5 lb/A compared to picloram alone. However, control was similar or tended to decline when dikegulac was applied with picloram at 0.75 or 1.0 lb/A.

Although there is a tendency for leafy spurge control to be improved from low rates of picloram plus dikegulac compared to picloram alone, this increase is not as great as when 2,4-D is added to picloram. Also, 2,4-D is more economical than dikegulac as a combination treatment with picloram for leafy spurge control. (Cooperative investigation Dep. of Agron. and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table 1. Leafy spurge control by 2,4-D or picloram applied alone or with dikegulac on 26 May 1982 near Lisbon, ND.

		Control			
		1983		1984	
Treatment	Rate	1 June	22 August	5 June	5 October
	(lb/A)	(%)			
Dikegulac + picloram	0.5+1.0	92	70	64	60
Dikegulac + picloram	0.5+2.0	100	90	68	63
Dikegulac + picloram	1.0+1.0	91	60	76	61
Dikegulac + picloram	1.0+2.0	100	83	87	85
Dikegulac + picloram	2.0+1.0	96	68	78	73
Dikegulac + picloram	2.0+2.0	99	94	90	89
Dikegulac + 2,4-D	0.5+2.0	15	3	3	3
Dikegulac + 2,4-D	1.0+2.0	15	3	0	0
Dikegulac + 2,4-D	2.0+2.0	2	0	0	0
Dikegulac	0.5	1	0	0	0
Dikegulac	1.0	0	0	0	0
Dikegulac	2.0	2	0	0	0
Picloram	1.0	90	19	27	26
Picloram	2.0	96	98	72	75
2,4-D	2.0	12	0	0	0
LSD (0.05)		13	15	21	23

Table 2. Leafy spurge control by 2,4-D or picloram applied with dikegulac as a pretreatment or tank mix near Lisbon, ND.

		1982	Control	
		Application	1983	1982
Treatment	Rate	date	1 June	22 August
	(lb/A)		(%)	
Dikegulac	0.5	30 June	0	0
Dikegulac	1.0	30 June	7	0
Picloram	1.0	30 June	90	9
2,4-D	1.0	30 June	14	0
Dikegulac+picloram (split)	0.5+1.0	26 May/30 June	94	19
Dikegulac+picloram (split)	1.0+1.0	26 May/30 June	92	16
Dikegulac+picloram (tank mix)	0.5+1.0	30 June	95	18
Dikegulac+picloram (tank mix)	1.0+1.0	30 June	82	9
Dikegulac+2,4-D (split)	0.5+1.0	26 May/30 June	4	0
Dikegulac+2,4-D (split)	1.0+1.0	26 May/30 June	4	0
Dikegulac+2,4-D (tank mix)	0.5+1.0	30 June	1	0
Dikegulac+2,4-D (tank mix)	1.0+1.0	30 June	9	0
LSD (0.05)			14	10

Table 3. Leafy spurge control by 2,4-D or picloram applied with dikegulac as a pretreatment or tank mix near Lisbon, ND.

Treatment	Rate	1982 Application date	Control	
			1 June 1983	22 August 1983
	(lb/A)		(%)	
Dikegulac+picloram (tank mix)	0.5+1.0	7 Sept	72	1
Dikegulac+picloram (tank mix)	1.0+1.0	7 Sept	52	4
Dikegulac+picloram (split)	0.5+1.0	7 Sept/4 Oct	47	0
Dikegulac+picloram (split)	1.0+1.0	7 Sept/4 Oct	64	8
Dikegulac+2,4-D (tank mix)	0.5+2.0	7 Sept	2	0
Dikegulac+2,4-D (tank mix)	1.0+2.0	7 Sept	2	0
2,4-D	2.0	7 Sept	4	0
Picloram	1.0	7 Sept	57	8
LSD (0.05)			20	3

Table 4. Leafy spurge control by picloram and dikegulac tank mix treatments applied near Hunter, ND.

Treatment	Rate	Application date/control			
		10 May 84		22 May 84	
		Aug 1984	May 1985	Aug 1984	May 1985
	(lb/A)	(%)			
Dikegulac	0.25	0	0	1	0
Dikegulac	0.5	1	0	1	0
Dikegulac	1.0	1	2	0	0
Picloram	0.5	16	4	38	14
Picloram	0.75	53	7	31	49
Picloram	1.0	69	68	56	75
Dikegulac+picloram	0.25+0.5	32	16	38	28
Dikegulac+picloram	0.25+0.75	37	1	70	36
Dikegulac+picloram	0.25+1.0	43	0	81	36
Dikegulac+picloram	0.5+0.5	55	18	37	18
Dikegulac+picloram	0.5+0.75	51	31	55	44
Dikegulac+picloram	0.5+1.0	80	67	60	69
Dikegulac+picloram	1.0+0.5	24	5	24	1
Dikegulac+picloram	1.0+0.75	24	6	30	35
Dikegulac+picloram	1.0+1.0	50	36	48	43
LSD (0.05)		34	28	35	35

Russian and spotted knapweed control by several herbicides in North Dakota. Lym, Rodney G. and Calvin G. Messersmith. Several experiments were established statewide in 1984 and 1985 to evaluate various herbicides for control of Russian and spotted knapweed. All experiments were in a randomized complete block design with four replications and 10 by 30 ft plots. The herbicides were applied using a tractor-mounted sprayer at 8.5 gpa and 35 psi. Evaluations were based on visual percent stand reduction as compared to the control.

The Russian knapweed control experiments were established near Williston, ND, on 30 June 1984 on an old mining site with a well established infestation. The plants were 18 to 24 inches tall, in the bud growth stage and growing under drought conditions. Clopyralid at 1 and 2 lb/A, dicamba at 4 lb/A and picloram at 1 lb/A all gave 100% Russian knapweed control 12 months following application in the first experiment (Table). Picloram at 0.25 lb/A gave only 68% Russian knapweed control, but provided 93% control when combined with 2,4-D at 1 lb/A. Glyphosate did not provide satisfactory control. The second experiment compared triclopyr and clopyralid alone and combined with 2,4-D for Russian knapweed control. Triclopyr at 2 lb/A gave 82% control and control was not increased with the addition of 2,4-D. Russian knapweed control with relatively low rates of clopyralid was inconsistent. Clopyralid at 0.125 and 0.25 lb/A provided 61 and 19% control, respectively. Low rates of picloram and clopyralid combined with 2,4-D gave good Russian knapweed control in the third experiment. All treatments resulted in 84% or better Russian knapweed control except picloram plus 2,4-D at 0.125 + 1 lb/A which provided only 34% control.

Spotted knapweed control experiments were established at Marmarth and Pekin in western and eastern North Dakota, respectively. The first experiment at Marmarth was begun on 13 September 1984 when the plants were in the rosette growth stage, and the second experiment was established on 20 June 1985 with the plants 6 to 37 inches tall and in the bud growth stage. The experiment at Pekin was established on 11 July 1985 when the plants were 3 to 4 feet tall and beginning to flower. Clopyralid at 0.5 and 1 lb/A, dicamba at 2 lb/A, picloram at 1 lb/A and picloram plus 2,4-D at 0.25 + 1 lb/A provided excellent initial spotted knapweed control. There was a general increase in control for the fall applied treatments at 12 months compared to 9 months following application. Dicamba and glyphosate at 1 lb/A did not provide satisfactory spotted knapweed control. Spotted knapweed control with fluroxypyr was inconsistent when evaluated 1 to 3 months after application. In general, relatively low rates of clopyralid, dicamba and picloram alone or combined with 2,4-D provided excellent Russian and spotted knapweed control. 2,4-D, glyphosate and triclopyr either provided unacceptable knapweed control or application rates for satisfactory control were uneconomical. (Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table. Russian and spotted knapweed control from various herbicides at several locations in North Dakota.

Treatment	Rate	Russian knapweed/Williston 6 June 1985			Spotted knapweed/site/evaluation date			
					Marmarth (13 Sept 84)		Marmarth (20 June 85)	Pekin (11 July 85)
		Exp. 1	Exp. 2	Exp. 3	5 June 85	19 Sept 85	19 Sept 85	26 Aug 85
	(lb/A)	(%)						
2,4-D	1.0	5	...	...	0	15	...	...
2,4-D	2.0	0	...	...	...	...	...	...
2,4-D	4.0	0	...	...	...	...	...	...
2,4-DB	2.0	0	...	...	...	...	...	...
Picloram	0.25	68	...	...	46	80	55	64
Picloram	0.5	...	...	...	...	...	78	92
Picloram	1.0	100	...	...	99	98	...	...
Picloram+2,4-D	0.125+1.0	...	...	34	...	...	...	...
Picloram+2,4-D	0.188+1.0	...	...	86	...	...	...	...
Picloram+2,4-D	0.25+1.0	93	...	...	69	100	94	86
Picloram+2,4-D	0.5+1.0	97	...	91	...	...	...	...
Dicamba	1.0	...	...	...	41	79	...	...
Dicamba	2.0	43	...	...	86	100	100	99
Dicamba	4.0	100	...	...	...	...	...	...
Triclopyr	1.0	...	54	...	...	...	...	...
Triclopyr	2.0	...	82	...	...	...	...	...
Triclopyr+2,4-D	1.0+1.0	...	28	...	...	...	...	...
Triclopyr+2,4-D	2.0+1.0	...	70	...	...	...	...	...
Glyphosate	1.0	61	...	...	3	23	50	83
Glyphosate	3.0	74	...	...	...	...	...	...
Clopyralid	0.125	...	61	...	...	...	...	...
Clopyralid	0.188	...	38	...	...	...	...	...
Clopyralid	0.25	91	19	...	43	70	...	...
Clopyralid	0.5	...	...	...	...	...	99	95
Clopyralid	1.0	100	...	...	90	100	...	...
Clopyralid	2.0	100	...	...	...	...	...	...
Clopyralid+2,4-D	0.125+0.5	...	45	...	...	...	...	...
Clopyralid+2,4-D	0.2+0.8	...	59	...	...	...	...	...
Clopyralid+2,4-D	0.25+1.0	...	83	84	...	...	93	99
Clopyralid+2,4-D	0.5+1.0	...	...	96	...	...	...	...
Fluroxypyr	1.0	...	...	...	...	...	99	68
LSD (0.05)		41	43	19	30	41	33	9

Absinth wormwood control with clopyralid and picloram. Lym, Rodney G. and C. G. Messersmith. Absinth wormwood (*Artemisia absinthium* L.) is a perennial forb that regrows from a root crown each year. The plant causes economic losses by reducing available forage, tainting the milk of cattle that graze it, and medically as a pollen source for allergies and asthma. The plant is most often found on dry soils, in overgrazed pasture and rangeland, wastelands and roadsides. The purpose of this research was to evaluate low rates of clopyralid and picloram for absinth wormwood control.

The experiment was established near Enderlin, ND, on 18 June 1984. The herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The plots were 10 by 30 ft in a randomized complete block design with four replications. The plants were 4 to 20 inches tall and in the bud growth stage. Evaluations are based on a visual evaluation of percent stand reduction as compared to the control.

		Control/evaluation date		
		1984	1985	
Treatment	Rate	20 August	29 May	20 August
	(lb/A)	----------------(%)-------------		
Clopyralid	0.125	33	69	69
Clopyralid	0.1875	48	92	88
Clopyralid	0.25	73	99	95
Clopyralid+2,4-D	0.125+0.5	75	97	96
Clopyralid+2,4-D	0.1875+0.75	87	99	97
Clopyralid+2,4-D	0.25+1.0	84	100	92
Picloram	0.125	83	92	84
Picloram	0.1875	66	97	96
Picloram	0.25	90	100	95
LSD (0.05)		26	12	17

Absinth wormwood control was higher when evaluated 12 and 15 months following application than after 3 months regardless of treatment. Previous research at North Dakota State University has shown that absinth wormwood is controlled by relatively low rates of dicamba and picloram but the plant dies very slowly. Picloram and clopyralid at 0.25 lb/A both provided 85% absinth wormwood control in August 1985 but picloram provided better control than clopyralid when applied at 0.125 and 0.1875 lb/A. Clopyralid + 2,4-D at 0.125 + 0.5 lb/A or 0.1875 + 0.75 lb/A tended to provide better control than clopyralid alone, and was similar to clopyralid or picloram at 0.25 lb/A alone. (Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Mowing as a pretreatment for leafy spurge control with herbicides. Lym, Rodney G. and C. G. Messersmith. Previous research has shown that annual mowing of leafy spurge tends to increase forage production and delay leafy spurge maturity. Leafy spurge mowed in mid-summer begins vigorous regrowth and may start to flower and set seed in the fall, whereas unmowed plants generally have leafless mature stems with 4 to 6 inch branches of new growth near the tip. Two experiments were established to evaluate mowing as a pretreatment to fall herbicide application for leafy spurge control in a pasture near Sheldon, ND. Leafy spurge was mowed on 2 August 1983 and picloram at 1.0 lb/A or 2,4-D at 2.0 lb/A were applied on 11 August, 18 August or 6 September 1983 in the first experiment. The leafy spurge was dormant prior to mowing, but regrowth ranged from 2 to 3 inches tall on 11 August to flowering and 20 to 26 inches tall on 6 September. Leafy spurge was mowed on 2 August, 18 August or 6 September 1983 with all herbicide treatments applied on 22 September 1983 in the second experiment. Leafy spurge ranged from 24 inches tall, flowering and beginning seed set in plots mowed on 2 August to only 2 inches tall with few stems in plots mowed on 6 September. The plots were mowed with a rotary mower and 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. Air temperature was 84, 82, 71 and 46 F when herbicides were applied on 11 August, 18 August, 6 September and 22 September, respectively. Evaluations are based on visual estimate of percent stand reduction as compared to the control.

Leafy spurge control with picloram applied 16 and 35 days after mowing was similar to control of unmowed plants in Experiment 1 (Table). However, control 9 months after application was only 42% when picloram was applied 9 days after mowing, probably due to the limited leafy spurge regrowth for foliar absorption of picloram. Leafy spurge control with 2,4-D was 31 and 29% when applied to unmowed plants or 35 days after mowing, respectively. Control was only 3 and 6% when 2,4-D was applied 9 and 16 days after mowing, respectively. Mowing did not affect leafy spurge control one year after treatment.

Leafy spurge control with picloram in the second experiment was similar regardless of mowing date or no mowing at 9 months following application. However, 15 months after treatment control was 60 and 55% when picloram at 1.0 lb/A was applied 51 days after mowing or on unmowed plants, respectively, but only 13 and 25% when application was made 35 and 16 days after mowing, respectively. Leafy spurge control with 2,4-D increased to 33 and 14% when applied 51 days after mowing compared to 10 and 6% with no mowing when evaluated 9 and 12 months after application, respectively. No other mowing date affected leafy spurge control with 2,4-D. Mowing alone tended to decrease leafy spurge density slightly with all mowing dates during the first year of the experiment. In general, leafy spurge control was not improved by a mowing pretreatment regardless of the mowing or herbicide application date and tended to decline if herbicides were applied earlier than 35 days after mowing. (Cooperative investigation Dep. of Agron. and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table. Leafy spurge control with picloram and 2,4-D applied on several dates in 1983 following mowing as a pretreatment.

Treatment	Rate	Days after mowing	Control 1984 June	Control 1984 August	Control 1985 June
	(lb/A)		-----------(%)--------		
Experiment 1 (mowed 2 Aug 83)					
Mow + picloram (11 Aug)	1.0	9	42	6	8
Mow + 2,4-D (11 Aug)	2.0	9	3	5	2
Mow + picloram (18 Aug)	1.0	16	94	27	28
Mow + 2,4-D (18 Aug)	2.0	16	6	8	1
Mow + picloram (6 Sept)	1.0	35	88	25	20
Mow + 2,4-D (6 Sept)	2.0	35	29	6	2
Picloram (6 Sept)	1.0	..	97	30	13
2,4-D (6 Sept)	2.0	..	31	3	0
Mow only	...	..	7	0	0
LSD (0.05)			23	12	11
Experiment 2 (treated 22 Sept 83)					
Mow (2 Aug) + picloram	1.0	51	96	22	60
Mow (2 Aug) + 2,4-D	2.0	51	33	14	10
Mow (18 Aug) + picloram	1.0	35	91	30	13
Mow (18 Aug) + 2,4-D	2.0	35	18	2	0
Mow (6 Sept) + picloram	1.0	16	94	17	25
Mow (6 Sept) + 2,4-D	2.0	16	1	0	0
Mow (2 Aug 83)	...	..	5	2	3
Mow (18 Aug 83)	...	..	5	5	0
Mow (6 Sept 83)	...	..	3	4	3
Picloram	1.0	..	99	21	55
2,4-D	2.0	..	10	6	0
LSD (0.05)			16	8	18

German ivy control in the coastal sage scrub regions of southern California. CUDNEY, D. W. and D. Hodel. German ivy is an escaped perennial ornamental plant which is replacing natural species in the coastal sage scrub communities of southern California. It is well-adapted to the rainfall and temperature regimes which occur in this community. It can completely overgrow and crowd out the native species. Due to its shallow root system, german ivy can create serious soil erosion problems on the hillsides of this region. A trial was established to evaluate the weed control performance of five herbicides on this pest. One month after the winter application, glyphosate, oxyfluorfen, and triclopyr gave the best initial control. Four months after application, seedlings were beginning to emerge in the treated plots, triclopyr and the combination of glyphosate plus a soil residual application of simazine were showing a trend toward superior control. (University of California Cooperative Extension, Riverside, CA 92521)

German ivy control in the coastal sage scrub regions of southern California

Treatment	lbs. ai/A	1/31 Cover of german ivy	4/5 Control ratings	4/5 Number of seedlings
glyphosate	4	0.00	9.75	8.25
dicamba	1	2.50	10.00	11.75
2,4-D	1	12.00	9.25	8.75
oxyfluorfen	1	1.50	9.25	12.50
tryclopyr	1	1.75	9.00	4.50
glyphosate + simazine	4 + 2	0.00	10.00	2.00
Check		65.00	0.00	15.00
L.S.D.	.05	14.89	1.00	NS

Average of four replications.

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 visually evaluated July 17, 1985. All treatments reduced the field bindweed infestation 53 to 88 percent. 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. Control provided by picloram alone was less than provided by 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.

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

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

[1]Herbicides applied June 6, 1984.

[2]Visual evaluations July 17, 1985.

Response of common bermudagrass to one, two, and four applications of fluazifop-butyl and sethoxydim. Chernicky, J. P. and K. C. Hamilton. The response of common bermudagrass to fluazifop-butyl and sethoxydim applied as a single 0.5 lb/A application, two 0.25 lb/A applications, or four 0.125 lb/A applications was determined at Tucson, AZ. In the spring of 1983, 96 plants of bermudagrass spaced 10 to 15 feet were established by planting rhizome segments from a single parent plant. Seed heads were removed by mowing. Each year 1 lb/A of simazine and 0.75 lb/A of trifluralin were applied to control annual weeds. Irrigation was similar to that given cotton. Each plot contained four plants and treatments were replicated four times. Individual bermudagrass plants covered 150 sq. ft. when treatments started in May of 1985. Herbicides were applied in 25 gpa of water with 1 qt/A of crop oil. The single application was on May 7, split applications were on May 7 and 8, and the four applications were on May 6, 7, 8, and 9. On June 18 the amount of green topgrowth was determined for each plant.

All herbicide treatments killed topgrowth of bermudagrass within 3 weeks. There was no difference in rates of topkill due to herbicide or number of applications. There was regrowth on all plants by the fourth week after treatment.

Six weeks after treatment there was more regrowth on plants treated with sethoxydim (See Table). Applying 0.5 lb/A of fluazifop-butyl or sethoxydim in one, two, or four treatments in a 4-day period did not alter bermudagrass control. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Number of bermudagrass plants with regrowth and area covered by live plants after applications of fluazifop-butyl and sethoxydim.

Treatment			Plant number with regrowth	Plant size sq. ft.
Herbicide	lb/A	dates	June 18	June 18
fluazifop-butyl	0.5	5/7	16	53
fluazifop-butyl	0.25	5/7 and 8	16	56
fluazifop-butyl	0.125	5/6, 7, 8, & 9	16	39
sethoxydim	0.5	5/7	16	104
sethoxydim	0.25	5/7 and 8	16	110
sethoxydim	0.125	5/6, 7, 8, & 9	16	90

PROJECT 2.

HERBACEOUS WEEDS OF RANGE AND FOREST

Mark A. Ferrell - Project Chairman

Evaluation of herbicides for control of creeping buttercup (*Ranunculus repens* L.) in pastures. Whitson, T.D., Dave Humphrey, P.S. Friedrichsen, Ken French, and R.C. Hinman. Past studies for the control of creeping buttercup have been limited. A field study was conducted to evaluate the effect of several herbicides for selective control in perennial grass pastures with understory of ladino clover. The experiment was established May 4, 1985 in Josephine County, Oregon on a Kerby loam soil with a 6.4 pH. The plots were 10 ft by 27 ft and were arranged as a complete block design with four replications. The herbicides were applied with a 10 ft hand-held boom at a pressure of 45 lb PSI. Forty gallons of water were applied per acre. Creeping buttercup was in the early bloom stage at time of the herbicide application.

Crop tolerance and herbicide efficacy were taken as visual estimates six weeks after application. Herbicides showing good control of creeping buttercup were: DPX-T6376 at 0.18, and 0.7 oz ai/A, dicamba at 0.5 lb ai/A, 2,4-D (LVE) at 1.5 dicamba + 2,4-D at 0.5 + 1.5 lb ae/A, triclopyr + 2,4-D at 0.25 + 0.5 lb ae/A, DPX-T6376 + bromoxynil at 0.18 oz ai/A + 0.5 lb ai/A, DPX-T6376 + dicamba at 0.18 oz + 0.5 lb ae/A. Damage to ladino clover was extensive in all of the treated areas except those areas treated with 2,4-D LVE at 1.5 lb ae/A, 2,4-D (amine) at 3.0 lb ae/A and MCPA (ester) at 1.5 lb ae/A. Evaluations will be taken again in 1986 to determine long term control of creeping buttercup and ladino clover damage. (Crop Science Dept., and Oregon Dept. of Ag., Oregon State University, Corvallis, OR 97331)

Creeping buttercup control in pasture

Herbicide	Application[2] Rate	% Ladino[1] clover Damage	% Creeping buttercup Control
clopyralid (Dowco 290)	0.25 lb ai/A	98	31
clopyralid (Dowco 290)	0.5 lb ai/A	100	21
fluroxypyr (Dowco 433)	0.25 lb ai/A	89	18
fluroxypyr (Dowco 433)	1.0 lb ai/A	100	28
DPX-T6376	0.18 oz ai/A	100	98
DPX-T6376	0.7 oz ai/A	100	100
dicamba	0.5 lb ae/A	100	85
2,4-D LVE	1.5 lb ae/A	16	99
MCPA (ester)	1.5 lb ae/A	34	94
2,4-D (amine)	3.0 lb ae/A	25	100
triclopyr	0.75 lb ai/A	95	64
picloram	0.25 lb ae/A	93	78
diçamba + 2,4-D	0.5 + 1.5 lb ai/A	100	99
triclopyr + 2,4-D LVE	0.25 + 0.5 lb ai/A	53	86
DPX-T6376 + bromoxynil	0.18 oz ai/A + 0.5 lb ai/A	100	95
DPX-T6376 + dicamba	0.18 oz ai/ + 0.5 lb ae/A	100	96
DPX-T6376 + 2,4-D LVE	0.18 oz ai/A + 0.5 lb ae/A	100	99
Check		0	0

Note: Grass browning was observed for 30 days after all applications of DPX-T6376

[1]Percent clover damage and percent creeping buttercup control were determined by visual estimates on June 12, 1985

[2]Herbicides were applied May 4, 1985

Efficacy of sequential applications of selected herbicides on control, density, and yield of common crupina. Zamora, D. L., D. C. Thill, and R. H. Callihan. A herbicide screening experiment was established near Stites, Idaho to study the effect of broadleaf herbicides for control of common crupina. The first application was made November 8, 1984, with a CO_2 pressurized backpack sprayer calibrated to deliver 93 L/ha at 275 kPa and 1.3 m/s. The air temperature at the soil surface was 7 C and the soil temperature was 6 C at a depth of 8 cm. Common crupina was in the cotyledon to four leaf stage. The second application was made on February 27, 1985, in the same manner as the first application. The air temperature at the soil surface was 12 C and 11 C at a depth of 8 cm. The plants were in the cotyledon to six leaf stage. The experiment was a randomized complete block design with four replications and plots of 3 by 7.6 m. Common crupina plants were counted November 14, January 23, February 23, and May 15, in permanently established 1.4 m^2 quadrats within each plot. Common crupina plants were clipped at the soil surface from these quadrats May 15, dried for 48 h at 43 C and weighed. Visual evaluations of control were made on February 16 and May 9.

The early evaluation indicated that picloram was the only herbicide that effectively controlled (97%) common crupina with a single fall application. After the second application, all herbicides except chlorsulfuron and DPX-G8311 controlled 97 to 100% of common crupina. Visual estimates (data not presented) of grass injury by these herbicides showed less injury from clopyralid or triclopyr alone than any other treatment (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Effect of sequential applications of herbicides on control, density, and yield of common crupina.

Treatment	Rate	Weed control[1] 2/16	5/9	Density change[2]	Density 5/15/85	Yield
	(kg ai/ha)	(% of check)		(%)	(#/m^2)	(kg/ha)
picloram	0.28	97	100	100	0.0	0
dicamba	0.57	63	100	100	0.0	0
triclopyr	0.57	51	99	100	0.2	18
triclopyr	0.28	27	97	97	9.0	45
triclopyr + 2,4-D amine	0.57 1.12	64	100	100	0.0	0
triclopyr + 2,4-D amine	0.28 1.12	66	100	100	0.0	0
clopyralid	0.21	50	100	100	0.0	0
clopyralid	0.43	56	100	100	0.0	0
clopyralid + 2,4-D amine	0.10 0.43	50	100	100	0.0	0
clopyralid + 2,4-D amine	0.14 0.57	73	100	100	0.0	0
chlorsulfuron + surfactant[3]	0.018 0.5% v/v	54	51	44	61.0	676
DPX-G8311 + surfactant	0.026 0.5% v/v	33	69	76	70.0	333
handweeded check		--	--	99	0.0	0
unweeded check		--	--	29	81.0	666
LSD (0.05)		29	15	10	41.0	267

[1] First application - Nov. 8, 1984; second application - Feb. 27, 1985.
[2] % decrease from pretreatment density to the density on 5/15/85.
[3] Nonionic surfactant (X-77).

Efficacy of spring applied herbicides on control, density, and biomass of common crupina. Zamora, D. L., D. C. Thill, and R. H. Callihan. An experiment was conducted near Winona, Idaho to evaluate common crupina control with a single, spring herbicide application. The single application was made April 8, 1985 with a CO_2 pressurized backpack sprayer calibrated to deliver 93 L/ha at 275 kPa and 1.3 m/s. The temperature at the soil surface and at a depth of 5 cm was 17 C. Common crupina plants were in the four to eight leaf stage. The experiment was a randomized complete block design with four replications and plots of 3 by 10 m. Density measurements and visual estimations of control were made April 3, and July 2, respectively. Density was determined from three permanently established 20 by 50 cm quadrats within each plot. The common crupina plants were clipped at the soil surface from the quadrats July 2, dried at 43 C for 48 h, and weighed.

Treatments that controlled 81 to 100% of common crupina were picloram, clopyralid + MCPA, and dicamba. Treatment with the different formulations of MCPA and the chlorsulfuron plus dicamba at 0.02 + 0.14 kg ai/ha inadequately controlled common crupina. Density change and visual evaluation showed the differences in control between the MCPA treatments and the picloram, dicamba, or clopyralid + MCPA treatments, better than did biomass data.

Treatments were also included in this study to determine the effect of surfactant with picloram, dicamba, and tank mixes of these herbicides on common crupina control. Visual evaluations of control, and density and biomass measurements indicated no enhancement effect. Symptoms of herbicide injury appeared sooner after treatment with surfactant than without surfactant, but by harvest these differences were not evident. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843)

Effect of selected herbicides on control, density, and yield of common crupina.

Treatment	Rate	Control	Density change[1]	Density 7/2/85	Biomass
	(kg ai/ha)	(%)	(%)	(#/m^2)	(kg/ha)
picloram	0.28	99	100	0	0
picloram + sf[2]	0.28	97	99	4	8
dicamba	0.57	99	100	0	0
dicamba + sf	0.57	100	100	0	0
picloram + dicamba	0.28 + 0.57	100	100	7	4
picloram + dicamba	0.28 + 1.12	100	100	0	0
picloram + dicamba + sf	0.28 + 0.57	100	100	0	0
picloram + dicamba + sf	0.28 + 1.12	100	100	0	0
EH 786[3]	2.13	26	50	296	620
EH 786	3.19	67	83	92	279
EH 786	4.26	50	89	73	166
MCPA dimethyl amine	2.13	39	66	265	471
MCPA dimethyl amine	3.19	50	57	185	271
MCPA dimethyl amine	4.26	55	77	158	256
chlorsulfuron + dicamba + sf	0.02 + 0.14	61	80	179	295
chlorsulfuron + dicamba + sf	0.02 + 0.28	81	91	38	59
clopyralid + MCPA ester	0.06 + 0.32	98	99	3	6
clopyralid + MCPA ester	0.09 + 0.48	100	100	0	0
clopyralid + MCPA ester	0.12 + 0.64	100	100	0	0
check		-	24	480	738
LSD (0.05)		24	24	228	341

1 % decrease from pretreatment density to harvest density.
2 sf is nonionic surfactant (X-77) used at 0.5% v/v.
3 75% dimethylamine salt of MCPA plus 25% diethanol amine salt of MCPA.

Evaluation of spring applications of herbicides for control of downy brome. Whitson, T.D., M.A. Ferrell, and H.P. Alley. Downy brome has been controlled on rangeland for periods up to two years with atrazine. This experiment was conducted to evaluate the efficacy of spring applications of herbicides for downy brome control. The experiment was established on rangeland, April 26, 1983 in Johnson County, Wyoming on a sandy loam soil. The soil composition was 76% sand, 9% silt, 15 % clay, 0.8% organic matter with a 7.4 pH. The plots were 9 ft by 30 ft, replicated three times in a randomized complete block design. The herbicides were applied with a hand-held 6-nozzle boom sprayer and a centrifugal granular applicator.

Perennial grass tolerance and downy brome control were evaluated visually on September 9, 1983, July 11, 1984, and September 10, 1985. The only herbicide that controlled downy brome and resulted in modest thinning of perennial grasses was the wetable powder formulation of tebuthiuron applied at 0.5 lb ai/A. The granular formulation of tebuthiuron applied at the 0.5 lb ai/A rate resulted in only 57% control the third year after application with 47% perennial grass damage. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR1393.)

Evaluation of spring applied herbicides
for downy brome control in rangeland

Herbicide[1]	Rate lb ai/A	Percent Control[2] 1983	1984	1985	Perennial grass damage
El 97517	0.125	0	0	0	0
El 97517 + crop oil	0.125	20	0	0	0
El 97517 + crop oil	0.25	53	0	0	0
El 97517 + crop oil	0.25	60	0	0	0
El 97517	0.5	82	0	0	0
El 97517	1.0	100	0	0	0
tebuthiuron 5G	0.25	0	27	40	25
tebuthiuron 5G	0.5	0	43	57	47
tebuthiuron 5G	1.0	50	82	92	91
El 187	0.25	30	0	0	0
El 187	0.5	67	0	0	0
El 187	1.0	94	0	0	17
tebuthiuron 80W	0.25	37	10	0	0
tebuthiuron 80W	0.5	87	98	93	30
tebuthiuron 80W	1.0	100	100	99	97
Check	- -	0	0	0	0

[1]Herbicides were applied April 26, 1983
[2]Visual evaluations were taken Sptember 9, 1983, July 11, 1984, and September 10, 1985

Evaluations of fall applications of herbicides for control of downy brome. Whitson, T.D., M.A. Ferrell, and H.P. Alley. Downy brome has been controlled on rangeland for periods up to two years with atrazine. This experiment was conducted to evaluate the efficacy of fall applications of herbicides for downy brome (*Bromus tectorum* L.) control. The experiment was established on rangeland, November 12, 1982 in Johnson County, Wyoming on a sandy loam soil. The soil composition was 76% sand, 9% silt, 15% clay, 0.8% organic matter with a 7.4 pH. The plots were 9 ft by 30 ft, replicated three times in a randomized complete block design. Herbicides were applied with a hand-held 6-nozzle boom sprayer and a centrifugal granular applicator.

Perennial grass tolerance and downy brome control were evaluated visually on April 26, 1983, July 11, 1984, and September 10, 1985. Tebuthiuron 80W applications above 0.5 lb ai/A controlled downy brome at levels above 90% for three growing seasons. Perennial grasses were moderately tolerant to the 0.5 lb ai/A application rate; however, the 1.0 lb ai/A rate was very damaging to perennial species. Granular formulations were not as effective as the wettable powder for control of downy brome and were more damaging to perennial grasses. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR1394).

Evaluation of fall applied herbicides for downy brome control in rangeland

Herbicide[1]	Application Rate lb ai/A	Percent Control[2] 4/83	7/84	9/85	% Perennial grass damage
chlorsulfuron	1/32	0	0	0	none
chlorsulfuron	1/16	0	0	0	none
chlorsulfuron	1/8	0	0	0	none
tebuthiuron 5G	0.25	42	37	27	13
tebuthiuron 5G	0.5	65	63	70	68
tebuthiuron 5G	1.0	89	100	89	93
tebuthiuron 80W	0.25	60	23	13	3
tebuthiuron 80W	0.5	96	98	93	43
tebuthiuron 80W	1.0	100	100	96	88
El 97517	0.25	86	0	0	0
El 97517	0.5	98	0	0	0
El 97517	1.0	99	0	0	0
Check	- -	0	0	0	0

[1]Herbicides were applied November 12, 1982
[2]Visual control evaluations made April 26, 1983, July 11, 1984, and September 10, 1985

Effect of selected herbicides on eucalyptus. CUDNEY, D. W. and C. L. Elmore. Eucalyptus (Eucalyptus camaldulensis) has been shown to be a valuable plant for biomass production for fuel. Plantations are being established in the western United States for this purpose. This has created a need for information on selective weed control and herbicide tolerance of eucalyptus. A trial was established in the Moreno Valley of southern California, on clay loam soil in April of 1985. Nineteen treatments, consisting of the commonly used preemergence herbicides and combinations of those herbicides together with postemergence grass control herbicides, were evaluated. None of the treatments, at the rates tested, gave significant injury to the eucalyptus nor did they result in a significant reduction in the growth rate. A second application in the fall was made which also resulted in no phytotoxicity symptoms being produced. Under the conditions of this trial all the herbicides used proved to be safe. No weeds were present, thus weed control information was not taken. The weed control capabilities of these materials are well-known. (University of California Cooperative Extension, Riverside, CA 92521).

Effect of selected herbicides on eucalyptus

Treatments	Rates (lb. ai/A)	Phytotoxicity 5/6/85	Pretreatment height in cm 4/24/85	Growth in cm from 4/24/85 to 6/6/85	Growth in cm from 4/24/85 to 10/10/85	†Phytotoxicity 11/14/85
simazine	0.5	0.6	53.5	24.8	80.2	0.5
simazine	1.0	0.7	48.5	19.1	74.6	0.2
oxyfluorfen	1.0	1.0	47.2	24.6	105.5	0.3
oxyfluorfen	2.0	1.3	46.0	19.0	92.6	0.0
oxyfluorfen directed*	1.0	0.7	48.0	21.5	81.0	0.1
oxyfluorfen directed*	2.0	0.9	47.8	18.5	67.6	0.1
oryzalin	4.0	1.7	48.0	21.1	101.5	0.0
oryzalin	8.0	0.9	46.6	22.5	91.4	0.1
oxadiazon	2.0	0.8	46.7	23.5	109.2	0.2
oxadiazon	4.0	0.9	53.1	21.7	86.9	0.2
norflurazon	2.0	1.5	49.8	19.4	107.0	0.1
norflurazon	4.0	1.5	54.5	16.4	73.9	0.2
sethoxydim	0.5	1.2	54.0	17.1	71.8	0.5
sethoxydim	1.0	0.9	55.6	18.4	110.2	0.1
fluazifop	0.5	0.9	50.0	23.1	120.6	0.3
fluazifop	1.0	1.1	45.2	20.4	82.6	0.0
oxyfluorfen + oryzalin	1.0 + 4.0	1.1	56.8	27.2	113.6	0.2
simazine + oxyfluorfen	0.5 + 1.0	1.1	51.7	24.5	105.1	0.2
simazine + oryzalin	0.5 + 4.0	1.1	53.9	27.4	109.4	0.0
Check		1.1	49.7	23.3	99.1	0.3
L.S.D.	.05	NS	NS	NS	NS	

*Treatments substituted with 2 and 4 lbs. ai/A simazine, respectively, on second application.
†Phytotoxicity: 0 = no effect, 10 = all plants dead.

Average of five replications. First application was made April 29, 1985 at planting; second application was made October 10, 1985.

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

Visual shoot control evaluations made June 21, 1985, two years following treatment show a considerable reduction in shoot control since 1984 in all treatments. However, dicamba 10G and dicamba 4DMA + X-77 both at 8.0 lb ai/A were still maintaining 86% shoot control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1387.)

Russian knapweed shoot control

Herbicides	Rate lb ai/A	Percent shoot control 1984	1985	Observations
dicamba 10G	6.0	93	64	moderate grass
dicamba 10G	8.0	100	86	damage
dicamba 4DMA + X-77[1]	4.0	73	42	
dicamba 4DMA + X-77	8.0	100	86	
picloram	0.25	70	25	
dicamba/picloram + X-77	0.5 + 0.25	70	30	
dicamba/picloram + X-77	0.5 + 0.5	92	67	
dicamba/picloram + X-77	1.0 + 0.25	80	35	
dicamba/picloram + X-77	1.0 + 0.5	98	75	
dicamba/2,4-DA + X-77	2.0 + 0.5	75	47	

[1]Treatments applied July 19, 1983, X-77 applied at 0.5% v/v
[2]Visual shoot control evaluations July 17, 1984 and June 21, 1985

Evaluation of various herbicide application times and treatments for control of knapweed spp. Whitson, T.D., Robert Costa, and Steve Campbell. Spotted (*Centaura maculosa* Lam.) and diffuse knapweed (*Centaura diffusa* Lam.) in eleven Oregon counties in 1985. Picloram and 2,4-D LV ester have been recommended for control of these species. An experiment was established in 1984 on mixed populations of spotted and diffuse knapweed to determine the efficacy of several herbicide treatments applied at different times. The experiment was established in 1984 in Morrow County, Oregon. The plots were 10 by 30 ft, replicated three times in a randomized complete block design. Herbicides were applied with a 6 nozzle hand-held boom in 40 gal of water per acre.

Evaluations were based on visual estimates made June 5, 1985. Applications of picloram above 0.25 lb ai/A applied in either spring or fall were effective for control of both species. Dowco 290 applications above 0.5 lb ai/A provided excellent control. Dicamba was a more effective control when applied twice yearly in combination with 2,4-D. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Timing applications for diffuse and spotted knapweed (mixed population) control

Treatment	Rate	Times/Yr	Years	Timing	Ave
picloram	0.25 lbs ae/A	1	1	early spring	96
picloram	0.25 lbs ae/A	1	1,2	early spring	99
picloram	0.25 lbs ae/A	1	1,2,3	early spring	100
picloram	0.25 lbs ae/A	1	1,3	early spring	90
picloram	0.5 lbs ae/A	1	1	early spring	99
picloram	0.25 lbs ae/A	1	1	fall	99
picloram	0.375 lbs ae/A	1	1	fall	100
picloram	0.25 lbs ae/A	1	1	early spring	94
picloram	0.125 lbs ae/A	1	2	early spring	93
Dowco 290	0.25 lbs ai/A	1	1	early spring	77
Dowco 290	0.5 lbs ai/A	1	1	early spring	93
2,4-D	1.0 lb ae/A	1	1,2,3	late May	30
2,4-D/dicamba	1.0 lbs/2 oz/product/A	1	1,2,3	late May	28
2,4-D/dicamba	1.0 lbs/4 oz/product/A	1	1	late May	13
2,4-D/dicamba	1.0 lbs/4 oz/product/A	1	1,2	late May	12
2,4-D/dicamba	1.0 lbs/4 oz/product/A	1	1,2,3	late May	13
2,4-D/dicamba	1.0 lbs/4 oz/product/A	1	1,2,3	mid-April	78
2,4-D/dicamba	1.0 lbs/4 oz/product/A	2	1,2,3	mid-April/mid-June	88
2,4-D/dicamba	1.5 lbs/2 oz ae/A	1	1,2,3	late May	15
2,4-D/dicamba	1.5 lbs/4 oz ae/A	1	1,2,3	late May	27
2,4-D/dicamba	1.0 lbs/16 oz ae/A	1	1,2,3	late May	68
2,4-D/picloram	0.75 lbs/0.125 lbs ae/A	1	1	late May	78
2,4-D/picloram	0.75 lbs/0.125 lbs ae/A	1	1,2,3	late May	85
dicamba	1.0 lb ai/A	1	1	late May	67
Control					0

[1]Treatments were evaluated June 5, 1985

Enhancing medusahead germination with potassium nitrate. Northam, F. E. and R. H. Callihan. Previous medusahead germination studies demonstrated that seeds less than three months old germinate slowly. A seed lot collected in 1984 from north central Idaho (Nez Perce Co.) was germinated at 18°C with a 10 hr. light/14 hr. dark photo period. The seeds were germinated in three-inch diameter petri plates containing two layers of germination pads. Each plate held thirty deawned seeds and was replicated five times. The first test began seven weeks after seed maturity (defined as the disappearance of all green color from the glumes, lemmas, awns and rachis of the infloresence). The percent germination in distilled water was 9.2% after 14 days, 47.5% after 28 days and 64.4% after 49 days (Table 1). The test was repeated using a seed lot collected in 1985 from the same site. The seeds were subjected to 18°C and a photoperiod of 14 hrs. light/10 hrs. dark. The 1985 test began four weeks after seed maturity. The percent germination was 6.0% after 14 days, 50% after 28 days and 76% after 49 days. These results confirm that young seeds from this medusahead population do not germinate rapidly.

Concurrent with the seven week 1984 evaluation another germination treatment was established using a 0.2% KNO_3 germination solution. Those seeds exposed to KNO_3 germinated more rapidly than those in distilled water. The KNO_3 treatment had 35% germination (380% of the control) at 14 days, 83.3% (175% of the control) after 28 days and 87% (143% of the control) after 49 days. These results indicate that KNO_3 enhances the speed of medusahead germination.

This comparison was repeated seven months after seed maturity. Those seed treated with the KNO_3 solution germinated faster than those in distilled water. At 14 days the KNO_3 treatment reached the maximum of 96.7% germination (129% of the control), at 28 days (108% of the control) and at 49 days (103% of the control). Therefore KNO_3 improved the germination speed of seven month old medusahead seed but to a lesser degree than seven week old seed.

The experiment was repeated again with the 1984 seed lot at an age of fifteen months. The KNO_3 treatment had only slight effects on seed germination. Both the control and KNO_3 treatment had over 80% germination (82.4% and 88.7% respectively) at 14 days. Germination at 28 days in the distilled water treatment was 90.7% compared to 93.7% in the KNO_3 treatment. Therefore KNO_3 has minimal influence on the germination of deawned 15 month old medusahead seeds stored at room temperature.

Another factor noted from these evaluations is the influence of time on medusahead germination speed. Young seed require many weeks to produce high germination percentages. The 1984 seven week control treatment plates were observed until they reached 83.3% germination which required 17 weeks. It required 7 weeks to reach 55.8% germination and 10 weeks to reach 75% germination. At seven months the same seed lot under the same conditions reached 75% germination within 14 days and at 15 months 82.4% germination occurred at 14 days. Clearly some factor associated with time is either activated or lost as the seeds age. (Idaho Agriculture Experiment Station, Moscow ID 83843).

Table 1. Germination of a medusahead seed lot (from north central Idaho) at three ages and two germination solutions - distilled H_2O and 0.2% KNO_3

Seed Age	Germination solution	Germination % 14 Days	28 Days	49 Days
7 weeks				
	Distilled H_2O	9.2*	47.5	64.4
	0.2% KNO_3	35.0	83.3	86.7
7 months				
	Distilled H_2O	75.0	89.2	94.2
	0.2% KNO_3	96.7	96.7	96.7
15 months				
	Distilled H_2O	82.4	90.7	-
	0.2% KNO_3	88.7	93.7	-

*These data are the averages of five replicates of thirty seeds each which were maintained at 18°C with a 10 hr. light/14 hr. dark photoperiod.

Evaluation of herbicide treatments for control of Douglas rabbitbrush (*Chrysothamnus viscidiflorus* [Hook.] Nutt.). Ferrell, M.A., T.D. Whitson and H.P. Alley. Dense stands of unpalatable rabbitbrush are an indicator of overgrazing. Plots were established June 25, 1984, south of Laramie, Wyoming on a dense stand of Douglas rabbitbrush on rangeland to evaluate control with various herbicides.

Rabbitbrush was at prebud and 4 to 12 inches in height at the time of treatment. 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 three replications. The soil was a loamy sand (83% sand, 9% silt, and 8% clay) with 1.4% organic matter and a 7.3 pH.

Visual estimates of rabbitbrush control were made on July 9, 1985, one year after treatment. There was considerable variation within treatments. However, picloram at 0.5 lb ai/A gave the greatest level of control (86%), followed by XRM 4715 (triclopyr 0.5 lb ai/A + 2,4-D LVE 1.0 lb ai/A), with 85% control. No other treatments were effective in controlling Douglas rabbitbrush. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1383.)

Douglas rabbitbrush control

Treatment[1]	Rate ai/A	Percent shoot control[2]
DPX-T 6376 60DF + X-77	0.125 oz	0
DPX-T 6376 60DF + X-77	0.25 oz	13
DPX-T 6376 60DF + X-77	0.5 oz	17
DPX-T 6376 60DF + X-77	1.0 oz	30
chlorsulfuron + X-77	0.5 oz	0
chlorsulfuron + X-77	1.0 oz	0
chlorsulfuron + X-77	2.0 oz	17
chlorsulfuron + X-77	4.0 oz	13
2,4-D LVE	2.0 lb	71
XRM 4715 (triclopyr + 2,4-DA)	0.25 lb + 0.5 lb	47
XRM 4715 (triclopyr + 2,4-DA)	0.5 lb + 1.0 lb	85
XRM 4757 (Dowco 290 + picloram)	0.13 lb + 0.5 lb	42
XRM 4757 (Dowco 290 + picloram)	0.25 lb + 1.0 lb	70
XRM 4703 (Dowco 290 + picloram)	0.25 lb + 0.25 lb	42
XRM 3972 (Dowco 290)	0.5 lb	10
picloram (K salt)	0.5 lb	86
triclopyr 4E	1.0 lb	25
triclopyr 4E	2.0 lb	67

[1]Treatments applied June 25, 1984. X-77 applied at 0.25% v/v.

[2]Visual shoot control evaluations July 9, 1985.

Evaluations of herbicides for control of big sagebrush and resulting forage production. Whitson, T.D., and M.A. Ferrell. Sagebrush control has been achieved since the early 1950's with 2,4-D. Recent introductions of tebuthiuron and other compounds as possible controls have been introduced but have not been compared in single study. This experiment was established on rangeland June 10, 1982 in Fremont County, Wyoming on a sandy loam soil with 70% sand, 22% silt, 8% clay, organic matter 0.8 and a pH of 6.5. The plots were 9 by 30 ft and were replicated three times in a randomized complete block design. The herbicides were applied with a hand-held, 6 nozzle boom sprayer. Sagebrush leaves were open and sagebrush was actively growing at the time of treatment.

Sagebrush control and forage yields per acre were done as visual evaluations and clipping comparisons. Treatments of DPX-T 6206 and 2,4,5-T maintained above 90% control since the time of application. Three year averages of forage yields have been above 500 lbs/A. Other treatments with three year averages above 400 lbs/A included: DPX 6206 applied at 0.062 and 0.125 lb/A, PPG 1259 applied at 1.0 lb ai/A, 2,4-D LVE at 2.0 lb ai/A and triclopyr applied at 0.5 and 1.0 lb ai/A. DPX-T 6376 and DPX-T 6206 applied at 0.5 lb ai/A had 100 and 93% sagebrush control, respectively. PPG 1259 applied at 1.0, 2.0, and 4.0 lb ai/A maintained 100% control for three years although forage production was reduced in plots receiving rates above 2.0 lb ai/A tebuthiuron 20% pellets applied at 0.25 lb ai/A and above, reduced sagebrush growth 87 to 97%. Applications above 0.75 lb ai/A substantially reduce forage yields. All applications of UC77179 reduced total vegetation in treated areas. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1388.)

Evaluation of herbicide for control of big sagebrush and resulting forage production. 1985.

Herbicide[1]	Rate lb ai/A	Percent Control[2] 1983	1984	1985	Air Dry Forage[3] lb/A 1983	1984	1985	3 year ave
DPX-T 6376 70% WP + X-77	0.031	54	33	30	526	310	164	333
DPX-T 6376 70% WP + X-77	0.062	86	67	63	628	406	182	405
DPX-T 6376 70% WP + X-77	0.125	87	68	58	530	348	164	347
DPX-T 6376 70% WP + X-77	0.5	100	100	100	586	368	164	373
DPX-T 6206 70% WP + X-77	0.031	68	58	47	494	282	100	292
DPX-T 6206 70% WP + X-77	0.062	68	53	55	748	479	208	478
DPX-T 6206 70% WP + X-77	0.125	91	88	75	564	609	150	441
DPX-T 6206 70% WP + X-77	0.5	98	95	93	504	865	222	530
PPG 1259 FL	1.0	100	100	100	532	631	192	452
PPG 1259 FL	2.0	100	100	100	102	404	186	231
PPG 1259 FL	4.0	100	100	100	94	203	154	150
dicamba 4DMA	1.0	0	7	0	344	224	62	210
dicamba 4DMA	2.0	38	30	5	432	276	114	274
2,4-D ester	1.0	63	55	50	506	300	164	323
2,4-D ester	2.0	98	97	97	564	470	166	400
2,4,5-T ester	1.0	93	90	90	436	281	176	298
2,4,5-T ester	2.0	98	95	90	802	574	210	529
tebuthiuron 20%	0.125	35	47	40	418	291	146	285
tebuthiuron 20%	0.25	75	85	87	406	471	124	292
tebuthiuron 20%	0.5	92	93	87	210	368	174	251
tebuthiuron 20%	0.75	99	99	99	132	126	100	119
tebuthiuron 20%	1.0	99	99	99	120	139	186	148
UC 77179	0.5	91	83	88	126	385	162	224
UC 77179	1.0	100	100	100	352	107	120	193
UC 77179	2.0	100	100	100	0	0	46	15
UC 77179	4.0	100	100	100	0	0	0	0
UC 77179	6.0	100	100	100	0	0	0	0
triclopyr 4E	0.25	38	18	40	604	342	88	345
triclopyr 4E	0.5	96	93	90	622	476	190	429
triclopyr 4E	1.0	94	93	90	762	406	188	452
triclopyr 4E/2,4-D	0.5 + 1.0	89	80	83	356	211	208	258
Dowco 290	0.25	8	5	0	476	476	102	351
Dowco 290	0.5	33	27	17	506	438	132	315
Dowco 290	1.0	43	27	17	442	312	106	287
Check	---	---	---	---	304	176	62	181

[1]Herbicide treatments applied June 10, 1982.
[2]Visual control evaluations May 23, 1983, May 31, 1984, and July 22, 1985, production measurements July 19, 1983, July 24, 1984, and July 22, 1985.
[3]Production from 2.5 ft diameter quadrat per replication.

Rangeland species production at Bosler, WY, five 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 containing 60.6% sand, 24.2% silt, 15.8% clay with 1.7% organic matter and a 6.9 pH. Treatment areas of 49 m^2 were arranged in a randomized complete block design with three replications. The study area was fenced to prevent grazing. The herbicides were applied with a centrifugal granular applicator.

Perennial grass tolerance was evaluated by clipping individual species from 15, one-half m^2 quadrats per treatment. Sagebrush control was visually evaluated. The 10% tebuthiuron formulation generally produced higher grass yields than the 20% formulation. No differences in grass production were observed with either a spring or fall application time. Tebuthiuron applications of 0.5 lb ai/A or higher gave over 95% sagebrush control regardless of formulation. Date of application did not affect sagebrush control. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1389 .)

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

Tebuthiuron pelleted formulation	Application rate lb ai/A	Application time	Percent sagebrush control	lbs oven dry forage production per acre: *Agropyron smithii*	*Koeleria pyramidata*	*Poa sandbergii*	Total
10%	0.25	5/29/80	93	827	27	78	932
10%	0.5	5/29/80	98	651	18	105	774
10%	0.75	5/29/80	98	610	1	13	624
10%	1.0	5/29/80	99	566	4	26	596
20%	0.25	5/29/80	87	535	34	49	618
20%	0.5	5/29/80	96	509	20	91	620
20%	0.75	5/29/80	95	557	4	47	608
20%	1.0	5/29/80	96	477	9	50	536
Check	- -	- - - -	0	246	0	99	345
10%	0.25	9/16/80	92	602	10	44	656
10%	0.5	9/16/80	98	628	5	43	676
10%	0.75	9/16/80	99	747	8	21	776
10%	1.0	9/16/80	100	436	2	32	470
20%	0.25	9/16/80	88	443	26	71	540
20%	0.5	9/16/80	98	555	4	61	620
20%	0.75	9/16/80	100	643	21	48	712
20%	1.0	9/16/80	100	592	1	14	607
check	- -	- - - -	0	231	11	95	337
Grazed Check	- -	- - - -	0	88	2	13	103

Evaluations of tebuthiuron formulations of 10 and 20% aerially applied for big sagebrush control. Whitson, T.D., M.A. Ferrell, and H.P. Alley. Plots were established October 21, 1980 near Kaycee, Wyoming on rangeland infested with sagebrush. Treatments were applied by airplane equipped with a granular applicator developed by Elanco Products, Inc. Plots were 10.3 acres in size with one replication.

Visual control estimates were made September 10, 1985, five years after application. Considerable grass thinning was evident where tebuthiuron application rates exceeded 0.55 lb ai/A. Five years after application all tebuthiuron applications were showing 90% control or above. There were no differences in sagebrush control or grass injury with the 10 and 20% formulations. Grass species showing sensitivity to tebuthiuron at application rates above 0.55 lb ai/A included: western wheatgrass (*Agropyron smithii*), needle-and-thread (*Stipa comata*) and green needlegrass (*Stipa viridula*). Blue grama (*Bouteloua gracilis*) exhibited no sensitivity to tebuthiuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1390.)

Evaluation of fall aerial applications of tebuthiuron 10% and 20% formulations for big sagebrush control

Treatment[1]	Application rate lb ai/A	Percent[2] control	Percent grass thinning
tebuthiuron 20P	0.30	95	5
tebuthiuron 20P	0.60	98	10
tebuthiuron 20P	0.90	100	35
tebuthiuron 20P	1.2	100	65
tebuthiuron 20P (3/16" pellet)	0.90	100	60
tebuthiuron 10P	0.28	90	5
tebuthiuron 10P	0.55	95	10
tebuthiuron 10P	0.83	100	40
tebuthiuron 10P	1.10	100	65
Check	- - -	0	0

[1]Treatments were applied October 21, 1980

[2]Visual evaluations were made September 10, 1985

Rangeland species production at Kaycee WY, five 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 effect on sagebrush and perennial grass production. The experiment was established on June 24, 1980 and September 6, 1980 on a Moret loam soil containing 47.2% sand, 31.6% silt, 21.2% clay, 3.1% organic matter, and a 7.4 pH. Treatment areas of 98 m^2 were arranged in a randomized complete block design with three replications. The study area was fenced to prevent grazing. The herbicides were applied with a centrifugal granular applicator.

Perennial grass tolerance was evaluated by clipping individual species from 15, one-half m^2 quadrats per treatment. Sagebrush control was visually evaluated. Western wheatgrass (*Agropyron smithii*) and Stipa spp. were thinned as a result of tebuthiuron applications of 0.75 lb ai/A and above. All treatments resulted in three four fold increases of total forage production. Considerable downy brome (*Bromus tectorum*) was found in areas treated with tebuthiuron. Blue grama (*Bouteloua gracilis*) a warm season grass was not affected by any application rate of tebuthiuron. Excellent sagebrush control was obtained in areas receiving tebuthiuron applications of 0.5 lb ai/A and above. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1391 .)

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

pelleted tebuthiuron formulation	application lb ai/A	application time	% sagebrush control	lbs oven dry forage production per acre: *Agropyron smithii*	*Bromus tectorum*	*Bouteloua gracilis*	*Stipa* spp.	Total
10%	0.25	6/24/80	75	238	66	11	6	321
10%	0.5	6/24/80	96	134	119	14	0	267
10%	0.75	6/24/80	99	196	75	41	0	312
10%	1.0	6/24/80	99	161	131	44	2	338
20%	0.25	6/24/80	58	120	134	14	9	277
20%	0.50	6/24/80	88	230	63	9	0	302
20%	0.75	6/24/80	98	128	91	12	0	231
20%	1.0	6/24/80	100	132	202	20	10	364
Check	- -	- - - -	0	67	2	-	11	80
10%	0.25	9/ 6/80	68	181	151	0	37	369
10%	0.5	9/ 6/80	96	182	195	24	0	401
10%	0.75	9/ 6/80	100	85	281	53	10	429
10%	1.0	9/ 6/80	100	125	87	33	0	245
20%	0.25	9/ 6/80	93	223	39	0	21	283
20%	0.5	9/ 6/80	99	209	61	4	0	274
20%	0.75	9/ 6/80	100	158	75	0	5	238
20%	1.0	9/ 6/80	100	81	27	0	109	217
Check	- -	9/ 6/80	0	179	2	14	44	239
Grazed Check	- -	- - - -	- -	68	2	2	4	76

Herbicide applications at three growth stages for control of rush skeletonweed (*Condrilla juncea* L.). Whitson, T.D., Ken French, David Humphrey, and P.S. Friedrichsen. An experiment was initiated to determine effects of herbicides and application timing on control of rush skeletonweed. The experiment was established on abandoned farmland April 25, 1985 in Douglas County, Oregon on a loam soil with a 6.2 pH and organic matter content of 2.0%. The plots were 10 by 27 ft. Four sub-plot replications of 16 ft^2 were designated within each plot. Individual plant counts were made at the beginning of the study within marked sub-plots. The herbicides were applied at 45 lbs pressure in 40 gal of water with a 6 nozzle CO_2 hand-held boom sprayer.

Weed control was calculated from original rosette counts made at the beginning of the study on April 25, 1985, final evaluations were made September 30, 1985. Treatments and treatment combinations controlling greater than 90% of the rush skeletonweed included: fluroxypyr applied at mid-bolt and as a sequential treatment at 1.0 lb ai/A, DPX-T6376 applied as a sequential treatment at 0.011 lb ai/A, 2,4-D (amine) applied at mid-bolt at 3.0 lb ae/A. Triclopyr applied as a sequential treatment at 0.75 lb ae/A, 2,4-D (LVE) + DPX-T6376 applied at the mid-bolt stage at 1.5 + 0.11 lb ai/A, dicamba + DPX-T6376 applied at the rosette stage at 0.5 + 0.011 lb ai/A, 2,4-D (LVE) + DPX-T6376 applied at the rosette stage and as a sequential treatment at 0.5 + 0.011 lb ai/A. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Herbicide applications at three growth stages for control of rush skeletonweed

Herbicide[1]	Rate (lb/ai/A)	Percent Control[2] at Growth Stages: rosette	mid-bolt	bud	Three sequential[3] treatments
clopyralid	0.25	14	0	0	55
clopyralid	0.5	75	0	0	88
fluroxypyr	0.25	0	30	30	57
fluroxypyr	1.0	50	100	8	93
DPX-T6376	0.011	0	0	0	93
DPX-T6376	0.044	13	0	0	29
dicamba	0.5	20	6	0	40
2,4-D (LVE)	1.5	62	100	60	44
MCPA + DPX-T6376	0.75 + 0.011	78	0	0	63
MCPA	1.5	8	0	50	18
2,4-D (amine)	3.0	37	92	86	79
triclopyr	0.75	75	0	0	93
picloram	0.25	67	11	0	83
2,4-D (A) + dicamba	1.5 + 0.5	48	78	85	78
triclopyr + 2,4-D (LVE)	0.25 + 0.5	73	73	50	53
bromoxynil + DPX-T6376	0.5 + 0.011	54	0	0	0
dicamba + DPX-T6376	0.5 + 0.011	100	0	0	-
2,4-D (LVE) + DPX-T6376	0.5 + 0.011	93	7	0	100
Check	- - - - - - -	0	0	0	0

[1]Herbicides were applied; 4/25/85 (rosette), 6/12/85 (mid-bolt), 7/18/85 (bud), and as a sequential treatment at all three stages of growth.

[2]Percent control was calculated from original marked plants within treatments. Original counts were made April 25, 1985, final counts were taken September 30, 1985.

[3]Sequential treatments received three treatments at the rate listed.

Evaluation of herbicides for control of western snowberry (*Symphoricarpos occidentalis* Hook.). Ferrell, M.A. 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 the control of western snowberry.

Plots were established July 4, 1984 six miles north of Aladdin, Wyoming on a dense stand of western snowberry in a pasture. The western snowberry was 12 to 20 inches in height and in the bud to full bloom stage of growth. Treatments were applied with a 6-nozzle knapsack spray unit delivering 40 gpa of water. Plots were 9 by 20 ft arranged in a randomized complete block design with three replications. The soil was a clay loam (41% sand, 30% silt, and 29% clay) with 5.2% organic matter and a 6.8 pH.

Visual evaluations taken on May 30, 1985, one year following treatment, indicate that none of the herbicides used in this study show promise for the control of western snowberry at the rates evaluated. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1386.)

Western snowberry control

Treatment[1]	Rate lb ai/A	Percent shoot control[2]
XRM 4708 (triclopyr)	1.0	0
XRM 4708 (triclopyr)	2.0	0
XRM 4757 (Dowco 290 + 2,4-DA)	0.25 + 1.0	10
XRM 4757 (Dowco 290 + 2,4-DA)	0.38 + 1.5	20
XRM 4703 (Dowco 290 + picloram)	0.25 + 2.25	20
picloram (K salt)	2.0	73

[1]Treatments applied July 4, 1984
[2]Visual shoot control evaluations May 30, 1985

<u>Spikeweed control in pastureland</u>. Whitson, T.D., and Robert Costa. Spikeweed, an annual composite, has been reported as a pasture weed problem on alkali soils in several Oregon counties. A series of treatments were applied to determine their efficacy on spikeweed. The soil was a silt loam with a 9.5 pH and a textural composition of 9.5% clay, 24.0% sand, and 67.0% silt. Herbicides were applied April 19, 1984 with a hand-held boom sprayer. The experiment was arranged as a randomized complete block design with 10 by 40 ft plots. Percent spikeweed control was based on counts within four 16 ft^2 quadrats. The control area contained 104 spikeweed plants per sq ft. Perennial grasses were not present in sufficient populations to determine crop damage.

Weed control evaluations made July 18, 1984, approximately 3 months following treatment, showed that clopyralid, picloram, dicamba, chlorsulfuron, and metsulfuron-methyl, and the herbicide combinations dicamba + 2,4-D amine each provided spikeweed control above 99%. Triclopyr and 2,4-D LV ester and amine formulations were only partically effective for control of spikeweed. One year following treatments, spikeweed control percentages were reduced to zero in plots treated with dicamba, 2,4-D (LV ester), 2,4-D amine, triclopyr, dicamba + 2,4-D amine and triclopyr + 2,4-D (LVE). However, plots treated with clopyralid, picloram, chlorsulfuron, and metsulfuron-methyl all maintained excellent spikeweed control one year following treatment. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Spikeweed control in pastureland

Herbicide	Application Rate	% Control[1] 1984	1985
clopyralid	0.25 lb ae/A	100	99
clopyralid	0.50 lb ae/A	100	100
clopyralid	1.0 lb ae/A	100	100
picloram	0.25 lb ae/A	100	80
picloram	0.5 lb ae/A	100	99
picloram	1.0 lb ae/A	100	100
dicamba	0.25 lb ae/A	96	0
dicamba	0.5 lb ae/A	100	0
dicamba	0.75 lb ae/A	100	0
2,4-D (LV ester)	0.75 lb ae/A	41	0
2,4-D (LV ester)	1.5 lb ae/A	55	0
2,4-D (LV ester)	2.0 lb ae/A	49	0
2,4-D (amine)	0.75 lb ae/A	23	0
2,4-D (amine)	1.5 lb ae/A	46	0
2,4-D (amine)	2.0 lb ae/A	33	0
triclopyr	0.75 lb ae/A	82	0
triclopyr	1.5 lb ae/A	95	0
triclopyr	2.0 lb ae/A	94	0
chlorsulfuron	0.75 oz ai/A	100	98
chlorsulfuron	1.5 oz ai/A	100	99
chlorsulfuron	2.25 oz ai/A	100	100
chlorsulfuron	3.0 oz ai/A	100	90
metsulfuron-methyl	0.75 oz ai/A	100	99
metsulfuron-methyl	1.5 oz ai/A	100	100
metsulfuron-methyl	2.25 oz ai/A	100	100
metsulfuron-methyl	3.0 oz ai/A	100	100
dicamba + 2,4-D (amine)	0.25 + 0.75 lb ae/A	99	0
dicamba + 2,4-D (amine	0.5 + 1.5 lb ae/A	100	0
triclopyr + 2,4-D (LVE)	0.125 + 0.25 lb ae/A	36	0
triclopyr + 2,4-D (LVE)	0.25 + 0.50 lb ae/A	49	0
Untreated	---	0	0

1. % control was determined as counts on July 18, 1984 and visual estimates on June 5, 1985.

Comparative treatments of fluroxypyr, dicamba, and picloram for leafy spurge control. Whitson, T.D. A comparative trial was set up near Enterprise, Oregon to compare the efficacy of fluroxypyr (Dowco 433) to dicamba and picloram.

The experiment was applied July 27, 1984 on leafy spurge in full flower. The experimental design was a randomized complete block with four replications of each treatment. Soils consisted of 11.2% sand, 63.3% silt, and 26.5% clay with an organic matter of 2% and a 7.0 pH. Applications were made with a 10 foot, 6 nozzle, hand-held boom, using 40 gallons of water per acre. Plots were 10 feet by 27 feet in size.

Leafy spurge control was visually evaluated on June 8, 1985. Fluroxypyr had four times the activity of picloram on leafy spurge when each herbicide was applied at 0.25 lb ai/A. Leafy spurge remained in the vegetative state without any flower or seed production one year following all fluroxypyr applications. Fluroxypyr applications of 0.25 and 0.5 lb ai/A gave 60 and 76% control, respectively. Increasing fluroxypyr rates to 1.0 and 2.0 lb ai/A did not increase leafy spurge control above the 0.5 lb ai/A application rate. Application rates of fluroxypyr at 0.25 lb ai/A controlled a higher percentage of leafy spurge than did 4.0 lb ai/A of dicamba.

This initial study comparing fluroxypyr, dicamba, and picloram indicates that fluroxypyr has considerable activity on leafy spurge. Treatment combinations with other herbicides, as well as sequential and timing trials, be conducted to further determine the activity of fluroxypyr on leafy spurge. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Comparative treatments of fluroxypyr, dicamba, and picloram for leafy spurge control

		% Control				
Herbicide	lb ai/A	Rep 1	Rep 2	Rep 3	Rep 4	Ave
		No flowering of leafy spurge -------------------				
fluroxypyr	0.25	60	60	60	60	60
		No flowering of leafy spurge -------------------				
"	0.5	60	75	85	85	76
		No flowering of leafy spurge -------------------				
"	1.0	80	70	85	85	80
		No flowering of leafy spurge -------------------				
"	2.0	70	70	80	70	73
dicamba 4L	4.0	40	50	50	50	48
"	8.0	85	95	95	99	94
picloram 2E	0.25	10	10	15	20	14
"	1.0	98	80	98	95	93
"	2.0	99	97	99	97	98
Check	--	0	0	0	0	0

Leafy spurge shoot control resulting from original and successive herbicide treatments. Whitson, T.D., M.A. Ferrell, H.P. Alley, and R.E. Vore. No single herbicide application has been successful in total control of leafy spurge after it has become established. In 1978, a study was established to determine how long single herbicide treatments would last and what successive treatments would be required to maintain adequate control. The experiment was established May 25, 1978 with yearly retreatments. Plots 21.5 ft by 21.5 ft were arranged in a split block with two replications. Herbicides were applied with a truck mounted sprayer in a 20 gal/A water. The soil was a sandy loam with 65.4% sand, 23.2% silt, 11.4% clay, 1.5% organic matter, and a 7.7 pH.

Weed control counts were used to determine percent control of each treatment. When no retreatments were applied to the original treatments control averaged only 15.0% across all treatments. The highest level of control was approximately 32% obtained in areas treated with dicamba at 4.0 and 8.0 lb ai/A and picloram 22k at 1.0 lb ai/A. The picloram retreatments were the most effective leafy spurge control in this study, providing averages of over 94%. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1395 .)

Percentage leafy spurge shoot control resulting from the original and successive herbicide retreatments, 1984, 1985

Original Treatments[1] lb ai/A	Percent Shoot Control[2] Retreatment lb ai/A: 2,4-D amine 2.0		Tordon 22K 0.5		Tordon 22K 1.0		Banvel 4L 2.0		Banvel/ 2,4-D amine 1.0 + 2.0		Check	
	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985
picloram 2.0	94	87	97	99	99	99	92	88	87	77	18	16
picloram 1.0	84	76	94	96	98	100	78	75	71	73	64	32
picloram 2.0	73	63	92	97	97	99	72	65	55	49	4	20
picloram 2.0	90	86	92	98	100	100	92	79	81	69	6	2
picloram 1.0	81	59	96	98	99	100	79	70	53	50	53	17
picloram 0.5	69	53	95	98	100	100	48	53	58	54	41	21
picloram + 2,4-D amine 2.0 + 4.0	75	62	95	98	100	100	79	70	74	58	44	41
picloram + 2,4-D amine 1.0 + 2.0	73	56	93	99	100	100	65	66	50	36	12	0
picloram + 2,4-D amine 0.5 + 1.0	63	43	91	99	99	100	71	43	78	58	0	0
dicamba 8.0	75	76	74	95	98	95	91	83	70	67	34	32
dicamba 4.0	61	77	87	94	98	99	64	72	75	67	2	27
Check	78	56	95	97	98	100	82	75	47	46	- -	0

[1] Original treatments May 25, 1978; retreatments yearly; except Tordon 22K terminated with 1981 treatment

[2] Evaluations were based on quadrat counts used to determine percent control; evaluations were made May 22, 1984 and May 29, 1985

Leafy spurge shoot control with 2% and 10% picloram pellets. Ferrell, M.A., T.D. Whitson, and H.P. Alley. This experiment was established to evaluate several picloram formulations for control of leafy spurge and was conducted at Afton and Lander, Wyoming.

The Lander plots were established June 1, 1984 on a dense stand of leafy spurge. Leafy spurge at treatment was in the seedling to full bloom stage-of-growth, 2 to 18 inches in height. The Afton plots were established August 8, 1984 on a dense stand of leafy spurge. Leafy spurge was in the prebud stage-of-growth and 6 to 8 inches in height. The granular formulations were applied with a centrifugal applicator. Plots at both sites were 9 by 30 feet. The Lander study consisted of two replications and the Afton study consisted of three replications. The soil at Lander was a sandy clay loam (54% sand, 29% silt, and 17% clay) with 1.9% organic matter and 8.0 pH, and the soil at Afton was a silt loam (22% sand, 54% silt, and 24% clay) with 3.7% organic matter and 6.2 pH.

Shoot counts were taken May 2, 1985 at Lander and a visual estimate of shoot control was taken July 11, 1985 at Afton. Percent shoot control with each treatment was similar between the two sites. However, the picloram 2% pellets gave better shoot control than the 10% pellets at both sites, for all rates. The reduced leafy spurge shoot control with the 10% pellets suggests this material is not providing as uniform distribution as the 2% pellets. Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1381.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent shoot control[2] Lander	Afton
picloram 2K	0.5	62	60
picloram 2K	1.0	84	90
picloram 2K	2.0	100	93
picloram 10K	0.5	39	50
picloram 10K	1.0	73	73
picloram 10K	2.0	80	88
Check	- -	0	0

[1]Treatments applied June 1, 1984 - Lander and August 28, 1984 - Afton.
[2]Shoot counts May 2, 1985 - Lander and visual shoot control evaluation July 11, 1985 - Afton.

Evaluation of dicamba formulations for leafy spurge shoot control. Ferrell, M.A., T.D. Whitson, and H.P. Alley. An experiment was conducted to compare liquid and granular formulations of dicamba for leafy spurge shoot control. Plots were established June 16, 1982, south of Hulett, Wyoming along the Belle Fourche River. Treatments were applied to a dense stand of leafy spurge at bud to full bloom and 12-18 inches tall. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water. Granular formulations were applied with a hand operated centrifugal broadcaster. Plots were 9 by 30 ft arranged in a randomized complete block design with three replications. Soil was a loam (38% sand, 47% silt, and 15% clay) with 1.8% organic matter and a 7.8 pH.

Leafy spurge shoot control has declined since 1983 with all dicamba treatments. However, dicamba 4DMA + X-77 at 8.0 lb ai/A and dicamba 5G at 4.0 lb ai/A are maintaining 78 and 70 percent control, respectively, three years after treatment application. Picloram 2% pellets at 2.0 lb ai/A continue to maintain excellent control three years after application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1382.)

Leafy spurge shoot control

Treatment[1]	Rate lb ai/A	Percent[2] shoot control 1983	1984	1985
dicamba pellets 10%	6.0	95	49	33
dicamba pellets 10%	8.0	92	70	55
dicamba 4DMA + X-77	6.0	83	67	47
dicamba 4DMA + X-77	8.0	98	82	78
dicamba 4DMA + 2,4-DLVE + X-77	4.0 + 0.5	97	73	55
dicamba pellets 10%	5.0	49	51	23
dicamba pellets 10%	8.0	96	70	37
dicamba pellets 5%	4.0	94	91	70
dicamba pellets 5%	8.0	93	78	33
dicamba pellets 20%	4.0	65	68	37
dicamba pellets 20%	8.0	95	91	40
picloram pellets 2%	2.0	100	100	99

[1]Treatments applied June 16, 1982, X-77 added at 0.125% v/v
[2]Shoot counts May 18, 1983, May 23, 1984, and May 30, 1985

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

Original treatments were made May 23 and September 14, 1980. Liquid formulations were applied with a 13-nozzle truck mounted spray unit delivering 25 gpa water. The granular formulations were applied with a hand operated centrifugal granular spreader. Retreatments were made May 29 and September 12, 1981; May 24 and September 17, 1982; May 29 and September 15, 1983; and May 31 and September 18, 1984. The retreatments of picloram at 0.5 and 1.0 lb ai/A were terminated with the 1981 treatment. The leafy spurge was in bud to flowering stage-of-growth and 4 to 18 inches in height during the spring retreatments and had shed most of its seed when fall retreatments were made. Plots were 22.5 by 22.5 ft arranged in a split block design with two replications. Soil was a sandy loam (73% sand,15% silt, and 12% clay) with 1.3% organic matter and 7.6 pH.

The area has been flood irrigated following application of original treatments. There was thin grass cover when plots were established. By September, 1981 grass was 20 to 24 inches in height and green in treated areas. Good grass cover has been maintained in treated areas since 1981.

Percent shoot control is based on reduction of live leafy spurge shoots in treated plots as compared to the untreated (check) plots.

The picloram original treatment at 2.0 lb ai/A provided the most effective long-term leafy spurge shoot control. The picloram original treatment at 1.0 lb ai/A was more effective for long-term leafy spurge shoot control than was the original dicamba treatment at 4.0 or 8.0 lb ai/A. Retreatments have been more effective for controlling leafy spurge shoot growth than a one time single treatment. There has been a reduction in shoot control in the picloram retreatment plots since the retreatments were terminated with the 1981 application. However, picloram retreatments have generally been the most effective followed by dicamba, 2,4-D (S & F) and 2,4-D. Leafy spurge shoot control has decreased in most of the original treatment plots over the last five years, however, there seems to be little difference in the effectiveness of the original treatments whether spring or fall applied. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1385.)

Leafy spurge shoot control

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

[1]Original treatments made May 23 and Sept. 14, 1980; retreatments made May 29 & Sept. 12, 1981; May 24 and Sept. 17, 1982; May 29 and Sept. 15, 1983; and May 31 and Sept. 18, 1984. 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.

Evaluation of herbicides for control of St. Johnswort (*Hypericum perforatum* L.) in pastureland. Whitson, T.D., D. Humphrey, P.S. Friedrichsen and K. French. A field study was conducted to evaluate various herbicides for control of St. Johnswort. The experiment was established April 25, 1985 in Douglas County, Oregon on a loamy clay soil with 2.0% organic matter and a 5.6 pH. The plots were 100 by 108 feet with one replication, however, blocks were subsampled with 3 samples during evaluation. The herbicides were applied with a pickup boom type sprayer delivering 20 gallons per acre at 35 psi.

Crop tolerance and weed control were visually determined on June 12, 1985. No treatments caused perennial grass injury. Treatments of 2,4-D amine applied at 3.0 lb ai/A, triclopyr + 2,4-D LVE applied as a 0.25 + 0.5 lb ai/A, MCPA + DPX-T 6376 applied at 0.75 lb ai/A + 0.17 oz ai/A, 2,4-D LVE at 1.5 lb ae/A and floroxypyr (Dowco 433) at 1.0 lb ai/A all provided above 95% control two months after application. Reevaluations will be made in 1986. (Crop Science Dept., State Dept. of Ag., Oregon State University, Corvallis, OR 97331)

St. Johnswort control in pasture

Herbicide[1]	Application Rate	%[2] Control
dicamba	0.5 lb ae/A	20
2,4-D Amine	3.0 lb ae/A	100
triclopyr	0.75 lb ai/A	80
triclopyr + 2,4-D LVE	0.25 + 0.5 lb ai/A	95
MCPA + DPX-T 6376	0.75 lb ae/A + 0.17 oz ai/A	95
dicamba + 2,4-D	0.5 + 1.5 lb ae/A	50
Check	---	0
2,4-D LVE	1.5 lb ae/A	98
DPX-T 6376 + dicamba	0.17 oz ai/A + 0.5 lb ae/A	25
DPX-T 6376	0.7 oz ai/A	25
DPX-T 6376 + bromoxynil	0.17 oz ai/A	20
clopyralid (Dowco 290)	0.5 lb ai/A	0
floroxypyr (Dowco 433)	1.0 lb ai/A	99
" "	0.25 "	85
Dowco 290	0.25 "	0
DPX-T 6376 + 2,4-D LVE	0.17 oz ai/A + 0.25 lb ae/A	60
picloram	0.25 lb ae/A	85
DPX-T 6376	0.17 oz ai/A	30
Check	---	0

1. Herbicides were applied April 25, 1985.
2. Evaluations made June 12, 1985.

Establishment of intermediate wheatgrass in a yellow starthistle-infested range. Callihan, R. H., C. H. Huston, and D. C. Thill. This study was established to determine the effectiveness of a rangeland drill, in conjunction with picloram or glyphosate treatments and to establish intermediate wheatgrass in yellow starthistle-infested rangeland. Four treatments were established in a randomized complete block design on December 11, 1981 near Lapwai, Idaho. Treatments were (1) picloram at 0.38 lb/A followed by 15 lb/A drill-seeded intermediate wheatgrass, (2) 1.0 lb/A glyphosate followed by 14 lb/A drilled intermediate wheatgrass seed, (3) 14 lb/A drill-seeded intermediate wheatgrass seed, and (4) non-treated check. All herbicides were broadcast sprayed in 20 gpa water at 40 psi using Teejet 5002 flatfan nozzles. Yields of yellow starthistle, intermediate wheatgrass, annual grasses, and forbs were measured July 10, 1983 and June 26, 1984 by clipping 4.7 ft^2 quadrats, and July 1, 1985 by clipping two 3.0 ft^2 quadrats per plot.

1983 Harvest Results

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

1984 Harvest Results

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

1985 Harvest Results

The picloram followed by seeding treatment produced the greatest intermediate wheatgrass yield, 399 lb/A. Wheatgrass yield in the remaining treatments, ranging from 36 to 157 lb/A, did not differ among treatments. Yellow starthistle yield, ranging from 782 to 1568 lb/A, annual grass yield, ranging from 1162 to 1334 lb/A, and forb yield, which ranged from 150 to 554 lb/A, did not differ among treatments. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Establishment of Intermediate Wheatgrass

Treatment	Yield (lb/A) AGRIN[1]	CENSO[2]	Annual[3] grasses	VERBL[4]
1983 Results				
0.38 lb/A picloram + seed (15 lb/A)	301	50	177	148
1.0 lb/A glyphosate + seed (15 lb/A)	28	518	96	30
Seed (15 lb/A)	27	412	184	34
Untreated Check	20	310	176	22
$LSD_{0.05}$	33	298	140	60
1984 Results				
0.38 lb/A picloram + seed (15 lb/A)	598	341	528	92
1.0 lb/A glyphosate + seed (15 lb/A)	101	1156	255	31
Seed (15 lb/A)	114	1117	240	40
Untreated Check	20	1339	310	35
$LSD_{0.05}$	95	207	132	53
1985 Results				
0.38 lb/A picloram + seed (15 lb/A)	399	782	1133	239
1.0 lb/A glyphosate + seed (15 lb/A)	157	1316	1568	306
Seed (15 lb/A)	52	1162	1147	554
Untreated Check	36	1334	795	150
$LSD_{0.05}$	201	1216	980	722

[1] Intermediate wheatgrass

[2] Yellow starthistle

[3] Medusahead wildrye and downy brome

[4] Moth mullein

Evaluation of various herbicides for control of yellowstar thistle (*Centaurea solstitialis* L.). Whitson, T.D. and Robert Costa. Yellow starthistle has been reported in eleven counties in Oregon and now occupies over 8000 acres in the state. 2,4-D has been reported as a possible control along with picloram. This study was conducted to see if chlorsulfuron and metsulfuron-methyl would effectively control yellowstar thistle. The experiment was established March 22, 1984 on actively growing seedlings and rosettes. The plots were 10 by 27 ft and were replicated three times in a randomized complete block design. The herbicides were applied with a 6 nozzle hand-held boom delivering 40 gal of water/acre. A surfactant at 0.5% v/v was added to chlorsulfuron and metsulfuron treatments. The soil contained 10.9% clay, 12.3% sand and 76.9% silt with a 9.5 pH.

Treatments were evaluated visually as percent control. Neither chlorsulfuron or metsulfuron-methyl were as effective in controlling yellowstar thistle as picloram and 2,4-D LVE. A later application might have been more effective when more leaves and seedlings were available. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Yellowstar thistle control with various herbicides

Herbicide	Rate	% Control Replications
chlorsulfuron	1 oz product	55
chlorsulfuron	2 oz product	90
chlorsulfuron	3 oz product	73
chlorsulfuron	4 oz product	87
metsulfuron	0.5 oz (70% product)	7
metsulfuron	1.0 oz (70% product)	17
metsulfuron	1.5 oz (70% product)	47
metsulfuron	3.0 oz (70% product)	37
metsulfuron	4.0 oz (70% product)	20
picloram	0.125 lb ai/A	99
picloram	0.25 lb ai/A	100
2,4-D LV ester	1.0 lb ae/A	100

Herbicide control evaluations on tansy (*Tanacetum vulgare*). Ferrell, M.A. 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 has become a serious problem along ditchbanks, fencerows, and roadsides in Sheridan and Teton counties and is moving into range and pasture lands. This study was established to evaluate various herbicides for the control of tansy.

Plots were established July 31, 1984, east of Sheridan, Wyoming on a dense stand of tansy in a pasture. The tansy was at prebud to full bloom and 2 to 4.5 feet in height. Liquid formulations were applied with a 6-nozzle knapsack spray unit delivering 40 gpa water carrier. Plots were 9 by 20 feet arranged in a randomized complete block design with three replications. The soil was a loam (47% sand, 40% silt, and 13% clay) with 4.0% organic matter and 7.4 pH.

Visual evaluations made June 13, 1985, one year after treatment, indicate none of the XRM formulations to be effective in controlling tansy. Treatments showing excellent tansy control, were DPX-T6376 at 2 oz ai/A (100%) and dicamba + picloram at 1.0 + 0.5 (94%) and 2.0 + 0.5 lb ai/A (95%). (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1384.)

Tansy shoot control

Treatement[1]	Rate ai/A	Percent shoot control[1]
XRM 4715 (triclopyr + 2,4-DA)	1.0 lb + 2.0 lb	0
XRM 4708 (triclopyr)	1.0 lb	0
XRM 4708 (triclopyr)	2.0 lb	0
XRM 4757 (Dowco 290 + 2,4-DA)	0.25 lb + 1.0 lb	0
XRM 4757 (Dowco 290 + 2,4-DA)	0.38 lb + 1.5 lb	0
XRM 4703 (Dowco 290 + picloram)	0.25 lb + 0.25 lb	17
XRM 3972 (Dowco 290)	0.5 lb	0
picloram (K salt)	0.5 lb	85
picloram + 2,4-DA	0.25 lb + 1.0 lb	67
picloram + 2,4-DA	0.38 lb + 1.5 lb	75
dicamba 4L + X-77	1.0 lb	0
dicamba 4L + X-77	2.0 lb	13
chlorsulfuron + X-77	1.0 oz	33
chlorsulfuron + X-77	2.0 oz	85
DPX-T6376 + X-77	1.0 oz	87
DPX-T6376 + X-77	2.0 oz	100
dicamba + picloram + X-77	1.0 lb + 0.25 lb	55
dicamba + picloram + X-77	1.0 lb + 0.5 lb	94
dicamba + picloram + X-77	2.0 lb + 0.25 lb	62
dicamba + picloram + X-77	2.0 lb + 0.5 lb	95

[1]Treatments applied July 31, 1984, X-77 added at 0.25% v/v
[2]Visual evaluations June 13, 1985

Effect of herbicide treatments on tansy ragwort control. Whitson, T.D., Bob Hawkes, Jon Brown, Dave Humphrey, and Dave Langland. Past studies have indicated 2,4-D combinations to be effective controls for tansy ragwort. This study was conducted to evaluate the control of tansy ragwort with several newly developed herbicides in comparison with some older ones. The experiment was conducted in Linn County, Oregon on a McCully clay loam soil with a 6.2 pH. The plots were 10 by 27 ft and replicated four times in a randomized complete block design. The herbicides were applied in a pasture at 40 psi and 40 gal/H_2O with a boom sprayer, on March 30, 1984.

Crop tolerance to the herbicide was visually evaluated and tansy ragwort stand counts were made August 28, 1984. Treatments of metsulfuron-methyl and chlorsulfuron caused grass browning for approximately 30 days following treatment but only slight grass height reduction at application rates of 0.141 and 0.197 lb ai/A was apparent at the time of evaluation. No other treatments caused grass injury. Small hop clover and white clover stand reductions were observed from applications of clopyralid, chlorsulfuron, metsulfuron, dicamba, and picloram. Excellent tansy ragwort control was obtained with clopyralid applications of 0.5 and 1.0 lb ai/A, chlorsulfuron and metsulfuron applications of 0.47, 0.094, 0.141, 0.187 lb ai/A, 2,4-D (LV ester) applications of 0.75, 1.5 and 2.0 lb ai/A, 2,4-D (amine) applications of 1.5 and 2.2 lb ai/A, picloram applications of 0.25, 0.5, and 1.0 lb ai/A. Herbicide combinations of dicamba and 2,4-D (amine) applied at 0.25 + 0.75 lb ai/A and 0.5 + 1.5 lbs ai/A provided excellent control while triclopyr or triclopyr + 2,4-D (LVE) combinations did not adequately control tansy ragwort at the application rates tested.

Evaluations were made June 19, 1985. Excellent tansy ragwort control in established plants and seedlings was obtained with 1.0 lb ai/A clopyralid, 0.25, 0.5, and 1.0 lb ai/A picloram, 0.047, 0.094, 0.144, and 0.187 lb ai/A metsulfuron, and dicamba + 2,4-D (amine) at 0.25 + 0.75 lb ae/A and 0.5 + 1.5 lb ae/A. Bull thistle was common in plots treated with the sulfonyl ureas DPX-T6376 and chlorsulfuron. Subclover damage was found in plots treated with picloram. (Crop Science Dept. Oregon State University and Oregon State Dept. of Ag. Corvallis, OR 97333)

Effect of herbicide treatments on tansy ragwort control

Herbicide	Rate (lb ai/A)	% Control[1] 1984	1985
clopyralid	0.25	75	57
clopyralid	0.5	94	70
clopyralid	1.0	100	93
chlorsulfuron	0.047	100	87
chlorsulfuron	0.094	100	90
chlorsulfuron	0.141	100	94
chlorsulfuron	0.187	100	100
metsulfuron	0.047	100	98
metsulfuron	0.094	100	100
metsulfuron	0.141	100	100
metsulfuron	0.187	100	100
dicamba	0.25	39	7
dicamba	0.5	71	55
dicamba	0.75	69	45
2,4-D (LV ester)	0.75	98	76
2,4-D (LV ester)	1.5	100	91
2,4-D (LV ester)	2.0	96	97
2,4-D (amine)	0.75	48	66
2,4-D (amine)	1.5	92	95
2,4-D (amine)	2.0	96	98
triclopyr	0.75	39	46
triclopyr	1.5	71	52
triclopyr	2.0	71	67
picloram	0.25	98	100
picloram	0.5	100	100
picloram	1.0	100	100
dicamba + 2,4-D (amine)	0.25 + 0.75	96	87
dicamba + 2,4-D (amine)	0.5 + 1.5	100	87
triclopyr + 2,4-D (LVE)	0.13 + 0.25	64	31
triclopyr + 2,4-D (LVE)	0.25 + 0.5	87	63
untreated		0	0

[1]Percent control was based on counts made within (two) 4' by 4' quadrats in each treatment area in 1984 and 1985

Evaluation of herbicides for Canada thistle control. Whitson, T.D., M.A. Ferrell. A study was conducted to compare Canada thistle control with new and existing herbicides. The experiment was established July 10, 1984 on a sandy loam soil in Albany County, Wyoming. The plots were 9 ft by 30 ft and were replicated three times in a randomized complete block design. The herbicides were applied with a hand held 6-nozzle boom in 40 gpa water carrier.

Perennial grass tolerance and Canada thistle (Circium arvense (L.) Scop.) control were visually evaluated July 2, 1985. Perennial grasses were damaged with all application rates of chlorsulfuron and sulfometuron. Canada thistle control exceeded 90% with applications of clopyralid + 2,4-D at 0.75 and 3.0 lb ai/A, clopyralid + picloram at 0.25 + 0.25, 0.5 + 0.5 and 0.75 + 0.75 lb ai/A, clopyralid at 0.75 lb ai/A, picloram at 0.5 and 0.75 lb ai/A, chlorsulfuron at 4.0 oz ai/A, sulfometuron at 12.0 oz ai/A, and dicamba + picloram at 1.0 + 0.5 and 2.0 + 0.5 lb ai/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1392.)

Canada thistle control and percent grass damage following herbicide treatments

Herbicide[1]	Rate lb ai/A	% Control[2]	% Grass Reduction
XRM 4757 clopyralid + 2,4-D (PM)	0.25 + 1.0	40	0
XRM 4757	0.75 + 3.0	93	0
XRM 4703 clopyralid + picloram (PM)	0.25 + 0.25	90	0
XRM 4703	0.5 + 0.5	97	0
XRM 4703	0.75 + 0.75	100	0
clopyralid	0.75	97	0
picloram (2E)	0.5	99	0
picloram (2E)	0.75	99	0
chlorsulfuron + X-77	2 oz ai + 0.25%	78	60
chlorsulfuron + X-77	4 oz ai + 0.25%	99	80
metsulfuron + X-77	4 oz ai + 0.25%	77	70
sulfometuron + X-77	6 oz ai	65	100
sulfometuron + X-77	12 oz ai	96	98
dicamba 4L + X-77	2 + 9.5	48	
dicamba + picloram 2E + X-77	1.0 + 0.5 + 0.25%	100	0
dicamba + picloram 2E + X-77	2.0 + 0.25 + 0.25%	88	0
dicamba + picloram 2E + X-77	2.0 + 0.5 + 0.25%	100	0
EH 737	1 gal	13	0
EH 765	1 gal	13	0
EH 763	1 gal	23	0
EH 786	1 gal	17	0
2,4-D amine 4E	1 gal	13	0
Check	- - - - - - - - - -	0	0

[1]Herbicide applications were made July 10, 1984. PM = package mixture.

[2]Visual evaluations were made July 2, 1985

Pasture weed control in Idaho: Forage quality analysis. K. G. Beck, D. C. Thill, and R. H. Callihan. Forage samples were collected from herbicide treated pasture plots at Weiser, Bonners Ferry, and Viola, ID (Table 1) and were analyzed for percentage crude protein (CD), digestible protein (DP), total nitrogen (TN), lignin, acid detergent fiber (ADF), neutral detergent fiber (NDF), and relative feed value (RFV) by Agri-test Inc., Twin Falls, ID. Percentage weed control data is reported on pages 24, 37, and 40 of the 1982, 1983, and 1984, respectively, WSWS Research Progress Reports. Herbicide treatment caused no differences in the feed analysis variables at any location. When pooled over all herbicide treatments and harvested forage (hay plus weeds), there was more DP in 1982 at Weiser (Table 2) and more CP, DP, and TN in 1983 at Viola (Table 3). When data were pooled over herbicide treatments and sampling years, weeds had less DP, ADF, and NDF, but more lignin and a greater RFV than the hay at Weiser (Table 2). At Viola, weeds had less NDF, more CP, DP, TN, and lignin, and a greater RFV than the hay (Table 3). Weeds had more lignin than the hay at Bonners Ferry (data not shown). (Idaho Agric. Expt. Stn., Moscow, ID 83843).

Table 1. Herbicide treatments analyzed for feed value by location.

Treatment	Rate	Location[1]		
	(kg ai/ha)	Weiser	Bonners Ferry	Viola
Dicamba	2.24	+[2]	+	+
2,4-D	3.36	+	+	-
Dicamba + 2,4-D	1.12 + 1.12	+	-	-
Dicamba + 2,4-D	0.57 + 1.68	-	+	-
Dicamba + 2,4-D	1.12 + 3.36	-	-	+
Picloram	0.28	+	+	-
Picloram	1.12	-	-	+
Check		+	+	+

[1] Samples were collected at Weiser in 1982 and 1983, Bonners Ferry in 1982, and Viola in 1983 and 1984.

[2] + indicates samples were analyzed for feed value.

Table 2. Feed analysis of a pasture in Weiser, Idaho.

	Crude protein	Digestible protein	Total nitrogen	Lignin	ADF	NDF	RFV
	(% of dry matter)						
Year							
1982	9.7	6.1	1.5	7.9	34.1	54.0	103
1983	9.2	5.2	1.5	9.0	34.4	53.2	106
$LSD_{(0.05)}$	NS	0.7	NS	NS	NS	NS	NS
Sample							
Forage	9.1	6.7	1.5	4.3	36.1	64.9	78.9
Weeds	9.8	4.6	1.6	12.6	32.4	42.4	129.3
$LSD_{(0.05)}$	NS	0.7	NS	2.6	1.9	3.1	8.5

Table 3. Feed analysis of a pasture in Viola, Idaho.

	Crude protein	Digestible protein	Total nitrogen	Lignin	ADF	NDF	RFV
	(% of dry matter)						
Year							
1983	9.5	6.1	1.5	6.9	36.9	59.5	87.0
1984	6.3	4.1	1.0	6.2	39.7	59.0	85.0
$LSD_{(0.05)}$	2.6	1.7	0.4	NS	NS	NS	NS
Sample							
Forage	5.8	3.7	0.9	5.9	37.9	69.4	63.8
Weeds	10.0	6.5	1.6	7.2	38.6	49.2	108.3
$LSD_{(0.05)}$	2.6	1.7	0.4	1.1	NS	4.0	14.0

New Weed Species and Potential Weed Problems in Northern Idaho. Northam, F. E., R. R. Old, and R. H. Callihan. Several species of plants not previously reported in Idaho were observed during 1984-85. They are new introductions to the state and as aliens possess the potential of becoming weed problems. Other species that have been present in Idaho for several years, and which appear to be increasing their populations and ranges to the point of becoming pests, were noted. The following lists separate the plants into four groups based on (1) not previously reported for Idaho nor listed in Flora of the Pacific Northwest (Hitchcock and Cronquist, 1973); (2) not previously documented for Idaho although listed in Flora of the Pacific Northwest; (3) previously reported in Idaho and populations are increasing at a rate warranting further monitoring; and (4) previously reported, having noxious potential, but apparently not currently spreading. 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. Amorpha fruticosa L. (AMHFR) indigobush; Leguminosae; north of Moscow, Latah Co., Idaho. Native to southern and eastern U. S.

2. Bryonia alba L. (BYOAL) white bryony; Cucurbitaceae; numerous sites in Latah Co. and Nez Perce Co., Idaho. Viny weed capable of smothering woody shrubs.

3. Centaurea montana L. mountain bluet; Compositae; south of Wallace, Idaho. Native in central Europe.

4. Chaenorrhinum minus (L.) Lange (CHNMI) dwarf snapdragon; known to be weedy in British Columbia and the eastern U. S. Found in annual crop, Boundary Co., Idaho.

5. Eragrostis barrelieri Daveau. (ERABA) Mediterranean lovegrass; Gramineae; University of Idaho campus, Latah Co., Idaho. Native in southwest U. S. Collected two consecutive years; appears to be spreading on UI campus; initially identified as Mexican lovegrass (E. mexicana), but better samples obtained in 1985 made possible a more definitive identification.

6. Galium sp. bedstraw; a plant of the genus Galium was collected for which the species identity has not yet been determined, but which is not described in the Flora of the Pacific Northwest.

7. Lepyrodiclis holosteoides (C.A.M.) Fisch. et Mey. pashenick; apparently a new genus for N. America, confirmation from the New York Botanic Garden is pending; Nez Perce Co., Idaho.

8. Torilis arvensis (Hubs.) Link (TOAIR) hedgeparsley; Umbelliferae; Cavendish Grade and Lapwai Canyon, Nez Perce Co., Idaho.

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

1. Anthemis tinctoria L. (ANTTI) yellow chamomile; Compositae; rangeland and wasteland near Kendrick, Latah Co., McCall, Valley Co., Idaho.

2. Cynosurus echinatus L. (CYXEC) hedgehog dogtailgrass; Gramineae; near Kooskia, Idaho Co., Idaho.

3. Hibiscus trionum L. (HIBTR) Venice mallow; Canyon Co., Ada Co., Idaho; known to be weedy in the midwest, previously only reported in the Northwest for the Willamette Valley, Oregon.

4 Hieracium canadense Michx. Canada hawkweed; Compositae; near Priest Lake, Bonner Co. and along Selway River, Idaho Co., Idaho.

5. Lapsana communis L. (LAPCO) nipplewort; Compositae; University of Idaho campus, Latah Co., Idaho. Native of Eurasia, inhabits fields and waste sites throughout N. E. United State.

6. Lychnis coronaria (L.) Desr. (LYHCO) rose campion; Caryophyllaceae; east of Orofino, Clearwater Co., Idaho.

7. Matricaria maritima var. agrestis (Knaf.) Wilmot (MATIN) scentless chamomile; Compositae; Latah Co., Kootenai Co., Custer Co., Idaho.

8. Salvia pratensis L. (SALPR) meadow sage; Labiatae; Idaho Co., Idaho. Field and pasture weed of N. E. United States.

9. Salvia sclarea L. clary sage; Labiatae; Idaho Co., Idaho.

10. Silene dichotoma Ehrh. (SILDI) hairy catchfly; Caryophyllaceae; near Cavendish, Nez Perce Co., Idaho. Native of Eurasia, widespread weed in U. S.

GROUP III: Species previously reported in Idaho and appear to be increasing their densities and ranges.

1. Anchusa officinalis L. (ANCOF) common bugloss; becoming increasingly frequent in Benewah Co., Kootenai Co., Idaho.

2. Apera interrupta (L.) Beauv. interrupted windgrass; Gramineae; well established in Idaho panhandle winter grain areas and previously misidentified as Apera spica-venti (L.) Beauv. which is present, but its occurrence is insignificant when compared to A. interrupta.

3. Cardus acanthoides L. (CRUAC) plumeless thistle; Compositae; near Craigmont and Lawyer's Canyon, Lewis Co., Idaho.

4. Euphorbia esula L. (EPHES) leafy spurge; Euphorbiaceae; south of Emida, Benewah Co., near Lewiston, Nez Perce Co., Idaho.

5. Hieracium aurantiacum L. (HIEAU) orange hawkweed; Compositae; Idaho panhandle counties particularily in towns.

6. _Hieracium_ _pratense_ Tausch (HIECA) yellow hawkweed; Compositae; Idaho panhandle counties, where it dominates and reduces productivity of ranges and pastures.

7. _Hypochoeris_ _radicata_ L. (HRYRA) spotted catsear; Compositae; Latah Co., Idaho.

8. _Onopordum_ _acanthium_ L. (ONRAC) Scotch thistle; Compositae; Snake River canyons and near Leland, Nez Perce Co., Idaho. Eurasian weed.

9. _Salvia_ _aethiopis_ L. (SALAE) Mediterranean sage; Labiatae; Idaho Co., Idaho.

10. _Ventenata_ _dubia_ (Leers) Coss. & Dur. Ventenata; Gramineae; well established annual in Kootenai, Latah, and Benewah counties and known as far south as Boise Co., Idaho.

GROUP IV: Species previously reported in Idaho, having noxious potential, but are not _known_ to be spreading significantly in Idaho (should be controlled when found).

1. _Cytisus_ _scoparius_ (L.) Link (SAOSC) Scotch broom; Leguminosae; Kootenai, Benewah, and Clearwater counties, Idaho. Native of Europe, escaped from cultivation; occasionally used as an ornamental.

2. _Dianthus_ _armeria_ L. (DINAR) deptford pink; Caryophyllaceae; Idaho Co., Idaho where it is persisting to dominate in overgrazed range.

3. _Echium_ _vulgare_ L. (EHIVU) blueweed; Boraginaceae; Idaho Co., Idaho. Pasture weed in eastern North America.

4. _Hesperis_ _matronalis_ L. (HEVMA) damesrocket; Cruciferae; from Troy to Conklin Park, Latah Co., Idaho. Escaped ornamental.

5. _Lathyrus_ _latifolius_ L. (LTHLA) everlasting peavine; the major weed species along the lower Selway River.

6. _Trifolium_ _arvense_ L. (TRFAR) rabbitfoot clover; Leguminosae; near Kooskia, Idaho Co., Idaho. Native of Europe, casual weed of roadsides and waste places in N. E. United States. Previously known in the Northwest only west of the Cascades.

(Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

University of Idaho weed identification. Old, R. R., R. H. Callihan, and D. C. Thill. In 1985 the Cooperative Extension Service of the University of Idaho began a statewide weed identification program. Identification forms (see form 1 and 2) were developed and distributed to County Extension personnel throughout the state. Information gathered through this program will be used to create a historical data base as well as detect first records and extension of range. The following species were submitted for identification:

Date	County	Identification
10/28/85	Lincoln	Ambrosia acanthicarpa, Compositae
03/29/85	Bingham	Ambrosia psilostachya, Compositae
07/11/85	Latah	Anchusa officinalis, Boraginaceae
05/30/85	Idaho	Apocynum androsaemifolium, Apocynaceae
08/13/85	Idaho	Arrhenatherum elatius, Gramineae
08/16/85	Nez Perce	Arrhenatherum elatius, Gramineae
09/24/85	Idaho	Asclepias fascicularis, Asclepiadaceae
04/09/85	Nez Perce	Asperugo procumbens, Boraginaceae
07/23/85	Bannock	Astragalus inflexus, Leguminosae
05/30/85	Latah	Cardaria pubescens, Cruciferae
06/28/85	Fremont	Carum carvi, Umbelliferae
06/10/85	Idaho	Chaenactis douglasii, Compositae
09/30/85	Boundary	Chaenorrhinum minus, Scrophulariaceae
07/29/85	Lincoln	Chenopodium botrys, Chenopodiaceae
07/29/85	Ada	Cicer arietinum, Leguminosae
05/28/85	Washington	Cirsium canovirens, Compositae
06/04/85	Gooding	Cirsium canovirens, Compositae
08/12/85	Lincoln	Cleome lutea, Capparidaceae
08/29/85	Lincoln	Echinocystis lobata, Cucurbitaceae
07/17/85	Washington	Euclidium syriacum, Cruciferae
06/03/85	Nez Perce	Euphorbia esula, Euphorbiaceae
05/23/85	Washington	Galium aparine, Rubiaceae
10/11/85	Ada	Glecoma hederacea, Labiatae
06/07/85	Idaho	Helianthella uniflora, Compositae
02/13/85	Canyon	Hibiscus trionum, Malvacae
10/01/85	Ada	Hibiscus trionum, Malvaceae

Date	County	Identification
07/23/85	Idaho	Hieracium albertinum, Compositae
07/08/85	Kootenai	Hieracium aurantiacum, Compositae
07/15/85	Lincoln	Hyoscyamus niger, Solanaceae
06/28/85	Lincoln	Hypericum perforatum, Hypericaceae
03/29/85	Bingham	Kochia scoparia, Chenopodiaceae
05/28/85	Lincoln	Linum perenne, Linaceae
07/03/85	Lincoln	Mentzelia laevicaulis, Loasaceae
07/08/85	Owyhee	Mentzelia laevicaulis, Loasaceae
05/10/85	Clearwater	Ornithogalum umbellatum, Liliaceae
08/08/85	Idaho	Philadelphus lewisii, Hydrangeaceae
08/22/85	Kootenai	Potentilla recta, Rosaceae
08/08/85	Idaho	Prunus virginiana, Rosaceae
08/14/85	Benewah	Rhamnus purshiana, Rhamnaceae
05/29/85	Clearwater	Rorippa curvisiliqua, Cruciferae
06/19/85	Latah	Sanguisorba occidentalis, Rosaceae
02/06/85	Nez Perce	Sisymbrium altissimum, Cruciferae
10/02/85	Ada	Solanum nigrum, Solanaceae
07/18/85	Owyhee	Solanum rostratum, Solanaceae
08/08/85	Idaho	Symphoricarpos albus, Caprifoliaceae
08/08/85	Idaho	Symphoricarpos albus, Caprifoliaceae
06/13/85	Gem	Valerianella locusta, Valerianaceae
07/10/85	Nez Perce	Veratrum californicum, Liliaceae
07/23/85	Bannock	Verbascum thapsus, Scrophulariaceae
10/11/85	Canyon	Xanthium spinosum, Compositae

Six specimens which were identified only to genus and 76 specimens from non-Extension sources are not included. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Form 1

Weed Identification Request, Report and Record

Weed Identification
Extension Weed Specialist
University of Idaho
Cooperative Extension Service
1330 Filer Avenue East
Twin Falls, ID 83301
(208) 734-3602

Weed Identification
Department of Plant, Soil and Entomological Sciences
College of Agriculture
University of Idaho
Moscow Idaho 83843
(208) 885-6276

Instructions

I. For Reporting New Weeds:

Please report weeds new to an area **even if you don't need help** with them. We need to map our weeds, and your reports help. Just fill out and mail the form. You will be credited for your information.

II. For Identification Requests:

Plant identification is not a free service. It is offered, however, without charge on a cooperative information exchange basis, i.e. if you provide the background information in part I, we will provide part II. Otherwise, identification is available at the rate of $10.00 per specimen, **submitted with** the specimen.

Identification of your plant is not simple. There are thousands of possibilities, and the most expert taxonomist can't recognize them all on sight. Some we recognize immediately; others take hours to analyze. So we'll do our best if you do **your** part by giving us **whole** plants that arrive in **good** condition with full **information** on this form. Here's how:

1. **What To Send:** Plants are identified by flowers, fruits, seeds, leaves, stems, roots **and habitat**. Without these, identification may be impossible for us. Send plants that have as many of these plant parts as you can. Several plants are better than one plant.
2. **How To Send It:** Identification is more likely to be successful if plants are **not** dried, but adding water promotes decay organisms. Place the plant specimen in a plastic bag between dry paper towels without pressing or adding moisture and close the bag. Mail it on Monday, Tuesday or Wednesday. If fresh material is in the mail over the weekend, it may decay beyond recognition. Store it in a refrigerator until mailing.
3. **Use This Form:** In return for identification, we only request the background information on the attached form to develop a weed data base as well as aid in identification. **Use one form for each species**. Keep the goldenrod (back) copy, and send all three other copies with the specimen to the nearest of the two addresses shown. One complete copy will be returned.

   Keep a dried, pressed specimen for reference so that you will know what we have identified for you. We could return it, but the identification process and extra time deteriorates the specimen.

What To Do About Weeds

- **Be alert** for new weeds.
- If you don't know what their names are, **find out**.
- If they are on your property, **control them**. If you don't know how, ask your county agricultural Extension agent, county weed control supervisor or other licensed consultant.
- If they are not on your property **and** are classed "noxious" in the state weed law **or** are not common in the area, either:
  1. **Tell** the property owner, if they are not aware of the weeds or the law. If you don't or can't tell the owner, **or** if the weeds are new to the area;
  2. **Report** the weeds to the county weed supervisor or county commissioners.
- Support community, state and federal action against weeds.

Form 2

Weed Identification Request, Report and Record

University of Idaho

I. Background: To be filled out completely by sender. Use one form per species

(Use pencil; plant moisture can smear ink; press hard to make 4 copies; keep copy 4.)

Date ______________ County ______________ Agent ______________

Basis (check one): (a) information exchange_____; (b) $10.00 fee enclosed_____ Agent's reference no. ________

Person seeking identification: Name ______________

Address ______________ Phone ______________

Weed Location (from county map): Quarter-Section ________ Section ________ Range ________ Township ________

Approximate directions to the weeds: ______________

____

About how many years have they been there, if you know: ________. In what situation (garden, pasture, winter wheat, roadside, forest, etc.) were the plants found: ______________

How much area? A few plants _____; less than 1 acre_____; 1 to 10 acres _____; 10 to 100 acres _____; more than 100 acres _____

What density? less than 1% ground cover _____; 1 to 10% cover _____; 10 to 50% cover _____; more than 50% cover _____

If it is causing concern, describe the reason and the problem: ______________

____

Information requested other than identification: ______________

____

II. Identification: To be filled out by identifier. Sender is not to write below.

PSES Identification no. ______________ Date received: ______________

Physical condition: good ___ poor ___ Parts and quantity: adequate ___ inadequate ___

Botanical name: ______________

Common name: ______________

Source reference ______________ Family ______________

For the area: First record _____ Rare _____ Occasional _____ Common_____

Species is: Annual _____ Biennial _____ Perennial _____ Native _____ Alien _____

_____ I. Weed: This species is normally weedy, not a "plant out of place."

_____ A. Noxious weed (so designated by law): Normally very hard to control and exceptionally pestiferous. Report new sightings!

_____ B. Common weed: Known as a pestiferous species. Be alert for it!

_____ II. Non-weed: This species is not known for its weediness but can be a "plant out of place."

_____ A. Normally cultivated as: an ornamental _____ a crop _____

_____ B. Normally wild.

Identified by: ______________ Date: ______________

Remarks: ______________

____

Prescription for control depends on a great many factors; more background information may be needed to prescribe a control measure. Inquire of your county agricultural Extension agent, weed specialist or other licensed consultant if more information on control is requested.

Copy 1 (white) - PSES; copy 2 (yellow) - County Extension Agent; copy 3 (pink) - Extension Weed Specialist; keep copy 4 (goldenrod)

LORAN-C Feasibility for Pest Survey. Old, R. R. and R. H. Callihan. Loran-C is a navigational system commonly used in marine and aeronautical applications. The Loran-C receiver uses long wave radio signals from permanent ground stations maintained by the U.S. Coast Guard to determine position to a maximum accuracy of 0.01 minute Lat-Long (61 ft). Investigations were performed in 1984-1985 to determine if Loran-C is a feasible tool for pest survey and to identify limiting factors of the system. Studies included adaptation of power and signal apparatus to survey vehicles. It was necessary to locate known points throughout the area and to develop field test data forms for standardization of data. Tests of the system's accuracy in determining position throughout the region and the system's ability to accurately determine area, were proposed, as well as the development of a microcomputer interface.

Loran-C appears to be a feasible tool for weed survey in Idaho. Work in Washington and Oregon has also shown it to be a valuable addition to insect trapping surveys. The Apollo II receiver installed in a C.R.C. 500 battery equipped carrying case met the requirements needed for our applications and combined an accuracy, durability, and portability not found in other systems tested, including a Simrad Taiyo 856, an Apollo I, and a Teledyne TDL 708.

Factors affecting the utility of the system developed included:

a. Signal interference from electrical transmission lines up to a distance of ± 600 ft.
b. Signal interference from electrical systems of survey vehicles.
c. Signal reception due to limited antenna length.
d. Signal distortion due to overland signal shift.
e. Accuracy; also affected by overland signal shift.
f. Availability of known points (Lat-Long) to use for calibration.
g. Cost (approx. $2,500).

An 8 ft. fiberglass (Shakespeare) whip antenna with a II Morrow marine A-12 pre amp and magnetic base provided the best reception capabilities of any system tested. With a cigarette lighter power attachment and a magnetic antenna base, the system can be adapted to most vehicles. Parameters limiting the suitability of transport vehicles are still to be determined.

The Loran-C system utilizing an Apollo II receiver is a very "user friendly" system which, after several hundred hours of operating time, has allowed the development of a serviceable pest survey system. Training sessions were given for personnel in the Dept. of Entomology, Forestry, Range, Wash. Dept. of Ag., Wash. Aphis Prog., and Co. weed boards.

Known calibration points have been acquired from the Dept. of Trans., Boise, ID and Olympia, WA and through the USGS, Washington D.C. Test forms were developed and used in the field. Preliminary results of accuracy tests for the system in Idaho have been compiled. Further accuracy testing is yet to be performed. The system's ability to accurately determine areas during pest survey is still to be tested both on the ground and in the air.

Cooperation with other agencies has resulted in development of a microcomputer interface by Washington State University as well as in the acquisition of equipment for test by the Washington State Dept. of Ag.; Oregon State Dept. of Ag.; Idaho State Dept. of Ag.; Dept. of Forestry and Range, WSU; U.S.F.S. Forest Pest Management, Boise; and APHIS Pest Survey personnel in Washington and Oregon.

(Idaho Agricultural Experiment Station, Moscow, ID 83843)

PROJECT 3.

UNDESIRABLE WOODY PLANTS

Bruce R. Kelpsas - Project Chairman

No Reports were received for

the 1986 Research Progress Report:

UNDESIRABLE WOODY PLANTS

PROJECT 4.

WEEDS IN HORTICULTURAL CROPS

Ronald G. Brenchley - Project Chairman

Weed control in cabbage and carrots grown under floating row covers. Crabtree, G.D. and H.H. Fisher. The control of weeds under floating row covers was evaluated in cabbage and carrot field trials in 1985. Cabbage was transplanted into plots with or without preplant incorporated trifluralin 1.12 kg ai/ha. Sub-plots within weed control treatments included floating row covers of Reemay or Vispore or no covers. A similar trial with seeded carrots had herbicide treatments of linuron 0.56 kg/ha preemergence, linuron 1.68 kg/ha early post emergence, and a combination of linuron 1.12 kg ai/ha and fluazifop-butyl 0.28 kg ai/ha early post emergence. The post emergence herbicide applications were made over the top of the row covers and the herbicide allowed to penetrate to contact the weeds which had emerged. In all cases, both in the cabbage and carrot trials, weed control was as effective from herbicides used in conjunction with row covers as when used on uncovered plots. Effective control of weeds growing under row covers was obtained even though weed growth in plots without herbicides or mechanical weed control was greater in covered plots than in uncovered plots. No interactions between row cover treatments and weed control treatments were detected for any of the crop yield or quality factors measured. (Department of Horticulture, Oregon State University, Corvallis, OR)

Barnyardgrass control in carrots with fluazifop-p-butyl and sethoxydim. McReynolds, R., R. Vinal, and R.D. William. Various rates of fluazifop-p-butyl and one rate of sethoxydim successfully controlled barnyardgrass in a trial conducted in spring planted carrots. The purpose of the trial was to determine the optimum rate of fluazifop-p-butyl needed to achieve control of barnyardgrass and observe phytotoxicity symptoms if they occurred. The single rate of sethoxydim was included as a standard for comparison of fluazifop rates.

All rates of fluazifop-p-butyl showed some measure of control and improved with increasing rates. Complete control was achieved with 0.025 and 0.50 lb ai/acre suggesting there was no advantage to increasing the rate of fluazifop above 0.025 lbs. Control of barnyardgrass with 0.012 and 0.018 was acceptable, but not as good as the higher rates. The 0.06 lb rate did not produce acceptable levels of control. Control with sethoxydim was complete except for one plot that had been eroded by flooding resulting in later in-festations of barnyardgrass. No phytotoxic symptoms were observed on the carrots in any of the treatments.

The trial was established on June 18, 1985 in Marion County, Oregon, on Newberg silt loam soil. The herbicides were applied broadcast with a CO_2 powered backpack sprayer in 250 ml of water in a randomize complete block design. Plot dimensions were 6 by 20 feet and consisted of two rows of carrots. When the treatments were applied, the barnyardgrass was 6 to 8 inches tall and the crop was in the 4 to 5 leaf stage. 1% by volume crop oil was included in each treatment. Weeds were rated 80 days after applications. (Oregon State University Extension, Marion County, OR 97301)

Barnyardgrass control in carrots

	Herbicide	Rate lb ai/a	Average weed control rating[1/]
1	Untreated	-	0
2	Fluazifop-p-butyl	.06	3
3	Fluazifop-p-butyl	.12	7
4	Fluazifop-p-butyl	.18	8
5	Fluazifop-p-butyl	.25	10
6	Fluazifop-p-butyl	.50	10
7	Sethoxydim	.25	9

[1/] 0 = no control, 10 = complete control.

Herbicide screening in umbelliferous crops. Madrid, Jr., M.T. and G.D. Crabtree. Herbicide screening in carrots, coriander, dill, parsley and parsnips for the control of redroot pigweed, black nightshade, common groundsel and barnyardgrass included pre and postemergence treatments of propazine 0.56 to 1.12 kg/ha, pre and early postemergence treatments of prometryn 0.56 to 1.12 kg/ha, early and late postemergence treatments of linuron 0.56 to 1.12 kg/ha, preplant incorporated and preemergence treatments of fluorochloridone 0.17 to 0.56 kg/ha.

The experiment was established on May 29, 1985, at the Vegetable Research Farm, OSU, Corvallis, OR. The plots were 3m x 6m replicated five times in a randomized complete block design. Herbicides were applied at 355 l/ha with a compressed air sprayer. The preplant incorporated treatment was made during the establishment of the trial while preemergence, early post and late postemergence treatments were done June 3, June 17, and June 23, 1985, respectively.

Propazine, prometryn and linuron at the higher rates of application used in the trial gave slight temporary phytotoxicity to all the crops. Crop tolerance to fluorochloridone was good. At 1.12 kg/ha, propazine applied preemergence gave good control of pigweed and nightshade, while at the same rate, prometryn and linuron both applied early postemergence were effective against pigweed and marginal against nightshade. Fluorochloridone at 0.56 kg/ha preemergence gave good control of pigweed, nightshade and groundsel. None of the treatments controlled barnyardgrass.

Crop yields from propazine 1.12 preemergence, prometryn 1.12 early post emergence or linuron 1.12 early postemergence were lower than yields from the weed-free check and from fluorochloridone 0.56 preemergence, which exceeded the check. (Oregon State University, Corvallis, OR 97331)

Long-term preplant applications of metolachlor for yellow nutsedge control in bulb onions. Collins, C. K., R. L. Collins and P. J. Kloft. Two seperate tests were conducted on onions in the north Willamette Valley near Gaston, Oregon during the winter of 1984 and the winter of 1984-85 for yellow nutsedge control and crop tolerance.

Previous work in onions with metolachlor applied postplant preemergence provided excellent nutsedge control but unacceptable crop injury.

On February 7, 1984 metolachlor was applied to the soil at 4.0, 6.0, and 8.0 lb ai/A. This was compared to metham fumigant at 50 gpa and a untreated check. The plot area was known to infested with nutsedge nutlets. A randomized block experimental design was used for the trial with a plot size of 13 ft wide by 20 ft long or 260 sq ft in four replicates per treatment. The Yellow Danver variety onions were planted on May 7, 1984 in 5 ft beds with rows spaced 11 inches apart, in a muck soil with 3.5% organic matter and a pH of 6.1. Results show that metolachlor gave excellent nutsedge control and good crop tolerance at the lowest rate. Metham fumigant gave fair control of nutsedge, good crop tolerance, and the highest yields probably due to Pink Root (*Pyrenochaeta terrestris*) fungus disease control. The test area received approximately 13.37 inches of rain between application and planting.

With this previous success in controlling nutsedge, another test was initiated with metolachlor at 1.5, 3.0, 6.0, and 8.0 lbs ai/A, on December 7, 1984 and January 29, 1985. This was 125 and 76 days prior to planting of the Yellow Danver variety onions, which was April 15, 1985. Again, the herbicide was applied to bare ground known to be infested with nutsedge. This randomized block experiment was established with a plot size of 13 ft wide by 25 ft long or 325 sq ft in three replicates per treatment. The onions were planted in 5 ft beds with rows spaced 11 inches apart, in a muck soil with 2.7% organic matter and a pH of 6.6. The test area received approximately 9.64 inches of rainfall between treatment and planting.

All metolachlor treatments gave superior nutsedge control over the untreated checks. Crop damage in the check was caused by severe nutsedge competition. Metolachlor applied in early December had better yields and crop tolerance than applications made in late January. January applications showed that increased dosages of metolachlor reduced crop yields. No stand reduction was ever observed with either application date. The 1984-85 winter was considered a dry year, and had 28% less rain than the sam period in the winter of 1983-84. This area receives approximately 44 inches of rain per year. It appears that rainfall influenced the reduction of metolachlor residues in the soil. It is the author's opinion, that the best yield and crop safety occurs when metolachlor is applied in the fall, no later than 130 days before planting. These two tests confirm that yellow nutsedge can be controlled in onions in muck soils, which are normally susceptable, if the herbicide is applied far enough before planting, in western Oregon. (Collins Agricultural Consultants, Inc., Hillsboro, Oregon 97123)

Table 1 1984 yellow nutsedge control in bulb onions

		Average of four replicates 1/				
		Nutsedge ratings		Crop injury		
Treatments	Rate lbs ai/A	7/19/84	9/5/84	7/19/84	9/5/84	Harvest data in pounds 2/
metolachlor	4.0	10.0	10.0	0	0	241.5 a 3/
metolachlor	6.0	10.0	10.0	0	0	211.5 b
metolachlor	8.0	10.0	10.0	1.4	0	182.0 c
metham	50 gal/A	7.5	6.3	0	0	235.3 a
check	-	0	0	0	0	179.5 c

Treatments applied February 7, 1984 Yellow danver onions planted May 7, 1984

1/ 0 = no effect 10 = complete control

2/ Total area harvested 9/5/84, 800 sq ft/treatment

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

Table 2 1984-85 yellow nutsedge control in bulb onions

Treatments	Rate lbs ai/A	Date applied	Average of three replicates [1/] Nutsedge rating 6/12/85	Nutsedge rating 8/7/85	Crop injury 6/12/85	Crop injury 8/7/85	Harvest data in pounds [2/]
metolachlor	1.5	12/7/84	5.5	5.8	0.75	0.83	43.5 abc [3/]
metolachlor	3.0	12/7/84	7.8	8.7	0.33	0.16	55.8 ab
metolachlor	6.0	12/7/84	9.0	9.8	1.41	0.16	57.8 ab
metolachlor	8.0	12/7/84	9.3	9.9	2.25	0.1	67.4 a
check	-	-	0	0	0	3.6	35.1 bc
metolachlor	1.5	1/29/85	8.0	8.7	0.83	0.33	41.2 abc
metolachlor	3.0	1/29/85	9.5	9.8	1.33	0.33	54.7 ab
metolachlor	6.0	1/29/85	9.6	9.8	2.5	1.5	41.8 abc
metolachlor	8.0	1/29/85	9.8	9.8	2.75	1.2	37.3 bc
check	-	-	0	0	0	3.0	20.1 c

1/ 0 = no effect 10 = complete control Yellow danver onions planted 4/15/85
2/ Total area harvested 9/16/85, 375 sq ft/treatment
3/ Values followed by a common letter are not significantly different according to Duncan's Multiple Range Test (P=0.05%)

Effect of cycloxydim on grass control in onions. Anderson, J.L. and M.G. Weeks. This study was established to evaluate the grass control obtained by cycloxydim (BAS 517 02 H) in onions. Oxyfluorfen was included with most treatments for broadleaf weed control. Treatments were applied with a bicycle sprayer equipped with 8002 nozzles calibrated to deliver 300 L/ha at 40 psi. Seedling onions were treated at the 1 to 1 1/4 leaf stage May 13, 1985. Plots were established in the early morning when it was clear, calm and 16°C. Plots had received a uniform preplant DCPA treatment but still contained a moderate polulation of seedling grass and broadleaf weeds. A fluazifop treatment was also included for grass control comparison.

Plots were evaluated 1 and 3 weeks after treatment. The evaluation taken 3 weeks after treatment is summarized in the table below. Cycloxydim at 0.22 or 0.55 kg/ha gave excellent control of seedling grasses (primarily barnyardgrass and foxtail barley); 0.55 kg/ha cycloxydim without a crop oil additive gave incomplete control of barnyardgrass. One week after treatment grass seedlings treated with 0.22 or 0.55 kg/ha were already dead; seedlings treated with fluazifop or 0.11 kg/ha cycloxydim were dying. Oxyflurfen gave good but incomplete control of lambsquarters or common cocklebur. (Utah Agricultural Experiment Station, Logan, UT 84322-4820)

Effects of postemergence herbicide treatments on onion weed control

Treatment[1]	Rate (kg/ha)	Additive[2]	Weed Control[3] Grasses	Weed Control[3] Broadleaf weeds
cycloxydim + oxyfluorfen	0.11 0.27	crop oil	9.0	8.5
cycloxydim + oxyfluorfen	0.22 0.27	crop oil	10	7.5
cycloxydim + oxyfluorfen	0.55 0.27	crop oil	10	9.0
cycloxydim	0.55	---	8.0	3.0
fluazifop-P-butyl + oxyfluorfen	0.22 0.27	crop oil	10	9.0
oxyfluorfen	0.27	crop oil	5.0	9.0

[1]Treated May 13, 1985 when onions were in 1-1 1/4 leaf stage.

[2]1% AG-98 crop oil added where indicated.

[3]Rated 0-10; 10 = complete weed control. Ratings are the average of three 4.5 x 10.5 replications taken June 4, 1985.

Wild prosso millet control in sweet corn with tridaphane. McReynolds, R., R. Vinal, and R.D. William. Wild prosso millet began infesting sweet corn plantings in the Willamette Valley about 5 to 6 years ago. Current infestations on about 100 acres are serious enough now to reduce crop yields. Registered herbicides have limited effectiveness on the weed. During the 1985 growing season, 3 trials were established to test the effectiveness of a new product, tridaphane (Tandem), on Wild prosso millet. When combined with atrazine, the produce controls weeds such as Wild prosso millet that resist treatment with atrazine alone.

Three randomized complete block trials were established in the Stayton-Scio area of the Willamette Valley. The purpose of the trials was to determine the effectiveness of tridaphane-atrazine combinations for the control of Wild prosso millet and observe its phytotoxic effects on 'Golden Jubilee' sweet corn. Treatments consisted of various rate combinations of atrazine and tridaphane, atrazine only, and an untreated control. Nine treatments were applied preemergence or at emergence of both the weed and the corn, while seven treatments were applied one month after emergence of both. On the 2nd treatment date, the corn was from 12 to 15 inches tall and the millet was 10 to 12 inches tall. Postemergence applications included 1% crop oil by volume.

Treatments were applied in May and June to dry soil surfaces in 2000 ml of water with a CO-2 backpack sprayer using four 8003 nozzles. Preemergence applications were irrigated with 1/2 to 3/4 inches of water the same day. Air temperatures ranged from 68 to 72 F and soil temperatures from 85 to 92 F. Individual replicate size was 240 sq. ft. and replicated four times. Preemergence applications of either cyanazine-alachlor or Sutazine had been applied to the fields by the growers prior to treatments. These herbicides showed no effect on Wild prosso millet growth.

Only one trial was uniformly and heavily infested with Wild prosso millet. In the other two trials, weed populations were light and concentrated on only one side of the entire trial. Weed control ratings were recorded from 2 to 3 months after applications. Selected treatments involving the control, the atrazine-tridaphane applied preemergence, and the higher rates of atrazine-tridaphane applied postemergence were harvested 3 months after planting in all three trials. Since the Wild prosso millet infestations in the other two trials were not uniformly distributed, their weed control ratings are not summarized. Significant corn yield differences were found only in the uniformly infested trial.

Wild prosso millet control in all plots containing tridaphane applied preemergence was very good, with minor differences among rates. The single application provided weed-free conditions until very late in the season. By then, competition from the corn prevented the millet plants that did emerge from becoming very large. Conversely, millet in the control and the atrazine treatments were 5 to 6 feet tall by harvest. In the heavily infested trial, tridaphane-atrazine combinations significantly improved sweet corn yields in comparison to both the untreated control and the atrazine applications. All postemergence applications were completely ineffective in controlling the millet. Results from the other two trials confirmed those of the one reported here. There were no apparent phytotoxic symptoms observed on the sweet corn in any of the trials. (Oregon State University Extension, Marion County, OR 97301)

Wild prosso millet control and sweet corn yields[1/]

Treatment	Rate lb ai/A	Control of Wild prosso millet[2/]	Yield (tons/A)
Preemergence			
1 control	-	0	3.97 ab
2 Atrazine	.50	0	-
3 Atrazine + Tridaphane	.50 .75		5.93 cd
4 Atrazine	1.00	3	-
5 Atrazine + Tridaphane	1.00 .50	8	8.04 de
6 Atrazine + Tridaphane	1.00 .75	8	7.54 de
7 Atrazine + Tridaphane	1.00 1.00	8	6.56 cde
8 Atrazine	1.50	1	5.00 bc
9 Atrazine + Tridaphane	1.50 .75	8	6.79 de
Postemergence			
10 Atrazine	1.00	0	-
11 Atrazine + Tridaphane	1.00 .50	3	-
12 Atrazine + Tridaphane	1.00 .75	4	-
13 Atrazine + Tridaphane	1.00 1.00	0	-
14 Atrazine + Crop oil	1.00 1%	0	2.69 a
15 Atrazine + Tridiphane + Crop oil	1.00 .50 1%	0	-
16 Atrazine + Tridaphane + Crop oil	1.00 .75 1%	2	4.11 ab

1/ Numbers followed by the same letter are not significantly different at the 5% level according to Duncans Multiple Range.

2/ 0 = No Control 10 = Complete Control

Herbicide evaluations in field potatoes. Arnold, R.N., E.J. Gregory and W.J. Price. Research plots were established on April 24, 1985 at the Agricultural Science Center to evaluate efficacy of several herbicides in field potatoes (var. Sangre). Soil type was a Kinnear very fine sandy loam with a pH of 7.9 and an organic matter content of less than 1.0 percent. Individual plots were 12 by 40 ft in size with four replications arranged in a randomized complete block design. Herbicides were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Preplant incorporated herbicides were applied April 24, and immediately disc and spike-tooth harrowed to a depth of 2-4 inches. Preemergence surface treatments were applied May 3, and postemergence treatments were applied May 14 when potato plants were $\frac{1}{2}$ to 1 inch in height. Weed seeds were broadcast and spike-tooth harrowed at the beginning of this study to provide heavy weed infestations. Potatoes were planted on 34-inch beds at 2200 lb/A on April 24, and were harvested September 23.

Visual evaluations of crop injury and weed control were made June 13, 1985. All treatments provided good to excellent broadleaf control except EPTC plus R-33865, barnyardgrass control was excellent with all treatments except metribuzin. Moderate crop injury was observed with R-40244 and trifluralin plus metolachlor. All treatments produced greater yields than the check. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Herbicide evaluations in potatoes, 1985

Treatment	Timing[1]	Rate (lb ai/A)	Crop[2] Injury	% Weed Control[2] Kochia	Russian Thistle	Prostrate Pigweed	Barnyard-grass	Potato Yield cwt/A
metolachlor	PES	2.0	0	88.8	92.5	98.8	100.0	494
EPTC + R-33865	PPI	4.5	0	75.0	62.5	52.5	95.0	395
R-40244	PES	.25	10	100.0	83.8	100.0	93.8	428
R-40244	PES	.50	18	100.0	95.0	98.8	92.5	418
metribuzin	POST	.25	0	100.0	97.5	85.5	71.3	452
trifluralin + metolachlor	PPI	.75 + 1.5	12	90.0	82.5	92.5	100.0	350
check			0	0	0	0	0	299

1. PPI = preplant incorporated, PES = preemergence surface, POST = postemergence.
2. Based on a visual scale from 0-100 where 0 = no control or injury and 100 = dead plants.

Effects of 2,4-D amine herbicide on strawberries. Collins, R. L. and P. Kloft. 2,4-D herbicide has been registered for use in strawberries for many years in the Pacific Northwest. However, much of the orginal research was accomplished on strawberry varieties no longer grown. As a result, three tests were conducted in two years on commercial varieties currently grown to evaluate crop tolerance.

Two experiments were conducted on one year old established Benton and Shuksan strawberry varieties. 2,4-D amine was applied at 0.25, 0.5, and 1.0 lbs ai/A on January 31 and February 27, 1984 near Cornelius, Oregon on Woodburn silt loam soil at 2% organic matter. The plots were 3.3 ft(one row) by 12.5 ft long and replicated four times in a randomized complete block design. The 2,4-D was applied in 40 gpa water with a CO_2 backpack sprayer. A single 8003 nozzle sprayed a 1.5 ft band over the row. On January 31, there were 1 to 2 inches of new growth emerging from the crowns and on February 27, 1984 there was 2 to 4 inches of partially expanded trifoliate leaves emerged from the crowns, for both varieties.

Visual crop tolerance ratings were taken on April 6 and June 21, 1984. Some 2,4-D symptoms were present on the early date but were gone by the late date. Yield data and grades were taken at the three harvest dates of June 21, 29 and July 11, 1984. No significant yield reductions or changes in grades were measured at harvest.

A third experiment was conducted on two year old Totem variety strawberries. 2,4-D amine was applied at 0.25, 0.5, 1.0 and 2.0 lbs ai/A on February 26, 1985, near Cornelius, Oregon on a Helvetia silt loam soil at 2% organic matter. The plots were 3.3 ft(one row) by 12.5 ft long and replicated four times in a randomized complete block design. The 2,4-D was applied in 20 gpa water with a CO_2 backpack sprayer. A single 8002 nozzle sprayed a 1.5 ft band over the row. The trifoliate leaves were 1 to 2 inches long emerging from the crown and were not expanded.

Visual crop evaluations were taken on April 29 and June 7, 1985. 2,4-D symptoms were seen on April 29, but could not be observed by harvest. Yield data was taken at two harvest dates of June 7 and 19, 1985. No yield reduction occurred with 2,4-D at 1.0 lb ai/A or less. A significant reduction in yield occurred at 2.0 lbs ai/A of 2,4-D. (Collins Agricultural Consultants, Inc. Hillsboro, Oregon 97123)

Table 1

Effects of 2,4-D amine herbicide
on benton and shuksan strawberries, 1984

Cornelius, Oregon

Treatment	Date applied	Rate lb ai/A	Crop rating 4/6/84 1/ Benton	Crop rating 4/6/84 1/ Shuksan	Average yield grams/plot 3 pickings Benton	Average yield grams/plot 3 pickings Shuksan
2,4-D	1/31/84	0.25	0.06	0	6799 a 2/	4742 a
2,4-D	1/31/84	0.5	0.18	0	5820 a	4544 a
2,4-D	1/31/84	1.0	1.0	0	5176 a	5114 a
Check	-	-	0	0	6489 a	5122 a
2,4-D	2/27/84	0.25	0.25	0	5233 a	4319 a
2,4-D	2/27/84	0.5	0.68	0	5300 a	4919 a
2,4-D	2/27/84	1.0	1.5	1.0	6179 a	4622 a

Table 2

Effects of 2,4-D amine herbicide
on totem strawberries, 1985

Cornelius, Oregon

Treatment	Rate lb ai/A	Visual crop 1/ rating 4/29/85	Average yield grams/plot 2 pickings
2,4-D	0.25	0	3279 a 2/
2,4-D	0.5	0.87	2595 a
2,4-D	1.0	1.25	2811 a
2,4-D	2.0	2.75	1727 b
Check	-	0	3371 a

Applied February 26, 1985

1/ 0 = no effect 10 = complete elimination

2/ Any value followed by a common letter is not significantly different according to Duncan's Multiple Range Test (P=0.05%)

Effects of phenoxy herbicide combinations on broadleaf weed control in bluegrass turf. Anderson, J.L. This study was designed primarily to compare the control of broadleaf weeds in Kentucky bluegrass turf using dichlorprop and mecoprop singly and in combination with other herbicides. The test site was an established Kentucky bluegrass-white clover sod at the Cache County Fair Grounds in Logan, Utah. The treated area was fertilized and mowed routinely but was not irrigated; further, the area was used for vehicle parking on occasions. The site had a moderately heavy population of common dandelion and lesser amounts of broadleaf and buckhorn plantain, prostrate knotweed, common mallow and black medic. Isolated populations of prickly lettuce, pineapple weed and field bindweed also occurred in the area.

Treatments were applied in 300 L of water/ha with a bicycle sprayer equipped with an air tank pressurized to 40 psi and 8002 nozzles. Plots were established the morning of May 7, 1985 when the weather was clear and calm with a temperature of 18°C.

Plots were evaluated for dandelion and clover control May 20 (see attached table) and July 1. Mecoprop gave poor weed control alone or in combination at the rates used. Dichlorprop generally provided good weed control in either formulated or tank mixtures. (Utah State Agricultural Experiment Station, Logan, UT 84322-4820)

Effects of herbicide combinations on broadleaf weed control in bluegrass turf

Treatment	Formulation	Rate[1] (lb ai/A)	Weed Control[2]	
			Dandelion	White Clover
mecoprop	potassium salt	1.0	30	10
MCPA	diethylamine salt	1.0	60	10
2,4-D	diethylamine salt	2.0	50	30
dicamba	diethylamine salt	0.6	40	50
dichlorprop + 2,4-D	butoxyethyl ester butoxyethyl ester (f)[3]	1.0 1.0	90	50
2,4-D + dichlorprop	diethylamine salt butoxyethyl ester (t)	2.0 2.0	70	30
mecoprop + dicamba	potassium salt diethylamine salt (t)	1.0 0.125	40	20
dichlorprop + 2,4-D + dicamba	butoxyethyl ester butoxyethyl ester (f) diethylamine salt (t)	1.0 0.125	90	50
2,4-D + dichlorprop + dicamba	butoxyethyl ester butoxyethyl ester diethylamine salt (t)	1.0 0.5 0.125	90	60
2,4-D + dichlorprop + dicamba	butoxyethyl ester diethylamine salt diethylamine salt (t)	1.0 1.0 0.125	90	70
2,4-D + dichlorprop + dicamba	isooctyl ester butoxyethyl ester diethylamine salt (f)	0.75 0.75 0.19	90	90
2,4-D + triclopyr	butoxyethyl ester butoxyethyl ester (f)	1.0 0.5	90	50
2,4-D + dicamba	diethylamine salt diethylamine salt (f)	1.0 0.35	60	30
untreated		---	0	0

[1]applied May 7, 1985

[2]rated May 20, 1985; figures represent percent control

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

Postemergence control of *Euphorbia maculata* (spotted spurge). Elmore, Clyde L. and J.A. Roncoroni. A bluegrass/bentgrass turf site on the margin of a practice putting green was selected to study postemergence control of *Euphorbia maculata* (spotted spurge). A mature, heavy population of spurge was treated August 7, 1985. The herbicides and rates used were: bromoxynil, 1 lb/A; bromoxynil plus pendimethalin, 1 + 2 lb/A; bromoxynil plus pendimethalin, 1 plus 4 lb/A; bromoxynil plus DCPA, 1 + 10 lb/A; bromoxynil plus DCPA, 1 + 15 lb/A; MSMA, 1 lb/A; MSMA, 2 lb/A; MSMA, 3 lb/A; MSMA plus pendimethalin, 2 + 2 lb/A; triclopyr (ester), 0.5 lb/A; triclopyr, 0.75 lb/A; 2,4-D + MCPP, 1.0 + 1.2 lb/A; 2,4-D + MCPP, 1.68 + 1.8 lb/A; trichlopyr plus pendimethalin, 0.5 + 2 lb/A; and triclopyr plus pendimethalin, 0.75 + 2 lb/A. Each experimental unit was replicated 4 times. Applications were made in 100 gpa at 30 psi. The temperature was 70 F with a high during the day of 90 F.

Visual evaluations representing burndown (August 7) and residual control (September 9) were taken. (Table 1) Bromoxynil at 1 lb/A exhibited initial burndown on mature spotted spurge 2 days after treatment. A combination of bromoxynil and pendimethalin at 1 + 4 lb/A gave excellent residual control. Triclopyr when combined with pendimethalin gave acceptable residual control but not when it was used alone. The combination of 2,4-D plus MCPP at 1.68 + 1.8 lb/A gave excellent control of spotted spurge. MSMA alone or in combination with pendimethalin was not effective nor was the standard bromoxynil plus DCPA (1 + 10 lb/A). By increasing the DCPA above label rate (15 lb/A) with bromoxynil increased control was achieved. No single herbicide or combination gave complete control. (University of California Cooperative Extension, Davis, CA 95616)

Control of spotted spurge in turfgrass

Herbicide	Rate lb. ai/A	Spotted spurge control[1] 2 DAT	Spotted spurge control[1] 30 DAT
bromoxynil	1	6.2	4.2
bromoxynil + pendimethalin	1 + 2	6.0	4.8
bromoxynil + pendimethalin	1 + 4	7.0	8.5
bromoxynil + DCPA	1 + 10	3.8	3.8
bromoxynil + DCPA	1 + 15	4.8	6.5
MSMA	1	1.0	1.8
MSMA	2	1.0	1.2
MSMA	3	1.0	2.0
MSMA + pendimethalin	2 + 2	1.2	2.0
triclopyr	0.5	1.2	3.2
triclopyr	0.75	1.5	3.2
2,4-D + MCPP	1.0 + 1.2	2.2	5.8
2,4-D + MCPP	1.68 + 1.8	2.5	9.5
triclopyr + pendimethalin	0.5 + 2	1.8	7.5
triclopyr + pendimethalin	0.75 + 2	1.5	7.2
untreated	-	1.0	1.0

[1] Spurge control: 1 = no control; 10 = complete burndown or control.

Chemical suppression of turfgrass using postemergence herbicides. Brundage, L.M. and R.D. William. During 1985, several chemical suppression experiments were conducted on Manhattan II perennial ryegrass (*Lolium perenne* L.), using sublethal rates of three postemergence herbicides. Plot size was 5 by 15 ft. with 3 replicates in a randomized complete block. Crop oil was combined with sethoxydim and fluazifop-p-butyl at 1% of total spray volume. Plots were visually rated within 4 to 6 weeks of herbicide application. Initially, chemical suppression trials were conducted on fertilized and unfertilized plots, but were continued on fertilized plots only as there was no visible difference in response to treatments.

Excellent (80-100%) suppression was achieved with fluazifop-p-butyl at rates of 0.10 and 0.20 lb ai/A, and moderate (50%) suppression was produced with fluazifop-p-butyl at 0.05 lb ai/A applied in the spring. Glyphosate at 0.15 to 0.35 lb ai/A failed to suppress growth.

Previous trials indicated less sensitivity to herbicide treatments with summer applications. Therefore, fluazifop-p-butyl and sethoxydim rates were doubled for summer and fall trials to encompass the entire range of seasonal variations in response. In our fall trial, complete (90-100%) suppression was achieved with only the highest rate of fluazifop-p-butyl at 0.40 lb ai/A and glyphosate at 0.35 lb ai/A, with some crop injury. Fluazifop-p-butyl at 0.1 and 0.2 lb ai/A, sethoxydim at 0.04 lb ai/A and glyphosate at 0.15 and 0.25 lb ai/A caused moderate (50-70%) growth suppression and some loss of color. Growth suppression ratings were lower than expected during the fall trial, although the plots experienced heat and moisture stress throughout the trial.

A separate experiment was conducted to determine the effectiveness of fluazifop-p-butyl and sethoxydim when combined with crop oil at 1% by volume and surfactant at .1% by volume. Fluazifop-p-butyl at 0.10 lb ai/A with crop oil produced satisfactory (80%) suppression as compared to moderate (60%) suppression with surfactant and poor (30%) suppression with herbicide alone. While moderate suppression was achieved with sethoxydim and oil, sethoxydim and surfactant and herbicide alone were ineffective. (Oregon State University Extension, Corvallis, OR 97331)

Evaluation of various herbicides in established rosemary (Rosmarinus officinalis). Elmore, C.E., and J.A. Roncoroni. Four pre-emergence herbicides, prometryn, pendimethalin, oxyfluorfen, and oryzalin, and two postemergence grass herbicides, sethoxydim and fluazifop-butyl, were tested for their weed control properties and phytotoxic effect, if any, on established rosemary. The rosemary was planted April 10, 1984, as rooted cuttings. On May, 6 1985, the established rosemary was cut to a height of 4 inches with a rotary mower.

This trial established at Davis, California, was conducted in a randomized complete block design of four replications, each measuring 1 row (30 in.) wide by 10 ft long. All treatments were applied with a CO_2 backpack hand sprayer using a single nozzle at 30 psi. The preemergence treatments were applied at 30 GPA water using a 8002E nozzle, and the postemergence treatments were applied at 50 gpa water using a 8004E nozzle.

Prometryn at 0.8 and 1.6 lb/A ai and pendimethalin at 2 and 4 lbs/A were applied on May 8, and oxyfluorfen at 0.5 and 1 lb/A and oryzalin at 2 and 4 lb/A was applied on May 9. No weeds were present at the time of application. Sprinkler irrigation was applied immediately after the application of the herbicides on May 9.

Two postemergence grass herbicides, sethoxydim at 0.5 and 1.0 lb/A plus 0.25% Surfel, a paraffin based spray adjuvent, and fluazifop-butyl at 0.25 and 0.5 lb/A ai plus 0.25%, X-77 a nonionic surfactant, were applied September 5, 1985. The late date of application was due to a late germination of a substantial number of barnyardgrass plants.

A visual evaluation of weed control was taken on September 9. There was an insufficient population of broadleaf weeds to determine weed control efficacy. The population of barnyardgrass plants was larger, but still very light-all herbicides produced better than 87% control of barnyardgrass in this trial.

Visual ratings for phytotoxic effect were made on three dates-June 4 and 13, and September 9. Only one herbicide caused more than slight phytotoxic effects. This herbicide, pendimethalin at both the 2 and 4 lb/A ai rates, caused moderate to severe damage to the rosemary and was visible at all three ratings. The effect of the pendimethalin on the rosemary was an almost complete ceasation of top growth for approximately 2 months. As the season progressed, the effect lessened and due to the late harvest date Oct. 28 - Nov. 6, 1985, the effect on yield was minimized and there was no significant difference in yield at the 5% level and significance. Harvesting in August or early September may have shown a far greater difference in rosemary yield.

Weed control, phytotoxicity and yield of rosemary treated with herbicides

Herbicide	Form.	Rate lb/A ai	Date of appl.	Appl. type	Phytotoxicity[1] 6/4	6/13	9/9	Control barnyardgrass[2] 9/9	Avg./gm yield/ plot
prometryn	80 WP	0.8	5/8	Pre	1.0	1.0	1.0	9.5	5720
prometryn		1.6	5/8	Pre	1.5	1.0	1.25	10.0	5543
pendimethalin	4 EC	2.0	5/8	Pre	3.2	3.8	3.0	9.75	4433
pendimethalin		4.0	5/8	Pre	3.5	4.5	3.75	9.0	4238
oxyfluorfen	1.6 EC	0.5	5/9	Pre	1.2	1.5	1.5	9.25	5616
oxyfluorfen		1.0	5/9	Pre	1.8	1.5	2.0	8.75	5532
oryzalin	4 AS	2.0	5/9	Pre	1.2	1.2	1.0	9.5	5616
oryzalin		4.0	5/9	Pre	1.2	1.2	1.5	9.25	6352
sethoxydim[A]	1.5 L	0.5	9/5	Post	1.8	1.0	1.0	10.0	6408
sethoxydim		1.0	9/5	Post	1.8	1.2	1.75	9.5	6018
fluazifop-butyl[B]	1L	0.25	9/5	Post	1.5	1.0	1.25	9.5	6102
fluazifop-butyl		0.50	9/5	Post	1.0	1.0	1.50	9.5	5355
control - unweeded	-	-	-		1.8	1.2	1.5	9.25	5327
control - weeded	-	-	-		1.2	1.0	1.25	9.75	5680

[A] = + 0.25% surfel

[B] = + 0.25% X-77

All numbers are an average of 4 replications.

[1] 1 = no effect, 10 = dead plant.

[2] 1 = no control, 10 = complete control.

Control of Hedera canariensis and Hedara helix in the landscape. Elmore C.L., L. Costello and D. Hamilton. Ornamental ivy *Hedera canariensis*, (algerian ivy) or *H. Helix* (English ivy) is commonly used in landscape plantings as a ground cover. It becomes evasive in the landscape as well as being a haven for rodents and snails.

Previous studies have shown both species to be tolerant of label rates of most premergence herbicides and such postemergence herbicides as amitrole, 2,4-D and glyphosate.

A study was initiated in 1983 by planting 5 foot wide strips of both species to evaluate control treatments in 1984. Mechanical and chemical treatments were initiated May 1, 1984. Replicated 5 ft. by 5 ft. blocks were established down the strips. Treatments consisted of hand removal with a shovel, mowing, a foliar treatment of a 2% or 25% solution of glyphosate or a 2% solution of triclopyr (amine). Other blocks were cut to the stem surface with a nylon cord weedeater (Toro) just before treatment with glyphosate 2% or 25% solution or 2,4-D water soluable amine at 2% or 25% solution. An untreated block was maintained throughout the study. Field plots were maintained under normal landscape fertilizer and water conditions for the remainder of the season.

Evaluations for control were made for control in 1984 12 months after treatment (Table 1). A 2% solution of glyphosate was ineffective for the control of either Algerian or English ivy. Glyphosate when sprayed at 25% solution on leaves or on stems that were freshly injured with a weedeater controlled both ivy species. Injuring the stems and cutting the leaves followed by spraying increased effectiveness. When English ivy was cut and then sprayed with a 2% or 25% solution of 2,4-D excellent control was achieved. Algerian ivy was not controlled with 2,4-D. Triclopyr or mowing did not control either species.

The control by removing the plants with a shovel was immediate and there was little regrowth. (University of California Cooperative Extension, Davis, CA 95616)

Ivy Control[1]

Treatment	Algerian Ivy 12 mo.	English Ivy 12 mo.
Hand removal - shovel	9.8	9.7
glyphosate (spray) 2%	1.0	2.7
glyphosate (spray) 25%	8.2	9.0
glyphosate (cut and spray) 2%	2.3	6.3
glyphosate (cut and spray) 25%	9.5	10.0
2,4-D W.S. amine (cut and spray) 2%	1.3	9.9
2,4-D W.S. amine (cut and spray) 25%	3.0	10.0
triclopyr (amine) 2%	1.0	1.7
Mow	1.7	2.0
Untreated	1.0	1.0

[1] Control: 1 = no effect; 10 = complete control.

Sour cherry orchard weed control with 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 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 herbicides applied singly.

Fall application of residual herbicides was made in a 7 year old 'Montmorency' sour cherry orchard in South Willard, Utah on October 26, 1984. Existing weeds were treated with paraquat two weeks prior to plant establishment. This orchard had a low weed population level due in part at least to repeated cross cultivation within the orchard. Plots were 2 x 18 m containing three 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. Plots were evaluated 3 times during 1985, 2 of which are summarized in the attached table.

Because of repeated cultivation the weed spectrum in the orchard included mainly broadleaf annuals. Weeds in the control plots included several mustards (blue mustard, shepherdspurse, black mustard and tumble mustard), kochia, downy brome, lambsquarters, Russian thistle, sunflower and prickly lettuce. Blue mustard and shepherdspurse mature early and were observed primarily in the early evaluation accounting in part for the higher rating of some treatments at the later evaluation. Kochia was the most prevalent weed in the orchard. Treatments containing oryzalin, oxyfluorfen, terbacil and terbutryn tended to lose their effectiveness 10 months after treatment.

All plots listed in the table were retreated in October, 1985 to determine effects of repeat applications on the weed spectrum and tree growth. Several additional combinations were included in the 1985 plots. No cherry tree phytotoxicity was observed in 1985. (Utah State Agricultural Experiment Station, Logan, UT 84322-4820).

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

Treatment	Rate[1] (kg/ha)	Weed Control[2] 5-14-85	Weed Control[2] 8-26-85	Weeds uncontrolled
diuron	1.1	9.5	9.6	
diuron	2.2	9.7	9.9	
dichlobenil	2.2	9.9	9.9	
fluorochloridone	1.1	9.5	9.9	
fluorochloridone	2.2	9.9	9.9	
fluorochloridone + simazine	1.1 1.1	9.9	9.9	
fluorochloridone + norflurazon	1.1 1.1	9.7	9.9	
napropamide	4.5	5.5	7.6	mustards, kochia sunflower
napropamide + oxyflurofen	4.5 1.1	9.9	9.9	
napropamide + simazine	4.5 1.1	9.5	9.5	
norflurazon	2.2	9.5	8.5	Russian thistle, kochia
norflurazon	1.1	9.0	8.5	kochia, black mustard
norflurazon + oryzalin	1.1 2.2	8.7	9.7	
oryzalin	2.2	7.5	8.0	kochia, blue mustard
oryzalin + simazine	2.2 1.1	9.7	9.9	
oryzalin + diuron	2.2 1.1	9.7	9.9	
oryzalin + terbutryn	2.2 1.1	9.0	8.5	
oryzalin + oxyfluorfen	2.2 2.2	9.8	6.2	
oxyflurofen	2.2	9.8	9.0	kochia, sunflower
oxyflurofen + simazine	2.2 1.1	9.9	9.0	
simazine	2.2	8.5	6.5	kochia
simazine	1.1	7.8	7.0	kochia, prickly lettuce
terbacil	1.1	9.8	5.2	
terbutryn	2.2	8.7	5.5	kochia, downy brome
untreated	---	1.7	0	kochia, mustards, downy brome, etc.

[1]treatments applied 10-26-84

[2]plot rates 0-10; 10 = complete weed control; ratings represent the average of 4 replications

Shade tree seedling tolerance to postemergence applications of fluazifop-butyl and sethoxydim. Regan, R.P. and R.D. William. Shade tree seedlings, usually 1-0, are spring planted in the field and budded that summer. Selective postemergence herbicides are often needed to control grass weeds. At the time of treatment, May 30 to June 5, 1985, seedlings had been planted for six to eight weeks. New growth was two to ten inches in length and each seedling within a plot averaged at least three fully expanded leaves. Wild oats were present within only one trial site.

Fluazifop-butyl initially damaged the foliage of Prunus avium (Mazzard cherry), Acer platanoides (Norway maple), and to a lesser extent Gleditsia triacanthos (Honeylocust). Mazzard cherry foliage turned bronze and eventually desiccated. The amount of leaf damage was correlated with the rate of herbicide. Norway maple showed foliar damage 12 days after treatment at the highest rate of fluazifop-butyl. Seedlings affected had a yellowish color, some necrotic leaves, and were generally stunted. The maple site was located within an area where all seedlings had a uniformity problem related to environmental conditions. The typical symptom on the honeylocust affected by the high rate of fluazifop-butyl was petiole damage causing leaf curl.

Although leaf damage of certain seedling species was observed soon after treatment, there was little affect on seedling growth and vigor. The one Mazzard cherry plot that was severely damaged at the 12 day rating soon recovered vigor, but its average height was slightly reduced. The xylene carrier for fluazifop-butyl is suspect for the damage observed.

Sethoxydim was not phytotoxic to either European white birch or Mazzard cherry at any of the treatment levels. The wild oats were completely controlled. Tree species not injured by either herbicide included: Betula pendula (European white birch), Fraxinus pennsylvanica var. lanceolata (Green ash), Liquadamber styraciflua (Sweetgum), and Tilia cordata (Little-leaf linden). (Oregon State University Extension, Marion County, OR 97301)

Phytotoxicity ratings for seven shade tree species 12 and 50 days after treatment with fluazifop-butyl[a/]

Treatment	Rate (lbs ai/A)	12 DAY Mazz. cherry	12 DAY Norway maple	12 DAY Honey-locust	50 DAY Mazz. cherry	50 DAY Norway maple	50 DAY Honey-locust
Check	-	0	0	0	0	0	0
Oil Check	-	0	0	0	0	0	0
Fluazifop-butyl + crop oil	0.12	3	0	0	0	0	0
Fluazifop-butyl + crop oil	0.25	4	0	0	0	0	0
Fluazifop-butyl + crop oil	0.5	6	5	1	0.5	0	0

a/ Mean of four replications where 0 = no injury and 10 = complete damage. Evaluated 6/11-18/85 and 7/22-25/85.

PROJECT 5.

WEED IN AGRONOMIC CROPS

Stephen D. Miller - Project Chairman

Comparison of summer grass control with winter applied herbicides. ORLOFF, S. B. and D. W. Cudney. A field trial was conducted to evaluate the residual control of summer grasses (barnyardgrass and yellow foxtail) provided by soil-active herbicides used for winter weed control. These treatments were also compared with a trifluralin 10 percent granule application. Some phytotoxicity to alfalfa was observed from diuron and hexazinone and was greatest from the combination treatments of the two herbicides. However, the damage to the alfalfa was tolerable and the alfalfa soon outgrew the effects of the herbicide(s). No phytotoxicity to alfalfa was observed from pronamid or trifluralin.

Hexazinone did not provide adequate grass control. Pronamid provided slightly better residual grass control than hexazinone. At the time of the last rating, September 13, the residual summer grass control of pronamid had diminished. Of the soil-active winter herbicides, diuron gave the highest degree of summer grass control.

Trifluralin at both rates was superior to all other herbicide treatments. The 1 lb. rate of trifluralin was slightly better than diuron at the higher rate. Trifluralin at the 2 lb. rate, however, provided outstanding summer grass control; the plots were essentially grass-free for the entire growing season. (University of California Cooperative Extension, Riverside, CA 92521)

Comparison of summer grass control
with winter applied herbicides, Lancaster, CA

Treatment	Rate lbs. ai/A	2/14 Crop injury	Rating* 7/2	Rating* 7/23	Rating* 8/27	9/13 Yellow foxtail	9/13 Barnyard-grass
diuron	1.0	1.2	6.6	6.0	6.6	3.2	3.4
diuron	2.0	1.2	7.2	7.0	7.9	6.2	6.8
hexazinone	0.25	1.0	2.5	0.0	0.0	2.0	2.0
hexazinone	0.50	1.2	2.2	0.2	0.0	3.5	3.2
hexazinone	0.75	1.8	2.8	0.0	0.0	2.5	2.0
pronamid	1.0	0.0	1.0	1.2	0.0	3.5	1.8
pronamid	2.0	0	4.2	4.3	1.8	4.2	4.8
diuron + hexazinone	1.0 + .25	2.0	4.0	7.8	6.0	5.5	5.3
diuron + hexazinone	2.0 + .25	2.2	7.5	8.6	8.4	6.2	5.5
diuron + hexazinone	1.0 + .50	2.1	6.8	4.2	6.9	4.8	5.5
trifluralin	1.0	0.0	8.1	9.1	8.3	7.4	6.9
trifluralin	2.0	0.0	9.6	9.9	9.5	9.9	9.9
Check		0.0	0.0	0.0	0.0	3.2	3.0
L.S.D. .05		0.5	2.9	1.8	1.0	2.7	2.8

*Weed Control: 0 = No Weed Control 10 = 100% Weed Control
Crop Phytotox: 0 = No Injury 10 = Crop Killed

Data is the average of four replications. Herbicide applications were made January 18, 1985 and January 20, 1985.

Summer grass control in alfalfa. ORLOFF, S. B. and D. W. Cudney. Summer grasses pose a serious threat to alfalfa production in the high elevation deserts of southern California. The grasses which most often pose a problem are barnyardgrass and yellow foxtail. A summer grass control trial was established in an alfalfa field in its last year of production. This field was known to have a heavy summer grass infestation. Trifluralin (10 percent granules) was applied on March 22, 1985, and incorporated the following day with flood irrigation. Postemergence herbicides (sethoxydim and fluazifop) were applied after second cutting when the grasses were 6 to 8 inches tall.

Trifluralin provided superior grass control, especially at the two higher rates (2 and 3 lbs. ai/A). These rates provided excellent control even into late summer (August 28). Fluazifop provided some control, slightly better at the 0.5 lb. rate than the 0.25 lb. rate, but the control of yellow foxtail was inadequate. Applications of sethoxydim resulted in better yellow foxtail control than fluazifop, but not as complete control as that given by trifluralin at the higher rates. (University of California Cooperative Extension, Riverside, CA 92521)

Summer grass control trial, Lancaster, CA

				8/28	
	Rate	Yellow foxtail rating		Seed heads/ 22 ft.^{2}	
Treatment	lbs. ai/A	4/2	4/30	Barnyardgrass	yellow foxtail
trifluralin	1.0	7.1	7.1	1.0	4.3
trifluralin	2.0	7.4	8.9	0.5	1.2
trifluralin	3.0	8.9	9.8	0.1	0.1
sethoxydim	0.25	---	7.2	2.7	3.9
sethoxydim	0.50	---	8.1	1.8	3.0
fluazifop	0.25	---	4.6	2.6	16.7
fluazifop	0.50	---	5.9	1.7	18.6
Check		0.0	0.0	6.1	24.8
L.S.D. .05		2.7	1.7	2.7	4.6

*Rating: 0 = No Weed Control 10 = 100% Weed Control
Data is the average of four replications

Winter weed control in established alfalfa. ORLOFF, S. B. and D. W. Cudney. The purpose of this trial was to evaluate winter weed control herbicides in established alfalfa under high desert conditions in southern California. Such a comparison with currently available herbicides had not been made previously in this area. Winter annual grasses are a major pest to alfalfa during this season. The application of herbicides in this trial was timed to simulate a "normal grower application."

At treatment time, January 25, the wild barley had already emerged. The plots received one-half inch of rainfall within 3 days of treatment time. This helped incorporate the soil-applied materials (diuron, hexazinone, pronamid). The soil-applied herbicides were of limited value for weed control after the weeds had emerged. This trial demonstrated the advisability of applying the soil-applied herbicides earlier in the season or combining the soil-applied herbicides with paraquat. Initially paraquat (.50 ai/A) gave significantly better grass control than the soil-applied materials. Of the preemergence herbicides, pronamid gave the best grass control. The combination of 2 lbs. ai/A of pronamid and paraquat gave the best overall control. Combinations of the other soil-active herbicides with paraquat provided slightly better grass control (although not statistically significant) than paraquat alone. (University of California Cooperative Extension, Riverside, CA 92521)

Winter weed control in established alfalfa, Lucern Valley, CA

		Ratings*					
		2/14		4/25		5/16	
Treatment	Rate lbs. ai/A	Crop injury	Grass** control	Wild barley	Downy brome	Wild barley	Downy brome
paraquat	0.25	1.0	5.0	6.0	3.8	6.8	5.8
paraquat	0.50	2.2	7.8	8.5	6.2	8.8	7.0
diuron	1.00	0.2	1.8	3.2	1.8	5.0	4.5
diuron	2.00	0.9	3.2	4.0	2.8	6.6	6.2
hexazinone	0.25	1.1	2.0	2.0	2.8	6.0	6.0
hexazinone	0.50	1.5	1.8	5.5	2.0	7.2	6.0
hexazinone	0.75	1.4	3.0	5.2	3.8	6.5	5.8
pronamid	1.00	1.0	3.0	7.5	4.8	8.8	7.2
pronamid	2.00	0.2	3.2	6.5	5.0	9.0	7.8
diuron + paraquat	1.0 + .50	2.0	9.0	9.5	7.5	9.2	8.2
diuron + paraquat	2.0 + .50	2.5	9.5	8.8	7.0	9.4	8.2
hexazinone + paraquat	0.25 +.50	2.0	9.5	9.0	6.5	9.0	7.8
hexazinone + paraquat	0.50 +.50	2.2	9.3	9.0	6.2	9.2	8.5
pronamid + paraquat	1.0 + .50	2.5	10.0	9.2	7.2	9.8	7.7
pronamid + paraquat	2.0 + .50	2.4	10.0	9.5	8.5	9.8	9.4
diuron + hexazinone	1.0 + .25	1.2	3.3	4.2	4.2	6.2	6.5
diuron + hexazinone	2.0 + .25	1.2	3.0	4.5	3.5	7.5	6.2
diuron + hexazinone	2.0 + .50	1.5	2.3	4.2	3.0	7.2	6.8
diuron + hexazinone + paraquat	1.0 + .25 + .5	2.8	10.0	9.5	8.0	9.5	6.8
Check		0.3	1.8	3.0	2.2	2.0	1.0
L.S.D. .05		0.6	1.8	3.3	3.0	2.0	2.2

*0 = No Weed Control 10 = 100% Weed Control
0 = No Injury 10 = Crop Killed

**Grasses were a mixture of wild barley and downy brome.
Data is the average of four replications.

Quackgrass control in forage alfalfa. Whitesides, R.E. and D.G. Swan. A field experiment was established in January 1983 to evaluate the control of quackgrass in forage alfalfa after sequential applications of herbicides. The experiment was located in an alfalfa field with a quackgrass density of 431 shoots/m^2 with a silt loam soil. Plot size was 3 m by 6 m and each treatment was replicated four times. All herbicide treatments were applied with a compressed air bicycle wheel plot sprayer calibrated to deliver 187 l/ha at 207 kPa pressure. Visual observations of quackgrass control were conducted in 1983, 1984, and 1985 when the quackgrass and alfalfa were approximately 1 week away from harvest.

Twelve months after the last application of sethoxydim, fluazifop, and DPX-Y6202, quackgrass control had declined to a level that was unacceptable. Haloxyfop, pronamide, and hexazinone were effective in reducing quackgrass stands during the year of herbicide application and also provided very acceptable control 1 year after the last application. DPX-Y6202 was the most erratic in control from 1983 to 1984 and was not effective 1 year after treatment. Hexazinone (2.2 kg ai/ha) was the only treatment where quackgrass control increased after sequential applications, and residual control increased even after the final application. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Quackgrass control in forage alfalfa

Herbicide	Rate (kg ai/ha)	Application date 1983	Application date 1984	Quackgrass control[b] 1983	1984	1985
				%		
pronamide	3.4	Jan 14	Mar 8	100	85	73
pronamide	4.5	"	"	100	95	90
hexazinone	1.7	"	"	45	95	91
hexazinone	2.2	"	"	75	95	99
sethoxydim[a]	2.2	Mar 10	Mar 30	100	65	18
fluazifop[a]	0.6	"	"	100	65	51
haloxyfop[a]	1.1	"	"	100	85	98
DPX-Y6202[a]	0.3	"	"	0	65	35
Untreated control				0	0	0

[a] Herbicides were applied with 1.2 l/ha crop oil added to the spray solution.

[b] 0 = no control and 100 = total control. Evaluations completed April 26, 1983, April 25, 1984 and April 25, 1985.

The evalution of preemergence, residual herbicides for the control of Yellow Foxtail (Setaria lutescens) in established alfalfa hay. Vargas, Ron and Gerecke, Tom. A fourth year stand of Condura-73 alfalfa was divided into plots 10 X 20' and replicated four times in a randomized complete block design. Preemergence herbicides were applied on 2/2/84 to alfalfa with 1 to 6 inches of growth and known to be highly infested with yellow foxtail. Paraquat was applied to kill existing weed seedlings.

An evaluation on April 26, 1984, after the first cutting indicated excellent control (80 to 90 percent) with trifluralin granules, pendimethalin and prodiomine at both the low and high rates tested. Oryzalin was giving fair control at 63 to 70 percent. A later evaluation on August 22, 1984, after the fifth cutting, indicated 86 and 87 percent control with trifluralin granules at the 2 and 3 pound ai per acre rate. Prodiamine was giving 70 and 84 percent control at the 1 and 2 pound ai per acre rate. Yellow foxtail seedhead counts on July 16, 1984 exhibited excellent control with both trifluralin granules and liquid, pendimethalin, prodiamine and the high rate of oryzaline. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Preemergence yellow foxtail control in alfalfa hay

Treatments	#ai/A	Foxtail Control 4/26/84	Foxtail Control 8/22/84	Yellow Foxtail Seedheads Per Square Yard 7/16/84
trifluralin (5% granules)	2	9.12	8.6	0
trifluralin	2	7.6	2.25	4.0
pendimethalin	2	8.75	4.25	4.25
oryzalin	2	6.3	.75	35.75
prodiamine	1	8.0	7.0	4.25
prodiamine	2	8.0	8.4	.25
trifluralin (5% granules)	3	9.12	8.75	0
pendimethalin	3	9.25	6.5	.75
oryzalin	3	7.0	2.0	2.5
check	-	0	0	54.0

*Average of four replications were 0 = no control and 10 = 100% control

The evaluation of postemergence selective grass herbicides for the control of Yellow Foxtail (*Setaria lutescens*) in established alfalfa hay. Vargas, Ron and Gerecke, Tom. A fourth year stand of alfalfa hay heavily infested with yellow foxtail (70 per sq. yd.) was divided into plots 40 X 50' and replicated three times in a randomized complete block design. Various postemergence selective grass herbicides were applied on May 24, 1984, after the second cutting, at which time the foxtail was 2 to 6 inches tall with one to five tillers. All materials were applied in 20 gallons of water per acre with one quart of a petroleum based surfactant. A second application of both clopropoxydin and sethoxydim at .38 lb ai per acre was applied on July 24, 1984 after the fourth cutting when the foxtail was tillered. An early evaluation on June 26, 1984 indicated 80 percent control with both rates of sethoxydim and 83 to 86 percent control with clopropoxydin. All other materials were giving poor control. An evaluation on August 14, 1984 again indicated unacceptable control with all materials except clopropoxydin and sethoxydim. Control of both clopropoxydin and sethoxydim weakened, but when a second application was made control was maintained at 88 to 90 percent. Yellow foxtail seedhead counts exhibited a dramatic reduction from the check plots with both clopropoxydin and sethoxydim. Haloxyfop-methyl and asulam reduced seedhead counts down to 10.3 and 12.6 respectfully. Later counts on September 17, 1983 indicated large numbers (300 seedheads per square yard) with all materials except clopropoxydin and sethoxydim. Two applications of .38 lb ai of clopropoxydin reduced seedheads down to 15.6 per square yard as compared to a single application with 115.5 seedheads per square yard. Two applications of sethoxydim at .38 lbs ai reduced seedhead counts to 8.3 from 70.6 with a single application of .38 lbs ai per acre. (University of California Cooperative Extension , 328 Madera Avenue, Madera, CA 93637)

Postemergence yellow foxtail control in alfalfa hay

Treatments	#ai/A	Foxtail Control* 6/26/84	Foxtail Control* 8/14/84	Yellow Foxtail Seedheads Per Sq Yd 7/17/84	Yellow Foxtail Seedheads Per Sq Yd 9/17/84
clopropoxydim	.25	8.3	5.5	1.5	100.6
clopropoxydim	.38	8.6	6.0	.8	115.6
clopropoxydim	.38 + .38	8.6	9.0	-	15.6
sethoxydim	.25	8.0	6.0	2.6	64.6
sethoxydim	.38	8.0	6.1	.1	70.6
sethoxydim	.38 + .38	8.0	8.8	-	8.3
fluazifop-P-dibutyl	.125	1.6	2.2	85.0	1/
fluazifop-P-dibutyl	.25	4.0	3.3	29.5	1/
haloxyfop-methyl	.125	3.6	2.1	35.0	1/
haloxyfop-methyl	.25	5.0	3.0	10.3	1/
fenoxaprop-ethyl	.25	4.6	4.1	22.0	1/
fenoxaprop-ethyl	.38	6.3	5.6	31.0	1/
asulam	2.5	5.0	4.3	14.8	1/
asulam	3.3	6.3	5.3	12.6	1/
DPX-Y6202	.125	1.3	2.8	91.0	1/
DPX-Y6202	.25	4.6	3.0	24.1	1/
check	-	0	0	82.6	302.0

*Average of three replications were 0 = no control and 10 = 100% control

1/Visually seedhead numbers were equal to check plot, so counts were not made

Houndstongue control in alfalfa fields with early spring applied herbicides. Evans, J.O. and C.V. Bagley. Houndstongue (*Cynoglossum officinale* L.) has been shown to be toxic to horses. It is unpalatable and strongly avoided by most classes of livestock in all growth stages of the plant. Toxicity problems occur when houndstongue grows in alfalfa fields or grass hay fields and is harvested and fed forage. Horse losses have been reported in Colorado and Utah. Houndstongue occurs commonly throughout Utah, mostly in pastures and rangeland but is an increasing problem in fields devoted to producing livestock feed. Houndstongue is a difficult weed to control in that it produces a deep well-anchored taproot that is very strong. Simple surface cultivation is not effective in dislodging the plants from soil. Likewise, houndstongue is not readily rogued from fields by hand since the aerial portion of the plant usually breaks near the ground surface and plants quickly regenerate new top growth.

This trial was initiated 4 May 1985 in Utah county southeast of Provo, Utah on Dale Childs farm. Houndstongue was in the rosette stage approximately 2 inch diameter size. Alfalfa was 2 inches tall. Each treatment measured 8 x 20 feet and was replicated four times in a complete randomized design. Treatments were applied with a bicycle sprayer delivering 17 gpa. Metribuzin, hexazinone and terbacil had little, if any, action on houndstongue. They did not cause observable injury to the alfalfa. Increasing the dosage levels of the three herbicides mentioned above did not appear to increase their activity against the weed, whereas alfalfa injury increased slighly with increased herbicide dosage. Norflurazon did not show activity on houndstongue. Some discolorization of alfalfa plants was observed but disappeared as the season progressed.

The most effective treatment for controlling houndstongue in this trial was 4(2,4-DB). Both dosages tested resulted in greater than 80 percent houndstongue control with some improvement in control associated with the higher concentration of 4(2,4-DB). Bromoxynil was not highly active against houndstongue of this growth stage at treatment time but may be more active if applied at an earlier stage. Combining bromoxynil with 4(2,4-DB) weakened the 'phenoxy' herbicide action on houndstongue. (Plant Science Department, Utah State University, Logan, Utah 84322-4820).

Houndstongue Control in Established Alfalfa

Treatment	Rate lb/A	Alfalfa Injury (0-10)	Percent Control houndstongue
metribuzin	.25	0	0
metribuzin	.50	0	0
metribuzin	1.00	0	0
hexazinone	.25	0	0
hexazinone	.50	0	12
hexazinone	1.00	1.0	20
terbacil	.25	0	10
terbacil	.50	0.5	10
norflurazon	3.00	2.0	5
4(2,4-DB)	.50	0	82
4(2,4-DB)	1.00	0	90
bromoxynil	.50	0	5
bromoxynil + 4(2,4-DB)	.50 + .50	0	20
control		0	0

Crop injury - 0 = no effect; 10 = complete kill
Weed control - Evaluated 22 July 1985

Comparison of herbicides for control of yellow foxtail in established alfalfa. Norris, R. F., R. A. Lardelli and C. A. Schoner. This trial was conducted on a grower-cooperator field in Yolo County, California. Several herbicides were evaluated applied pre- and/or postemergence; the selected herbicide treatments were applied on two different dates to different plots. The preemergence application was on January 24, 1985 prior to emergence of yellow foxtail, and when the alfalfa was dormant. The postemergence application was on July 17, 1985 following the third cutting; alfalfa regrowth was approximately 4 inches tall and yellow foxtail was 1 to 3 inches tall. All treatments were applied with a CO_2 backpack handsprayer calibrated to deliver 30 gal/A. Plot size was 5 ft by 10 ft and each treatment was replicated four times.

Visual ratings for weed control efficacy were taken on June 20, August 22 and September 23, 1985. There was no noticeable crop damage or stunting from any of the treatments. Preliminary observation in early February indicated that norflurazon provided control of established weeds.

Preemergence application of prodiamine or trifluralin at 2.0 lb/A provided satisfactory control through September, whereas the performance of the other preemergence treatments had weakened by the mid-August evaluation.

Postemergence application of asulam at 1.75 lb/A was the most effective treatment of the postemergence herbicides tested. Sethoxydim plus oil also provided good grass control but required 1.0 lb/A to achieve adequate control. SC-1084 plus oil showed little effect on the yellow foxtail at the rates applied. (Botany Department, University of California, Davis, CA 95616, and Cooperative Extension, Woodland, CA 95695.)

Yellow foxtail control in established alfalfa following pre- and postemergence herbicide treatments.

Treatment	Rate	Yellow Foxtail Control[1/]		
		6/20	8/22	9/23
	(lb/A)	---------- (% control) ----------		
Preemergence (applied 1/24/85)				
Prodiamine	0.5	94 fg	71 fghijkl	80
Prodiamine	1.0	93 efg	91 ijkl	94
Prodiamine	2.0	100 g	99 l	100
Pendimethalin	1.0	83 defg	54 bcdefgh	43
Pendimethalin	2.0	100 g	78 hijkl	90
Pendimethalin	3.0	85 efg	74 ghijkl	66
Trifluralin 10G	1.0	94 fg	64 efghi	63
Trifluralin 10G	2.0	100 g	91 ijkl	96
Trifluralin 10G	3.0	100 g	98 kl	98
Oryzalin	1.0	65 bcdefg	39 abcde	35
Oryzalin	2.0	98 g	66 efghij	76
Oryzalin	3.0	100 g	70 fghijkl	80
Norflurazon	1.0	94 fg	43 abcdef	43
Norflurazon	2.0	98 g	63 defghi	59
Norflurazon	3.0	98 g	74 ghijkl	88
Haloxyfop	0.25	63 bcde	20 a	23
Haloxyfop	0.5	89 efg	30 ab	31
Haloxyfop	1.0	90 efg	45 abcdefg	28
DPX-Y6202	0.25	87 efg	35 abcd	43
DPX-Y6202	0.5	89 efg	45 abcdefg	38
DPX-Y6202	1.0	98 g	63 defghi	65
Postemergence (applied after 3rd cutting, 7/17/75)				
Asulam	1.0	65 bcdefg	66 efghij	80
Asulam	1.75	78 cdefg	98 kl	98
Sethoxydim + oil	0.25 + 1 qt.	70 bcdefg	59 cdefgh	84
Sethoxydim + oil	0.5 + 1 qt.	55 abcd	81 hijkl	86
Sethoxydim + oil	1.0 + 1 qt.	52 abc	94 jkl	99
SC 1084 + oil	0.5 + 1 qt.	46 ab	28 ab	29
SC 1084 + oil	1.0 + 1 qt.	33 a	35 abcd	35
Haloxyfop + oil	0.5 + 1 qt.	55 abcd	71 ghijkl	81
Untreated check		80 cdefg	33 abc	26

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

Evaluation of herbicide treatments in dormant alfalfa, Torrington. Miller, S.D. Research plots were established on March 20, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of herbicide treatments for weed control in dormant alfalfa (var. Apollo). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (71% sand, 21% silt, and 8% clay) with 1.2% organic matter and a 7.2 pH.

Visual weed control and crop damage evaluations were made on May 21 and plots harvested for yield June 3, 1985. Weed infestations were moderate to heavy throughout the experimental area. Several treatments resulted in slight alfalfa injury; however, all herbicide treatments resulted in substantial yield increases compared to the untreated check. Downy brome control was excellent with terbacil, hexazinone, metribuzin and simazine; tansy mustard control excellent with all treatments except pendimethalin and kochia control excellent with all treatments except hexazinone or pendimethalin. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1379.)

Weed control in dormant alfalfa - Torrington

Treatment	Rate lb ai/A	Alfalfa Injury %	Alfalfa Yield lb/A	Percent control Tamu	Percent control Dobr	Percent control Kocz
terbacil	0.5	2	3751	99	96	92
hexazinone	0.5	0	3287	100	99	77
metribuzin	0.75	8	3124	98	95	97
simazine	1.0	2	2829	90	92	92
pendimethalin	2.0	0	2810	43	58	85
pendimethalin	3.0	0	2784	50	50	82
AC-263,499	0.06	0	3520	100	57	97
AC-263,499	0.09	0	3280	100	60	100
AC-263,499	0.125	0	3248	100	65	100
Check	- - -	0	2483	0	0	0

Evaluation of herbicide treatments in dormant alfalfa, Laramie. Miller, S.D. Research plots were established on April 4, 1985 at the University of Wyoming Livestock Farm, Laramie 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 6-nozzle knapsack unit delivering 40 gpa at 40 psi. 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.

Visual weed control and crop damage evaluations were made on June 7 and plots harvested for yield July 1 and August 22, 1985. Weed infestations were moderate and uniform throughout the experimental area. None of the herbicide treatments injured alfalfa. Alfalfa yields in herbicide treated plots were increased 500 to 1400 lb/A compared to the untreated check plots. Downy brome control was excellent with hexazinone or terbacil; shepherdspurse excellent with all treatments and skeletonleaf bursage excellent with AC-263,499 at all rates or DPX-L5300 at 0.023 lb/A. Hexazinone at 0.75 lb/A was the only treatment which provided fair control of common dandelion. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1371 .)

Weed control in dormant alfalfa - Laramie

Treatment	Rate lb ai/A	Alfalfa Injury %	Alfalfa Yield lb/A 1st	Alfalfa Yield lb/A 2nd	Percent control Coda	Percent control Shpu	Percent control Sklb	Percent control Dobr
hexazinone	0.5	0	3952	2093	62	100	0	97
hexazinone	0.75	0	4416	2227	82	100	0	100
terbacil	0.5	0	4001	2227	10	100	0	100
AC-263,499	0.06	0	4577	2304	0	99	93	7
AC-263,499	0.09	0	3844	2170	13	97	95	7
AC-263,499	0.125	0	3805	2208	13	97	98	13
AC-263,499	0.15	0	3926	2266	32	99	98	23
DPX-L5300	0.015	0	3988	2246	23	91	78	0
DPX-L5300	0.023	0	4180	2534	30	97	95	0
Check	- - -	0	3347	2131	0	0	0	0

Prairie Cupgrass control in established alfalfa. Bell, C.E. Several postemergence grass herbicides were tested for control of prairie cupgrass (Eriochloa contracta Hitchc.) in established alfalfa. There were two experiments, done in two consecutive years (1984-85) in the same field in Imperial County, California.

In both experiments, application of the herbicide was with a CO2 pressured sprayer at 30 gallons per acre spray volume. Herbicide application was timed to be shortly after an irrigation so that the grass would not be stressed for moisture. Also, herbicide application was after the alfalfa harvest so that the alfalfa would not intercept the spray. Evaluation was by visual observation and rated on a scale of 0 to 10 (0 = no control, 10 = all weeds dead).

Experiment #1 was initiated on August 14, 1984. Plot size was 3 feet by 15 feet with three replications in a randomized complete block design. Evaluation was made on August 24, 1984. Herbicides, treatment rates, and level of control are shown in Table 1. Treatment rates are in lb ai/A.

Experiment #2 was initiated on July 22, 1985. Plot size was 5 feet by 25 feet with four replications in a randomized complete block design. Evaluation was made on August 19, 1985. Herbicides, treatment rates and level of control are shown in Table 2. Treatment rates are in lb ai/A.

There is a great deal of difference between the two years. Although the reasons for this variation are not precisely known, it is most likely due to environmental differences affecting the susceptibility of the grass. (University of California Cooperative Extension, El Centro, California 92243)

Table 1. Results of experiment in 1984

Herbicide	Rate	Control
1. sethoxydim	.15	6.7
2. sethoxydim	.3	8.7
3. sethoxydim	.45	10.0
4. fluazifop-butyl	.15	6.7
5. fluazifop-butyl	.3	8.3
6. fluazifop-butyl	.45	7.7
7. fluazifop-p-butyl	.15	6.3
8. fluazifop-p-butyl	.3	8.7
9. fluazifop-p-butyl	.45	9.3
10. DPX-Y6202	.15	7.7
11. DPX-Y6202	.3	8.3
12. DPX-Y6202	.45	10.0
13. fenoxaprop-ethyl	.15	8.7
14. fenoxaprop-ethyl	.3	8.7
15. fenoxaprop-ethyl	.45	9.7
16. haloxyfop-methyl	.15	8.3
17. haloxyfop-methyl	.3	9.3
18. haloxyfop-methyl	.45	10.0
19. elopropoxidim	.15	7.0
20. elopropoxidim	.3	9.3
21. elopropoxidim	.45	9.0
22. poppenate-methyl	.15	5.0
23. poppenate-methyl	.3	6.0
24. poppenate-methyl	.45	7.7
25. Untreated control		0.0

Table 2. Results of experiment in 1985.

Herbicide	Rate	Control
1. sethoxydim	.3	4.3
2. sethoxydim	.6	6.5
3. BAS517	.075	4.0
4. BAS517	.15	6.3
5. fluazifop-butyl	.3	0.8
6. fluazifop-butyl	.6	4.5
7. fluazifop-p-butyl	.3	5.5
8. fluazifop-p-butyl	.6	6.0
9. haloxyfop-methyl	.15	5.3
10. haloxyfop-mehtyl	.3	9.0
11. DPX-Y6202	.15	0.8
12. DPX-Y6202	.3	2.3
13. poppenate-methyl	.3	1.8
14. poppenate-methyl	.6	3.5
15. Untreated control		0.0

Dodder control. ORLOFF, S. B. and D. W. Cudney. Dodder is the most important limiting factor to alfalfa production in the higher desert valleys of California. Dodder germinates in the spring and is a serious problem throughout the summer, requiring costly control procedures which presently provide less than preferred dodder control. Experiments were conducted in the spring and summer of 1985 to evaluate existing materials which had been previously found to have activity on dodder including: DCPA, pronamid, chloropropham, and glyphosate, as well as AC 263,499. In addition, the prospects of control with trifluralin were extremely encouraging.

I Preemergence dodder control. A preemergence dodder trial was established on April 4, 1985 in a field known to be infested with dodder. The efficacy of four different preemergence herbicides was evaluated after second cutting. Each plot was evaluated by comparing it to an adjacent untreated check. Only DCPA was found to be effective in controlling dodder. Pronamid provided some degree of control; however, it was not consistent.

II Preemergence dodder control. A severe dodder infestation occurred in a summer grass control trial. Dodder was noted to be absent or nearly absent in the trifluralin-treated plots. The plots were evaluated after second cutting on June 18, 1985. As shown in the table, trifluralin provided dodder control, especially at the higher rates (2 lbs. and 3 lbs. ai/A). Later ratings were not possible because the heavy dodder infestation in surrounding plots invaded the treated plots.

Postemergence dodder control. Two postemergence materials were tested in a field with a heavy infestation of attached dodder. An experimental herbicide, AC 263,499, and glyphosate were not effective in controlling dodder at the rates tested. By July 25, the plots were completely overgrown with dodder. (University of California Cooperative Extension, Riverside, CA 92521)

I Preemergence dodder control, Lucerne Valley, CA

Treatment	Rate lbs. ai/a	Dodder control* rating 6/17
pronamid	2.0	3.3
DCPA	10.0	10.0
AC 263,499	0.1	0.0
AC 263,499	0.2	0.0
chloropropham	4.0	0.0
Check	0.0	0.0
L.S.D. .05		2.9

*0 = No Weed Control 10 = 100% Weed Control
Data is the average of four replications.

II Preemergence dodder control, Lancaster, CA

Treatment	Rate lbs. ai/A	Dodder control* rating 6/18
trifluralin	1.0	8.0
trifluralin	2.0	9.5
trifluralin	3.0	9.5
Check		0.0

*0 = No Weed Control 10 = 100% Weed Control

Postemergence dodder control, Lancaster, CA

Treatment	Rate lbs. ai/A	Dodder control rating* 7/16	7/25
AC 263,499	.1	3.0	0.8
AC 263,499	.2	2.5	1.3
glyphosate	.0156	1.3	1.3
glyphosate	.0313	1.0	0.8
glyphosate	.0625	1.0	1.5
glyphosate	.25	1.8	2.8
Check		0.8	0.5
L.S.D. .05		NS	NS

*0 = No Weed Control 10 = 100% Weed Control
Data is the average of four replications. Treatment date July 9, 1985

Evaluation of postemergence herbicide treatments for dodder control in alfalfa. S.D. Miller. A series of postemergence herbicide treatments were applied at Riverton, Wyoming, July 8, 1985 to evaluate their effectiveness for dodder control in established alfalfa. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a loam (49% sand, 43% silt, and 8% clay) with 1.5% organic matter and a 7.6 pH. The alfalfa had a 0.5 in. of regrowth after the first cutting and dodder was starting to flower when treatments were applied.

Visual weed control and crop damage evaluations were made on July 24, 1985. Dodder infestations were moderate and uniform in the experimental area. DCPA at 7.0 lb/A and glyphosate at 0.25 lb/A were the only treatments which provided over 80% dodder control; however, glyphosate at 0.25 lb/A resulted in 18% alfalfa injury. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1372 .)

Dodder control in alfalfa

Treatment	Rate lb ai/A	Alfalfa Injury %	Dodder Control %	Dodder Attachment[1] 0-5
DCPA	3.5	0	73	2
DCPA	7.0	0	83	1
chloropropham	4.0	2	57	2.7
chloropropham	6.0	3	58	2.7
chloropropham + carbaryl	4.0 + 0.75	2	63	2.7
chloropropham + carbaryl	6.0 + 0.75	7	68	2.3
glyphosate	0.18	2	52	3.3
glyphosate	0.25	18	82	1.3
Check	------	0	0	5

[1]Attachment based on scale of 0 to 5 where 0 = none and 5 = complete

Alfalfa preplant and early postemergence weed control evaluations in California's high desert. CUDNEY, D. W. and S. B. Orloff. The following trial was conducted to evaluate existing preplant and postemergence herbicides for use under California's high desert conditions. The preplant herbicides compared were EPTC and benefin. The postemergence herbicides used were 2,4-DB amine and propham granules. In addition, sequential applications were studied using a preplant herbicide and one or both postemergence herbicides. Normal application rates and double application rates for each herbicide were studied.

The preplant herbicides gave limited weed control with EPTC providing the better weed control of the two. However, especially at the higher rate, EPTC caused some phytotoxicity which was expressed as a "sticking together" of the leaves. Neither of the two gave adequate control of weeds in the mustard family.

Applications of 2,4-DB amine at both rates resulted in excellent control of mustard species (tansy mustard, london rocket and shepherd's purse). 2,4-DB also caused some alfalfa injury which was expressed as stunting and malformed leaves. Plants outgrew these symptoms after a few weeks. Propham controlled wild barley especially at the higher application rate. Neither rate caused damage to the alfalfa.

Any combination treatment containing 2,4-DB produced phytotoxic symptoms in the alfalfa. The most severe symptoms were noted when 2,4-DB and propham were combined with a preemergence EPTC application. An application including 2,4-DB and propham provided control of both broadleaf and grassy weeds present in this trial. (University of California Cooperative Extension, Riverside, CA 92521)

Alfalfa preplant and early postemergence weed control evaluations in California's high desert, Barstow, CA

Treatment	Rate lbs. ai/A	Alflafa Phyto*	Wild Barley*	London Rocket*	Alfalfa Phyto*	Wild Barley*	London Rocket*
Preplant							
benefin	1	0.0	1.0	0.2	0.0	0.5	0.0
benefin	2	0.2	1.2	0.2	0.2	0.0	0.0
EPTC	2	0.2	1.5	0.5	0.2	1.2	0.0
EPTC	4	0.2	5.8	0.0	0.0	5.2	0.5
Postemergence							
2,4-DB amine	1	3.8	0.2	10.0	2.6	0.0	10.0
2,4-DB amine	2	3.5	0.0	10.0	3.0	0.0	10.0
propham	3	0.5	7.2	0.0	0.0	7.8	0.0
propham	6	1.0	8.0	0.2	0.2	9.8	10.0
2,4-DB + propham	1+3	2.5	6.0	9.8	1.5	7.0	9.5
2,4-DB + propham	2+6	4.8	8.8	10.0	3.2	9.0	10.0
Preplant + Postemergence							
benefin+2,4-DB + propham	1+1+3	3.2	5.8	10.0	2.1	8.0	9.8
benefin+2,4-DB + propham	2+2+6	4.8	8.2	10.0	3.5	9.8	10.0
EPTC+2,4-DB + propham	2+1+3	3.0	3.0	10.0	2.2	8.2	10.0
EPTC+2,4-DB + propham	4+2+6	7.5	9.8	10.0	4.7	10.0	10.0
Check	0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.D. .05		1.8	2.2	0.5	1.0	1.6	0.6

*RATING: Weed Control

0 = No Weed Control   10 = 100% Weed Control
0 = No Injury   10 = Crop Killed

Data is the average of four replications; preplant herbicides applied 9/21/85; 2,4-DB applied 10/25/84; propham applied and irrigated 11/9/84.

Competitive effects of wild barley in seedling alfalfa. CUDNEY, D. W. and S. B. Orloff. The detrimental effect of wild barley on seedling alfalfa in the high desert of southern California can be seen in the following trial.

A dense stand of wild barley had emerged in seedling alfalfa. On February 14, the wild barley was 8 to 10 inches tall and "over-topping" the alfalfa, which was 4 to 6 inches in height. Two rates of pronamid (1 and 2 lbs. ai/A) and two rates of propham (3 and 6 lbs. ai/A) were applied and sprinkled in the following day. Both materials controlled the wild barley, but the higher rate of propham was required to provide adequate control.

The competitive effect of the wild barley was still evident on June 26 when the alfalfa stand was showing effects of the earlier competition, though no wild barley was present at that time. Plant height was reduced by 40% while the stand was reduced by as much as 60% in the untreated check plots. This trial illustrated the importance of weed control not only on the quality of first cutting, but on the life and vigor of the alfalfa. (University of California Cooperative Extension, Riverside, CA 92521)

Competitive effect of wild barley on seedling alfalfa, Lancaster, CA

				6/26	
Treatment	Rate lbs. ai/A	Wild barley control* 4/2	4/30	Alfalfa plant ht.(cm)	Stand count crowns/Ft^2
pronamid	1	10.0	10.0	50.75	4.8
pronamid	2	10.0	10.0	49.75	5.1
propham	3	5.8	7.4	39.00	3.2
propham	6	8.5	8.6	49.25	5.1
Check		0.0	0.0	30.00	2.0
L.S.D.	.05	0.56	0.81	6.19	2.4

*0 = No Weed Control
10 = 100% Weed Control

Data is the average of four replications.

Wild barley control in seedling alfalfa. CUDNEY, D. W. and S. B. Orloff. Wild barley is a serious pest in high desert alfalfa production. It is a particular problem during the stand establishment period in seedling alfalfa. The following trial was established to evaluate the control of wild barley seedlings using postemergence grass control materials.

The field was treated with grass herbicides when the grasses were approximately 6 inches in height and in the mid-tillering stage. The alfalfa was in the 4 to 6 leaf stage. No phytotoxicity to the alfalfa was evident in any of the treatments.

Of the herbicides tested (sethoxydim, fluazifop, DPX-Y6202), DPX-Y6202 and fluazifop provided superior control. Sethoxydim did not give adequate control when used at the lower rates (.25 and .50 lbs. ai/A). All materials required 2 to 3 weeks before effects could be noted. (University of California Cooperative Extension, Riverside, CA 92521)

Wild barley control in seedling alfalfa, Barstow, CA

Treatment	Rate lbs. ai/A	Wild barley control rating* date evaluated 1/3/85	2/14/85
sethoxydim	0.25	3.2	0.8
sethoxydim	0.50	3.5	5.0
sethoxydim	0.75	6.2	9.2
fluazifop	0.25	3.8	9.1
fluazifop	0.50	3.5	10.0
fluazifop	0.75	5.2	10.0
DPX-Y6202	0.25	5.2	9.8
DPX-Y6202	0.50	6.5	10.0
DPX-Y6202	0.75	5.7	10.0
Check		0.2	0.2
L.S.D. .05		2.27	1.69

*Rating: 0 = No Weed Control
10 = 100% Weed Control

Data is the average of four replications. Treatment date was December 4, 1984.

Postemergence herbicides for mixed annual grass and broadleaf weed control in seedling alfalfa. Norris R. F. and R. A. Lardelli. A study was established at the University of California research farm at Davis to evaluate the efficacy of several new herbicides for control of winter annual grass and broadleaf weeds in fall-seeded alfalfa. Treatments were applied to a semi-dormant variety of alfalfa on December 17, 1984, when the alfalfa was in the 4 to 6 trifoliate-leaf growth stage. Size of grass weeds (see table) varied from 1 to 4 inches, whereas broadleaf species had 4 inches of vegetative growth. All treatments were applied with a CO_2 backpack handsprayer, calibrated to deliver 40 gal/A to 5 ft by 10 ft plots. A randomized complete block design was used, and the treatments were replicated three times.

Moderate phytotoxicity to the alfalfa was observed on February 11, 1984 in the plots treated with oxyfluorfen at 0.25 lb/A; no other treatment showed symptoms on the alfalfa. Time of day at treatment did not change the phytotoxicity of bromoxynil to alfalfa.

Treatments of propham at 4 lb/A and haloxyfop at 0.50 lb/A resulted in the highest annual bluegrass control by the end of February; other grass herbicides gave poor control of this weed species. All grass herbicides gave better than 85% control of other grass species present. Control of shepherdspurse was 80% or better with all rates of bromoxynil. When bromoxynil was applied late in the afternoon, as opposed to early in the morning, no difference in weed control was observed. Superior, longlasting weed control in this trial was achieved with bromoxynil at 0.75 lb/A plus sethoxydim at 0.50 lb/A. The apparent high levels of common chickweed control at the May evaluation were attributed to increased competition by the alfalfa when the grass weeds were controled. (Botany Department, University of California, Davis, CA 95616.)

Control of annual winter weeds in seedling alfalfa.

Treatment[3]	Rate	Weed Control[1,2] POAAN	LOLMU+ AVEFA	CAPBP	LOLMU	STEME
		--- (Feb. 11/85)		----	-- (May 21/85) --	
	(lb ai/A)			(% Control)		
Untreated check	-	0 a	0 a	0 a	0 a	0 a
Untreated check	-	0 a	13 ab	0 a	43 b	57 def
Bromoxynil (AM)	0.50	0 a	27 bc	97 d	30 ab	50 cde
Bromoxynil (AM)	0.75	0 a	40 c	100 d	17 ab	33 abcd
Bromoxynil (PM)	0.50	0 a	0 a	100 d	50 b	0 a
Bromoxynil (PM)	0.75	0 a	10 ab	93 d	17 ab	23 abc
2,4-D ester	1.00	0 a	30 bc	80 d	27 ab	13 ab
Sethoxydim + oil	0.25	7 ab	93 e	30 ab	100 c	87 fg
Sethoxydim + oil	0.50	0 a	100 e	0 a	100 c	100 g
Bromoxynil + sethoxydim + oil	0.50 + 0.25	33 abc	97 e	67 cd	100 c	93 g
Bromoxynil + sethoxydim + oil	0.50 + 0.50	0 a	100 e	100 d	100 c	100 g
Bromoxynil + sethoxydim + oil	0.75 + 0.25	0 a	95 e	100 d	92 c	67 efg
Bromoxynil + sethoxydim + oil	0.75 + 0.50	0 a	100 e	100 d	100 c	100 g
2,4-D ester + sethoxydim + oil	1.00 + 0.25	0 a	100 e	47 bc	100 c	97 g
2,4-D ester + sethoxydim + oil	1.00 + 0.50	0 a	100 e	80 d	100 c	100 g
Paraquat	0.125	87 d	27 bc	10 a	17 ab	17 ab
Propham	4.00	100 d	92 e	17 ab	100 c	98 g
Haloxyfop + oil	0.25	50 c	100 e	0 a	100 c	100 g
Haloxyfop + oil	0.50	100 d	100 e	0 a	100 c	100 g
Fluazifop + oil	0.25	0 a	100 e	0 a	93 c	100 g
Fluazifop + oil	0.50	0 a	80 de	0 a	90 c	97 g
DPX-Y6202 + oil	0.25	13 ab	100 e	23 ab	100 c	100 g
DPX-Y6202 + oil	0.50	53 c	98 e	0 a	100 c	93 g
HOE-33171 + oil	0.25	0 a	100 e	10 a	87 c	100 g
HOE-33171 + oil	0.50	0 a	100 e	0 a	100 c	100 g
RO 17-3664 + oil	0.0625	0 a	100 e	0 a	100 c	100 g
RO 17-3664 + oil	0.125	20 ab	100 e	0 a	100 c	100 g
RE-36290 + oil	0.25	0 a	100 e	0 a	100 c	100 g
RE-36290 + oil	0.50	0 a	100 e	20 ab	100 c	100 g
Oxyfluorfen	0.25	17 ab	63 d	93 d	40 c	53 cde

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 herbicides for weed control in new seeding alfalfa. S.D. Miller. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on June 4, 1985 to evaluate their efficacy for weed control in newly seeded alfalfa (var. Apolo II). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 10 gpa at 40 psi. The soil was classified as a sandy loam (76% sand, 14% silt, and 10% clay) with 1.6% organic matter and a 7.2 pH. Alfalfa was 2 to 3 in. and weeds 1 to 2 in. at the time the treatments were applied.

Visual weed control and crop damage evaluations were made on July 2, 1985. Weed infestations were heavy and uniform throughout the experimental area. DPX-L5300 was the most injurious treatment, reducing alfalfa growth 63% and stand 20% compared to the untreated check. The addition of oil concentrate with 2,4-DB increased alfalfa injury compared to 2,4-DB alone. Broadleaf weed control was fair to good with DPX-L5300, 2,4-DB at 1.0 lb/A alone and in combination with oil concentrate or bromoxynil at 0.37 lb/A alone and 0.25 lb/A in combination with 0.5 lb/A 2,4-DB. Grass control was 90% or greater with sethoxydim alone at 0.19 and 0.28 lb/A or PP-005 at 0.18 lb/A or higher, (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1374 .)

Weed control with postemergence herbicides in alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa Injury %	Alfalfa Stand reduction %	Percent control Kocz	Percent control Colq	Percent control Rrpw	Percent control Yeft
DPX-L5300	0.015	63	20	90	95	93	0
sethoxydim + oc	0.19	0	0	0	0	0	95
sethoxydim + oc	0.28	0	0	0	0	0	99
sethoxydim + 2,4-DB + oc	0.28 + 1.0	15	7	78	96	92	90
sethoxydim + 2,4-DB + oc	0.28 + 0.5	13	0	63	92	92	85
SC-1084 + oc	0.25	0	0	0	0	0	47
SC-1084 + oc	0.5	0	0	0	0	0	68
fluazifop + oc	0.37	0	0	0	0	0	83
PP-005 + oc	0.09	0	0	0	0	0	83
PP-005 + oc	0.12	0	0	0	0	0	83
PP-005 + oc	0.18	0	0	0	0	0	93
PP-005 + oc	0.25	0	0	0	0	0	93
PP-005 + oc	0.37	0	0	0	0	0	92
2,4-DB	1.0	17	5	85	93	85	0
2,4-DB + oc	1.0	27	10	83	99	87	0
bromoxynil (ME4)	0.25	7	3	35	88	63	0
bromoxynil	0.37	17	3	85	96	78	0
bromoxynil + 2,4-DB	0.25 + 0.5	20	3	83	96	93	0
Check	------	0	0	0	0	0	0

[1] oc = At Plus 411F at 1 qt/A except at 1% v/v with PP-005 and fluazifop

Evaluation of preplant incorporated herbicides for weed control in new seeding alfalfa. S.D. Miller. Research plots were established on April 16, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated in new seeding alfalfa. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 1½ to 2 in. Alfalfa (var. Apollo II) was planted on April 22. The soil was classified as a sandy loam (76% sand, 14% silt, and 10% clay) with 1.6% organic matter and a 7.2 pH.

Visual weed control and crop damage evaluations were made on June 6 and plots harvested for yield July 23, 1985. Weed infestations were moderate and uniform throughout the entire experimental area. Alfalfa stand was reduced over 10% by trifluralin alone and in combination with EPTC or AC-263,499 at 0.125 lb/A; however, all herbicide treatments resulted in substantial yield increases compared to the untreated check. Common lambsquarters control was 90% or greater with all treatments except benefin; kochia control 85% or greater with all treatments except EPTC or benefin and stinkgrass control 90% or greater with all treatments except AC-263,499. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1373.)

Weed control with preplant incorporated herbicides in alfalfa

Treatment	Rate lb ai/A	Alfalfa Stand reduction %	Alfalfa Yield lb/A	Percent control Colq	Percent control Kocz	Percent control Stgr
EPTC	3.0	2	3084	90	75	92
trifluralin	1.0	15	2410	93	88	95
EPTC + trifluralin	2.0 + 1.0	23	2307	95	95	98
EPTC + pendimethalin	2.0 + 1.0	7	3089	92	93	98
AC-263,499	0.06	0	2273	92	92	7
AC-263,499	0.09	0	2540	97	92	13
AC-263,499	0.125	13	1816	98	98	57
benefin	1.12	2	2561	83	72	90
Check	- - - - -	0	1003	0	0	0

Evaluation of postemergence grass herbicides for wild proso millet control in new seeding alfalfa. S.D. Miller. A series of postemergence herbicide treatments were applied at Wheatland, Wyoming, July 9, 1985 to wild proso millet in the 4-leaf to 4-tiller stage (10-14 in. height) to evaluate their efficacy in seedling alfalfa. The alfalfa was 2 to 6 in. tall at the time of treatment. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (52% sand, 34% silt, and 14% clay) with 2.1% organic matter and a 7.7 pH.

Visual weed control and crop damage evaluations were made on July 22 and August 5 and plots harvested for yield August 5, 1985. Wild proso millet infestation was heavy and uniform throughout the experimental area. None of the herbicide treatments injured alfalfa. All herbicide treatments except SC-1084 increased alfalfa yield compared to the untreated check. Wild proso millet control was 85% or greater with sethoxydim, haloxyfop and DPX-Y6202 at 0.2 lb/A or PP-005 and fluazifop at 0.25 and 0.37 lb/A; respectively. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1375 .)

Wild proso millet control in alfalfa

Treatment[1]	Rate lb ai/A	Alfalfa Injury %	Alfalfa Yield lb/A	% Wild proso millet control 2 wk	% Wild proso millet control 4 wk
sethoxydim + oc	0.2	0	2221	75	92
PP-005 + oc	0.19	0	2234	43	82
PP-005 + oc	0.25	0	2172	47	86
SC-1084 + oc	0.25	0	1975	30	70
SC-1084 + oc	0.5	0	1847	47	81
fluazifop + oc	0.37	0	2166	57	85
haloxyfop + oc	0.1	0	2059	55	67
haloxyfop + oc	0.2	0	2208	72	92
DPX-Y6202 + oc	0.1	0	2009	53	63
DPX-Y6202 + oc	0.2	0	2258	78	88
Check	- - -	0	1847	0	0

[1] oc = At Plus 411F at 1 qt/A except at 1% v/v with PP-005 and fluazifop

Herbicide evaluations in field corn. Arnold, R.N., E.J. Gregory and W.J. Price. Research plots were established on May 22, 1985 to evaluate efficacy of individual and/or herbicede combinations applied preplant incorporated and postemergence in field corn (var. Funk's G-4507). Soil type was a Kinnear very fine sandy loam with a pH of 7.9 and an organic matter content of less than 1.0%. Individual plots were 12 by 25 ft in size with four replications arranged in a randomized complete block design. Herbicides were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Preplant incorporated treatments were applied May 22 and immediately disc and spike-tooth harrowed to a depth of 2 to 4 inches. Postemergence treatments were applied June 5 to field corn in the 4 to 5-leaf stage (3-4 in. height). Weed heights were, kochia rosette stage (1.5 in. height), russian thistle 2 to 4-leaf stage (1/2 to 3/4 in. height), prostrate pigweed 2 to 4-leaf stage (1/8 to 1/4 in. height) and barnyardgrass 2 to 3-leaf stage (1 to 1.5 in. height). Weed seeds were broadcast and spike-tooth harrowed at the beginning of this study to provide heavy weed infestations. Plots were not harvested for yield.

Visual evaluations of corn injury and weed control were made July 3, 1985. Cyanazine combinations, vernolate plus extender and dicamba provided 95 percent or greater broadleaf control. All treatments gave excellent control of barnyardgrass except dicamba. EPTC plus R-25788 was very poor in russian thistle control. No significant crop injury was observed in any of the treatments. (Agricultural Science Center, New Mexico State University, Farmington, N.M. 87499).

Herbicide evaluations in field corn, 1985

Treatment[1]	Timing[2]	Rate (lb ai/A)	Crop[3] Injury	% Weed Control[3] Kochia	Russian Thistle	Prostrate Pigweed	Barnyard-grass
cyanazine	POST	1.2	0	100.0	98.7	77.5	93.7
cyanazine + metalachlor	PPI	1.0 + 2.0	0	97.5	95.7	97.5	97.5
cyanazine + vernolate + extender	PPI	1.0 + 5.0	0	98.7	98.0	98.7	98.7
cyanazine + dicamba	POST	1.2 + .38	0	100.0	98.7	98.7	100.0
cyanazine + dicamba + 2, 4-D ester	POST	1.2 + .38 + .12	0	100.0	100.0	98.7	100.0
vernolate + extender	PPI	5.0	0	100.0	98.7	96.2	98.7
EPTC + R-25788	PPI	3.8	0	82.5	22.5	82.5	100.0
dicamba	POST	.38	0	100.0	97.5	100.0	0
check			0	0	0	0	0

1. PPI treatments applied May 22, 1985. Postemergence treatments applied June 5, 1985.
2. PPI = preplant incorporated, POST = postemergence.
3. Based on a visual scale from 0-100 where 0 = no control or injury and 100 = dead plants.

Evaluation of early preplant herbicide applications in corn, Powell. Miller, S.D. Several soil persistent herbicides and/or combinations were applied to prepared soil at the Powell Research and Extension Center 30 and 0 days prior to corn planting to assess weed control and crop tolerance. All treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi on April 10 and May 7, 1985. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. The corn (var. Cargill 404) was seeded on May 7, 1985 immediately after the 0 day herbicide applications. The soil was classified as a sandy clay loam (47% sand, 27% silt, and 26% clay) with 1.6% organic matter and a 7.9 pH.

Weed control and stand evaluations were made on June 20, 1985 by counting two 6 in. by 5 ft quadrats per replication. Wild buckwheat, redroot pigweed, kochia, common lambsquarters, and yellow foxtail populations were moderate averaging 2.5, 2.6, 0.3, 0.5, and 5.5 plants/linear ft; respectively. No corn injury was observed with any treatment. Treatments applied 30 days prior to corn planting were equally as effective as those applied immediately prior to planting. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1370 .)

Early preplant herbicide applications in corn - Powell

Treatment[1]	Rate lb ai/A	Corn stand %	Percent control				
			Wibw	Rrpw	Kocz	Colq	Yeft
30-day							
cyanazine + atrazine (PM)	2.3 + 1.2	100	100	100	100	100	100
cyanazine + metolachlor (TM)	2.0 + 2.0	98	84	100	100	100	98
metolachlor + atrazine (PM)	2.0 + 1.6	98	99	100	100	100	100
cyanazine	3.5	98	96	65	100	100	98
atrazine	1.6	100	100	100	100	100	89
0-day							
cyanazine + atrazine (PM)	1.6 + 0.8	98	98	100	94	100	94
cyanazine + metolachlor (TM)	1.5 + 1.5	100	82	99	100	100	93
metolachlor + atrazine (PM)	1.5 + 1.2	100	98	100	100	100	95
cyanazine	2.5	94	96	89	100	100	95
atrazine	1.2	100	96	100	100	100	86
Check	- - - - -	100	0	0	0	0	0

[1]PM = package mix; TM = tank mix

Evaluation of early preplant herbicide applications in corn, Torrington. Miller, S.D. Several soil persistent herbicides and/or combinations were applied to prepared soil at the Torrington Research and Extension Center 45, 30, and 0 days prior to corn planting to assess weed control and crop tolerance. All treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi on March 20, April 2, and May 1, 1985. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. The corn (var. DeKalb XL 55A) was seeded on May 1, 1985 immediately after the 0 day herbicide applications. The soil was classified as a sandy loam (71% sand, 23% silt, and 6% clay) with 1.4% organic matter and a 7.6 pH.

Weed control and corn stand evaluations were made on June 13, 1985 by counting two 6 in. by 5 ft quadrats per replication. Redroot pigweed, hairy nightshade, common lambsquarters, and yellow foxtail populations were light averaging 0.2, 0.2, 0.15, and 2.0 plants/linear ft; respectively. No apparent corn injury was observed with any treatment. Treatments applied 45 or 30 days prior to corn planting were equally as effective as those applied immediately prior to planting. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1368 .)

Early preplant herbicide applications in corn - Torrington

Treatment[1]	Rate lb ai/A	Corn stand %	Percent Control Rrpw	Hans	Colq	Yeft
45-day						
metolachlor + atrazine (PM)	1.5 + 1.2	100	100	100	100	94
cyanazine + atrazine (PM)	2.0 + 1.0	100	100	100	100	94
cyanazine + metolachlor (TM)	1.5 + 1.5	97	90	100	100	95
cyanazine	3.0	100	70	90	89	94
atrazine	1.2	92	100	100	100	91
30-day						
metolachlor + atrazine (PM)	1.5 + 1.2	100	100	100	100	100
cyanazine + atrazine (PM)	2.0 + 1.0	100	100	100	100	94
cyanazine + metolachlor (TM)	1.5 + 1.5	100	100	100	100	95
cyanazine	3.0	100	80	90	89	92
atrazine	1.2	100	100	100	100	90
0-day						
metolachlor + atrazine (PM)	1.2 + 1.0	100	100	100	100	100
cyanazine + atrazine (PM)	1.3 + 0.7	100	100	100	100	92
cyanazine + metolachlor (TM)	1.2 + 1.2	100	100	100	100	100
cyanazine	2.0	100	80	90	100	97
atrazine	1.0	95	100	100	100	91
Check	- - - - -	100	0	0	0	0

[1] PM = package mix; TM = tank mix

Evaluation of preplant incorporated herbicides in corn. Miller, S.D. Research plots were established on May 1, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated in corn. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 1½ to 2 in. Corn (var. DeKalb XL 55A) was planted on May 1, 1985. The soil was classified as a sandy loam (78% sand, 13% silt, and 9% clay) with 1.5% organic matter and a 6.8 pH.

Weed control and crop damage evaluations were made on June 13, 1985 by counting two 6 in. by 5 ft quadrats per replication. Hairy nightshade, common lambsquarters, redroot pigweed, yellow foxtail, and common sunflower populations were light averaging 0.2, 0.2, 1.0. and 0.1 plants/linear ft; respectively, in the untreated check. Acetochlor severely reduced corn stands at 1.5 to 2.5 lb/A while alachlor and metolachlor at 4.0 lb/A caused moderate stand loss. Weed control was excellent with all herbicide treatments. The only weed present in herbicide treated plots was an occasional common sunflower. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1366 .)

Preplant incorporated herbicides in corn

Treatment[1]	Rate lb ai/A	Corn stand %	Percent control Hans	Colq	Rrpw	Yeft	Cosf
EPTC + dichlormid + dietholate (PM) + atrazine	3.0 + 1.0	100	100	100	100	100	100
butylate + dichlormid (PM) + atrazine	3.0 + 1.0	100	100	100	100	100	100
acetochlor	1.5	62	100	100	100	100	0
acetochlor	2.0	41	100	100	100	100	0
acetochlor	2.5	46	100	100	100	100	0
alachlor	3.0	89	100	100	100	100	0
alachlor	4.0	78	100	100	100	100	0
alachlor (MT)	3.0	97	100	100	100	100	0
alachlor (MT)	4.0	83	100	100	100	100	0
alachlor + atrazine	2.0 + 1.0	93	100	100	100	100	100
alachlor (MT) + atrazine	2.0 + 1.0	95	100	100	100	100	100
acetochlor + atrazine	1.25 + 1.0	90	100	100	100	100	100
metolachlor + atrazine	2.0 + 1.0	88	100	100	100	100	100
metolachlor + atrazine	2.0 + 1.6	88	100	100	100	100	100
metolachlor + atrazine	4.0 + 1.6	74	100	100	100	100	100
CGA-172764 + atrazine	2.0 + 1.6	100	100	100	100	100	100
CGA-172764 + atrazine	4.0 + 1.6	95	100	100	100	100	100
CGA-174104 + atrazine	2.0 + 1.6	100	100	100	100	100	100
CGA-174104 + atrazine	4.0 + 1.6	98	100	100	100	100	100
Check	- - - - - -	100	0	0	0	0	0

[1]PM = package mix; MT = microtech formulation

Evaluation of preemergence herbicides in corn. Miller, S.D. Research plots were established on May 1, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preemergence (var. DeKalb XL 55A). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (78% sand, 13% silt, and 9% clay) with 1.5% organic matter and a 6.8 pH.

Weed control and crop damage evaluations were made on June 13, 1985 by counting two 6 in. by 5 ft quadrats per replication. Redroot pigweed, common lambsquarters, hairy nightshade, and yellow foxtail populations were light averaging 0.2, 0.2, 0.3, and 0.8 plants/linear ft; respectively, in the untreated check. Acetochlor at 2.0 lb/A reduced corn stand 31%. Weed control was good to excellent with all herbicide treatments. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1365 .)

Preemergence herbicides in corn

Treatment[1]	Rate lb ai/A	Corn stand %	Percent control Rrpw	Colq	Hans	Yeft
alachlor	3.0	100	89	100	92	97
metolachlor	2.0	100	89	89	100	92
metolachlor	3.0	100	89	100	100	97
acetochlor	2.0	69	100	100	100	100
alachlor + atrazine	2.0 + 1.0	100	100	100	100	100
metolachlor + atrazine	2.0 + 1.0	100	100	100	100	100
SC-5676 + dichlormid (PM)	0.75 + 0.13	97	100	100	100	92
SC-5676 + dichlormid (PM)	1.5 + 0.2	100	100	100	100	100
SC-5676 + dichlormid (PM) + atrazine	0.75 + 0.13 + 1.0	100	100	100	100	97
SC-5676 + dichlormid (PM) + atrazine	1.5 + 0.2 + 1.0	95	100	100	100	100
SC-0051	1.5	100	100	100	92	92
SC-0774	0.5	100	100	100	92	100
SC-0774	1.0	100	100	100	100	100
SC-0774 + atrazine	0.5 + 1.0	97	100	100	100	100
SC-0774 + atrazine	1.0 + 1.0	100	100	100	100	100
Check	- - - - - - - - - -	100	0	0	0	0

[1] PM = package mix

Evaluation of postemergence herbicides in corn. Miller, S.D. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center June 4, 1985 to evaluate their efficacy for weed control in corn (var. DeKalb XL 55A). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (76% sand, 14% silt, and 10% clay) with 1.2% organic matter and 7.6 pH. The corn was in the 4 to 6-leaf stage (5-6 in. height) and yellow foxtail 1 in., common lambsquarters 2 to 3 in., redroot pigweed ½ to 1 in., and hairy nightshade ½ to 1 in. at the time of treatments.

Weed control and crop damage evaluations were made on June 19, 1985 by counting two 6 in. by 5 ft quadrats per replication. Redroot pigweed, hairy nightshade, common lambsquarters, and yellow foxtail infestations were light averaging 0.8, 0.4, 0.6, and 1.1 plants/linear ft; respectively, in the untreated check. No corn injury or stand reduction was observed with any treatment. Broadleaf weed control was good with all treatments. Yellow foxtail control ranged from 0 to 79% and was generally best with bromoxynil-atrazine combinations with or without tridiphane. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1378 .)

Postemergence weed control in corn

Treatment[1]	Rate lb ai/A	Corn stand %	Percent control Rrpw	Hans	Colq	Yeft
atrazine + oc	1.0 + 1 qt/A	100	100	100	100	67
bromoxynil (ME4)	0.25	100	93	95	100	0
bromoxynil	0.37	97	100	100	100	20
bromoxynil + dicamba	0.25 + 0.25	100	100	100	100	12
bromoxynil + 2,4-D (DMA)	0.25 + 0.25	95	98	100	100	0
bromoxynil + atrazine	0.25 + 1.0	100	100	100	100	79
bromoxynil + atrazine	0.37 + 1.0	100	100	100	100	79
bromoxynil + atrazine + tridiphane	0.25 + 0.5 + 0.5	100	100	100	100	75
bromoxynil + atrazine + tridiphane	0.25 + 0.75 + 0.5	100	100	100	100	79
SC-0051	0.5	100	88	100	89	36
SC-0051	1.0	100	83	100	96	63
SC-0051 + oc	0.5 + 1 qt/A	100	93	100	100	61
CN 11-6180	0.75	100	100	100	100	51
CN 11-6180	1.5	100	100	100	100	59
Check	- - - - - - - - -	100	0	0	0	0

[1] oc = At plus 411F, DMA = dimethylamine salt

Wild proso millet control in corn. Miller, S.D. and R. Shoemaker. Split applications of several herbicides and/or combinations were evaluated at Casa, Wyoming in 1985 to determine their effectiveness for wild proso millet control in corn. All treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi on April 12 and May 9, 1985. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. The corn (var. Pioneer 3747) was seeded on May 4, 1985. The soil was classified as a silt loam (52% sand, 34% silt, and 14% clay) with 2.1% organic matter and a pH of 7.7.

Weed control and corn stand evaluations were made on June 14 and July 8, 1985 by counting two 6 in. by 5 ft quadrats per replication. Wild proso millet stands were heavy averaging over 53 and 78 plant/linear ft in the check plots on June 14 and July 8; respectively. Corn stand was reduced 22% by split applications of acetochlor. No treatment adequately controlled wild proso millet. The split application of metolachlor and pendimethalin plus cyanazine was slightly more effective than split applications of metolachlor or metolachlor plus atrazine. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1353 .)

Wild proso millet control in corn

Treatment[1]	Rate lb ai/A	Corn stand %	Wild proso millet control June 14	July 8
metolachlor/metolachlor	1.5/1.0	100	71	63
metolachlor/metolachlor	2.0/1.0	100	77	64
metolachlor/metolachlor	2.0/0.5	100	68	66
metolachlor + atrazine (PM)/metolachlor	1.5 + 1.2/0.5	92	61	53
metolachlor + atrazine (PM)/metolachlor	1.5 + 1.2/1.0	97	74	59
cyanazine/alachlor	2.0/2.0	100	83	68
cyanazine/alachlor	2.0/2.5	95	79	71
acetochlor/acetochlor	1.5/1.0	78	88	73
metolachlor/pendimethalin + cyanazine	2.0/1.5 + 1.5	97	84	74
Check	- - - - - - -	100	0	0

[1]PM = package mix. Split treatments applied April 12 and May 9, 1985

Evaluation of SC-0774, SC-0051 and SC-5676 in Field Corn. Evans, J.O. and R.W. Gunnell. These trials were established at two locations in Cache County (Trenton and Logan) to evaluate the efficacy of SC-0774, SC-0051 and SC-5676 for weed control in field corn. The trial at Trenton was on a growers field while the trial at Logan was on the USU experimental farm. Environmental conditions are described in Table 1. The experimental design was a randomized complete block design with four replications at Trenton and three replications at Logan. Herbicide treatments were applied with a bicycle sprayer calibrated to deliver 187 l/ha.

The efficacy of these treatments varied greatly between the two locations. All of the treatments applied at the Logan site provided excellent broad-spectrum weed control while those applied at the Trenton site provided fair to poor weed control. Phytotoxicity of the herbicides to the crop also varied with more phytotoxicity being observed at the Logan site. The reduced activity of herbicidal treatments at the Trenton site may be related to lack of adequate irrigation after herbicide application. (Plant Science Department, Utah State University, Logan, UT 84322-4820).

Table 1. Environmental Conditions at the Trenton and Logan sites.

	Trenton	Logan
Date of Application	5-21-85	6-24-85
Air Temperature	12°C	21°C
Soil Temperature (5.1 cm)	11°C	21°C
Relative Humidity	85%	65%
Soil Texture	loam	silt loam
Soil pH	7.9	8.1

Table 2. Evaluation of SC-0774, SC-0051 and SC-5676 in Field Corn

Herbicide	Rate Kg ai/ha	Crop Phytotoxicity[2/][5/]		Weed Control [3/] [4/] [5/]					
				AMASP		CHEAL		Grass	
		Trt	Lgn	Trt	Lgn	Trt	Lgn	Trt	Lgn
SC-0774	0.56	0	10	55	93	45	98	13	95
SC-0774	1.12	0	20	64	95	46	99	31	97
SC-0051	1.12	0	0	66	99	50	100	13	94
SC-0051	1.68	0	1.7	88	100	86	100	18	97
SC-0051	2.24	0	1.7	83	99	85	99	23	96
SC-5676/R-25788[1/]	1.68	0	3.3	78	100	63	100	25	98
SC-5676	3.36	0	3.3	83	100	29	100	20	100
metolachlor	1.68	0	1.7	23	100	10	98	5	97
metolachlor	3.36	0	10.7	48	100	38	99	13	99
check	0	0	0	15	0	13	0	10	0

[1/] R-25788 was included as a crop safener.

[2/] Crop Phytotoxicity: 0 = no effect, 100 = complete kill

[3/] Weed Control: 0 = no control, 100 - complete control

[4/] Weed Designations: AMASP = Pigweed, CHEAL = common lambsquarter
Pigweed - mixed stand of redroot pigweed and prostrate pigweed.
Predominantly redroot pigweed at Trenton.
Grass - barnyardgrass and green foxtail. Predominantly barnyardgrass at the Trenton site

[5/] Locations: Trt = Trenton, Utah; Lgn = Logan, Utah.
Trenton - treated on 5-21-85 and evaluated on 6-26-85
Logan - treated on 6-24-85 and evaluated on 7-16-85

Evaluation of preplant incorporated herbicides in field corn. Mitich, L.W., and N.L. Smith. Several preplant incorporated herbicides were evaluated for weed control efficacy and crop tolerance at the UC Davis Research Farm. The test site was listed to 30-inch beds and herbicides were applied with a CO_2 backpack sprayer calibrated to deliver 40 GPA on May 15, 1985. All treatments were immediately incorporated to a 2-inch depth using a Marvin Rowmaster power driven incorporator. Field corn (cultivar: O's Gold 6882) was planted May 15. The test site contained a resident population of barnyardgrass, redroot pigweed, black and hairy nightshade and common purslane that emerged with the corn following a furrow irrigation. Individual plot size was 10 by 20 ft. in a randomized block design with 4 replications. The site was furrow irrigated approximately every 10 days. Nitrogen (ammonium sulfate) was applied at 160 units per acre. CN 11-6180 was applied, postemergence, June 12 to corn 8 inchs tall.

Slight phytotoxicity was observed June 20 from SC 0774, SC 0106 and SC 5676 (without R 25788). Control of all weed species was excellent from alachlor (EC or MT) plus cyanazine, acetochlor and SC 5676. Alachlor EC gave slightly better control than the MT formulation or metolachlor. Butylate followed by a postemergence application of CN 11-6180 was an effective combination. Control was not acceptable from SC 0774, SC 0051 and SC 0106. (University of California Cooperative Extension, Davis CA 95616)

Preplant herbicides in field corn - 1985

				% Weed control[1]									
	Rate	Phyto[1]		Barnyard-grass		Pigweed		Nightshade		Purslane		Yield	
Herbicide	lb/A	6/20	9/12	6/20	9/12	6/20	9/12	6/20	9/12	6/20	9/12	lb/A	Analysis[2]
SC 0051	0.5	0	0	5.3	5.3	5.8	4.5	5.8	4.3	6.0	1.8	10,611	abc
SC 0051	1.0	0	0	7.3	3.8	7.8	3.8	7.5	3.8	7.8	1.8	10,563	abc
SC 5676 + R 25788	1.5	0	0	10.0	9.0	10.0	10.0	10.0	10.0	8.0	7.8	10,298	abcd
SC 5676 + R 25788	3.0	0	0	10.0	10.0	10.0	9.8	10.0	9.8	9.8	9.5	10,966	ab
SC 5676	3.0	1.3	0	10.0	9.0	10.0	9.0	10.0	9.0	10.0	9.0	8,457	cd
SC 0106	2.0	0.5	0	2.3	1.0	4.5	0	0	0	2.0	0	8,149	d
SC 0106 + R 29148	2.0 + 1.0	0	0	5.5	5.3	5.8	0.8	4.5	0.8	2.5	0.3	9,809	abcd
alachlor MT	3.0	0	0	9.0	9.0	10.0	9.0	7.5	9.0	8.5	7.3	10,811	ab
alachlor EC	3.0	0	0	10.0	9.0	10.0	9.8	9.5	9.8	9.8	9.8	10,834	ab
alachlor EC + cyanazine	3.0 + 2.0	0	0	10.0	9.8	10.0	10.0	10.0	10.0	10.0	10.0	10,779	ab
acetochlor	2.0	0	0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9,684	abcd
alachlor MT + cyanazine	3.0 + 2.0	0	0	9.5	9.8	10.0	10.0	10.0	10.0	10.0	9.5	11,765	a
metolachlor	2.5	0	0	10.0	9.8	9.8	8.8	6.8	3.3	7.0	8.5	9,735	abcd
butylate	3.0	0	0	9.0	7.8	7.5	7.3	2.5	4.5	0.3	0	10,514	abc
butylate + SC 00058	3.0 + 1.0	0	0	9.3	8.3	7.8	5.8	6.8	5.5	0	0	10,358	abcd
butylate + SC 11-6180 (Post)	3.0 + (1.2)	0	0	9.3	9.0	10.0	9.8	10.0	9.8	10.0	9.8	11,495	a
SC 0774	0.5	0.5	0	6.0	5.3	6.5	4.3	6.3	4.3	6.5	3.0	9,733	abcd
SC 0774	1.0	1.0	0	5.5	5.3	4.8	3.8	4.3	3.3	5.0	3.5	9,687	abcd
Control	-	0	0	1.8	3.3	0	0	2.5	0	0	0	9,230	bcd

Data is average of 4 replications.

[1] 0 = no control or phytotoxicity; 10 = complete control.

[2] Means followed by the same letter are not significantly different at the 5% level.

Evaluation of postemergence herbicides in field corn. Mitich, L.W. and N.L. Smith. A site on the UC Davis Experimental Farm was selected to evaluate crop phytotoxicity and weed control efficacy with atrazine, bromoxynil, CN 11-6180, cyanazine, 2,4-D low volatile ester, dicamba, SC 0051 and SC 0074. Corn (cultivar: O's Gold 6882) was planted May 15, 1985, on 30-inch preformed beds. The corn was furrow irrigated. Barnyardgrass, common purslane, nightshade (hairy and black) and redroot pigweed emerged with the corn. Herbicides were broadcast applied June 6 to 2- to 5-inch tall weeds and 6- to 12-inch corn utilizing a CO_2 backpack sprayer calibrated to deliver 20 GPA spray volume. Paraffin base oil (Surfel) at 1 qt. per acre was added to all treatments of cyanazine and one rate of SC 0051. Air temperature at application was 80 F rising to 100 F within 6 hours. Four replications were employed in a randomized block design.

Visual evaluations of corn phytotoxicity and weed control were made June 31 and September 12. Corn phytotoxicity expressed as leaf burn was noted June 31 from the tridiphane, atrazine, cyanazine tank mix, cyanazine and bromoxynil; chlorosis was observed from SC 0074. Good barnyardgrass control was observed from SC 0051 at the high rate.

Excellent control of the broadleaf species was obtained from CN 11-6180, cyanazine (alone and in combination with tridiphane and atrazine), dicamba, SC 0074 and the high rate of SC 0051. Bromoxynil, 2,4-D and low rates of SC 0051 were weak on purslane. Broadleaf species were suppressed in the control plots due to a heavy stand of barnyardgrass. (University of California Cooperative Extension, Davis, CA 95616)

Postemergence herbicide in field corn - 1985

Herbicide	lb/A	Phyto[1]		Control[1]								Yield
				Barnyard-grass		Purslane		Pigweed		Night-shade		
		6/31	9/12	6/31	9/12	6/31	9/12	6/31	9/12	6/31	9/12	lb/A
CN 11-6180	1.2	0.5	0	0	6.5	9.5	10.0	9.8	10.0	10.0	10.0	9205
SC 0051	0.25	0	0	2.8	6.3	0	8.0	1.3	7.5	0.5	7.5	8608
SC 0051 + oil	0.5 + 1 qt.	0	0	7.8	7.5	5.8	9.5	8.8	9.5	8.0	9.5	9690
SC 0051	1.0	0	0	7.3	9.1	8.5	10.0	9.5	10.0	7.5	10.0	9156
SC 0074	0.5	3.0	0	6.3	7.0	9.5	8.5	9.3	9.3	9.5	9.3	8846
bromoxynil	0.5	2.8	0	0.5	3.8	0	9.8	10.0	9.8	10.0	9.8	8570
cyanazine + oil	1.0 + 1 qt.	3.0	0	1.8	2.8	10.0	10.0	10.0	10.0	10.0	10.0	8923
dicamba	0.25	0	0	0	3.8	6.8	10.0	7.5	10.0	7.5	10.0	8471
2,4-D LVE	0.5	0	0	0	3.8	3.5	10.0	6.3	10.0	4.5	10.0	8855
tridiphane + atrazine + cyanazine + oil	0.5 0.5 0.5 1 qt.	2.0	0	5.5	7.8	10.0	10.0	10.0	10.0	10.0	10.0	9059
Control	-	0	0	0	1.0	0	6.3	0	7.0	0	6.3	7503
Handweeded	-	0	0	8.0	9.1	8.0	10.0	8.0	10.0	8.0	10.0	8972

Data is average of 4 replications.

1 0 = no phytotoxicity or weed control; 10 = complete control.

2 No = significant differences at 5% level.

Effect of barnyardgrass competition in field corn. Mitich, L.W. and N.L. Smith. A site on the UC Davis Experimental Farm was selected to study the competitive effects of barnyardgrass on yield of field corn. The area was fumigated with methyl bromide prior to establishing the experiment to kill existing weed seeds. Corn, (cultivar: O's Gold 6882) was planted on 30-inch preformed beds May 16, 1985. Barnyardgrass at three densitites (1, 6 and 18 plants/foot of row) was seeded initially or 3 weeks following corn emergence. A weedless, season-long control was included. Initially, corn and barnyardgrass were irrigated up together. Following emergence, barnyardgrass was hand thinned to the desired density. The plot area was not cultivated during the growing season. Nitrogen (160 units), as ammonium sulfate, was supplied in a layby application. The plot was furrow irrigated approximately every 10 days. Individual plots were 10 ft. (4 rows) wide by 20 ft. long in a randomized block design.

Ten foot lengths were harvested out of the center 2 rows for yield. When compared to the (weedless season long) control, yields were not significantly reduced at the 5% level from any level of barnyardgrass. In the 1984 experiment, some yield was reduced significantly from the high density of barnyardgrass left the first 6 weeks, and from the plots that were weedy season long. (University of California Cooperative Extension, Davis, CA 95616)

Effect of barnyardgrass competition on field corn

		Density[1]	Corn yield lb/A	Analysis[2]
Weedless	Season long	-	9,526	abc
Weedy	Season long	Low	8,859	bc
Weedy	Season long	Med	8,612	c
Weedy	Season long	High	8,947	bc
Weedless	After 3 weeks	Low	9,537	ab
Weedless	After 3 weeks	Med	8,893	bc
Weedless	After 3 weeks	High	10,071	a
Weedless	After 6 weeks	Low	9,499	abc
Weedless	After 6 weeks	Med	9,001	bc
Weedless	After 6 weeks	High	8,670	bc
Weedless	First 3 weeks	Low	8,923	bc
Weedless	First 3 weeks	Med	9,292	abc
Weedless	First 3 weeks	High	8,974	bc

Data is average of 4 replications

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

2 Means followed by the same letter are not significantly different at the 5% level.

Application of herbicides in cotton through gravity flow furrow irrigation. Chernicky, J.P. and K.C. Hamilton. Cotton growers are interested in alternative methods of applying herbicides as a means of reducing production costs. In 1985, field research was conducted on a sandy clay loam at the Maricopa Aricultural Center in Arizona to measure the response of cotton and emerged wright groundcherry (*Physalis wrightii* Gray) to herbicides applied through the irrigation water. Cotton ('Deltapine 61') was seeded on 100 cm beds on April 29 at 15 kg/ha and normal cultural practices were followed to maintain a stand of cotton (10 plants/meter). Herbicide treatments (see table) were arranged in a randomized complete block design with four replications. Herbicide suspensions or emulsions were applied on July 10 at the head (upper) end of a furrow irrigation during the 4 th hour of a 6 hour irrigation which provided 10 to 12 cm of water to the crop. Herbicides were diluted with water and delivered to two furrows adjacent to one cotton row for either 30 seconds (volume of X rate=760mls/plot) or 60 seconds (volume of 2X rate=1,520mls/plot). Each plot measured 1 cotton row wide (100 cm) and 198 m long. Wright goundcherry populations varied from 1 to 3 plants per meter of row and ranged from 9 to 40 cm in plant height. Cotton height at the time of treatment ranged from 71 to 81 cm tall. Cotton injury and groundcherry control were estimated four weeks after treatment (August 7). In each plot measurements were taken in three different 66 m sections. The entire length of the treated row was harvested and reported on a kg/ha basis.

Herbicide injury to cotton varied with field location and treatment (see table). Diuron, prometryn, fluometuron, at 4.4 kg/ha or 3.3 kg/ha of butylate caused substantial injury to cotton, however this injury was generally confined to the first and last 10 m of each plot. Although this injury was severe, it only represented 1% of the area treated thus on a whole plot basis the injury was considered minimal. The yield data tends to support this arguement.

All treatments with the exception of oxyfluorfen and butylate provided commercially acceptable levels of groundcherry control. Wright groundcherry was most susceptible when 10 cm to 15 cm tall then become increasingly tolerant with further increases in plant height.

Diuron, prometryn, and fluometuron at 2.2 kg/ha applied through irrigation water provided excellent control of established populations of wright groundcherry with minimal injury to cotton, however the environmental impact of such a treatment must be further investigated. (University of Arizona, Dept. of Plant Science, Tucson, AZ 85721)

Response of cotton and wright groundcherry to several herbicides applied through furrow irrigation.

Herbicide	formu-lation	Rate	Field position from point of application (meters) 1/ 0-66 Crop injury	2/ Weed control	67-132 Crop injury	Weed control	133-198 Crop injury	Weed control	Seed cotton yield
		kg/ha		%		%		%	kg/ha
diuron	WP	2.2	4	98	0	90	2	90	5100
diuron	WP	4.4	6	98	0	95	7	98	4760
prometryn	LS	2.2	3	95	0	95	4	95	4980
prometryn	LS	4.4	5	98	0	98	3	90	4380
fluometuron	WP	2.2	3	90	0	85	0	90	4630
floumeturon	WP	4.4	6	95	0	98	4	95	5220
oxyfluorfen	EC	2.2	0	0	0	0	0	0	4280
oxyfluorfen	EC	4.4	0	0	0	0	0	0	4740
butylate	EC	3.3	8	10	0	0	7	5	4750
untreated		0.0	0	0	0	0	0	0	4720
LSD (.05)									(150)

1/ Crop injury 0=none 10=severe

2/ Wright groundcherry control 0=no control 100=complete control

The effect of experimental herbicides on wright groundcherry in cotton. Chernicky, J.P., and K.C. Hamilton. Two field experiments were conducted in 1985 on a sandy clay loam at the Maricopa Agricultural Center in Arizona. The objective of the two experiments were to measure the response of cotton and wright groundcherry (*Physalis wrightii* Gray) to several experimental herbicides (see table) applied either pre-plant incorporated (PPI) or preharrow (PH). In both tests herbicide treatments were arranged in a randomized complete block design with two replications. All treatments were applied by a backpack sprayer with an output of 374 l/ha.

In the PPI experiment, treatments were applied to flat ground on April 4 and disked in to a depth of 10 to 15 cm. The entire area was then bedded up on April 10 and a pre-plant irrigation followed on April 15. PH treatments were applied over the beds on April 24 and surface incorporated within 4 hours after treatment. Cotton ('Deltapine 61') was then seeded at a rate of 15 kg/ha on April 29. All plots consisted of four rows, 4 m wide and 11.5 m long. Cotton response to herbicides was measured by stand counts on May 29 and visual crop tolerance ratings on June 12. The two center rows of each plot were harvested on November 20 to determine yield of seed cotton. Visual ratings of groundcherry control were taken on July 9 and September 20.

EL 107 at 0.067 kg/ha alone or at 0.14 kg/ha plus trifluralin (0.84 kg/ha) and FMC 57020 (2.2 kg/ha) had no noticeable effect on crop emergence, however only EL 107 alone or in combination with trifluralin proved to be safe to cotton after the first post irrigation (see table). Of these herbicides, only EL 107 showed a potential for controlling wright groundcherry in cotton. Although SDS 57614 (1.8 and 3.2 kg/ha) provided excellent control of this weed it did cause a slight reduction in cotton stand compared to the handweeded check, however crop tolerance after crop emergence was excellent.

The PH treatments were less injurious to cotton emergence and showed additional safety after crop emergence. The treatments that were effective at controlling groundcherry PPI were equally active PH. For example RE 40885 at 0.56 and 1.12 kg/ha showed excellent activity on groundcherry applied PPI or PH but crop safety was only evident when it was applied PH. Seed cotton yield in general supports crop emergence and tolerance ratings. Yield reductions caused by herbicide injury were mostly due to the reduction in crop stand and subsequent growth rather than competition from wright groundcherry. (University of Arizona Department of Plant Science, Tucson, Az 85721)

Response of cotton and wright groundcherry to herbicides applied pre-plant incorporated (PPI) or pre-harrow (PH).

Herbicide	Rate (kg/ha)	1/ Crop stand PPI	PH	2/ Crop tolerance PPI	PH	3/ Weed control PPI	PH	Crop yield PPI	PH
						%		(kg/ha)	
Handweeded	____	10	8	--	--	100	100	4440	4380
Weedy check	----	7	7	--	--	0	0	3410	3890
trifluralin	0.84	8	8	G	E	75	10	4310	4050
SDS 57614	1.8	7	8	G	E	98	80	4240	4240
SDS 57614	3.2	7	9	G	E	98	100	4440	4620
EL 107	0.14	7	8	E	E	100	95	4510	4330
EL 107 + trifluralin	0.067 0.84	9	9	E	E	98	98	4120	4280
RE 40885	0.56	6	8	P	G	85	99	4070	4410
RE 40885	1.12	2	9	P	G	98	100	3600	4440
RE 39571	1.12	5	7	P	G	0	0	3050	4210
RE 39571	2.2	5	10	P	G	0	0	1100	3860
RE 39571 RE 40885	1.6 0.56	6	8	P	E	78	99	2760	4340
FMC 57020	2.2	9	7	P	P-F	20	10	2720	3350
SD 95485	1.12	2	7	P	G	0	0	2610	4500
LSD (0.05)								(210)	(130)

1/ stand per meter of row, May 29

2/ E=Excellent G=Good F=Fair P=Poor

3/ 0=no control 100=complete control

The evaluation of postemergence selective grass herbicides for the control of johnsongrass in cotton. Vargas, Ron and Gerecke, Tom. A uniform stand of SJ-2 cotton, infested with johnsongrass 6 to 24 inches high was divided into plots 12.6 X 30 ft and replicated four times in a randomized complete block design. The herbicides were applied in 20 gallons of water per acre with a one percent petroleum based surfactant on May 15, 1984 and again on July 3, 1984. An evaluation on May 30, 1984 after a single application of herbicides, indicated 73 to 83 percent control with all materials. Fluazifop-P-dibutyl at .75 and haloxyfop-methyl at .5 lb ai per acre were giving the best control. An evaluation on July 17, 1984 after the second application, again indicated good to excellent control with all materials. Fluazifop-P-dibutyl at .75 lb ai was exhibiting 100 percent control with haloxyfop-methyl at the .5 lb ai rate exhibiting 90 percent control. An evaluation at harvest on October 16, 1984 did indicate considerable regrowth with sethoxydim, fenoxaprop-ethyl and DPX-Y6202. Fluazifop-P-dibutyl and haloxyfop-methyl were still exhibiting acceptable control. (University of California Cooperative Extension, 328 Madera Avenue, Madera, CA 93637)

Johnsongrass control in cotton

Treatments*	#ai/A Date of App 5/15 + 7/3/84	Johnsongrass Control1/ 5/30/84	7/17/84	10/16/84
fluazifop-P-dibutyl	.25 + .25	7.6	7.3	7.7
fluazifop-P-dibutyl	.50 + .50	7.6	7.6	9
fluazifop-P-dibutyl	.75 + .75	8.3	10	9
sethoxydim	.50 + .50	7.6	8.3	1.0
fenoxaprop-ethyl	.25 + .25	7.0	7	2.7
fenoxaprop-ethyl	.5 + .5	7.6	8.6	6.7
haloxyfop-methyl	.25 + .25	7.6	8.6	7.3
haloxyfop-methyl	.50 + .50	8.3	9.0	9
DPX-Y6202	.25 + .25	7.6	8.6	5.7
DPX-Y6202	.50 + .50	7.3	8.6	3
check	-	0	0	0

*All treatments 1% petroleum based surfactant

1/Average of three replications were 0 = no control and 10 = 100% control

The evaluation of postemergence selective grass herbicides for the control of bermudagrass in cotton. Vargas, Ron and Gerecke, Tom. A uniform stand of SJ-2 cotton, infested with bermudagrass 2 to 10 inches tall was divided into plots 3.2 X 20 ft and replicated four times in a randomized complete block design. The herbicides were applied in 30 gallons of water per acre with a one percent petroleum based surfactant on July 30, 1984 and August 14, 1984. An evaluation on August 27, 1984 indicated fair to good control with most materials. DPX-Y6202 was exhibiting 82 percent control with a combination of sethoxydim and glyphosate giving 80 percent control. No glyphosate symptoms were evident in the cotton. An evaluation at harvest on October 8, 1984 again indicated acceptable control with fluazifop-butyl, fluazifop-P-dibutyl, haloxyfop-methyl, DPX-Y6202 and a combination of sethoxydim and glyphosate. Sethoxydim and fenoxaprop-ethyl were giving poor control at 53 and 63 percent. (University of California Cooperative Extension, 328 Madera Ave., Madera, CA 93637)

Bermudagrass control in cotton

Treatments*	Date of App 7/30 + 8/14/84	Bermudagrass Evaluation[1/] 8/22/84	10/8/84
sethoxydim	.5 + .5	7.6	5.5
fluazifop-butyl	.5 + .5	7	8.25
fluazifop-P-dibutyl	.25 + .25	6.8	8.4
fluazifop-P-dibutyl	.5 + .5	7.75	9.4
fenoxaprop-ethyl	.5 + .5	6.8	6.25
haloxyfop-methyl	.5 + .5	7.3	9.1
DPX-Y6202	.5 + .5	8.25	10
sethoxydim + glyphosate	(.5 + .5) + (.5 + .5)	8.0	9.0
check	-	0	0

*All treatments 1% petroleum based surfactant

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

Effectiveness of preplant incorporated herbicides for weed control in 'California Dark Red' kidney beans. Mitich, L. W., N. L. Smith, E. F. Szelezniak, and G. B. Kyser. Eight herbicides were evaluated, alone and in combinations, on 'California Dark Red' kidney beans artificially infested with barnyardgrass and tomatillo groundcherry at the UC Davis Experimental Farm. Eighteen treatments were made on June 4, 1985, using a CO_2 backpack sprayer at 30 psi, with a spray volume of 20 gpa and size 8002 nozzles. Treatments were power incorporated to a depth of 2 inches.

The experiment was conducted on a randomized complete block design on Yolo clay loam. Plots measuring 10 ft (four 30-inch rows) by 20 ft, replicated four times, were planted on June 5 and furrow-irrigated. Weed densities were evaluated on September 4, one day before the beans were cut.

AC 263,499 gave excellent **groundcherry** control (98% or better) at its high rate (0.125 lb/A), both alone and with pendimethalin. SC 5676 (2.0 lb/A) and alachlor EC + trifluralin (3.0 + 0.75 lb/A) controlled groundcherry very well (90% to 95%). Methazole (2.0 lb/A), alachlor MT + trifluralin (3.0 + 0.75 lb/A), and pendimethalin + metolachlor (0.75 + 2.5 lb/A) provided good control. Excellent control of **barnyardgrass** (greater than 95%) was obtained with alachlor (in both formulations and all combinations), SC 5676 at both rates, pendimethalin + metolachlor (0.75 + 2.5 lb/A), and AC 263,499 + pendimethalin (0.125 + 0.75 lb/A). AC 263,499 (0.125 lb/A), AC 263,499 + pendimethalin (0.06 + 0.75 lb/A), and pendimethalin (0.75 lb/A) gave good control of barnyardgrass. No crop phytotoxicity was evident in this trial. (University of California Cooperative Extension, Davis, CA 95616)

Preplant Incorporated Herbicides

in California 'Dark Red' Kidney Beans

Herbicide[1]	Rate (lb ai/A)	%Control Groundcherry	%Control Barnyardgrass	Dry bean yield[2] (lbs/A)	Statistical[4] group
AC 263,499	0.06	75	60	2449	A B C
AC 263,499	0.125	99	89	3201	A
AC 263,499 + pendimethalin	0.06 +0.75	73	84	2558	A B C
AC 263,499 + pendimethalin	0.125 +0.75	98	97	3067	A B
Pendimethalin	0.75	30	83	2854	A B
Pendimethalin + metolachlor	0.75 +2.5	80	100	3062	A B
Alachlor MT	3.0	60	96	3168	A
Alachlor MT + trifluralin	3.0 +0.75	81	99	3106	A
Alachlor EC	3.0	55	98	3079	A
Alachlor EC + trifluralin	3.0 +0.75	90	100	2990	A B
Alachlor MT + ethalfluralin	3.0 +0.75	68	99	3176	A
Alachlor EC + ethalfluralin	3.0 +0.75	54	100	3045	A B
SC 5676	1.0	65	98	3110	A
SC 5676	2.0	94	100	2881	A B
Methazole	0.5	25	33	2153	B C
Methazole	1.0	61	43	2442	A B C
Methazole	2.0	83	36	2328	A B C
Unweeded control	----	18	15	1882	C

[1]Paraquat (¼ lb ai/A) added to all treatments to control existing weeds.
[2]Average of 4 replications
[3]100% = total weed control; 0% = no weed control. Rated on September 4.
[4]Yields followed by a common letter are not significantly different at the 5% level (Duncan's multiple-range test).

Evaluation of postemergence herbicides for the control of selected weeds in 'California Dark Red' kidney beans. Mitich, L. W., N. L. Smith, E. F. Szelezniak, and G. B. Kyser. Five herbicides were tested at varied rates and in several combinations for their efficacy in controlling barnyardgrass and tomatillo groundcherry in kidney beans at the UC Davis Experimental Farm. Beans were planted on June 5, 1985, and weeds on June 7. Herbicides were applied June 27, when bean plants had 3-4 leaves and were 6 to 8 inches tall, barnyardgrass seedlings were up to 3 inches tall, and groundcherry seedlings had 1-2 leaves and were 1 to 2 inches tall.

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

AC 263,499 gave good **groundcherry** control (80%-90%) at all rates and combinations. ICI PP005 (both rates) and sethoxydim (0.5 lb/A) produced excellent control of **barnyardgrass** (98% or better). SC 1084 (0.5 lb/A) provided very good control of barnyardgrass (over 90%); AC 263,499 + sethoxydim (0.03 + 0.5 lb/A) and SC 1084 (0.25 lb/A) gave good control (80%-85%). AC 263,499 at 0.06 lb/A and bentazon at 1.0 lb/A produced **crop injury** over 20% at the first rating; no visible injury was noted at the second rating. Phytotoxicity associated with the high rate of AC 263,499 resulted in a bean yield lower than that of the unweeded control. (University of California Cooperative Extension, Davis, CA 95616)

Postemergence Herbicides
in California 'Dark Red' Kidney Beans

Herbicide[1]	Rate (lb ai/A)	Evaluations (average of 4 replications): Groundcherry 7/9	Groundcherry 9/4	Barnyardgrass 7/9	Barnyardgrass 9/4	Crop Injury[2,3] (percent)	Dry bean yield[2] (lb/A)	Statistical[4] group
AC 263,499	0.03	84	89	35	49	19	2443	A B C
AC 263,499	0.06	95	83	30	50	24	2079	C
AC 263,499 + sethoxydim	0.03 +0.5	86	88	81	80	15	2395	A B C
SC 1084	0.25	15	16	76	81	13	2169	B C
SC 1084	0.5	11	30	80	93	8	2736	A B
ICI PP005	0.25	21	33	93	98	10	2498	A B C
ICI PP005	0.5	36	18	99	100	10	2362	A B C
Sethoxydim	0.5	25	34	98	100	15	2847	A
Bentazon	1.0	80	69	10	40	21	2189	B C
Unweeded	----	13	49	8	13	3	2084	C

[1]AC 263,499 and combiinations applied with 1 qt/A Surfel; others applied with 0.25% X-77.

[2]All values are average of 4 replications.

[3]100% = total weed control or death of crop; 0% = no weed control, no phytotoxicity.

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

Evaluation of postemergence herbicides for crop phytotoxicity and control of selected weeds in kidney beans. Canevari, W.M., L. W. Mitich, and G. B. Kyser. In this trial, conducted at the Cortopassi Farms in San Joaquin County, four herbicides were applied to 'California Dark Red' kidney bean plants at the 2-3 trifoliate leaf stage of development for evaluation of weed control efficacy and crop phytotoxicity. Beans were planted in Egbert muck soil on June 27, 1985, and sprinkler irrigated. The experiment was constructed in a randomized complete block design with 4 replications; each plot was 5 ft (two 30-inch rows) by 25 ft.

Treatments were applied July 22 with a CO_2 backpack sprayer at 50 gpa. Air temperature during application was approximately 73 F, and the soil was dry. Weed control and crop vigor were evaluated July 30 and August 8.

In both evaluations, lactofen (both rates) and acifluorfen SP produced excellent **purslane** control (greater than 95%); acifluorfen WS (both rates) had done likewise by the time of the second evaluation. Bentazon controlled purslane well (90%-95%) in both evaluations. Bentazon also produced good **hairy nightshade** control (90% or better) in both evaluations. Fair nightshade control (80%-90%) was produced by lactofen (0.5 lb/A) in the first evaluation and by AC 263,499 (0.25 lb/A) in the second evaluation. Lactofen (both rates) produced excellent **pigweed** control (95%-100%) in both evaluations; AC 263,499 (both rates) had done likewise by the time of the second evaluation. Acifluorfen SP produced fair control of pigweed (80%-90%) in both evaluations. Bentazon produced significantly better control of **yellow nutsedge** than other treatments, but only at the time of the second evaluation was its performance adequate (80%). No treatment provided adequate control of **volunteer wheat.**

Bentazon, acifluorfen SP, and acifluorfen WS (both rates) reduced crop vigor by less than 20% in both ratings. Other treatments produced greater phytotoxicity. Bentazon and acifluorfen SP treatments produced significantly greater bean yields than other treatments. Treatment with the high rate (0.25 lb/A) of AC 263,499 gave a significantly lower yield than the other treatments. (University of California Cooperative Extension, Stockton, CA 95205 and Davis, CA 95616)

Evaluation of postemergence herbicides for control of selected weeds in kidney beans, San Joaquin County.

Herbicide	Rate (lb/A)	Purslane	Hairy nightshade	Pigweed	Volunteer wheat	Yellow nutsedge	Crop vigor[1] (avg. 4 replications)	Yield[2] (lb/A)	
Bentazon + oil	1.0 +1 qt.	93, 92	95, 91	53, 48	0, 0	63, 80	89, 93	2300	A
Lactofen	0.25	100, 100	76, 55	100, 100	39, 13	32, 18	45, 82	1732	B
Lactofen	0.5	100, 100	89, 54	100, 100	47, 13	40, 15	32, 51	1708	B
AC 263, 499	0.25	60, 50	50, 84	81, 100	21, 53	21, 60	46, 57	1307	C
AC 263, 499	0.125	59, 53	50, 76	76, 100	25, 40	32, 58	61, 79	1735	B
Acifluorfen (soluble salt)	0.25	95, 97	24, 20	85, 81	10, 0	18, 20	83, 89	2119	A
Acifluorfen (liquid)	0.25	81, 95	20, 15	53, 53	10, 13	21, 25	89, 87	1690	B
Acifluorfen (liquid)	0.50	86, 98	36, 28	78, 53	14, 18	28, 23	85, 83	1997	A B
Control	----	0, 0	0, 5	0, 0	0, 0	0, 13	100, 96	1171	C

[1]Evaluated 7/30, 8/8. 0% = No weed control, death of crop; 100% complete control, no phytotoxicity.

[2]Average of 4 replications. Values followed by the same letter are not different at the 5% level of significance.

Effect of nightshade competition on yield of kidney beans. Mitich, L. W., N. L. Smith, E. F. Szelezniak, and G. B. Kyser. The objective of this trial was to establish the population point at which a nightshade infestation threatens the economic production of kidney beans. The original intent was to create precise weed populations in four replications; but the nightshade germinated sporadically, necessitating the use of recessional analysis for interpretation of results.

California 'Dark Red' kidney beans were planted on June 5, 1985, in Yolo County loam which had previously been treated with methyl bromide fumigant for the control of existing weeds and weed seeds. Black and hairy nightshade seeds were sown on June 11 at several predetermined rates among newly germinated bean plants. Plots were 10 ft (four 30-inch rows) by 20 ft, and the field was furrow irrigated between each row. Surviving non-nightshade weeds were hand picked. On September 5, the dry bean plants were cut, and nightshade plants were counted, cut and dried for eventual weighing.

On the accompanying graph, dry bean yield is plotted against dry weight of nightshade for each plot. The equation of the best-fit line was determined using simple linear regression analysis. The "Distance between nightshade plants" side of the graph represents a hypothetical case which could be described as follows.

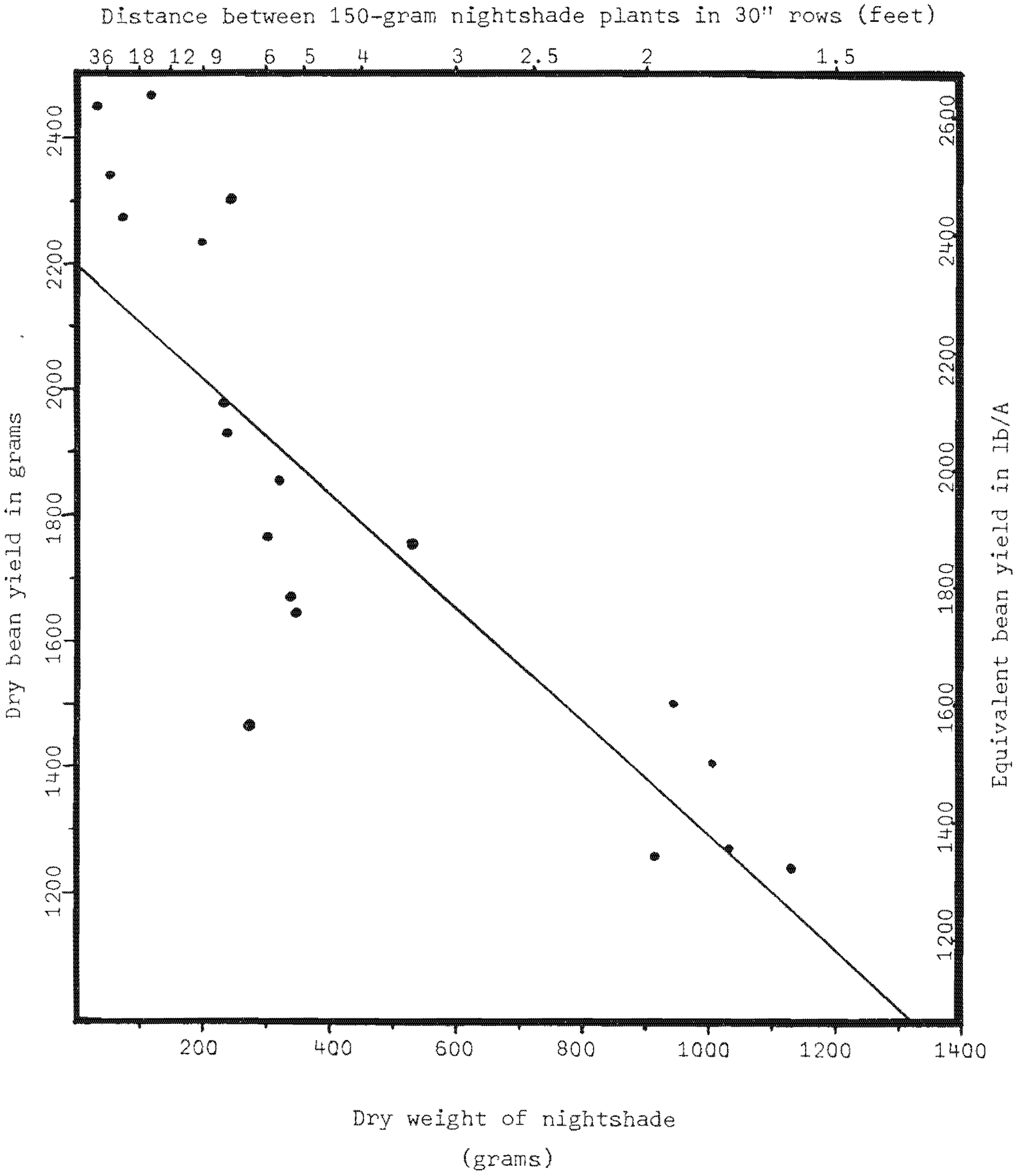
The best-fit line has a slope of -0.91 (almost -1:1). Therefore, in an 'average' field, a bean grower might lose a weight of dry beans equivalent to the dry weight of nightshade in his field. (Nightshade loses 65%-70% of its weight on drying, assuming the berries remain plump.) If nightshade plants growing in a field weigh 100-200 grams each and are approximately as big as the bean plants, then an infestation of one nightshade plant to every 5 feet of 30-inch row could cost a farmer 350 pounds of beans per acre. Other problems might include difficulties in harvesting and a lower quality, berry-stained product.

Field competition studies have their limitations: i.e., uncontrolled variables which make it unwise to generalize from any one trial. That the nightshade did not germinate as expected but rather germinated randomly was a disguised blessing, however. The random weed distribution obtained approximated field conditions in a realistic manner, and in dealing with the results we have concluded that regression analysis simplifies interpretation of such a study.

This trial cannot provide "when-to" guidelines for nightshade control in kidney beans. Economic factors complicate interpretation, as do the limitations previously mentioned. That nightshade can seriously reduce yields, though, is obvious. Future studies of this nature should employ larger ranges of nightshade populations, different soils, and various cultural techniques; then, perhaps, the correlation of nightshade population with bean yield can be refined and put to use. (University of California Cooperative Extension, Davis, CA 95616)

Bean yield dependence on nightshade population, UC Davis Experimental Farm, 1985.

Slope of best-fit line: -0.91
Y-intercept: 2197 grams
Coefficient of determination: 0.69



Herbicide evaluations in pinto beans. Arnold, R.N., E.J. Gregory and W.J. Price. Research plots were established on May 20, 1985 at the Agricultural Science Center to evaluate efficacy of individual and/or herbicide combinations applied preplant incorporated in pinto beans (var. Navajo). Soil type was a Kinnear very fine sandy loam with a pH of 7.9 and an organic matter content of less than 1.0%. Individual plots were 12 by 25 ft in size with four replications arranged in a randomized complete block design. Herbicides were applied with a CO_2 backpack sprayer calibrated to deliver 30 gal/A at 25 psi. Treatments were immediately incorporated using a tractor driven disc and spike-tooth harrow to a depth of 2 to 3 inches. Pinto beans were planted on 34-inch beds at a rate of 50 lb/A on May 21. Weed seeds were broadcast and spike-tooth harrowed at the beginning of this study to provide heavy weed infestations. Pinto beans were harvested for yield October 7, 1985.

Visual evaluations of crop injury and weed control were made July 8, 1985. All treatments provided excellent control of barnyardgrass. Kochia and prostrate pigweed control was good to excellent with all treatments, russian thistle control was excellent with all treatments except SD-95481. All treatments produced greater yields than the check. No significant crop injury was observed in any of the treatments. (Agricultural Science Center, New Mexico State University, Farmington, N. M. 87499)

Preplant incorporated herbicides in pinto beans, 1985

Treatment	Rate (lb ai/A)	Crop[1] Injury	% Weed Control[1]				Bean Yield lb/A
			Kochia	Russian Thistle	Prostrate Pigweed	Barnyardgrass	
ethalfluralin	.56	0	100.0	91.3	100.0	100.0	3,800
ethalfluralin + SD-95481	.56 + .57	0	99.3	98.8	100.0	100.0	3,750
ethalfluralin + metolachlor	.56 + 1.5	0	100.0	95.0	100.0	100.0	3,776
ethalfluralin + EPTC R-33865	.56 + 3.0	0	100.0	100.0	100.0	100.0	3,685
trifluralin	.75	0	100.0	96.3	100.0	100.0	3,823
trifluralin + metolachlor	.75 + 1.5	0	100.0	98.8	100.0	100.0	3,715
trifluralin + EPTC + R-33865	.75 + 3.0	0	100.0	100.0	100.0	100.0	3,649
SD-95481	.57	0	98.8	72.5	85.0	100.0	3,476
check		0	0	0	0	0	986

1. Based on a visual scale from 0-100 where 0 = no control or injury and 100 = dead plants.

Evaluation of preplant incorporated herbicides in pinto beans. Miller, S.D. Research plots were established on May 28, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preplant incorporated in pinto beans. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi and incorporated twice immediately after application with a roller harrow operating at 1½ to 2 in. Pinto beans (var. UI 114) were planted on May 28. The soil was classified as a sandy loam (73% sand, 18% silt, and 9% clay) with 1.6% organic matter and a pH 7.6.

Weed control and crop stand evaluations were made on June 17 and August 22 by counting two 6 in. by 5 ft quadrats per replication. Visual crop injury evaluations were made July 18 and plots harvested for yield on August 29, 1985. Common lambsquarters, redroot pigweed, hairy nightshade and yellow foxtail infestations were light averaging 0.3, 0.7, 0.1, and 1.1 plants/linear ft; respectively, in the untreated check. Isoxaben alone at rates of 0.087 lb/A or higher and isoxaben combinations with ethafluralin and trifluralin reduced pinto bean stands. AC-263,499 at all rates stunted pinto beans and delayed maturity. Pinto bean yields were generally related to weed control and/or crop injury. Season long weed control was excellent with EPTC combination with trifluralin, chloramben and pendimethalin, ethafluralin combinations with metolachlor, chloramben and isoxaben and trifluralin combinations with isoxaben. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1362 .)

Preplant incorporated herbicides in pinto beans

Treatment[1]	Rate lb ai/A	Pinto bean stand %	Pinto bean injury %	Pinto bean yield lb/A	June 17 Colq	June 17 Rrpw	June 17 Hans	June 17 Yeft	August 22 Colq	August 22 Rrpw	August 22 Hans	August 22 Yeft
EPTC + trifluralin	2.0 + 0.5	97	2	1559	100	100	100	100	95	93	96	99
EPTC + chloramben	2.0 + 1.5	100	5	1475	100	100	100	100	90	90	87	96
EPTC + pendimethalin	2.0 + 1.0	99	0	1824	100	100	100	100	91	95	98	95
ethalfluralin + metolachlor	0.75 + 2.0	100	2	1559	100	100	100	100	99	99	95	95
ethalfluralin + chloramben	0.75 + 1.5	100	2	1759	100	100	100	100	98	96	93	96
AC-263,499	0.06	100	18	1163	100	100	100	27	99	96	98	86
AC-263,499	0.09	100	28	1179	100	100	100	27	99	99	99	83
AC-263,499	0.125	100	30	883	100	100	100	27	99	96	99	85
cinmethylin	0.75	88	10	1682	6	67	50	98	57	85	67	96
acetochlor	1.5	100	2	1409	100	100	50	100	83	83	76	93
acetochlor	2.0	98	3	1428	100	100	100	100	88	88	80	95
alachlor	3.0	98	0	1524	100	100	100	100	85	75	83	90
alachlor	4.0	100	3	1582	100	100	100	98	85	81	87	92
alachlor (MT)	3.0	100	2	1489	94	100	100	100	73	78	78	89
alachlor (MT)	4.0	100	4	1498	100	100	100	100	83	87	85	95
metolachlor	3.0	100	0	1359	82	97	100	100	77	78	80	93
CGA-24704	1.0	100	0	944	0	69	17	84	20	20	13	50
CGA-24704	1.5	100	5	864	0	69	17	89	20	50	33	82
CGA-24704	2.0	100	5	1071	81	75	0	100	70	72	26	86
CGA-24704	2.5	100	8	1486	81	91	0	100	68	68	32	98
isoxaben	0.043	100	0	918	100	100	100	27	63	57	80	13
isoxaben	0.07	100	0	1056	100	100	100	27	57	60	80	27
isoxaben	0.087	84	2	998	100	100	100	11	67	76	83	27
isoxaben	0.13	78	3	1187	94	100	100	62	82	77	90	30
isoxaben	0.18	75	3	1375	100	100	100	73	82	82	93	40
isoxaben + ethalfluralin	0.13 + 0.75	83	9	1478	100	100	100	100	99	96	99	94
isoxaben + ethalfluralin	0.18 + 0.75	76	7	1578	100	100	100	100	99	98	99	96
isoxaben + trifluralin	0.13 + 0.5	79	7	1597	100	97	100	100	97	99	95	93
isoxaben + trifluralin	0.18 + 0.5	59	7	1747	100	100	100	100	98	99	99	94
Check	- - - - - -	100	0	891	0	0	0	0	0	0	0	0

[1]MT = microtech formulation

Evaluation of preemergence herbicides in pinto beans. Miller, S.D. Research plots were established on May 29, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of individual and/or herbicide combinations applied preemergence in pinto beans (var. UI 114). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (76% sand, 16% silt, and 8% clay) with 1.3% organic matter and a 8.0 pH.

Weed control and crop stand evaluations were made on June 17 and August 22 by counting two 6 in. by 5 ft quadrats per replication. Visual crop injury evaluations were made on July 18 and plots harvested for yield on August 29, 1985. Common lambsquarters, redroot pigweed, hairy nightshade and yellow foxtail infestations were light averaging 0.2, 0.7, 0.1, and 1.6 plants/linear ft; respectively, in the untreated check. No herbicide treatment reduced dry bean stand; however, AC-263,499 stunted and delayed maturity of pinto beans at all rates. Pinto bean yields were closely related to weed control and/or crop injury. Season long weed control was excellent with AC-263,499 at 0.125 lb/A, metolachlor combinations with lactofen or cinmethylin combinations with alachlor. Weed control was good with AC-263,499 at 0.06 and 0.09 lb/A or cinmethylin combinations with lactofen. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1367 .)

Preemergence herbicides in pinto beans

		Pinto bean			Percent control							
	Rate	stand	injury	yield	June 17				August 22			
Treatment	lb ai/A	%	%	lb/A	Colq	Rrpw	Hans	Yeft	Colq	Rrpw	Hans	Yeft
alachlor	3.0	100	3	1563	100	70	90	99	65	78	80	92
metolachlor	3.0	96	5	1661	50	100	100	100	70	77	80	91
metolachlor + lactofen	3.0 + 0.4	100	3	1855	100	100	100	100	93	95	98	98
cinmethylin	0.75	93	0	1350	0	43	0	100	37	23	37	99
cinmethylin + alachlor	0.75 + 2.0	100	0	1916	100	100	80	100	93	96	98	99
cinmethylin + actofen	0.75 + 0.4	94	3	1835	100	100	100	96	79	92	90	99
AC-263,499	0.06	94	13	1878	100	100	100	0	95	86	95	75
AC-263,499	0.09	100	18	1682	100	100	100	0	98	96	98	85
AC-263,499	0.125	100	20	1171	100	100	100	19	99	98	99	92
CGA-24704	1.0	100	0	1366	0	72	0	54	30	27	30	37
CGA-24704	1.5	95	3	1388	50	72	0	89	43	42	43	82
CGA-24704	2.0	100	3	1505	70	83	80	98	47	40	43	83
CGA-24704	2.5	100	7	1514	80	86	80	100	55	53	57	92
SC-5676 + dichlormid	1.0 + 0.17	100	5	1586	100	100	80	100	80	63	68	77
SC-5676 + dichlormid	1.5 + 0.25	100	2	1753	100	100	100	98	80	73	68	82
Check	- - - - -	100	0	1217	0	0	0	0	0	0	0	0

Evaluation of preemergence/postemergence and postemergence herbicides in pinto beans. Miller, S.D. Research plots were established on May 29, 1985 at the Torrington Research and Extension Center to evaluate the efficacy of preemergence/postemergence and postemergence herbicide treatments in pinto beans (var. UI 114). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa for preemergence and 10 gpa for postemergence treatments both at 40 psi. 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. Postemergence treatments were applied June 18 to pinto beans in the 1 to 2-trifoliolate leaf stage and grass 2 to 3 in. in height.

Weed control and crop stand evaluations were made on July 2, 1985 by counting two 6 in. by 5 ft quadrats per replication. Plots were harvested for yield August 29, 1985. Redroot pigweed, common lambsquarters, hairy nightshade and yellow foxtail infestations were light averaging 0.4, 1.0, 0.6, and 2.1 plants/linear ft; respectively, in the untreated check. Little apparent crop injury was observed with any treatment. All treatments except AC-263,499 increased pinto bean yields 1200 lb/A or more compared to the untreated check. Weed control was good with all treatments except AC-263,499. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1369 .)

Preemergence/postemergence and postemergence herbicides in pinto beans

Treatment[1]	Rate lb ai/A	Pinto bean stand %	Pinto bean yield lb/A	Percent control Rrpw	Colq	Hans	Yeft
Preemergence/postemergence							
lactofen/sethoxydim + oc	0.4/0.19	100	2477	86	98	97	93
lactofen/sethoxydim + oc	0.4/0.28	100	2304	95	94	90	98
lactofen/sethoxydim + oc	0.4/0.37	100	2450	95	98	97	99
lactofen/PP-005 + oc	0.4/0.09	100	2312	86	94	100	97
lactofen/PP-005 + oc	0.4/0.125	100	2465	86	94	100	98
lactofen/PP-005 + oc	0.4/0.19	100	2327	86	90	88	96
lactofen/PP-005 + oc	0.4/0.25	100	2300	86	94	97	98
lactofen/PP-005 + oc	0.4/0.37	100	2404	86	94	90	97
Postemergence							
AC-263,499	0.06	100	1025	0	37	37	16
AC-263,499	0.09	100	1075	53	74	100	18
AC-263,499	0.125	100	1148	72	82	100	69
Check	- - - - -	100	1098	0	0	0	0

[1] oc = At Plus 411F at 1 qt/A with sethoxydim and 1% v/v with PP-005.

Lambsquarter control in lentils. Huston, C. H., R. H. Callihan, and D. C. Thill. An experiment was conducted near Moscow, Idaho to evaluate several pre- and postemergence herbicides for annual broadleaf weed control in lentils. The soil at this location was a Larkin silt loam with organic matter of 2.5% and a pH of 6.5. The experimental design was a randomized complete block replicated four times with individual plot size of 10 ft by 32 ft. All treatments were applied with a backpack CO_2 sprayer calibrated to deliver 20 gpa at 40 psi using flat fan nozzles. 'Eston' lentils were planted April 24, 1985. Preemergence surface treatments of 0.25, 0.38, or 0.5 lb/A fluorchloridone (EC 2.0 lb/gal), 0.25 lb/A metribuzin (75% dry flowable) applied alone or combined with 0.25 lb/A fluorchloridone, 0.18 lb/A metribuzin plus 0.25 lb/A ethylmetribuzin (50% wettable powder). 0.38, 0.5, 0.75, or 1.0 lb/A ethylmetribuzin, 1.5 lb/A dinoseb (EC 3.0 lb/gal) alone or in combination with 0.25 lb/A fluorchloridone, and 3.0 lb/A dinoseb were applied April 29. Air temperature was 7 C, soil temperature at 6 inches was 9 C, and relative humidity was 50%. Postemergence treatments of 0.38, 0.5, or 1.0 lb/A ethylmetribuzin, and 0.18 lb/A metribuzin were applied June 13, 1985. The air temperature was 14 C and relative humidity was 70%. At this time lentils were 8 inches tall and common lambsquarters (CHEAL) plants ranged from the two leaf stage to four inches in height. Lambsquarter density was ten plants per ft^2 in the untreated check.

The spring season was extremely dry and both lambsquarters and lentil plants exhibited moisture stress and had stunted growth during the season. This lack of moisture may have affected herbicide activity and lentil yield.

Very slight temporary lentil leaf chlorosis was present in the fluorchloridone treatments shortly after emergence. Preemergence surface ethylmetribuzin treatments produced slight lentil stunting and leaf chlorosis. Postemergence ethylmetribuzin and metribuzin treatments produced slight to moderate stunting and leaf necrosis. The stunting was apparent throughout the growing season.

Only the 3.0 lb/A dinoseb treatment produced acceptable lambsquarters control (91%). All other treatments produced less than 75% control.

Lentil seed yield, which ranged from 914 to 1239 lb/A, did not differ among treatments. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Lambsquarter Control in Lentils

Herbicide	Rate	Appl.[1] Time	Crop Injury[2]	Weed Control CHEAL[2]	Seed Yield
	(lb/A)		%	%	(lb/A)
Check	-	-	-	-	939
fluorchloridone	0.25	PES	1	44	1053
fluorchloridone	0.38	PES	1	58	995
fluorchloridone	0.50	PES	1	74	1130
fluorchloridone + metribuzin	0.25 0.25	PES	1	45	1079
fluorchloridone + dinoseb	0.25	PES	1	65	1195
metribuzin	0.25	PES	0	43	1049
metribuzin	0.18	Post	24	48	909
dinoseb	1.5	PES	0	64	1239
dinoseb	3.0	PES	1	91	1132
ethylmetribuzin	0.38	PES	2	34	959
ethylmetribuzin	0.5	PES	1	24	1001
ethylmetribuzin	0.75	PES	4	36	1000
ethylmetribuzin	1.0	PES	5	52	1112
ethylmetribuzin	0.38	Post	9	49	914
ethylmetribuzin	0.5	Post	15	39	990
ethylmetribuzin	0.75	Post	14	49	976
ethylmetribuzin + metribuzin	0.25 0.18	PES	6	51	955
LSD(0.05)			6	24	ND

[1] PES = preemergence surface, Post = postemergence
[2] Crop injury and weed control as % of check: 0 = no injury or weed control, 100 = complete crop kill or weed control.

Wild oat control in lentils. Callihan, R. H., C. H. Huston, and D. C. Thill. This study was established near Moscow, ID to evaluate several pre- and postemergence herbicides for wild oat (AVEFA) control in lentils. The soil at this location was a Thatuna silt loam with a pH of 6.0 and organic matter of 3%. 'Chilean' lentils were planted April 17, 1985. The experimental design was a randomized complete block replicated four times with individual plot size of 10 ft by 32 ft. Postplant incorporated treatments of triallate (EC 4.0 lb/gal) or SD95481 (EC 7.0 lb/gal) and preemergence surface treatments of dinoseb (EC 3.0 lb/gal) or metribuzin (75% dry flowable) were applied on April 26, 1985. The air temperature was 8 C, soil temperature at 6 inches was 8 C, and relative humidity was 40%. All treatments were applied with a backpack CO_2 sprayer calibrated to deliver 20 gpa at 40 psi using flatfan nozzles. Triallate treatments were immediately incorporated by cross-harrowing with a spike-tooth harrow while SD95481 treatments were shallowly incorporated with a rake. Postemergence treatments of fluazifop-p-butyl (EC 1.0 lb/gal), sethoxydim (EC 1.5 lb/gal), Assure (EC 0.8 lb/gal), and SC1084 (EC 2.0 lb/gal) were applied June 9, 1985. The air temperature was 14 C and relative humidity was 70%. Postemergence treatments were applied with 1.25% v/v crop oil surfactant. At the time of postemergence applications wild oats were beginning to tiller and were at a density of 10 per ft^2 in the untreated check.

Excellent (95-100%) wild oat control was obtained with sequential treatments of 2.25 lb/A dinoseb followed by 0.13, 0.18, or 0.25 lb/A fluazifop-p-butyl, 0.3 lb/A sethoxydim, 0.06, 0.13, or 0.2 lb/A Assure, and 0.5 lb/A SC1084. Good control (85-94%) was obtained with 2.25 lb/A dinoseb followed by 0.07 lb/A fluazifop-p-butyl, 0.2 lb/A sethoxydim, 0.3 lb/A Assure, and 0.13 or 0.25 lb/A SC1084. Treatments of 2.25 lb/A dinoseb alone or following 1.25 or 1.5 lb/A triallate or 0.8 lb/A SD95481 produced poor (less than 25%) wild oat control. Treatments of 0.25 lb/A metribuzin alone or following 0.8 lb/A SD95481, and the 1.0 lb/A SD95481 treatment also produced poor control. No treatments provided any control of common lambsquarters (CHEAL). An unusually dry spring may have contributed to poor performance of the postplant incorporated and preemergence surface treatments.

Fluazifop-p-butyl treatments at 0.25 lb/A produced a slight, temporary chlorotic mottling of lentil leaves. No other treatments caused apparent injury. However, lentil senescence was delayed by about two weeks with treatments of 0.25 lb/A fluazifop-p-butyl or 0.5 lb/A SC1084.

Seed yield in treatments providing good to excellent wild oat control (948 to 1133 lb/A) were significantly ($p = 0.05$) greater than the untreated check (689 lb/A). Exceptions to this were the treatments of 0.07 lb/A fluazifop-p-butyl and 0.5 lb/A SC1084 which had yields of 798 and 862 lb/A, respectively. Seed yield in treatments providing poor wild oat control ranged from 731 to 869 lb/A and did not differ from the check. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Wild Oat Control in Lentils

Herbicide	Rate	Appl Time[1]	Crop Injury[2]	Weed Control[2] AVEFA[3]	Weed Control[2] CHEAL[3]	Seed Yield
	(lb ai/A)	---------------	--------------- %	---------------	---------------	(lb/A)
check	-	-	-	-	-	689
triallate[4]	1.25	POPI	0	5	0	745
triallate[4]	1.5	POPI	0	25	0	773
dinoseb	2.25	PES	0	0	0	731
metribuzin	0.25	PES	0	2	0	755
SD95481/	0.8	POPI	0	2	0	803
metribuzin	0.25	PES				
SD95481[4]	0.8	POPI	0	0	0	869
SD95481	1.0	POPI	0	5	0	765
fluazifop-p-butyl[4,5]	0.07	Post	0	92	0	798
fluazifop-p-butyl[4,5]	0.13	Post	0	98	0	1014
fluazifop-p-butyl[4,5]	0.18	Post	0	98	0	994
fluazifop-p-butyl[4,5]	0.25	Post	5	99	0	1133
sethoxydim[4,5]	0.2	Post	0	92	0	964
sethoxydim[4,5]	0.3	Post	0	95	0	981
DPX-76202[4,5]	0.03	Post	0	86	0	948
DPX-76202[4,5]	0.06	Post	0	98	0	1107
DPX-76202[4,5]	0.13	Post	0	98	0	1116
DPX-76202[4,5]	0.2	Post	0	99	0	1020
SC1084[4,5]	0.13	Post	0	90	0	1075
SC1084[4,5]	0.25	Post	0	91	0	1003
SC1084[4,5]	0.5	Post	0	96	0	862
$LSD_{0.05}$			2	15	ND	223

[1] POPI = postplant incorporated, PES = preemergence surface, Post = postemergence.
[2] Crop injury and weed control as percent of check: 0 = no crop injury or weed control, 100 = complete crop kill or weed control.
[3] AVEFA = Avena fatua L., CHEAL = Chenopodium album L.
[4] Received PES treatment of 2.25 lb/A dinoseb following POPI treatments or preceding Post treatments.
[5] Crop senescence was delayed by approximately two weeks.

DPX-Y6202 for wild oats control in lentils. Curran, W.S., R.E. Whitesides and L.A. Morrow. DPX-Y6202 was applied at 70 and 280 g ai/ha at 2 or 4 weeks after lentil emergence to evaluate herbicide efficacy on wild oats in lentils. The experiment was conducted twice in the greenhouse. Wild oats had 2 to 3 leaves at the first herbicide application and 3 to 4 tillers by the second application. Seven weeks after emergence, lentils were harvested and dried. No differences in lentil dry weights occurred. Both herbicide rates were effective in controlling the wild oats when the plants were treated at the 2 to 3 leaf stage of growth.

In the field, lentils were grown in two locations at the Palouse Conservation Field Station near Pullman, Washington. A south slope with less soil moisture infested with 112 wild oats/m^2 and a north slope with greater soil moisture infested with 132 wild oats/m^2 were treated with 140 g ai/ha DPX-Y6202 at 1, 3, 5, or 7 weeks after lentil emergence. Wild oats interference on the south slope reduced grain yield if the wild oats were not removed before 3 weeks. On the north slope, where soil moisture was not as limited, interference from wild oats was not as severe and lentil yields remained unaffected until 5 weeks of wild oats interference had occurred. Wild oats (3 to 4 leaf stage) were controlled best when the herbicide was applied 3 weeks after lentil emergence. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Table 1. The efficacy of DPX-Y6202 for wild oats control in lentils in the greenhouse

[a]Herbicide application	Wild oats growth stage	Herbicide rate	Lentil dry weight	[b]Wild oats control
(weeks)		(g ai/ha)	(g/plant)	---(%)---
2	3 leaves	0	0.87	0
		70	0.96	99
		280	0.95	100
4	4 tillers	0	0.87	0
		70	0.85	45
		280	0.87	86
LSD (0.05)			NS	9

[a]Weeks after lentil emergence.

[b]Visual evaluation: 100% = total wild oats control.
0% = no wild oats control.

Table 2. Lentil grain yield reduction as influenced by the control of wild oats with DPX-Y6202 in the field

[a]Herbicide application	Wild oats growth stage	Lentil yield	Yield reduction	[b]Wild oats control
(weeks)		(kg/ha)	---(%)---	---(%)---
	------------------------[c]South---------------------------			
hand-weeded		1055	-	100
1	2 leaves	886	16	94
3	4 leaves	722	32	96
5	6 tillers	549	48	89
7	mid-boot	176	83	40
11	headed	191	82	0
LSD (0.05)		242		
	------------------------[d]North---------------------------			
hand-weeded		1535	-	100
1	2 leaves	1523	-	85
3	4 leaves	1569	-	99
5	6 tillers	1379	10	82
7	mid-boot	1063	30	55
11	headed	886	42	0
LSD (0.05)		290		12

[a]Weeks after lentil emergence.
[b]Visual evaluation: 100% = total wild oats control.
0% = no wild oats control.
[c]Wild oats densities averaged 112 plants/m^2.
[d]Wild oats densities averaged 134 plants/m^2.

Graminicides for wild oat control in dry spring peas. Huston, C. H., R. H. Callihan, and D. C. Thill. A study site was established near Potlatch, Idaho to measure wild oat control and crop response to several pre- and postemergence herbicides. The soil at the study site was a Naff-Palouse silt loam. Experimental design was a randomized complete block replicated four times with individual plot size of 10 by 32 feet. 'Columbia' peas were planted April 13, 1985. Air and soil temperatures for two weeks following planting were cold, thus slowing pea germination and emergence. All herbicide treatments were applied with a backpack sprayer calibrated to deliver 20 gpa at 40 psi using Teejet 8002 flatfan nozzles.

Postplant incorporated treatments of triallate (EC 4.0 lb/gal) were applied and immediately incorporated by cross-harrowing April 18, 1985. Air temperature and soil temperature at 6 inches were 5 C. The wind was westerly at 3-5 mph and relative humidity was 80%. Rain showers immediately followed this application, after which came a seven week drought. Postplant incorporated treatments of SD95481 (EC 7.0 lb/gal) and preemergence surface treatments of dinoseb (EC 3.0 lb/gal) and metribuzin (DF 75%) were applied April 25, 1985. Air temperature was 10 C and relative humidity was 30%. SD95481 treatments were shallowly incorporated by raking. Postemergence treatments of fluazifop-p-butyl (EC 1.0 lb/gal), sethoxydim (EC 1.5 lb/gal), diclofop-methyl (EC 3.0 lb/gal), DPX-76202 (EC 0.8 lb/gal), and SC1084 (EC 2.0 lb/gal) were applied June 1, 1985. Air temperature was 12 C and relative humidity was 80%. All postemergence treatments were applied with 1 qt/A crop oil surfactant and also followed a preemergence surface treatment of 3.0 lb/A dinoseb. At the time of postemergence applications, the pea plants were 10-12 in tall and wild oats ranged from the 3 to 6 leaf stage. The wild oat population averaged three plants/ft^2 in the untreated check.

Excellent (95-100%) wild oat control was obtained with treatments of 1.25 lb/A triallate followed by 3.0 lb/A dinoseb; 0.07, 0.13, or 0.18 lb/A fluazifop-p-butyl; 3.0 lb/A diclofop-methyl; 0.3 lb/A sethoxydim; 0.03, 0.06, 0.13, or 0.25 lb/A DPX-7602; and 0.25 or 0.5 lb/A SC1084. Good (85-94%) wild oat control was provided by treatments of 1.5 lb/A triallate followed by 3.0 lb/A dinoseb, 0.2 lb/A sethoxydim, and 0.13 lb/A SC1084. Treatments of 0.8 lb/A SD95481 alone or preceding 3.0 lb/A dinoseb or 0.25 lb/A metribuzin, 1.0 lb/a SD95481, 3.0 lb/A dinoseb, and 0.25 lb/A metribuzin produced poor (less than 65%) wild oat control.

No treatment produced visible injury in the pea crop. Seed yields which ranged from 1542 to 1901 lb/A did not differ from the untreated check. (University of Idaho Agricultural Experiment Station, Moscow, ID 83843)

Wild Oat Control in Spring Peas

Herbicide	Rate	Appl. Time[1]	Crop Injury[2]	Weed Control AVEFA[3]	Seed Yield
	(lb ai/A)		---------- %	---------	(lb/A)
check	-		-	-	1641
triallate [4]	1.25	POPI	0	99	1748
triallate [4]	1.5	POPI	0	91	1585
dinoseb	3.0	PES	0	33	1800
metribuzin	0.25	PES	0	65	1576
SD95481/	0.8	POPI	0	57	1678
metribuzin	0.25	PES			
SD95481[4]	0.8	POPI	0	52	1771
SD95481	1.0	POPI	0	40	1710
fluazifop-p-butyl[4,5]	0.07	Post	0	100	1542
fluazifop-p-butyl[4,5]	0.13	Post	0	100	1564
fluazifop-p-butyl[4,5]	0.18	Post	0	100	1691
sethoxydim[4,5]	0.2	Post	0	94	1699
sethoxydim[4,5]	0.3	Post	0	100	1901
diclofop-methyl[4]	1.0	Post	0	98	1645
DPX-76202[4,5]	0.03	Post	0	95	1721
DPX-76202[4,5]	0.06	Post	0	98	1828
DPX-76202[4,5]	0.13	Post	0	100	1680
DPX-76202[4,5]	0.25	Post	0	100	1745
SC1084[4,5]	0.13	Post	0	87	1790
SC1084[4,5]	0.25	Post	0	99	1785
SC1084[4,5]	0.5	Post	0	100	1551
$LSD_{0.05}$			ND	23	312

1 PES = preemergence surface, POPI = postplant incorporated, Post = postemergence
2 Crop injury and weed control as percent of check: 0 = no injury or weed control, 100 = complete crop kill or weed control.
3 AVEFA = *Avena fatua* L.
4 Received PES treatment of 3.0 lb/A dinoseb following POPI treatments or preceding Post treatments.
5 Applied with 1 qt/A crop oil surfactant.

Control of grass weeds in dry peas. Whitesides, R.E. and D.G. Swan. Volunteer wheat and barley, wild oats, and quackgrass can be serious problems in the production of dry peas in the Palouse Region of eastern Washington and northern Idaho. In the spring of 1985, a field experiment was established to evaluate the control of grass weeds in dry peas. Dry peas (Columbia variety) were seeded April 27, 1985 and treated May 31, 1985 when they had six nodes and were 18 cm tall. The experimental area was overseeded with spring wheat (cv. Waverly) and spring barley (cv. Advance) and a natural population of wild oats and quackgrass was allowed to develop. At treatment time, the spring wheat had three to seven leaves, spring barley four leaves to four tillers, wild oats three to eight leaves, and quackgrass three to nine leaves. All treatments were applied with a compressed air bicycle plot sprayer calibrated to deliver 187 l/ha spray solution at 207 kPa pressure.

All herbicides effectively controlled the annual grass weeds. Fluazifop was the only herbicide that did not provide 100% control of barley, wild oats, and wheat. Haloxyfop provided complete quackgrass control and fluazifop was least effective. However, all treatments gave better than 90% control of quackgrass. Sethoxydim was the only herbicide that reduced yields. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Visual ratings and crop yield of a grass weed control experiment in dry peas

Herbicide	Rate[a] (kg ai/ha)	Weed control: Barley	Wheat	Wild oats	Quack-grass	Pea yields[b] kg/ha
		———	%[c]	———		
DPX-Y6202	0.3	100	100	100	95	1785 a
haloxyfop	0.5	100	100	100	100	1686 ab
sethoxydim	0.5	100	100	100	95	1287 b
fluazifop	0.5	98	100	98	93	1554 ab
Untreated control		0	0	0	0	1466 ab

[a] All herbicides were applied with 2.3 l/ha crop oil added to the spray solution.

[b] Means followed by the same letter are not significantly different at the 5% level.

[c] 0 = no control and 100 = total control.

Soil persistence of chlorsulfuron, dicamba, and picloram as measured in a bioassay study with peas and lentils. Whitesides, R.E. and D.G. Swan. Some herbicides that can be used selectively for broadleaf weed control in wheat or barley persist in the soil and may damage rotational crops. Chlorsulfuron, dicamba, and picloram were applied to the soil surface in 1982, 7 months prior to seeding peas and lentils. All applications were made with a bicycle wheel compressed air plot sprayer. The sprayer was calibrated to deliver 187 l/ha at 207 kPa pressure. In the spring of 1983, 1984, and 1985 Alaska dry peas and Chilean lentils were seeded into these plots. The experiment was located on a Thatuna silt loam soil, pH 5.9, with 2.7% organic matter. Annual precipitation in the experimental area is 559 mm.

Lentils were more sensitive to the herbicide residues than peas. Picloram, at the rate tested, was the most persistent of the herbicides evaluated. Chlorsulfuron reduced yield of peas and lentils in 1983, but when these crops were seeded 19 months after herbicide application, no yield reduction occurred. Dicamba at 4.5 kg/ha was the least persistent herbicide in this study. Yields of peas and lentils seeded into treated soil 31 months after treatment were not influenced by soil residues of any herbicides tested. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Crop yields for peas and lentils from a herbicide residue study

Herbicide	Rate (kg ai/ha)	Herbicide application (months prior to seeding)	Yields kg/ha[a] Peas	Lentils
			------ 1983	------
dicamba	4.5	7	1920 a	686 b
chlorsulfuron	0.018	7	854 b	0 c
picloram	0.14	7	0 c	0 c
Untreated control			2036 a	1132 a
			------ 1984	------
dicamba	4.5	19	1836 a	678 a
chlorsulfuron	0.018	19	1934 a	672 a
picloram	0.14	19	1386 b	426 b
Untreated control			1877 a	641 a
			------ 1985	------
dicamba	4.5	31	1870 a	1219 a
chlorsulfuron	0.018	31	1915 a	1277 a
picloram	0.14	31	1890 a	1147 a
Untreated control			1918 a	1231 a

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

Canada thistle control in peppermint. Brewster, B.D., A.P. Appleby, and R.L. Spinney. Clopyralid was applied at one timing and two rates in the fall and at three timings and one rate in the spring (Table 1) to evaluate Canada thistle control in peppermint. Eight locations were evaluated in the Willamette Valley of western Oregon. The plots were 2.5 m by 6 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. Visual evaluations of Canada thistle control were made in July, 1985.

Most applications resulted in good to excellent control through the season. The fall application of 0.56 kg/ha at location 4 probably produced poor control because of invading thistles from adjacent plots. The poor control in the early spring timing at locations 1 and 3 was probably caused by the immature stage of thistle growth. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Canada thistle height and clopyralid application date at eight locations.

clopyralid rate (kg/ha)		Location 1	2	3	4	5	6	7	8
					(1984)				
0.28	height (cm)	rosette	rosette	rosette	rosette	rosette	rosette	rosette	rosette
	date	Sep. 28	Sep. 28	Sep. 27	Oct. 1	Sep. 28	Oct. 3	Oct. 3	Sep. 26
0.56	height	rosette	rosette	rosette	rosette	rosette	rosette	rosette	rosette
	date	Sep. 28	Sep. 28	Sep. 27	Oct. 1	Sep. 28	Oct. 3	Oct. 3	Sep. 26
					(1985)				
0.21	height (cm)	5-25	15-30	10-20	45-50	10-25	10-30	8-30	8-20
	date	May 16	May 20	Apr. 29	May 13	Apr. 29	May 12	May 13	May 13
0.21	height (cm)	10-30	30-45	10-25	45-75	15-45	30-60	10-45	15-30
	date	May 31	May 30	May 17	May 20	May 16	May 24	May 24	May 30
0.21	height (cm)	20-45	30-60	12-30	60-90	30-60	50-75	25-60	30-50
	date	Jun 10	Jun 7	May 30	May 30	May 30	Jun 10	Jun 10	Jun 12

Table 2. Canada thistle control in peppermint at eight locations in the Willamette Valley

clopyralid rate (kg/ha)	Location 1	2	3	4	5	6	7	8
	Canada thistle control (%)							
0.28	85	99	93	88	83	91	87	85
0.56	90	96	92	63	78	91	93	96
0.21	0	98	23	70	78	95	97	72
0.21	96	91	88	87	98	80	67	93
0.21	90	87	92	73	75	87	67	93
0	0	0	0	0	0	0	0	0

Tolerance of peppermint to DPX Y6202 and bromoxynil. Brewster, Bill D., Arnold P. Appleby, and Robert L. Spinney. Bromoxynil and DPX Y6202 were applied alone and in combination to moderate to low-yielding stands of peppermint to ascertain crop tolerance. Trials were conducted at nine locations in the Willamette Valley and central Oregon. The trials were designed as randomized complete blocks with three replications, and 2.5 m by 6 m plots. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha. Treatments were applied in late May when the mint was 10 to 30 cm tall. Weed-free locations were chosen so that weed competition would not be a factor. The peppermint foliage was collected from three 1-m sq quadrats, air-dried, and distilled to remove the oil.

Although considerable variation occurred within mint trial sites, fresh weight and oil yields were lower than the check for plots treated with the higher rate of bromoxynil (Table 1 and 2). The addition of DPX Y6202 to the lower rate of bromoxynil did not greatly affect oil yield. DPX Y6202 alone seemed to have little effect on oil yield except at location 7, where yields appeared to be increased. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Fresh weight of peppermint foliage from nine locations treated with bromoxynil and DPX Y6202

Treatment	Rate (kg/ha)	Peppermint fresh weight									
		Location									
		1	2	3	4	5	6	7	8	9	Avg
		(kg/3 m²)									
bromoxynil	0.42	17.0	17.8	3.6	20.9	15.6	5.5	5.0	13.0	11.7	12.2
bromoxynil	0.56	10.6	12.1	2.5	17.6	9.4	7.2	4.8	11.1	11.4	9.6
DPX Y6202 + COC	0.56 + 2.3 l	19.7	12.6	3.2	23.0	15.0	8.2	11.3	15.5	17.0	13.9
bromoxynil + DPX Y6202 + COC	0.42 + 0.56 + 2.3 l	16.2	16.5	1.5	22.6	13.8	4.7	4.8	8.3	12.3	11.2
Check	0	20.5	14.9	2.5	18.5	10.9	8.7	5.6	17.8	14.6	10.6
$LSD_{.05}$ =		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	

Table 2. Peppermint oil yield from plots at nine locations treated with bromoxynil and DPX Y6202

Treatment	Rate (kg/ha)	Peppermint oil Location 1	2	3	4	5	6	7	8	9	Avg
		(kg/ha)									
bromoxynil	0.42	71.6	90.3	23.4	77.7	75.7	31.8	26.5	40.2	47.6	53.9
bromoxynil	0.56	45.9	66.2	16.5	71.8	56.4	38.1	27.3	36.2	51.2	45.5
DPX Y6202 + COC	0.56 + 2.3 l	76.8	75.3	23.9	81.2	74.3	44.1	58.5	50.1	70.4	62.3
bromoxynil + DPX Y6202 + COC	0.42 + 0.56 + 2.3 l	63.7	87.0	10.5	84.3	71.7	24.0	27.3	28.3	59.0	50.3
Check	0	84.3	84.0	16.9	74.7	66.4	46.1	35.4	64.8	60.9	59.3
$LSD_{.05}$ =		19.4	n.s.	n.s.	n.s.	n.s.	n.s.	13.8	n.s.	n.s.	

Tolerance of peppermint to clopyralid. Brewster, B.D., A.P. Appleby, and R.L. Spinney. Clopyralid was applied to weed-free peppermint at four locations in western and central Oregon to evaluate crop tolerance at various timings. Clopyralid was applied in the fall at two rates on one date and in the spring at one rate on three dates. A repeated fall/spring treatment was also included (Table 1). Treatments were applied at 234 l/ha with a unicycle plot sprayer. The plots were 2.5 m by 6 m and were arranged in a randomized complete block design with five replications. Three 0.9 m^2 quadrats were hand-harvested from each plot in early August. The peppermint was air-dried and distilled to remove the oil.

The latest spring application at location 2 was the only treatment to significantly reduce peppermint oil yields (Table 2). (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Clopyralid application date and peppermint height at four locations

clopyralid rate (kg/ha)	Location 1		2		3		4	
	(1984)							
	Date	ht. (cm)	Date	ht. (cm)	Date	ht. (cm)	Date	ht. (cm)
0.28	Oct. 2	2	Sep. 27	5-10	Oct. 2	10-12	Oct. 2	2-5
0.56	Oct. 2	2	Sep. 27	5-10	Oct. 2	10-12	Oct. 2	2-5
	(1985)							
0.21	May 14	8	May 20	2-5	May 14	10-15	May 14	5-10
0.21	May 28	10-20	May 30	10-20	May 28	30	May 28	10-20
0.21	Jun 11	20-25	Jun 12	25-37	Jun 11	45	Jun 11	15-30
	(1984-85)							
0.56/ 0.21	Oct. 2/ May 28	2/ 10-20	Sep. 27/ May 30	5-10/ 10/20	Oct. 2/ May 28	10-12/ 30	Oct. 2/ May 28	2-5/ 10/20
0	-	-	-	-	-	-	-	-

Table 2. Peppermint oil yield from clopyralid applications at four locations

clopyralid rate (kg/ha)	Location 1	Location 2	Location 3	Location 4
	Peppermint oil (kg/ha)			
0.28	41.8	105.2	94.6	77.8
0.56	38.4	100.0	92.1	70.4
0.21	35.8	99.7	75.4	84.0
0.21	40.9	97.6	78.8	77.7
0.21	36.2	70.6	87.7	71.8
0.56/0.21	29.1	94.2	96.4	81.5
0	40.4	104.8	90.5	80.6
$LSD_{.05}$	n.s.	15.5	n.s.	n.s.

Evaluation of postemergence weed control in fall-planted sugar beets. Norris, R. F., R. A. Lardelli and R. L. Sailsbery. Herbicide activity of sethoxydim when applied as a single treatment or tank mixed with phenmedipham/desmedipham or pyrazon was investigated for postemergence weed control. The sugar beets were at the early 2-leaf growth stage, and the broadleaf species (see table) were up to 2 cm tall. Italian ryegrass varied from 1 to 5 cm in size. Herbicides were applied on December 20, 1984 with a CO_2 backpack hand-sprayer calibrated to deliver 40 gal/A. The plot size was 2 beds on 30 inch centers (5 ft) by 15 ft, and each treatment replicated four times in a randomized complete block design.

No herbicides affected the sugar beet stand, but various reductions in crop vigor were observed. The greatest injury to sugar beets resulted from the tank-mixed application of phenmedipham/desmedipham plus sethoxydim with oil at both rates tested. Safety of beets was good for the tank-mixed treatments that included pyrazon plus oil. The lower sugar beet vigor in the untreated check at the March evaluation was attributed to competition from uncontrolled weeds. Sethoxydim applied alone or in combination with broadleaf herbicides provided excellent Italian ryegrass control. Mixtures of sethoxydim plus the broadleaf herbicides showed potential activity on corn spurry at the early evaluation date. Combination of phenmedipham/desmedipham with sethoxydim plus oil showed good general broadleaf weed control. Assessment of pyrazon mixed with sethoxydim plus oil versus pyrazon alone indicated that sethoxydim reduced the control of red maids, bur clover, dog fennel and bull thistle. (Botany Department, University of California, Davis, CA 95616, and Cooperative Extension, Orland, CA 95963)

Postemergence weed control in fall planted sugar beets.[1]

Treatment	Rate	Sugar beet[2] 1/31	Sugar beet[2] 3/14	Weed Control[3] SPRAR	BL	CIRVU	COLMU	EROCI	CLNOM	BRS	MEDPO	ANTCO	CAPBP
				(January 31, 1985)			(March 14, 1985)						
	(lb ai/A)	(Vigor/Injury)		(% control)									
Sethoxydim + oil[4]	0.28	90 bc	81 ab	68 cd	54 b	0 a	100 c	28 a	8 a	25 a	0 a	0 a	0 a
Sethoxydim + oil	0.375	94 bc	84 ab	63 cd	48 b	0 a	100 c	0 a	10 ab	25 a	0 a	0 a	0 a
Phenm./desm.[5]	1.30	79 b	91 b	38 b	88 c	95 c	0 a	95 b	88 d	100 b	60 c	68 b	100 c
Pyrazon	4.00	93 bc	93 bc	38 b	85 c	85 c	0 a	95 b	83 d	95 b	65 c	65 b	95 b
Sethoxydim + Phenm./desm. + oil	0.28 + 1.30	45 a	78 ab	93 e	93 c	100 c	99 bc	95 b	45 c	88 b	68 c	60 b	100 c
Sethoxydim + Phenm./desm. + oil	0.375 + 1.30	58 a	75 a	85 e	93 c	98 c	100 c	98 b	85 d	95 b	73 c	60 b	100 c
Sethoxydim + pyrazon + oil	0.28 + 4.00	85 bc	94 b	79 de	83 c	30 b	98 b	98 b	40 c	98 b	38 b	53 b	100 c
Sethoxydim + pyrazon + oil	0.375 + 4.00	80 b	91 b	93 c	91 c	43 b	99 bc	100 b	35 bc	100 b	53 bc	53 b	100 c
Untreated check	-	99 c	81 ab	0 a	8 a	0 a	0 a	25 a	0 a	25 a	0 a	0 a	0 a

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/ BL = broadleaf; BRS = Brassica spp.; other letters are species code numbers from WSSA Composite List of Weeds, Weed Sci., 32, Suppl. 2.
4/ Oil = Pace spray adjuvant; used at volume of 1 qt/A.
5/ Phenm./desm. = phenmedipham + desmedipham.

Barnyardgrass control in sugar beets by sethoxydim in relation to spray volume. Norris, R. F., R. A. Lardelli and F. R. Kegel. A trial was established in San Joaquin County, California to evaluate the effectiveness of sethoxydim for barnyardgrass control by varying the volume of water used for application. The herbicide treatments were made on June 18, 1985 to sugar beets in the 6-leaf growth stage, and the weed ranging in size from 1 to 4 inches tall. The treatments were applied with a CO_2 backpack handsprayer calibrated to deliver 10, 20 or 40 gal/A of spray solution. The plot size was 2 beds on 30 inch centers (5 ft) by 15 ft, replicated 3 times in a randomized complete block design.

Satisfactory barnyardgrass control was achieved only with sethoxydim at 0.5 lb/A and with 10 or 20 gal/A of spray volume. The two lower rates of sethoxydim provided inadequate grass control. The grass control achieved in this trial was variable and precluded obtaining clear-cut responses in relation to spray volume. However, when sethoxydim was applied in a spray volume of 40 gal/A there was a consistent trend for decreased efficacy at all rates tested. (Botany Department, University of California, Davis, CA 95616, and Cooperative Extension, Stockton, CA 95205.)

Barnyardgrass control in sugar beets with sethoxydim applied at differing spray volumes.

Treatment	Herbicide rate	Spray volume	Barnyardgrass[1/] 7/26/85
	(lb ai/A)	(gal/A)	(% control)
Sethoxydim + oil[2/]	0.28 + 1 qt.	10	67 abc
Sethoxydim + oil	0.28 + 1 qt.	20	43 abc
Sethoxydim + oil	0.28 + 1 qt.	40	40 a
Sethoxydim + oil	0.375 + 1 qt.	10	60 abc
Sethoxydim + oil	0.375 + 1 qt.	20	63 abc
Sethoxydim + oil	0.375 + 1 qt.	40	43 ab
Sethoxydim + oil	0.50 + 1 qt.	10	90 c
Sethoxydim + oil	0.50 + 1 qt.	20	90 c
Sethoxydim + oil	0.50 + 1 qt.	40	75 bc
Untreated check			0 -

1/ Means with a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test; untreated check not included in Anova.

2/ Oil = Pace spray adjuvant.

Evaluation of postemergence herbicides for grass control in sugarbeets. Miller, S.D. and K.J. Fornstrom. Research plots were established at the Torrington Research and Extension Center to evaluate the effectiveness of postemergence grass herbicides for weed control in sugarbeets (var. Holly Hybrid 30). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The soil was classified as a sandy loam (71% sand, 17% silt, and 12% clay) with 1.3% organic matter and a 7.3 pH. Desmedipham plus phenmedipham was applied for broadleaf weed control to all plots except the weedy check May 16, 1985 (sugarbeets 2 to 4 true leaves and broadleaf weeds 1 to 2 in. tall) with a tractor mounted sprayer delivering 20 gpa at 25 psi. Postemergence grass herbicide treatments were applied with a CO_2 pressurized 6-nozzle knapsack unit delivering 10 or 20 gpa at 40 psi on May 20 (sugarbeets 4 to 6 true leaves and yellow foxtail 1 to 2 in.) and May 28 (sugarbeets 6 to 8 true leaves and yellow foxtail 3 to 4 in.).

Weed control and crop stand evaluations were made on June 13, 1985 and were determined by counting two 3 in. by 10 ft quadrats per replication. Plots were harvested for yield September 27, 1985. Yellow foxtail infestations were moderate averaging 2.5 plants/linear ft. No sugarbeet injury was observed with any treatment. Sugarbeet yields were increased 6.4 T/A by application of desmedipham plus phenmedipham and an additional 2.4 to 9.9 T/A by the application of the postemergence grass herbicides. Yellow foxtail control was 90% or greater with all grass herbicide treatments except PP-005 at 0.09 to 0.19 lb/A, sethoxydim at 0.19 lb/A late or BAS-517 at 0.05 lb/A late. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1376 .)

Postemergence grass control in sugarbeets

Treatment[1]	Rate lb ai/A	Sugarbeet Injury %	Sugarbeet Stand No./100ft	Sugarbeet Sugar %	Sugarbeet Yield T/A	%Yeft Control
desmedipham + phenmedipham	0.5 + 0.5	0	120	14.7	15.8	23
Grass 1 to 2 in.						
/sethoxydim + oc*	0.5 + 0.5/0.19	0	120	14.4	25.3	95
/sethoxydim + oc*	0.5 + 0.5/0.28	0	127	14.7	23.9	99
/sethoxydim + oc	0.5 + 0.5/0.19	0	143	14.7	23.8	97
/sethoxydim + oc	0.5 + 0.5/0.25	0	120	14.6	22.1	99
/sethoxydim + desmedipham + phenmedipham + oc*	0.25 + .25/0.28 + 0.25 + 0.25	0	123	14.4	23.5	98
/sethoxydim + desmedipham + phenmedipham + oc	0.25 + 0.25/0.28 + 0.25 + 0.25	0	123	14.2	25.2	99
/BAS 517 + oc	0.5 + 0.5/0.05	0	123	14.4	23.5	99
/BAS 517 + oc	0.5 + 0.5/0.075	0	123	14.2	25.2	99
/BAS 517 + oc	0.5 + 0.5/0.1	0	150	14.1	25.7	100
/BAS 517 + oc	0.5 + 0.5/0.15	0	123	14.5	27.0	100
/fluazifop + oc	0.5 + 0.5/0.37	0	127	14.4	19.2	92
/PP-005 + oc	0.5 + 0.5/0.09	0	113	14.1	18.2	81
/PP-005 + oc	0.5 + 0.5/0.125	0	116	14.1	22.5	87
/PP-005 + oc	0.5 + 0.5/0.19	0	117	14.4	22.2	87
/PP-005 + oc	0.5 + 0.5/0.25	0	123	14.3	22.3	97
/PP-005 + oc	0.5 + 0.5/0.37	0	153	14.1	21.6	99
/PP-005 + oc	0.5 + 0.5/0.75	0	127	14.4	25.4	99
Grass 4 in.						
/BAS 517 + oc	0.5 + 0.5/0.05	0	140	14.4	25.2	81
/BAS 517 + oc	0.5 + 0.5/0.075	0	130	14.7	25.8	91
/BAS 517 + oc	0.5 + 0.5/0.1	0	127	14.4	22.8	90
/BAS 517 + oc	0.5 + 0.5/0.15	0	150	14.3	23.8	98
/sethoxydim + oc	0.5 + 0.5/0.19	0	113	14.1	21.1	69
Check	- - - - - - - - -	0	107	14.4	9.4	0

[1] oc = At Plus 411 F at 1 qt/A except at 1% v/v for fluazifop and PP-005 treatments
*Treatments applied at 10 gpa all others at 20 gpa

Herbicide combinations and time of application for weed control in red clover grown for seed. Whitson, T.D. and J.A. Leffel. In 1983 a screening trial was established with 250 herbicide treatments at three locations to determine possible treatments and times of application for weed control in red clover being grown for seed. Thirty-three treatments were selected from this trial to be used as a replicated experiment in 1984-1985. The experiment was established December 1, 1984 in Washington County, Oregon on a loam soil with a 5.8 pH and an organic matter content of 3.5%. The plots were 10 by 27 ft and replicated four times in a randomized complete block design. The herbicides were applied at 45 psi pressure in 40 gal of water/acre with a 6 nozzle hand held sprayer.

Crop tolerance and weed control were evaluated visually on April 9, 1985. The treatment controlling 15 of the 19 species at a 100% level with the remaining four species at an average of 85% was a combined diuron, pronamide and MCPA (amine) treatment applied at 1.2, 1.2 and 0.25 lb ai/A, respectively. Diuron and pronamide applications were made January 15, 1985 and the MCPA (amine) application was made December 1, 1984. Clover height reduction was 9% with the herbicide combination. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331.)

Herbicide combinations and time of application for weed control in red clover grown for seed.

Herbicide	Rate lb ai/A	App. date	% Clover height reduction	Italian ryegrass	bull thistle	mousear chickweed	birdsrape mustard	curley dock	dogfennel	dovefoot geranium	common groundsel	hairy vetch	smooth hawksbeard	henbit	prickly lettuce	quackgrass	shepherdspurse	annual sowthistle	wild carrot	wild oats	little bittercress	dandelion
				Weed Species (% control)																		
diuron pronamide dinoseb (amine)	0.8 0.8 1.5	1/15/85 1/15/85 12/1/84	15	95	45	100	100	58	100	50	100	73	100	100	100	64	100	75	75	100	97	50
diuron pronamide paraquat	0.8 0.8 0.25	1/15/85 1/15/85 12/1/84	12	96	25	100	100	25	100	100	100	100	100	100	100	97	100	100	100	100	100	75
diuron pronamide MCPA (amine)	0.8 0.8 0.25	1/15/85 1/15/85 12/1/84	10	97	75	100	100	20	100	100	78	78	100	100	100	54	100	100	100	100	100	100
diuron pronamide dinoseb (amine)	0.8 0.8 1.5	1/15/85 1/15/85 3/15/85	28	97	3	100	100	30	100	73	100	100	100	100	100	93	100	75	73	100	100	75
diuron pronamide MCPA (amine)	0.8 0.8 0.25	1/15/85 1/15/85 3/15/85	20	100	63	100	100	43	100	75	75	100	100	100	100	83	100	100	100	100	100	58
diuron pronamide	0.8 0.8	1/15/85 1/15/85	9	100	23	100	100	45	100	73	70	100	100	100	100	95	75	100	73	100	75	63
diuron pronamide dinoseb (amine)	1.2 1.2 1.5	1/15/85 1/15/85 12/1/84	15	100	20	100	100	13	100	75	100	50	100	100	100	93	100	78	75	100	100	75
diuron pronamide paraquat	1.2 1.2 0.25	1/15/85 1/15/85 12/1/84	18	100	20	100	100	25	100	75	100	75	100	100	100	90	100	95	77	100	100	75
diuron pronamide MCPA (amine)	1.2 1.2 0.25	1/15/85 1/15/85 12/1/84	9	100	100	100	100	80	100	100	95	100	100	100	100	91	100	100	100	100	100	75
diuron kerb dinoseb (amine)	1.2 1.2 1.5	1/15/85 1/15/85 3/15/85	23	99	50	100	100	80	100	66	100	66	100	100	100	94	100	100	75	100	100	100
diuron pronamide MCPA (amine)	1.2 1.2 0.25	1/15/85 1/15/85 3/15/85	28	100	38	100	100	63	100	75	45	100	100	100	100	93	100	100	93	100	100	100
diuron pronamide	1.2 1.2	1/15/85 1/15/85	8	100	0	100	100	40	100	75	50	75	100	100	100	91	100	100	55	100	100	100
diuron pronamide dinoseb (amine)	1.6 1.6 1.5	1/15/85 1/15/85 12/1/84	48	100	0	100	100	33	100	75	100	75	100	100	100	95	100	75	74	100	100	100

Herbicide	Rate lb ai/A	App. date	% Clover height reduction	Weed Species (% control)																		
				Italian ryegrass	bull thistle	mousear chickweed	birdsrape mustard	curley dock	dogfennel	dovefoot geranium	common groundsel	hairy vetch	smooth hawksbeard	henbit	prickly lettuce	quackgrass	shepherdspurse	annual sowthistle	wild carrot	wild oats	little bittercress	dandelion
diuron pronamide paraquat	1.6 1.6 0.25	1/15/85 1/15/85 12/1/84	44	100	35	100	100	58	100	100	100	100	100	100	100	93	100	100	90	100	100	75
diuron pronamide MCPA (amine)	1.6 1.6 0.25	1/15/85 1/15/85 12/1/84	36	100	100	100	100	48	100	100	100	100	100	100	100	98	100	100	100	100	100	75
diuron pronamide dinoseb (amine)	1.6 1.6 1.5	1/15/85 1/15/85 3/15/85	46	100	48	100	100	88	100	78	75	100	78	100	100	92	100	75	75	100	100	75
diuron pronamide MCPA (amine)	1.6 1.6 0.25	1/15/85 1/15/85 3/15/85	34	93	50	100	100	73	100	53	95	100	100	100	100	95	100	100	88	100	100	100
diuron pronamide	1.6 1.6	1/15/85 1/15/85	23	100	25	75	100	80	75	100	0	50	100	100	100	92	100	75	75	100	100	100
dinoseb (amine)	1.5	12/1/84	0	25	50	25	100	25	75	75	75	50	100	100	100	0	75	100	75	100	75	100
paraquat	0.25	12/1/84	18	60	48	100	100	0	98	100	100	100	100	98	100	18	75	100	75	100	97	75
MCPA	0.25	12/1/84	5	20	50	0	100	0	100	50	30	100	100	66	100	25	100	100	55	100	75	100
dinoseb (amine)	1.5	3/15/85	11	25	25	100	75	0	100	25	75	100	100	100	100	13	50	100	25	50	100	100
MCPA (amine)	0.25	3/15/85	18	13	48	50	100	25	100	75	4	100	100	50	100	3	75	95	75	100	77	75
asulam	0.25	2/15/85	11	18	25	50	100	3	100	50	100	100	100	75	100	20	25	100	25	100	100	100
asulam	0.25	3/15/85	10	5	0	0	50	20	100	100	100	100	100	66	100	10	53	100	25	75	100	75
fluorochloridone	0.25	12/1/84	15	18	50	75	100	0	100	75	25	75	100	100	100	28	50	100	25	100	66	75
fluorochloridone	0.5	12/1/84	10	5	25	100	95	0	100	75	25	75	100	100	100	3	100	100	50	100	100	75
diuron diuron pronamide pronamide	0.8 1.6 0.8 0.8	12/1/84 1/15/85 12/1/84 1/15/85	60	100	8	100	100	88	100	66	100	100	100	100	100	73	100	50	100	100	100	100
diuron diuron pronamide	0.8 0.8 0.8	12/1/84 1/15/85 12/1/84	26	95	22	100	100	13	100	50	75	75	100	100	100	73	100	66	80	75	98	75
bromoxynil pronamide	0.25 1.6	3/15/85 3/8/85	0	80	0	100	100	0	100	0	50	75	100	75	100	55	100	100	25	100	25	--
bromoxynil pronamide	0.5 1.6	3/15/85 3/8/85	0	73	0	100	100	0	75	0	25	100	100	75	75	55	100	100	25	100	0	--
bromoxynil MCPA pronamide	0.25 0.25 1.6	3/15/85 3/15/85 3/8/85	0	75	0	100	100	0	50	75	50	100	100	50	100	55	100	100	25	100	50	--
Check	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Safflower response to postemergence application of three sulfonylurea herbicides. R. L. Anderson. Previous research has shown that safflower is tolerant to chlorsulfuron applied after safflower is at least 15 cm in height. A study was conducted in 1985 to determine if other sulfonylurea herbicides have potential for weed management systems in safflower. Metsulfuron, chlorsulfuron, and DPX-6316 at 18 g/ha were applied foliarly with surfactant at 0.05% (v/v) to safflower 10-15 cm in height on June 6, 1985. Trifluralin at 1.1 kg/ha was applied prior to safflower planting to ensure weed-free conditions. The plots were 3 by 10 m, replicated three times in a randomized complete block design. The herbicides were applied at 300 L/ha with a sprayer equipped with hollow cone nozzles.

Metsulfuron and chlorsulfuron were phytotoxic to safflower, reducing plant height and decreasing grain yield. Metsulfuron injured safflower more than chlorsulfuron. Injury by chlorsulfuron resulted from applying the herbicide to safflower before it reached 15 cm in height, as safflower tolerance to chlorsulfuron increases with plant size. DPX-6316 did not injure safflower, thus showing potential for a postemergence application. The sulfonylureas did not affect germination of safflower progeny but DPX-6316 enhanced germination. Safflower appears to be more tolerant of DPX-6316, allowing earlier spraying to reduce weed competition. Also, DPX-6316 may enable no-till safflower production to succeed if combined with a postemergence grass herbicide. (USDA-ARS, Akron, CO 80720).

Agronomic response of safflower to three sulfonylurea herbicides

Treatment	Rate	Visual injury[1/] June 13 (1 week)	Visual injury[1/] July 11 (5 weeks)	Plant height	Grain yield	Germination
	g/ha	%	%	cm	kg/ha	%
Metsulfuron	18	25	18	46.3	1230	83
Chlorsulfuron	18	18	7	56.0	2020	81
DPX-6316	18	2	0	61.3	2320	92
Control	-	0	0	63.0	2380	81
LSD (0.05)		6	4	2.5	290	8

1/ Visual injury rating scale was 100% = total plant kill and 0% no visible plant injury.

Weed control in sunflowers. Miller, S.D. and M.S. Page. Research plots were established at the Sheridan Research and Extension Center to evaluate the efficacy of preplant incorporated, preemergence and postemergence herbicide treatments in sunflower (Var. Hybrid 894). Preplant incorporated herbicides were applied and immediately incorporated twice with a field cultivator, sunflowers seeded and preemergence herbicides applied May 15, 1985. Postemergence treatments were applied June 12 to sunflowers in the 3 to 4 leaf stage and barnyardgrass 1/2 to 1 in. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa for preplant and preemergence or 10 gpa for postemergence treatments both at 40 psi. The soil was classified as a clay loam (25% sand, 35% silt, and 40% clay) with 1.6% organic matter and a 6.3 pH.

Visual weed control and crop injury evaluations were made on June 29, 1985. Weed densities were light but uniform throughout the experimental area. Sunflower tolerance to the herbicide treatments was good as only slight injury and stand reduction were observed with several treatments. Weed control was good with ethafluralin alone or in combination with chloramben and fluorochloridone, trifluralin combinations with chloramben and fluorochloridone combinations with EPTC, PP-005 or sethoxydim. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1358.)

Weed control in sunflowers

Treatment[1]	Rate lb ai/A	Sunflower Injury %	Sunflower Stand reduction %	Percent Control Coma	Percent Control Prpw	Percent Control Bygr
PPI						
ethafluralin	0.94	0	3	93	95	100
ethafluraline + chloramben	0.75 + 1.5	0	3	95	100	100
EPTC	3.0	0	0	50	77	90
trifluralin + chloramben	1.0 + 1.5	0	2	98	95	98
PPI/PE						
EPTC/fluorochloridone	3.0 + 0.5	0	2	100	100	90
ethafluralin/fluorochloridone	0.75 + 0.5	5	3	100	100	100
PE						
metolachlor	3.0	0	0	50	70	87
metolachlor + fluorochloridone	2.5 + 0.5	0	3	100	100	92
CGA-24704	2.0	0	0	63	70	77
PE/POST						
fluorochloridone/PP-005 + oc	0.5 + 0.14	0	0	97	95	93
fluorochloridone/PP-005 + oc	0.5 + 0.19	3	0	97	95	100
fluorochloridone/sethoxydim + oc	0.5 + 0.27	3	0	97	97	100
Check	- - - - - -	0	0	0	0	0

[1] oc = At Plus 411 F at 1 qt/A

The influence of perennial ryegrass residue on Italian ryegrass establishment and growth. Kawate, M.K. and A.P. Appleby. In recent years, there have been scattered reports of glyphosate activity in soil. One possible explanation involves a detrimental effect of chemically treated vegetation on subsequent crop growth. The objective of this study was to determine the effect of perennial ryegrass residue, whether chemically or non-chemically treated, on subsequent Italian ryegrass establishment.

The experiment was conducted in the greenhouse from June to September, 1985. Day and night temperatures were approximately 21 C and 15 C, with no supplemental light provided. Perennial ryegrass was grown as the residue species and was subjected to various treatments 3 or 4 weeks after planting. There were 10 seeds per row in two rows that were 5 cm apart. Italian ryegrass was seeded 4 weeks after planting perennial ryegrass. This represents seeding either 1 week after or immediately prior to treatment into (a) pots with whole perennial ryegrass plants, (b) pots with foliage removed after treatment, or (c) pots in which the treated foliage was deposited on a clean soil surface. Italian ryegrass was seeded at the same density as perennial ryegrass, in alternate rows.

Perennial ryegrass was treated with 3.1 kg ae/ha of glyphosate, 1.1 kg ai/ha of paraquat, or was frozen at -15 C for 20 h. All treatments also were applied to pots containing no ryegrass plants. Six weeks after planting, stand counts and fresh weights of Italian ryegrass were taken.

Growth of Italian ryegrass was reduced when it was planted in pots containing (a) entire plants or (b) roots of perennial ryegrass, regardless of whether the perennial ryegrass had been treated or not. Depositing treated or untreated foliage on the surface did not reduce Italian ryegrass growth. Residues resulting from treatment with glyphosate or paraquat were no more inhibitory that untreated residues.

Residues from plants chemically treated 1 week before Italian ryegrass was planted tended to be somewhat less inhibitory than from plants treated immediately after planting.

Untreated perennial ryegrass was extremely inhibitory, possibly through competitive effects. The untreated roots alone also were inhibitory, perhaps indicating that allelopathy was involved. This could involve phytotoxins released by the roots, or could involve interactions with pathogenic microorganisms.

Interestingly, Italian ryegrass growth was stimulated in soil that had been frozen, in the absence of perennial ryegrass. (Oregon State University, Crop Science Department, Corvallis, OR 97331)

Effect of perennial ryegrass residue on establishment and growth of Italian ryegrass

Treatment[a]	Counts Time 1	Counts Time 2[b]	Fresh weight per plant (g) Time 1	Fresh weight per plant (g) Time 2
glyphosate-treated:				
whole plants	11.8*	13.2*	0.330*	0.114*
foliage	17.0	12.6*	0.729	0.558
roots	13.2*	15.2	0.325*	0.178*
paraquat-treated:				
whole plants	13.2*	17.6	0.350*	0.191*
foliage	16.8	12.8*	0.718	0.658
roots	12.6*	16.0	0.358*	0.199*
frozen:				
whole plants	15.6	19.0	0.599	0.295*
foliage	15.6	18.2	0.912	0.791
roots	18.6	17.6	0.331*	0.294*
untreated:				
whole plants	16.8	18.2	0.025*	0.023*
foliage	14.8*	18.0	1.103	0.637
roots	13.8*	16.0	0.246*	0.132*
glyphosate, pre	17.2	17.8	0.564	0.566
paraquat, pre	17.2	17.4	0.587	0.495
check, frozen	18.4	16.8	0.747*	0.808*
check	17.8	16.8	0.591	0.505
	$LSD_{.05}$ = 2.9		$LSD_{.05}$ = 0.151 g	
	SE = 1.4		SE = 0.076 g	

[a]Whole plants, foliage, and roots refer to perennial ryegrass, the residue species. Treatments were replicated five times in a randomized block design.

[b]Time 1 = perennial ryegrass treated 1 week prior to planting annual ryegrass. Time 2 = perennial ryegrass treated at the time of planting annual ryegrass.

* Significantly different from the untreated check at the 5% level of probability.

Control of bulbous bluegrass in established Kentucky bluegrass grown for seed. Whitesides, R.E. and W.J. Johnston. Bulbous bluegrass (*Poa bulbosa* L.) seriously reduces the quality of Kentucky bluegrass grown for seed and can eliminate the possibility for certification of an infested seed lot. In the fall of 1984 and the spring of 1985 bulbous bluegrass, in an established field of Garfield Kentucky bluegrass, was treated with herbicides. All herbicide treatments were applied using a compressed air bicycle plot sprayer calibrated to deliver the herbicide in 187 l/ha of water at 207 kPa pressure. The fall treatments were applied to bulbous bluegrass that had no more than three leaves and Kentucky bluegrass that was dormant. The spring treatments were applied when the bulbous bluegrass was 2.5 to 7.5 cm tall, well-tillered and when the Kentucky bluegrass was 5 to 10 cm tall. The soil is a Palouse silt loam. The experiment was replicated four times and plot size was 2 m by 9 m.

Visual observations of crop symptoms and bulbous bluegrass control were taken on June 6, 1985. Paraquat and paraquat plus metribuzin, applied in the spring, were the only treatments that provided acceptable control of bulbous bluegrass. However, growth of Kentucky bluegrass was seriously suppressed by these treatments and there was no seed production. The Kentucky bluegrass showed acceptable tolerance to all other treatments. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Bulbous bluegrass control and Kentucky bluegrass symptoms after herbicide treatment

Herbicide	Rate (kg ai/ha)	Time of Applications	Visual evaluations[a] Bulbous bluegrass	Suppressed Kentucky bluegrass growth
			%	
atrazine	1.8	Oct. 30, 1984	10	0
simazine	1.8	"	8	0
metribuzin	0.6	"	12	0
diuron	0.2	"	0	0
terbacil	0.9	"	15	4
bromacil	0.9	"	12	3
ethofumesate	1.1	"	0	0
terbutryn	3.4	"	8	0
ethyl metribuzin	1.1	"	8	0
metribuzin + terbutryn	0.3 0.9	"	7	0
paraquat[b]	0.3	April 16, 1985	98	90
paraquat[b] + metribuzin	0.2 0.3	"	98	90
Untreated Control			0	0

[a] Numbers are an average of four replications. 0 = no symptoms or control and 100 = total control

[b] Nonionic surfactant added at 0.25% v/v.

Selective control of Canada thistle in cereals with clopyralid. Curtis, R.E., T. Haagsma. Canada thistle is a persistent perennial weed that infests large areas of land in the N. American cereal belt. Research conducted in Alberta has indicated that Canada thistle infestations of 16 plants/M^2 may decrease cereal yields by 45%. Numerous research workers have indicated the excellent activity of clopyralid against Canada thistle at rates ranging from 80 to 200 g ai/ha. Two experiments were established near Edmonton, Alberta to determine crop tolerance and control of Canada thistle in cereal crops during the 1984 and 1985 growing seasons using clopyralid at 60 to 140 g/ha. The plots were 3 by 10m and replicated four times in a randomized complete block design. The herbicide treatments were applied using an Oxford CO_2 small plot sprayer at 110 l/ha. Visual observations of cereal tolerance and weed control were taken 2 and 4 weeks after treatment, and Canada thistle shoot counts were made in August, 1984 and June and July, 1985.

All herbicide treatments indicated good crop tolerance to both spring wheat and barley. At the end of the first growing season clopyralid applied at all rates gave excellent top growth control (80% or better). Clopyralid applied at 100 to 140 g/ha extended control of Canada thistle into the second year as indicated by a reduction in the number of shoots produced the following year. Agricultural Products R&D, Dow Chemical Canada Inc., Edmonton, Alberta, Canada.

1984 Control of Canada Thistle with Clopyralid

Clopyralid Rate g/ha	Number of Plants per m^2 August 1984
Weedy Check	55.8 a
140	10.0 c
120	8.0 c
100	8.5 c
80	8.7 c
60	7.5 c
Bromoxynil + MCPA	33.5 b

Effect of Clopyralid on Canada Thistle Plant Density One Year After Treatment.

Clopyralid Rate g/ha	Number of Plants per m^2 June, 1985	July, 1985
Weedy Check	42.9 a	36.2 a
140	12.4 b	5.0 b
120	10.2 b	5.1 b
100	9.5 b	9.6 b
80	13.9 b	4.6 b
60	13.8 b	11.1 b

Canada thistle control in spring barley. Lish, J. M. and D. C. Thill. Fourteen herbicide combinations were tested for Canada thistle (CIRAR) control in spring barley near Soda Springs, Idaho. Canada thistle rosettes were 3 to 4 in across and barley was starting to joint on June 27, 1985. The air temperature, soil temperature at 2 in, and relative humidity were 69 F, 70 F, and 73%, respectively. Treatments were applied with a CO_2 pressurized backpack sprayer in water at 10 gal/A. Plots were 10 by 30 ft, and the experimental design was a randomized complete block. Grain was harvested September 11 with a Hege plot combine.

All treatments indicated good Canada thistle control 45 days after treatment (DAT) (Table). Canada thistle control 80 DAT was 90% or higher only with treatments containing XRM4757 or XRM4813. XRM4757 at 0.47 lb ae/A resulted in 88% control of Canada thistle but this treatment had the highest barley grain yield. Barley grain yield was lowest with 2,4-D LVE at 1.0 lb ae/A and 2,4-D WS at 1.5 lb ae/A. (Idaho Agric. Exp. Sta., Moscow, Idaho 83843)

Canada thistle control and spring barley yield.

Treatment	Rate	CIRAR control 45DAT	80DAT	Barley
	(lb ae/A)	------(%)	-----	(lb/A)
Check	0.00	.	.	1995
DPXL5300[1]	0.01	92	66	1989
DPXL5300	0.02	95	79	2123
DPXL5300	0.03	96	80	1926
DPXL5300	0.06	94	80	1747
XRM4757	0.47	96	88	2234
XRM4757	0.63	98	90	2179
XRM4813	0.51	97	90	2159
XRM4813	0.68	96	94	1870
XRM4757+DPXL5300	0.47+0.02	96	90	2031
XRM4813+DPXL5300	0.51+0.02	97	93	1723
MCPA LVE	1.00	93	74	2004
2,4-D LVE	1.00	94	79	1642
2,4-D (WS)	0.75	92	62	1983
2,4-D (WS)	1.50	96	74	1637
LSD (0.05)		3	16	364
C.V.		2	14	13

[1] Treatments containing DPXL5300 were applied with nonionic surfactant at 0.5% v/v.

Evaluation of herbicides for field bindweed (*Convolvulus arvensis* L.) control and crop tolerance. Whitson, T.D. and Brian Tuck. Various researchers have found partial control of field bindweed with picloram and dicamba. As a result a field study was established July 17, 1984 to determine the effectiveness of several herbicides for field bindweed control in comparison to dicamba and picloram. The experiment was established on a silt loam soil containing 17.0% clay, 25.5% sand and 57.5% silt with a 6.8 pH. It was arranged as a randomized complete block design with four replications. Plots were 10 ft by 27 ft. Herbicides were applied with a 10 ft hand held boom at a pressure of 45 lbs psi. Forty gallons of water were applied per acre. Field bindweed was in bloom at the time of application and measured one to two feet across. Spring barley was planted in March 1985 to determine crop tolerance to the herbicides.

Crop tolerance and herbicide efficacy were visually evaluated eleven months after herbicide applications. Substantial crop damage was observed in plots treated with DPX-T 6376 at 1.6 oz ai/A, dicamba at 4.0 lb ae/A and picloram at 0.25, 0.5, 1.0 and 2.0 lb ai/A. These treatments were also the most effective for control of field bindweed. The plots treated with a combination of dicamba plus 2,4-D amine had 60% control of field bindweed with no crop damage. When dicamba was applied alone at 4.0 lb ai/A, 100% of the field bindweed was controlled but barley was damaged 43%. Evaluations in this study will continue in 1986. (Crop Science Dept., Oregon State University, Corvallis, OR 97331)

Evaluation of herbicides for field bindweed control.

Herbicide[1]	Application Rate	% Crop Damage or Bindweed Control	
		Crop Damage	% Control
Dowco 290 (clopyralid)	1.0 lb ai/A	0	3
Dowco 433 (fluroxypyr)	0.25 "	3	0
" "	0.5 "	0	0
" "	1.0 "	0	0
" "	2.0 "	7	10
DPX-T 6376	1.6 oz ai/A	80	65
dicamba	4.0 lb ai/A	43	100
2,4-D LVE	3.0 "	0	30
2,4-D Amine	3.0 "	0	10
triclopyr	3.0 "	5	33
picloram	0.25 "	18	50
"	0.5 "	35	83
"	1.0 "	63	100
"	2.0 "	85	100
dicamba + 2,4-D	1.0 + 2.0 lb ae/A	0	60
triclopyr + 2,4-D (LVE)	1.0 + 2.0 lb ae/A	0	40

1. Treatments applied July 17, 1984 to fallow ground with bindweed 1-2 ft across.
2. Crop damage was to spring barley planted in March 1985.
3. Evaluations were visual estimates taken June 4, 1985.

Broadleaf weed control in spring barley at Potlatch, Idaho. Swensen, J. B., and D. C. Thill, and R. C. Callihan. Broadleaf weed control efficacy with experimental compounds and fluroxypyr was compared to standard bromoxynil and MCPA applications in spring barley near Potlatch, Idaho. Following a single spring cultivation, the field was seeded April 25 with a blend of three cultivars of 2-row spring barley (Seven, Menuet, and Vanguard). Small seeds in each seed lot were removed by sieving. Seventy lbs of nitrogen, 25 lbs of phosphate, 5 lbsof potassium and 25 lbs of sulfur per acre were applied in a deep side band at seeding. Soil type was a silt loam with 2.8% organic matter, pH 5.3, and CEC of 11.7 meq/100 g soil. Plots measured 10 by 25 feet and treatments were replicated four times in a randomized complete block design. Treatments were broadcast either at early post emergence (May 15) or at tillering (June 3) with a backpack sprayer calibrated to deliver 20 gal/A at 40 psi and 3 mph. Conditions at the time of spraying are described in the following table:

Date of Application:	5/15	6/3
Air Temp (F)	72	75
Soil Surface Temp (F)	73	79
2 in Soil Temp (F)	62	67
Relative Humidity (%)	50	52
Cloud Cover (%)	0	30
Stage of Crop Growth	1-leaf	4-tiller
Stage of Weed Growth	2-leaf	6-leaf

Crop and weed populations were determined in check plots May 20, and June 3, 1985 (Table 1). The percent control relative to untreated check plots was evaluated for the four most abundant weed species June 10, and July 26, 1985. Seed was harvested from all plots August 23, with a Hege small plot combine and crop yield determined.

Table 1. Density of crop and weed species observed at two dates.

Species	Abbrev.	5/20	6/3
		-------plants ft^{-1}------	
spring barley	HORVX	17.0	20.0
coast fiddleneck	AMSIN	4.9	5.4
henbit	LAMAM	9.4	9.9
tumble mustard	SSYAL	3.0	2.8
field pennycress	THLAR	3.1	2.1
mayweed chamomile	ANTCO	0.6	0.7
common lambsquarters	CHEAL	0.3	0.4

At the early evaluation for weed control (June 10), bromoxynil alone averaged 82% control of all weed species evaluated (Table 2). When combined with MCPA, control averaged from 86 to 96% depending on formulation. All rates of DPX-M6313 and DPX-R9674 controlled 87 to 99% of the weeds, while weed control with DPX-L5300 was poorer, averaging 87%. The addition of bromoxynil to DPX-L5300 appeared to enhance weed control. However, addition of MCPA did not further enhance control. Combining DPX-M6316 with bromoxynil or bromoxynil plus MCPA increased control from 89 to 93 and 97%, respectively. Weed control was poorest in plots treated with XRM-4757 or fluroxypyr, which averaged 72 and 76%, respectively. A trend toward increased control was noted when bromoxynil was included with these two herbicides. Weed control with XRM-4813 ranged from 76 to 86% in response to increasing rate, and was enhanced by the inclusion of bromoxynil.

At the late evaluation (July 26) all treatments but three averaged 95% weed control or better (data not shown). Poorer weed control was observed in plots treated with XRM-4757 at the lowest rate or fluroxypyr at either rate, and averaged 85, 86, and 93%, respectively. In check plots, less than 5% of tumble mustard or coast fiddleneck were as tall or taller than the crop canopy. Most of the broadleaf weeds competed poorly with the vigorous early growth of the crop, which was maximized by early planting, large seed size, optimum population density, mellow seed bed, and banded fertilizer. Consequently, yield did not vary among treatments (Table 2).(Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 2. Broadleaf weed control and yield in spring barley at Potlatch, Idaho.

Treatment[1]	Rate	Date applied	Weed Control (6/10) AMSIN	LAMAM	THLAR	SSYAL	Average	Grain Yield
	(lb ai/A)		---------------------	%	------------------			-(lb/A)-
check	---	---	--	--	--	--	--	1860
bromoxynil (2EC)	0.38	5/15	80	70	85	88	81	2010
bromoxynil (ME4)	0.38	5/15	90	73	90	80	83	2150
bromoxynil/MCPA (2EC)	0.38	5/15	80	73	95	98	86	2020
bromoxynil/MCPA (3+3EC)	0.38	5/15	95	90	100	100	96	1790
DPX-M6316 (75DF)	0.008	5/15	95	83	83	95	89	2060
DPX-M6316 (75DF)	0.016	5/15	98	93	95	95	95	2000
DPX-M6316 (75DF)	0.031	5/15	98	98	95	100	98	1940
DPX-L5300 (75DF)	0.008	5/15	90	93	88	83	83	1790
DPX-L5300 (75DF)	0.016	5/15	90	93	90	90	91	1850
DPX-L5300 (75DF)	0.031	5/15	95	85	83	67	88	2170
DPX-R9674 (75DF)	0.012	5/15	85	83	88	93	87	1650
DPX-R9674 (75DF)	0.024	5/15	98	98	95	100	98	1700
DPX-R6974 (75DF)	0.047	5/15	100	98	98	100	99	1960
bromoxynil (ME4) + DPX-M6316(DF)	0.189 0.016	5/15	88	95	88	100	93	1840
bromoxynil/MCPA (3+3)+ DPX-M6316 (DF)	0.189 0.016	5/15	100	90	98	100	97	1990
bromoxynil (ME4) + DPX-L5300	0.189 0.016	5/15	95	98	95	95	95	1760
bromoxynil/MCPA (3+3)+ DPX-L5300	0.189 0.016	5/15	93	95	93	98	94	1750
XRM 4757 (2.5EC)	0.31	6/3	55	58	90	100	76	1880
XRM 4757 (2.5EC)	0.47	6/3	50	45	88	100	71	1870
XRM 4757 (2.5EC)	0.63	6/3	43	50	90	100	71	1890
XRM 4813 (2.72EC)	0.34	5/15	63	63	90	90	76	1990
XRM 4813 (2.72EC)	0.51	5/15	68	58	98	93	79	2030
XRM 4813 (2.72EC)	0.68	5/15	80	68	98	100	86	1860
fluroxypyr (1.7EC)	0.125	5/15	78	85	75	78	79	1650
fluroxypyr (1.7EC)	0.19	5/15	73	88	75	60	74	1830
bromoxynil (ME4) + XRM 4757 (2.5EC)	0.19 0.31	6/3	95	38	85	100	79	2050
bromoxynil (ME4) XRM 4813 (2.5EC)	0.19 0.34	5/15	75	85	93	100	88	1940
bromoxynil (ME4) + fluroxypyr (1.7EC)	0.19 0.125	5/15	75	90	75	78	79	1880
LSD (0.05)			16.3	16.0	21.2	11.3	8.1	NS

[1]All treatments containing DPX compounds included 0.5% v/v nonionic surfactant.

Broadleaf weed control in spring barley at Bonners Ferry, Idaho. Zamora, D. L., D. C. Thill, and R. H. Callihan. On June 6, 1985, an experiment was established near Bonners Ferry, Idaho to determine the efficacy of selected herbicide treatments on spring barley (var. Vanguard). Plots were 10 by 25 ft with treatments replicated four times in a randomized complete block design. The treatments were broadcast applied with a CO_2 pressurized bicycle sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silty clay loam with pH 7.6, 6.1% organic matter and CEC of 19.6 meq/100 g. Treatments were applied June 6, 1985. At the time of application the air temperature at the soil surface was 63°F; soil temperature at 6 in was 58°F; relative humidity was 80%; cloud cover was 100%. Crop stage at the time of application was 2 to 4 leaves and tillering; common lambsquarters (CHEAL) was in the cotyledon to 8 leaf stage; catchweed bedstraw (GALAP) was in the cotyledon to 4 leaf stage. Crop injury and weed control evaluations were made July 30, 1985. The barley was harvested on August 27, 1985 with a small plot combine.

All treatments except fluroxypyr controlled 98 to 100% of common lambsquarters. A tank mix of fluroxypyr and bromoxynil controlled 100% of the common lambsquarters. Catchweed bedstraw was controlled (85 to 100%) by all treatments except the low rates of XRM-4757 (0.31 and 0.47 lbs ai/A) and all rates of XRM-4813. When tank mixed with bromoxynil, XRM-4757 and XRM-4813 controlled 100% of the catchweed bedstraw. Fluroxypyr controlled 100% of the catchweed bedstraw in contrast to 50 to 83% control of common lambsquarters. There were no differences in grain yield among treatments. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed control in spring barley at Bonners Ferry, Idaho

Treatment	Rate[1]	Crop injury	Weed control CHEAL	Weed control GALAP	Yield
	(lb ai/A)	----------(%)--------			(lb/A)
check #1	0.0	0.0	-	-	3372
check #2	0.0	0.0	-	-	2748
bromoxynil (2EC)	0.38	0.5	100	100	3242
bromoxynil (4EC)	0.38	1.8	100	100	2947
bromoxynil / MCPA (2EC)	0.38	0.5	100	100	3449
bromoxynil / MCPA (3EC)	0.38	0.0	100	100	3089
DPX-M6316	0.13 oz	0.0	100	95	2466
DPX-M6316	0.25 oz	0.0	100	100	2942
DPX-M6316	0.50 oz	0.0	100	100	3241
DPX-L5300	0.13 oz	0.8	99	100	3350
DPX-L5300	0.25 oz	0.0	100	100	2993
DPX-L5300	0.50 oz	1.8	100	100	2902
DPX-R9674	0.20 oz	0.0	100	85	2945
DPX-R9674	0.40 oz	1.0	100	100	3067
DPX-R9674	0.80 oz	1.8	100	99	2910
bromoxynil (4EC) + DPX-M6316	0.19 + 0.25 oz	0.5	100	100	3243
bromoxynil / MCPA (3EC) + DPX-M6316	0.19 + 0.25 oz	0.5	100	100	2532
bromoxynil (4EC) + DPX-M6316	0.25 oz	0.0	100	100	2951
bromoxynil / MCPA (3EC) + DPX-M6316	0.19 + 0.25 oz	0.5	100	100	3277
XRM-4757	0.31	0.5	100	73	2937
XRM-4757	0.47	0.8	100	70	2245
XRM-4813	0.34	0.0	100	73	2720
XRM-4813	0.51	1.3	100	73	3223
XRM-4813	0.68	1.3	100	75	2706
fluroxypyr	0.13	1.5	83	100	2824
fluroxypyr	0.19	0.0	50	100	3203
XRM-4757 + bromoxynil (4EC)	0.31 + 0.19	1.0	100	100	2561
XRM-4813 + bromoxynil (4EC)	0.34 + 0.19	1.8	100	100	2589
fluroxypyr + bromoxynil (4EC)	0.13 + 0.19	0.5	100	100	2946
LSD (0.05)		NS	11	22	NS

[1]All DPX treatments were applied with 0.5 % v/v nonionic surfactant (X-77).

Evaluation of herbicides for broadleaf weed control in spring barley. Miller, S.D. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on May 7, 1985 to evaluate their effectiveness for broadleaf weed control in spring barley (var. Steptoe). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (70% sand, 20% silt, and 10% clay) with 1.0% organic matter and a 7.2 pH. The barley was in the 5 to 6-leaf stage (1 to 2 tillers), kochia 1/2 to 1 in., common lambsquarters 1 to 2 in. and hairy nightshade emerging to 1 in. at the time of treatment.

Visual weed control and crop damage evaluations were made on May 29 and plant heights measured June 19, 1985. Weed infestations were moderate and uniform throughout the experimental area. Treatments containing dicamba at 0.09 lb/A or higher injured barley and this injury was reflected in a slight height reduction. Common lambsquarters control was 80% or greater with all treatments, kochia control 80% or greater with all treatments except picloram plus 2,4-D or clopyralid plus 2,4-D at the low rate and hairy nightshade control 80% or greater with all treatments except chlorsulfuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1377 .)

Broadleaf weed control in spring barley

Treatment[1]	Rate lb ai/A	Barley injury %	Barley height inches	Percent Control Colq	Percent Control Kocz	Percent Control Hans
bromoxynil (ME4)	0.2	0	26	88	88	90
bromoxynil	0.3	0	27	99	99	98
bromoxynil + 2,4-D (ES)	0.25 + 0.25	0	27	100	100	100
bromoxynil + MCPA (3 + 3)	0.25 + 0.25	0	28	97	96	98
bromoxynil + clopyralid	0.25 + 0.09	0	28	99	100	100
bromoxynil + clopyralid	0.25 + 0.12	0	27	98	98	100
dicamba	0.12	8	26	92	85	93
dicamba + 2,4-D (DMA)	0.06 + 0.37	3	28	95	90	96
dicamba + 2,4-D	0.09 + 0.37	7	26	95	88	98
dicamba + clopyralid	0.06 + 0.1	0	28	92	87	93
picloram + 2,4-D (DMA)	0.015 + 0.37	0	27	92	78	93
picloram + 2,4-D	0.023 + 0.3	2	27	95	83	96
picloram + bromoxynil	0.015 + 0.37	2	26	100	100	100
picloram + bromoxynil	0.023 + 0.37	2	25	100	100	100
picloram + 2,4-D + dicamba	0.015 + 0.12	13	24	97	92	97
picloram + 2,4-D + dicamba	0.023 + 0.12	12	24	94	90	96
chlorsulfuron + X-77	0.015 + 0.25%	0	26	96	88	0
chlorsulfuron + bromoxynil	0.01 + 0.25	0	27	100	100	100
chlorsulfuron + clopyralid	0.01 + 0.12	0	28	98	96	98
chlorsulfuron + picloram	0.01 + 0.015	0	26	98	90	95
chlorsulfuron + picloram	0.01 + 0.02	0	28	95	90	93
clopyralid + 2,4-D (PM)	0.09 + 0.37	0	27	80	65	93
clopyralid + 2,4-D (PM)	0.12 + 0.5	2	27	87	80	96
clopyralid + 2,4-D (PM) + bromoxynil	0.09 + 0.37 + 0.25	0	28	100	100	100
clopyralid + 2,4-D (PM) + bromoxynil	0.12 + 0.5 + 0.25	0	28	100	99	100
clopyralid + 2,4-D (PM) + dicamba	0.09 + 0.37 + 0.12	7	25	95	88	95
clopyralid + 2,4-D (PM) + dicamba	0.12 + 0.5 + 0.12	10	26	95	90	95
clopyralid + 2,4-D (PM) + chlorsulfuron	0.09 + 0.37 + 0.01	3	27	97	97	99
clopyralid + 2,4-D (PM) + chlorsulfuron	0.12 + 0.5 + 0.01	3	26	99	99	99
clopyralid + 2,4-D (PM) + fluroxypyr	0.09 + 0.37 + 0.06	3	27	90	87	89
clopyralid + 2,4-D (PM) + fluroxypyr	0.12 + 0.5 + 0.06	0	26	95	95	98
Check	- - - - - - - - - -	0	28	0	0	0

[1] ES = butoxyethyl ester; DMA = dimethylamine, PM = package mix

Tillage effects on spring barley production. Flom, D. G., D. C. Thill, and R. H. Callihan. An experiment was initiated in the fall of 1984 near Moscow, Idaho to study the effects of time of tillage or tillage plus glyphosate and planter-type on the production of spring barley (var. Advance). The experimental design was a randomized complete block with 16 by 50 ft plots and treatments replicated four times. Soil type was a silt loam with 4.5% organic matter, pH 5.4, and CEC of 19.2 meq/100 g soil. The previous crop was spring barley and 10 to 14 in of standing stubble was present in all plots. Treatment compounds and dates of application are given in Table 1:

Table 1. Treatment component and date of application

Component	Date
chisel plowing	11/08/84
glyphosate (0.28 lb ae/A)	5/02/85
discing	5/13/85
fertilize-dry (100 lb N/A)	5/13/85
cultivate (spike tooth harrow)	5/13/85
plant (double disc)	5/17/85
chisel/fertilize/plant	5/17/85

The fertilizer applied at the time of planting was in the liquid form and contained the same concentrations of nutrients as in the dry fertilizer. Barley was seeded at a rate of 90 lb /A with both planters but row spacings were 7 and 12 in for the double disc and chisel planters, respectively. All plots were sprayed with difenzoquat plus bromoxynil/MCPA (3+3) at rates of 1.0 and 0.38 lb ai/A on June 16 to control wild oat (AVEFA) and broadleaf weeds. Principle broadleaf weeds were henbit (LAMAM), Canada thistle (CIRAR), field bindweed (CONAR), coast fiddleneck (AMSIN), and prickly lettuce (LACSE). Crop height, plant stand, and heads per plant were determined and the crop was harvested on August 16 using a small plot combine.

Barley growing in plots fertilized with liquid fertilizer exhibited faster early season growth and had a deeper green color than in plots fertilized with dry fertilizer, but there was no visual difference in crop appearence beginning with the heading stage of the barley. Plants were shorter in the fall conventional plots than in spring no-till or spring conventional plots (Table 2). Plots planted with the double disc planter had more plants per unit area than plots planted with the chisel planter even though seeding rates were the same for both planters. Crop yield was greatest in spring no-till plots. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 2. Tillage effects on spring barley at Moscow, Idaho

Treatment[1]	Crop height (in)	Stand (no./yd^2)	Heads (no./plt)	Yield (lb/A)	Test weight (lb/bu)
fall conventional	25.6	132	3.0	1591	45.5
fall chisel	26.6	91	3.2	1499	45.4
spring disc	26.2	101	3.2	1796	45.2
spring no-till	27.2	112	3.2	2141	44.2
spring conventional	27.4	140	2.7	1773	44.3
LSD(0.05)	1.4	7	NS	367	NS

[1]

fall conventional	fall chisel	spring disc	spring no-till	spring conventional
fall chisel spring disc fertilize-dry cultivate plant (double disc)	fall chisel spring glyphosate chisel/ fertilize/ plant	spring glyphosate spring disc chisel/ fertilize/ plant	spring glyphosate chisel/ fertilize/ plant	spring glyphosate spring disc fertilize-dry cultivate plant (double disc)

Postemergence herbicide, wild oat control in irrigated, no-till spring barley. Lish, J. M. and D. C. Thill. Four postemergence herbicides were compared for wild oat control in sprinkler irrigated spring barley in southeast Idaho. The field was treated with glyphosate one week before seeding 'Gustoe' barley with a Haybuster no-till drill. Plots were 10 by 30 ft, and the experiment was a randomized complete block design with four replications. Herbicides were applied in 10 gal/A water at 42 psi with a CO_2 pressurized backpack sprayer. Conditions at the time of applications are summarized below:

	Date of application	
	June 5	June 12
Air temperature (F)	56	80
Soil temperature @ 2 in (F)	55	68
Relative humidity (%)	83	40
Cloud cover (%)	85	20
Wild oat growth stage (lf)	1 to 3	4 to 5

Wild oat control was evaluated visually July 9 and August 14. Grain was harvested September 11 with a Hege plot combine.

Wild oat control was best with AC 222,293 (Table). Barban and diclofop did not control wild oat. Difenzoquat reduced wild oat vigor early in the season but control was inadequate by August 14. Frost and aphids during kernel fill reduced barley grain yield; however, grain yield was highest with AC 222,293 (1.0 lb ai/A) which indicates no herbicide injury to barley. (Idaho Agric. Exp. Sta. Moscow, ID 83843)

Wild oat control in irrigated spring barley.

Herbicide[1]	Rate	Wild oat control July 9	Wild oat control August 14	Barley yield
	(lb ai/A)	--------(%)-------		(lb/A)
barban	0.25	22	8	1808
barban	0.38	41	5	2024
diclofop	0.75	8	2	1500
diclofop	1.00	21	18	2093
difenzoquat	0.75	94	55	2248
difenzoquat	1.00	96	52	2274
AC 222,293	0.38	99	80	2132
AC 222,293	0.50	100	86	2427
AC 222,293	1.00	96	90	3143
control	--	--	--	1850
LSD (0.05)		18	23	718
C.V.		20	37	23

[1]AC 222,293 was applied with 0.5% v/v nonionic surfactant.

Evaluation of herbicides for wild oat control in spring barley. Miller, S.D. and J.R. Gill. A series of postemergence herbicide treatments were applied at Worland, Wyoming May 6 or May 16, 1985 to wild oat in the 2 to 3 or 3 to 5-leaf stage; respectively, to evaluate their efficacy for wild oat control in spring barley (var. Moravian III). Barley had 2 to 3 more leaves than wild oat when the treatments were applied. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. Treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit delivering 20 gpa at 40 psi. The soil was classified as a silt loam (23% sand, 48% silt, and 29% clay) with 2.4% organic matter and a 8.0 pH.

Visual weed control and crop injury evaluations were made on June 20 and plots harvested for yield July 25, 1985. Wild oat infestations were moderate averaging 10 plants/ft². AC-222,293 combinations with 2,4-D caused slight injury at the early but not the late stage of application. AC-222,293 treatments increased barley yields 12 to 15 bu/A at the early and 7 to 12 bu/A at the late stage. Wild oat control with AC-222,293 ranged from 95 to 99% at the early and 83 to 96% at the late stage of application. Wild oat control with 0.37 lb/A AC-222,293 at the early stage was as effective as 0.625 lb/A at the late stage. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1364 .)

Wild oat control in spring barley

Treatment[1]	Rate lb ai/A	Barley injury %	Barley yield bu/A	% control wild oat
2-leaf				
barban	0.37	0	81	33
diclofop	0.75	0	78	63
diclofop + oc	0.75	0	81	62
difenzoquat	1.0	0	71	43
barban + diclofop	0.37 + 0.5	0	76	60
AC-222,293 + X-77	0.37	0	87	95
AC-222,293 + X-77	0.5	0	84	98
AC-222,293 + X-77	0.62	0	82	99
AC-222,293 + 2,4-D (E) + X-77	0.5 + 0.5	5	85	98
AC-222,293 + bromoxynil (ME4) + X-77	0.5 + 0.5	0	84	99
4-leaf				
diclofop	1.0	0	77	62
diclofop + oc	1.0	0	76	75
difenzoquat	0.75	0	77	47
barban + difenzoquat	0.37 + 0.5	0	76	43
AC-222,293 + X-77	0.37	0	83	83
AC-222,293 + X-77	0.5	0	79	91
AC-222,293 + X-77	0.62	0	83	96
AC-222,293 + 2,4-D + X-77	0.5 + 0.5	0	80	87
AC-222,293 + bromoxynil + X-77	0.5 + 0.5	0	84	94
Check	------	0	72	0

[1] oc = At Plus 411F at 1 qt/A; X-77 applied at 0.25% v/v; E = butoxyethyl ester

Tolerance of spring wheat and spring barley varieties to sulfonyl urea herbicides. Lish, J. M. and D. C. Thill. Four sulfonyl urea herbicides were applied at two rates to buckwheat stubble on March 8, 1985 near Lewiston, Idaho. Treatments were applied in 93.5 L/ha water with a CO_2 pressurized backpack sprayer. The field was treated with glyphosate at 1.1 kg ai/ha 2 weeks before planting and cultivated the day before planting. Spring wheat varieties, 'Waverly', 'Pondera', 'Borah', 'Owens', 'WB802', and 'WB906R', and spring barley varieties, 'Steptoe', 'Vanguard', 'Clark', 'Gustoe', 'Advance', and 'Andre' were planted across the herbicide treatments on May 1. The experiment was a split block design with four replications and subplots were 1.2 by 4.6 m. Bromoxynil-MCPA was applied June 6 to control broadleaf weeds and volunteer buckwheat. Crop stand, tillers, height, grain yield, and test weight were recorded.

There was no variety by herbicide interaction or herbicide effect at the 95% confidence level for any measured variable; however, tillering tended to be low in check and chlorsulfuron treated plots, wheat and barley tended to be shorter with metsulfuron treatments, and mean barley yield was 13% greater than the check in chlorsulfuron treated plots (Table). Low test weights and yields were attributed to drought. The experiment will be repeated in 1986 at Moscow, Idaho. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Sulfonyl herbicide effects on wheat and barley tillering, height, test weight, and yield.

	Rate	Wheat				Barley			
		Tillers	Height	Test wt	Yield	Tillers	Height	Test wt	Yield
	(g ai/ha)	(no./0.5 m row)	(cm)	(g/l)	(kg/ha)	(no./0.5 m row)	(cm)	(g/l)	(kg/ha)
metsulfuron	9.1	43	44	730	299	43	63	528	393
metsulfuron	26.3	43	45	700	274	43	60	535	361
DPXM6316	70	40	49	714	296	40	68	563	402
DPXM6316	140	39	48	710	327	39	68	520	409
DPXL5300	35	44	46	666	264	44	67	498	332
DPXL5300	70	42	48	702	317	42	70	509	430
chlorsulfuron	17.5	36	46	732	379	36	68	535	511
chlorsulfuron	52.5	35	46	730	313	35	66	568	526
check	-	37	47	691	314	37	68	526	458

Differential tolerance of spring wheat and spring barley cultivars to three sulfonylurea herbicides. Spratling, D.L. and R.E. Whitesides. Fall applications of chlorsulfuron in winter cereals is a practice gaining increased popularity in many parts of the Western U.S. In several of these areas, winter kill is a common if not frequent occurrence. One remedy for the winter killed area is to reseed with a spring wheat or barley. Reseeding into soil that received a fall application of chlorsulfuron is potentially injurious to spring planted wheat or barley. Therefore, identification of spring wheat and barley cultivars tolerent to residual chlorsulfuron would be beneficial.

In the spring of 1985, field studies were initiated near Pullman and Walla Walla, Washington. Four spring wheat cultivars (Owens, Waverly, Wampum and NK-751) and four spring barley cultivars (Andre, Clark, Steptoe and Kombar) were seeded into soil that had been treated with three sulfonylurea herbicides (chlorsulfuron, metsulfuron and DPX-M6316) 30 days prior to planting. Cultivars were selected on the basis of reported injury or popular use by growers in the Pacific Northwest. The soil at Walla Walla is a silt loam with pH 5.4 and O.M. 2.1%. The soil at Pullman is a silt loam with pH 5.4 and O.M. 3.6%.

The herbicide treatments did not significantly reduce wheat yield, as compared to the untreated checks at Pullman or Walla Walla. Barley yields were affected at both locations. At Walla Walla, yields of all barley varieties were significantly reduced by the metsulfuron at 0.024 lb ai/A. Andre and Clark (both two-row barley varieties), were also affected by the chlorsulfuron at 0.048 lb ai/A . Only one herbicide caused yield reductions at Pullman. The metsulfuron (at both rates) significantly reduced the yields of Steptoe barley. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Yield of spring wheat and spring barley when seeded into herbicide-treated soil at Walla Walla

		Spring wheat (lb/A)				Spring barley (lb/A)			
	Rate	Soft white		Hard red		2-row		6-row	
Treatment	lb/A	Owens	Waverly	Wampum	NK-751	Andre	Clark	Steptoe	Kombar
chlorsulfuron	0.016	1680	1740	1800	1800	1584	1728	1920	1536
chlorsulfuron	0.048	1980	1800	1860	2040	1344**	1440**	1584	1680
metsulfuron	0.008	1680	1800	1620	2040	1536	1872	1584	1584
metsulfuron	0.024	1800	1740	1620	1740	1248**	1584**	1008**	1008**
DPX-M6316	0.040	1860	2040	1500	1800	1968	1968	2256	1824
DPX-M6316	0.125	1620	2040	1740	1920	1824	1680	2016	2016
Untreated check		1980	1980	1680	1740	1872	2160	1968	1920

** Means that were significantly different than the untreated check at 5% level.

Yield of spring wheat and spring barley when seeded into herbicide-treated soil at Pullman

		Spring wheat (lb/A)				Spring barley (lb/A)			
	Rate	Soft white		Hard red		2-row		6-row	
Treatment	lb/A	Owens	Waverly	Wampum	NK-751	Andre	Clark	Steptoe	Kombar
chlorsulfuron	0.016	2460	2220	2100	2340	2784	2544	3552	2880
chlorsulfuron	0.048	2520	2280	2100	2580	2736	2400	3264	2640
metsulfuron	0.008	2460	2340	2280	2640	2832	2357	3070**	2592
metsulfuron	0.024	2400	2160	2100	2400	2592	2592	3070**	2688
DPX-M6316	0.040	2760	2340	2580	2880	2880	2680	3792	2784
DPX-M636	0.125	2640	2160	2220	2640	2880	2496	3408	2640
Untreated check		2400	2040	2220	2280	2832	2496	3792	2544

** Means that were significantly different from the untreated check at 5% level.

The effect of repeated application of chlorsulfuron on Canada thistle plant density. Fay, P. K. and E. S. Davis. Chlorsulfuron provides effective season-long control of Canada thistle (*Cirsium arvense* Scop.) when applied at label rates in wheat. An experiment was established to measure the effect of annual applications of chlorsulfuron for three years on Canada thistle density.

Chlorsulfuron was applied at 0, .25, .5, and 1.0 oz. a.i./A during the second week of June in 1983, 1984 and 1985 to 11 by 40 ft. plots which were seeded each year to spring wheat in late April. Canada thistle plants per square meter were counted at three random locations per plot just prior to harvest each year. Plots were harvested using a small plot combine.

The results indicate that chlorsulfuron when applied annually for 3 years at the labeled rate (0.25 oz. a.i./A) slowly reduces the Canada thistle population. Three years of use resulted in a 65% decrease in the population by the time of harvest in 1985 (Table 1). Rates of 0.5 and 1.0 oz. a.i./A, which are far in excess of the labeled rate, do not provide enough additional control after 3 years of continuous use to warrant consideration.

The present labeled rate of chlorsulfuron for use in wheat (0.25 oz. a.i./A) provided excellent full season control. The regrowth of Canada thistle at the time of harvest was not tall enough to cause problems during combining (Table 2). Most of the regrowth following application was less than 12 ins. tall. Most of the Canada thistle that was not sprayed was over 12 ins. tall and would interfere with harvest. There is no need to exceed the labeled rate of chlorsulfuron since there is no increase in Canada thistle control, and the increased rates will lead to unacceptable soil residues of the herbicide. (Plant and Soil Science Dept., Montana State Univ., Bozeman, MT 59717-0002)

Table 1. The Canada thistle population density per square meter at the time of harvest in 1983, 1984, and 1985.

Chlorsulfuron rate of application	Canada thistle plants (M^2)		
	8-22-83	9-4-84	8-19-85
(oz. a.i./A)			
0	38.8	37.4	27.1
.25	26.5	24.8	9.4
.50	18.1	13.3	5.3
1.00	12.7	7.0	1.9
LSD .05	9.2	9.4	5.4

Table 2. The Canada thistle population density and stage of growth at the time of spring wheat harvest following annual applications of chlorsulfuron in 1983, 1984, and 1985.

Date	Chlorsulfuron rate of application oz. a.i./A	Canada thistle plants (M^2) Stage of growth 0-3" Tall	4-12" Tall	Bud Stage	Scenescent	Total
8-22-83	0	1.0	9.5	2.3	26.0	38.8
	.25	6.5	19.0	1.0	0.0	26.5
	LSD .05	3.9	7.7	1.1	6.5	7.3
9-4-84	0	3.5	10.3	6.6	17.0	37.4
	.25	10.3	11.8	2.0	0.7	24.8
	LSD .05	5.6	5.8	2.0	3.3	6.6
8-19-85	0	5.9	10.3	4.9	6.0	27.1
	.25	3.7	5.3	0.4	0.0	9.4
	LSD .05	2.5	4.1	2.0	1.4	7.4

The residual control of Canada thistle by clopyralid. Fay, P. K. and E. S. Davis. Clopyralid is a promising herbicide for Canada thistle control. It can be used in small grains and reportedly does not persist for long periods in soil. It has a very narrow spectrum so it could potentially be used in many crops. This experiment was established to measure the control of Canada thistle during one full year after application.

Clopyralid, MCPA ester, chlorsulfuron and bromoxynil were applied to winter wheat in 7 by 25 ft. plots at the rates listed in the table on May 8, 1984 at Belgrade, MT. The herbicides were applied with a CO_2-pressurized backpack sprayer with a 4-nozzle boom in 16.7 gals. of water per acre to wheat in the 3-leaf stage. Visual ratings were taken on June 6, July 6, and August 20, 1984. Crop yields were measured on August 20, 1984 using a small plot combine which cut 5 ft. wide by 20 ft. long. Canada thistle stand counts were taken on May 6, 1985 by counting plants per M^2 at 3 random locations per plot.

Clopyralid at the lowest rate tested provided complete control of Canada thistle until harvest. MCPA ester and Chlorsulfuron, which are widely used on Canada thistle did not provide control until harvest. One year after application Clopyralid reduced Canada thistle populations 90% compared to approximately 30% for the most effective labeled treatments. (Plant and Soil Science Dept., Montana State Univ., Bozeman, MT 59717-0002)

Effect of clopyralid on Canada thistle density one year after application.

Herbicide	Rate/A	Visual control rating 6-6-84	Visual control rating 7-6-84	Visual control rating 8-20-84	Crop yield	Canada thistle plants/m^2 on 5-6-85
		(%)	(%)	(%)	(Bu/A)	----- No. ----
Clopyralid	4.00 oz	93	100	100	70	4.0
Clopyralid	5.30 oz	95	100	100	71	2.3
Clopyralid	6.70 oz	94	100	100	65	4.0
MCPA ester	.50 lb	75	98	60	85	23.7
Chlorsulfuron	.06 oz	87	97	45	83	26.7
Bromoxynil	.25 lb	7	13	30	76	41.7
Control	0	0	0	0	75	35.7
LSD .05		20.4	3.8	10.2	16.3	16.5

Broadleaf weed control in spring wheat at Bonners Ferry, Idaho. Zamora, D. L., D. C. Thill, and R. H. Callihan. On June 3, 1985, an experiment was established near Bonners Ferry, Idaho to test the efficacy of selected broadleaf herbicides in spring wheat (var. Stevens). The experiment was a randomized complete block design with four replications; plots were 10 by 25 feet. A CO_2 pressurized bicycle sprayer, calibrated to deliver 20 gpa at 40 psi and 3 mph, was used to broadcast the herbicides. At the time of application, the air temperature at the soil surface was 75 F, the soil temperature at 6 in was 62 F, relative humidity was 52%, there was no dew present, and there was a 15% cloud cover. The loam soil had a pH of 5.4, a CEC of 14.5 meq/100 g soil, and 3.9% organic matter. At the time of application, the crop stage was 2 to 4 leaf and tillering, and the field pennycress (THLAR) had 6 to 8 leaves. The entire study area was treated with difenzoquat at 1 lb ai/A for wild oat control. Weed control was evaluated July 30. The crop was not harvested.

Field pennycress control was 99 to 100% for all treatments except bromoxynil at 0.19 lbs ai/A. Any tank mix with bromoxynil increased control to 99 to 100%. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Broadleaf weed control in spring wheat at Bonners Ferry, Idaho

Treatment	Rate	Crop injury	THLAR control
	(lb ai/A)	--------(%)--------	
clopyralid	0.09	0.0	100
clopyralid + bromoxynil	0.09 0.19	0.0	100
clopyralid + fluroxypyr	0.09 0.13	1.3	100
XRM-4813	0.34	3.3	100
XRM-4813	0.51	1.8	100
XRM-4813	0.68	1.8	100
XRM-4813 + bromoxynil	0.34 0.19	0.5	100
XRM-4813 + fluroxypyr	0.34 0.13	1.3	100
XRM-4757	0.31	0.0	100
XRM-4757	0.47	1.3	100
XRM-4757	0.63	0.8	100
XRM-4757 + bromoxynil	0.31 0.19	0.0	100
XRM-4757 + fluroxypyr	0.31 0.13	0.0	100
fluroxypyr	0.13	0.8	99
fluroxypyr	0.19	2.3	99
fluroxypyr + bromoxynil	0.13 0.19	1.8	100
bromoxynil	0.19	0.8	98
bromoxynil / MCPA	0.25	0.8	99
bromoxynil / MCPA	0.38	0.0	100
LSD (0.05)		NS	1

Evaluation of low volume 2,4-D applications in spring wheat. Miller, S.D. Research plots were established at the Torrington Research and Extension Center on May 8, 1985 to evaluate the effectiveness of low volume 2,4-D applications for broadleaf weed control in spring wheat (var. Oslo). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 4.5 gpa at 50 psi. The soil was classified as a sandy loam (73% sand, 16% silt, and 11% clay) with 0.9% organic matter and a 7.7 pH. The spring wheat was in the 3 to 4-leaf stage, kochia 1 to 1½ in., common lambsquarters 1 to 2 in., hairy nightshade ½ to 1 in. and wild buckwheat 1 to 2 in. at the time of treatment.

Visual weed control and crop damage evaluations were made on May 29 and plots harvested for yield August 8, 1985. Weed infestations were moderate and uniform in the experimental area. No treatment injured spring wheat. Spring wheat yields were 3 to 9 bu/A higher in the herbicide treated than untreated check plots. Wild buckwheat control was not adequate with any treatment. Common lambsquarters and hairy nightshade control was good and kochia control fair with all treatments except EH-736 at 0.25 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1359.)

Low volume 2,4-D applications in spring wheat

Treatment[1]	Rate lb ai/A	Wheat injury %	Wheat yield bu/A	Percent Control Colq	Percent Control Kocz	Percent Control Hans	Percent Control Wibw
EH-736	0.25	0	60	70	43	75	0
EH-736	0.37	0	63	88	72	92	17
EH-736	0.5	0	63	93	80	95	43
EH-736	0.75	0	62	95	77	95	50
2,4-D (DMA)	0.37	0	62	90	70	92	30
2,4-D	0.75	0	66	93	77	92	53
Check	- - -	0	57	0	0	0	0

[1] EH-736 = SULV 2,4-D; DMA = dimethylamine salt

Broadleaf weed control in spring wheat. Miller, S.D. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on May 7, 1985 to evaluate their efficacy for broadleaf weed control in spring wheat (var. Oslo). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (73% sand, 16% silt, and 11% clay) with 0.9% organic matter and a 7.7 pH. The spring wheat was in the 3 to 4-leaf stage, kochia 1 to 1½ in. and common lambsquarters 1 to 2 in. at the time of treatment.

Visual weed control and crop damage evaluations were made on May 27 and plots harvested for yield August 8, 1985. Weed infestations were moderate and uniform in the experimental area. Dicamba alone or in combination with 2,4-D caused slight wheat injury. Wheat yields were 5 to 15 bu/A higher in the herbicide treated than untreated check plot. Common lambsquarters control was 95% or greater with all treatments and kochia control 90% or greater with all treatments except picloram plus 2,4-D, clopyralid plus 2,4-D or dicamba alone. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1355 .)

Broadleaf weed control in spring wheat

Treatment[1]	Rate lb ai/A	Spring Wheat injury %	Spring Wheat yield bu/A	Percent Control colq	Percent Control kocz
bromoxynil (ME4)	0.25	0	68	97	92
bromoxynil	0.37	0	72	100	100
bromoxynil + MCPA	0.25 + 0.25	0	68	100	100
picloram + 2,4-D (DMA)	0.015 + 0.37	0	71	98	80
clopyralid + 2,4-D (PM)	0.12 + 0.5	0	64	96	78
dicamba	0.125	8	64	96	85
dicamba + 2,4-D	0.09 + 0.37	5	66	99	92
DPX-M6316 + X-77	0.015	0	67	98	98
DPX-M6316 + X-77	0.023	0	66	100	97
DPX-M6316 + X-77	0.03	0	65	100	100
DPX-L5300 + X-77	0.015	0	64	100	100
DPX-L5300 + X-77	0.023	0	64	100	100
DPX-L5300 + X-77	0.03	0	62	100	100
Check	- - - - - - -	0	57	0	0

[1]DMA = dimethylamine; PM = package mix; X-77 = 0.25% v/v

Tolerance of 12 varieties of wheat to two rates of AC 222,293 as compared to difenzoquat. Mitich, L. W., and N. L. Smith. Twelve varieties of hard red spring, hard white, soft white, and durum wheat were evaluated for tolerance to AC 222,293 at 0.5 and 1.0 lb/A; difenzoquat at 1.0 lb/A was included as a standard for comparison. The trial was conducted at the UC Davis Experimental Farm, an area relatively free of wild oat, as varietal tolerance alone was under evaluation.

Wheat was planted in Yolo sandy loam on January 4, 1985; herbicides were applied March 12, when the wheat plants were 6 to 12 inches tall and well tillered (2 to 5 tillers per plant). A CO_2 backpack sprayer was used to apply treatments at 20 gpa. All treatments included X-77 at 0.25% as a surfactant. Air temperature during application was approximately 63 F.

After treatment with difenzoquat (1.0 lb/A), five varieties (Aldura, Klasic, Mexicali, Modoc, and UC 544) showed yields significantly lower than the yields of these varieties in any other treatment. Additionally, Mexicali (a durum) treated with AC 222,293 (1.0 lb/A) showed a significantly lower yield than the Mexicali control; this was the only significant evidence for varietal susceptibility to AC 222,293. (University of California Cooperative Extension, Davis, CA 95616)

Yield of several varieties of wheat as influenced by difenzoquat and by 2 rates of AC 222,293, UC Davis Campus, 1985.

	Yield in lb/A (avg. 4 replications)[1]			
Variety	Control	AC 222,293 (0.5 lb/A)	AC 222,293 (1.0 lb/A)	Difenzoquat (1.0 lb/A)
Anza	4415 A	4911 A	4230 A	4412 A
Yecora Rojo	5240 A	5500 A	5405 A	5485 A
Mexicali	5704 A	5409 A B	4996 B	4140 C
Phoenix	4355 A	4874 A	4357 A	4692 A
Modoc	5449 A	5563 A	5521 A	4565 B
Yolo	5576 A	5450 A	5560 A	5491 A
Aldura	5740 A	5818 A	5575 A	3582 B
Klasic	5667 A	5600 A	5684 A	4655 B
WB 911	4710 A	4751 A	4706 A	4874 A
WB 881	3348 A	3424 A	3373 A	1926 B
NK 4236	4775 A	4844 A	5017 A	5094 A
UC 544	4266 A	4223 A	4454 A	3633 A

[1] Within each variety, yields followed by the same letter were not different at the 5% level of significance.

Tolerance of eleven wheat varieties to two rates of AC 222,293. Mitich, L. W., and N. L. Smith. Eleven varieties of hard red spring, soft white, and durum wheats were evaluated for tolerance to AC 222,293 at 0.5 and 1.0 lb/A. Wheat was planted in peat soil at the Tulelake Field Station on April 11, 1985, in an area free of wild oat.

AC 222,293 was applied on May 30 with a CO_2 backpack sprayer at 20 gpa when the wheat plants were 6 to 12 inches tall and well tillered (5 to 6 tillers on most plants). Both treatments included X-77 at 0.25% as a surfactant. Phytotoxicity was evaluated on June 18; slight stunting (8%-10%) was observed on three varieties (Aldura, Produra, and Mexicali).

Only TL 75-409, a variety of durum, showed a significant yield reduction from the treatments. However, four other varieties (Produra, Mexicali, Fielder and Irridur) showed slight (not statistically significant) yield reduction at the 1.0 lb/A rate of AC 222,293. (University of California Cooperative Extension, Davis, CA 95616)

Yield of several varieties of wheat as influenced by 2 rates of AC 222,293, Tulelake Field Station, 1985.

Variety	Yield in lb/A		
	Control[1]	AC 222,293[1] (0.5 lb/A)	AC 222,293[1,2] (1.0 lb/A)
Yecora Rojo	3648	3585	4080
Modoc	4579	4738	4572
Aldura	4715	4901	5246
NKD 893	4630	4716	4542
WB 803	5361	4786	4827
Irridur	6269	5855	5390
Waid	6052	6074	5917
Produra	3560	4798	4255
Fielder	5738	5787	5578
Mexicali	5109	4657	4431
TL 75409	5981	5223	5338

[1]All values averaged from 4 replications.

[2]The higher rate of AC 222, 293 produced the only evidence of phytotoxity observed in this trial: a value of 8% for var. Aldura, and values of 10% for var. Produra and var. Mexicali.

Weed control in wheat with barban and diclofop. Mitich, L.W., N.L. Smith, T. Kearney and C. Langston. This experiment was designed to evaluate weed control activity and crop tolerance of diclofop and barban applied alone and in combination, utilizing reduced rates. Wheat (cultivar: Yolo) was planted in November 1984, on a dryland site (Sehorn clay loam) in western Yolo County. Herbicides were applied December 20, using a CO_2 backpack sprayer calibrated to deliver 15 GPA spray volume. Individual plot size was 10 by 50 ft. with 4 replications.

The site contained a uniform population of wild oat, Italian ryegrass and canarygrass in the 2-leaf stage along with 4 to 5 leaf wheat. Weather was clear, 50 F at application followed by a cold, dry period. Soil moisture was at field capacity.

Phytotoxicity from barban alone and the tank mix with diclofop was severe and was observed throughout the growing season. Wheat had grown out of the early injury from diclofop by April 30. Control of all the grass weed species was excellent with diclofop and barban. The tank mix was weak on canarygrass. The trial was harvested July 2. Grain yield was significantly higher from the diclofop treatment. Plant height was significantly reduced from barban and barban plus diclofop applications. (University of California Cooperative Extension, Davis, CA 95616)

Grass control in wheat

Herbicide	Rate lb/A	Wheat phytotoxicity[1] 1/22	2/14	4/30	Weed control[1] 4/30/85 Wild oat	Italian ryegrass	Canary-grass	Harvest Plant height	Bushel weight	Yield lb/A	Analysis[2]
diclofop	1.0 lb	2.25	3.50	0.50	9.75	10.0	8.50	33.0	62.5	3370	A
barban	0.38	3.50	5.79	3.75	9.63	10.0	8.25	30.5	62.7	2690	B
diclofop + barban	0.38 + 0.25	4.25	5.75	3.75	9.25	10.0	4.25	30.4	62.5	2490	B
control		0	0	0	0	0	1.75	34.4	62.2	2200	B
LSD @ 5%		0.92	1.31	1.65	0.68	0	3.25	1.5	N.S.	592	
CV%		23.0	22.0	50.0	6.0	0	36.0	2.9	1.0	13.8	

Data is average of 4 replications

1 0 = no phytotoxicity or weed control; 10 = complete control.

2 Treatments with the same letter are not significantly different at the 5% level.

Comparison of AC 222,293 with other wild oat herbicides for wild oat and broadleaf weed control in wheat. Mitich, L. W., and N. L. Smith. Ten wild oat herbicides were applied alone or in combination to wheat for evaluation of weed control and crop injury. Broadleaf weed control was also evaluated, though most herbicides tested were not expected to perform well in this spectrum.

The crop was planted April 13, 1985, at the Tulelake Field Station; the treatments were applied May 30, when wheat plants had two tillers, wild oats had three leaves and one to two tillers, and most broadleaf weeds were approximately 2 inches tall. Herbicides were applied with a CO_2 backpack sprayer at 20 gpa.

Phytotoxicity was evaluated June 18; injury was negligible in most treatments and only fluorochloridone (both rates) approached the 8%-10% injury level. Crop injury was not reflected in yield reduction.

Weed control was evaluated June 19 and August 8. In the first evaluation, all treatments with AC 222,293, diclofop, or difenzoquat produced good to excellent control of wild oats. Bromoxynil produced excellent broadleaf control in combination with AC 222,293 and with MCPA + diclofop, fair control with MCPA alone, and poor control in combination with diclofop. In the August evaluation, wild oat control was lower overall, but the distribution of control remained similar. The four treatments listed above performed poorly on broadleaf weeds in the second evaluation.

Wheat yields were significantly higher for all treatments in which wild oats was controlled. Broadleaf weed control appeared to have little effect on yield. (University of California Cooperative Extension, Davis, CA 95616)

The effect of wild oat and broadleaf herbicides alone and in combination on weed control and crop yield, Tulelake, 1985.

Herbicide	Rate lb/A	6/19	8/8	Kochia 8/8	Lambs-quarters 8/8	Pigweed 8/8	Phyto-toxicity[1,2] 6/19	Yield[1,3] (lb/A)	
AC 222,293	0.375	100	81	68	18	93	0	4091	A B C
AC 222,293	0.5	100	88	63	13	63	3	4550	A B
AC 222,293	0.625	100	84	100	13	63	0	4307	A B
AC 222,293 + bromoxynil	0.5 + 0.5	100	65	100	100	100	5	4341	A B
AC 222,293 + MCPA	0.5 + 0.75	100	89	75	100	100	3	4491	A B
AC 222,293 + bronate	0.5 + 0.75	100	80	100	100	100	5	3959	A B C
Diclofop + bromoxynil + MCPA	0.8 + 0.25 +0.045	100	85	100	100	100	5	4057	A B C
Diclofop + bromoxynil + MCPA + oil	0.8 + 0.25 +0.045	90	78	100	100	100	0	4142	A B C
Diclofop + bromoxynil	0.8 + 0.25	85	76	25	0	100	0	3999	A B C
Fluorochloridone	0.25	23	5	100	100	100	10	3508	B C D
Fluorochloridone	0.5	0	0	100	100	100	8	2465	D E
Diclofop	1.0	100	83	50	0	50	0	4554	A B
Difenzoquat	1.0	98	70	50	0	100	5	4105	A B C
Bromoxynil + MCPA	0.25 + 0.25	5	3	100	100	100	0	2812	D E
Dicamba + MCPA	0.19 + 0.38	0	0	100	100	100	3	2242	E
DPXR-9674	0.25 oz.	15	5	100	100	100	0	2589	D E
DPXR-9674	0.75 oz.	20	5	100	100	100	0	2849	D E
DPXR-9674 + diclofop	0.75 oz. + 1.0 lb	100	80	100	100	100	3	4647	A
DPXL 5300	0.5 oz.	100	0	100	100	100	0	3062	C D E
DPXL 5300	1.0 oz.	50	5	100	100	100	0	3103	C D E
DPXL 5300 + diclofop	1.0 oz. + 1.0 lb	90	33	100	100	100	3	3043	C D E
Control		13	0	50	0	75	0	2584	D E

[1]Average of 4 replications.
[2]0% = No weed control, no phytotoxicity; 100% = complete control, dead plants.
[3]Values followed by the same letter are not different at the 5% level of significance.

Wild oat control in spring wheat with AC-222,293 alone and in combination with broadleaf herbicides. Miller, S.D. and M.S. Page. A series of AC-222,293 treatments alone or in combination with broadleaf herbicides were applied at the Sheridan Research and Extension Center May 14 or May 23, 1985 to wild oat in the 1 to 1½ or 3½ to 5-leaf stage; respectively, to evaluate their efficacy for wild oat control in spring wheat (var. Olaf). Spring wheat generally had 1 to 2 more leaves than wild oat when the treatments were applied. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit delivering 20 gpa at 40 psi. The soil was classified as a loam (49% sand, 27% silt and 24% clay) with 1.4% organic matter and a 6.3 pH.

Visual weed control and crop injury evaluations and plant height measurements were made June 27, 1985. Wild oat infestations were moderate and uniform throughout the experimental area averaging 5 to 7 plants/ft². No significant wheat injury was observed with any treatment. Wild oat control with AC-222,293 was excellent regardless of stage of application or broadleaf herbicide mixture. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1356 .)

Wild oat control with AC-222,293 alone or in combination with broadleaf herbicides

Treatment[1]	Rate lb ai/A	Wheat injury %	Wheat height inches	% control wild oat
2-leaf				
AC-222,293	0.375	0	22	97
AC-222,293	0.5	0	22	98
AC-222,293	0.625	0	23	99
AC-222,293 + bromoxynil (ME4)	0.5 + 0.37	0	22	95
AC-222,293 + bromoxynil	0.5 + 0.5	0	22	95
AC-222,293 + chlorsulfuron	0.5 + 0.015	0	22	98
AC-222,293 + DPX-M6316	0.5 + 0.015	0	22	97
AC-222,293 + DPX-L5300	0.5 + 0.015	0	22	99
AC-222,293 + clopyralid	0.5 + 0.12	0	23	98
AC-222,293 + 2,4-D (E)	0.5 + 0.5	3	21	96
AC-222,293 + bromoxynil + MCPA (3+3)	0.5 + 0.25 + 0.25	0	22	94
4-leaf				
AC-222,293	0.375	0	22	92
AC-222,293	0.5	0	21	96
AC-222,293	0.625	0	22	98
AC-222,293 + bromoxynil	0.5 + 0.37	0	22	93
AC-222,293 + bromoxynil	0.5 + 0.5	0	22	92
AC-222,293 + chlorsulfuron	0.5 + 0.015	0	22	95
AC-222,293 + DPX-M6316	0.5 + 0.015	0	22	98
AC-222,293 + DPX-L5300	0.5 + 0.015	0	22	96
AC-222,293 + clopyralid	0.5 + 0.12	0	22	94
AC-222,293 + 2,4-D	0.5 + 0.5	2	20	95
AC-222,293 + bromoxynil + MCPA	0.5 + 0.25 + 0.25	0	21	93
Check	- - - - - - - - - -	0	22	0

[1] All treatments applied with 0.25% v/v X-77, E = butoxyethyl ester

Wild oat control in spring wheat with fenoxaprop formulations. Miller, S.D. and M.S. Page. A series of postemergence herbicide treatments were applied at the Sheridan Research and Extension Center May 14 or May 23, 1985 to wild oat in the 1 to 1½ or 3½ to 5-leaf stage; respectively, to evaluate their efficacy for wild oat control in spring wheat (var. Olaf). Spring wheat generally had 1 to 2 more leaves than wild oat when the treatments were applied. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack spray unit delivering 20 gpa at 40 psi. The soil was classified as a loam (49% sand, 27% silt, and 24% clay) with 1.4% organic matter and a 6.3 pH.

Visual weed control and crop injury evaluations and plant height measurements were made June 27, 1985. Wild oat infestations were moderate and uniform throughout the experimental area averaging 5 to 7 plants/ft^2. Wheat injury was observed with all treatments except fenoxaprop plus MCPA. HOE-171-05H at 0.32 lb/A caused the greatest wheat injury at both stages of application. Wild oat control was 90% or greater with all treatments except fenoxaprop plus MCPA. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1357.)

Wild oat control in spring wheat with fenoxaprop formulations

Treatment	Rate lb ai/A	Wheat Injury %	Wheat height inches	% control wild oat
2-leaf				
HOE-7115-02H	0.25	5	20	94
HOE-7115-02H	0.32	8	20	97
HOE-7115-02H	0.64	14	18	98
HOE-7115-01H	0.3	4	20	92
HOE-7115-01H	0.4	4	20	96
HOE-7115-01H	0.8	7	19	99
HOE-7117-01H	0.46	4	20	95
HOE-7117-01H	0.57	7	19	97
HOE-7117-02H	0.53	5	19	97
HOE-7117-02H	0.66	6	20	97
HOE-171-05H	0.16	3	20	93
HOE-171-05H	0.32	25	17	99
fenoxaprop + MCPA	0.16 + 0.25	0	21	73
fenoxaprop + MCPA	0.32 + 0.25	0	22	82
4-leaf				
HOE-7115-02H	0.25	4	19	97
HOE-7115-02H	0.32	9	19	99
HOE-7115-02H	0.64	11	18	99
HOE-7115-01H	0.3	4	20	99
HOE-7115-01H	0.4	5	20	99
HOE-7115-01H	0.8	5	19	99
HOE-7117-01H	0.46	9	19	99
HOE-7117-01H	0.57	14	18	98
HOE-7117-02H	0.53	3	20	96
HOE-7117-02H	0.66	5	20	99
HOE-171 -05H	0.16	33	16	99
HOE-171 -05H	0.32	38	15	99
Check	- - - - - -	0	22	0

Wild oat control in small-grain cereals with AC 222,293. Morishita, D. W., D. C. Thill, and R. H. Callihan. AC 222,293 is an experimental herbicide currently being tested for wild oat control in small-grain cereals. Two experiments were conducted near Bonners Ferry, Idaho to compare wild oat control with AC 222,293 applied alone or in combination with several broadleaf herbicides to barban, diclofop and difenzoquat herbicides. These experiments were established in spring barley (var. Lud) and spring wheat (var. Olaf). The experimental design for both studies was a randomized complete block with four replications and 10 by 25 ft plots. Herbicide treatments were applied with a CO_2 pressurized bicycle sprayer calibrated to deliver 10 or 20 gpa at 3 mph. All barban treatments were applied at 10 gpa. Environmental and edaphic conditions are listed in Table 1. Wild oat control and crop injury was visually evaluated in both experiments July 30. The crop was harvested August 28 with a small-plot combine.

Table 1. Application information and soil data

Crop	barley		wheat	
Date of application	5/23	6/9	5/23	6/4
Leaf stage of wild oat	2 to 3	3 to 5	2 to 3	3 to 5
Air temperature (F)	64	63	73	58
Soil temperature (F, 2 in)	60	60	68	56
Relative humidity (%)	56	60	50	88
Cloud cover (%)	10	100	20	100
Wind speed (mph)	0 to 2	0 to 3	0 to 5	0
Soil type	silty clay		loam	
Organic matter (%)	8.1		4.4	
pH	7.4		7.7	
CEC (meq/100 g soil)	26.6		14.3	

No herbicide treatments injured the spring wheat (Table 2). Difenzoquat alone and difenzoquat + bromoxynil did cause 4 and 9% crop injury, respectively, in the spring barley (Table 3). All AC 222,293 treatments applied alone and the tank mixtures (except dicamba) controlled 88 to 100% of the wild oat in both experiments. Apparent antagonism between AC 222,293 and dicamba reduced wild oat control to 55 and 83% in the wheat and barley, respectively. Grain yields from the herbicide treatments in the barley were not greater than the nontreated check. In the wheat, nearly all the herbicide treatments had grain yields greater than both checks. The highest yielding treatments included all AC 222,293 treatments except AC 222,293 + dicamba. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 2. Wild oat control in spring wheat at Bonners Ferry, Idaho

Treatment	Rate	Appl date	Crop injury	AVEFA control	Yield
	(lb ai/A)		------(%)-----		(bu/A)
check 1	-	-	-	-	29
check 2	-	-	-	-	44
barban	0.38	5/23	0	23	51
diclofop	1.0	5/23	0	43	66
difenzoquat	1.0	6/4	2	92	60
AC 222,293[1]	0.38	5/23	1	94	82
AC 222,293	0.50	5/23	1	98	85
AC 222,293	0.75	5/23	0	98	81
AC 222,293	1.0	5/23	0	99	84
barban + bromoxynil	0.38 + 0.38	5/23	0	23	63
diclofop + bromoxynil	1.0 + 0.38	5/23	0	53	77
difenzoquat + bromoxynil	1.0 + 0.38	6/4	0	99	73
AC 222,293 + bromoxynil	0.50 + 0.38	5/23	0	88	80
AC 222,293 + bromoxynil & MCPA	0.50 + 0.38	5/23	0	88	84
AC 222,293 + MCPA	0.50 + 0.50	5/23	0	95	88
AC 222,293 + 2,4-D	0.50 + 0.50	5/23	0	91	82
AC 222,293 + DPX-M6316	0.50 + 0.031	5/23	0	95	77
AC 222,293 + DPX-L5300	0.50 + 0.016	5/23	3	94	78
AC 222,293 + DPX-R9674	0.50 + 0.023	5/23	0	95	81
AC 222,293 + dicamba	0.50 + 0.13	5/23	0	55	69
bromoxynil & MCPA	0.38	5/23	0	0	54
LSD (0.05)			NS	18	13

[1] All AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

Table 3. Wild oat control in spring barley at Bonners Ferry, Idaho

Treatment	Rate	Appl date	Crop injury	AVEFA control	Yield
	(lb ai/A)		------(%)-----		(lb/A)
check	-	-	-	-	4642
barban	0.38	5/23	0	86	5317
diclofop	1.0	5/23	0	68	4872
difenzoquat	1.0	6/9	4	100	4767
AC 222,293[1]	0.38	5/23	3	100	5313
AC 222,293	0.50	5/23	0	100	5186
AC 222,293	0.75	5/23	1	99	5348
AC 222,293	1.0	5/23	3	100	5201
barban + bromoxynil	0.38 + 0.38	5/23	0	54	4653
diclofop + bromoxynil	1.0 + 0.38	5/23	0	79	5203
difenzoquat + bromoxynil	1.0 + 0.38	6/9	9	100	4516
AC 222,293 + bromoxynil	0.50 + 0.38	5/23	0	99	4451
AC 222,293 + bromoxynil & MCPA	0.50 + 0.38	5/23	0	100	5008
AC 222,293 + MCPA LVE	0.50 + 0.50	5/23	0	98	4650
AC 222,293 + 2,4-D LVE	0.50 + 0.50	5/23	1	100	4968
AC 222,293 + DPX-M6316	0.50 + 0.031	5/23	1	100	4603
AC 222,293 + DPX-L5300	0.50 + 0.016	5/23	1	100	5093
AC 222,293 + DPX-R9674	0.50 + 0.023	5/23	0	100	5318
AC 222,293 + dicamba	0.50 + 0.125	5/23	1	83	4729
bromoxynil & MCPA	0.375	5/23	0	0	3904
LSD (0.05)			3	12	741

[1] All AC 222,293 treatments applied with 0.5% v/v nonionic surfactant.

<u>The effect of seeding rate and seeding depth on spring wheat injury from triallate</u>. Fay, P. K. and E. S. Davis. This experiment was established at Bozeman to determine if an increase in seeding rate could compensate for stand reductions caused by preplant incorporated applications of triallate. Triallate is the most popular wild oat (*Avena fatua* L.) herbicide in Montana. It is normally applied post plant incorporated to prevent injury to spring wheat.

Triallate was applied on April 30, 1985 at 1.25 lb. a.i./A to 8.25 by 25 ft. plots in 16.5 gals. of water per acre using a four-nozzle CO_2-pressurized backpack sprayer operating at 34 psi. The herbicide was incorporated 2 ins. deep with a tractor-drawn Triple K. 'Newana' spring wheat was seeded on May 1, 1985 one or three ins. deep at seeding rates of 30, 50, or 70 lb./A. The plots were arranged in a split block design. Main blocks were seeding depth and subplots were seeding rate. There were three replications of each treatment. Stand counts were taken by counting the number of spring wheat plants per meter of row at three random locations per plot on June 10, 1985. Crop yield was measured using a small plot combine which cut 5 ft. wide by 22 ft. long.

Triallate reduced the stand of spring wheat at both depths of seeding (Table). Crop yield was decreased 2 to 22% by triallate. There appears to be no relationship between depth of seeding and crop safety. Increasing the seeding rate caused a trend towards increased yield, however the surviving spring wheat plants were not able to compensate completely for the triallate damage. The Monsanto Company presently has a label for the use of preplant incorporated triallate on spring wheat for wild oat control. Our research results to date indicate that a significant crop injury hazard exists with a preplant application of triallate for spring wheat. (Plant and Soil Science Dept., Montana State Univ. Bozeman, MT 59717-0002)

Effect of preplant incorporated triallate on spring wheat stand and yield after planting 30, 50 and 70 pounds of seed per acre either one or three inches deep.

Seeding rate	Seeding depth	Spring wheat seedlings per meter of row on 6-10-85		Stand decreased caused by Triallate	Crop yield		Crop yield loss caused Triallate
		No Triallate	Triallate		No Triallate	Triallate	
(lb/A)	(inches)	--------- No. ---------		--- (%) --	-------- (bu/A) -------		--- (%) ---
30	1	6.0	4.3	28	18.1	14.6	19
50	1	11.0	4.0	19	20.9	20.5	2
70	1	18.7	7.7	59	25.4	19.7	22
30	3	7.7	6.0	22	20.6	18.7	9
50	3	8.3	5.7	31	22.9	19.6	14
70	3	15.3	9.0	41	25.1	22.3	11

Preemergence application for control of downy brome in winter wheat. Evans, J.O., R.W. Gunnell and R.W. Downard. The experiment was established in Cache Junction, Utah. The herbicides were applied on October 22, 1984 with a bicycle sprayer at 30 psi using a 8002 nozzle with water as the carrier at 20 GPA. The plots 3.35 meters by 9.15 meters arranged in a randomized complete block design with four replications. Weed control was evaluated as percent control. A phytotoxic evaluation was also performed on the wheat.

Some treatments had phytotoxic readings which could be of concern yet variation among replications was to great to make any conclusions. Good control of downy brome and common lambsquarter was achieved with SMY 1500 plus DPX-R7910-9 at 1.12 and 1.68 kg/ha, flourchloridone at .42 kg/ha and SD-95481 at 1.12 kg/ha. SC-0574 at 3.36, 4.48 and 5.60 kg/ha in combination with flourchloridone at .42 kg/ha also gave good control of common lambsquarter. (Plant Science Department, Utah state University, Logan, UT 84322-4820).

Weed Control in Winter Wheat

Treatment	Rate Kg ai/ha	Phytotoxic[1/] Reading: Wheat	Percent Control [2/]: Downy Brome	Common lambsquarter	Field pennycrest
SC-0574	3.36	0	46	36	68
SC-0574	4.48	3	45	46	48
SC-0574	5.60	0	60	72	75
SC-0574 + flourchloridone	3.36+ .42	5	28	93	63
SC-0574 + flourchloridone	4.48+ .42	15	43	90	90
SC-0574 + flourchloridone	5.60+ .42	43	58	90	92
SC-2957	3.36	0	30	28	28
SC-2957	4.48	8	30	30	30
SD-95481	.56	3	20	43	49
SD-95481	1.12	13	88	85	63
SC-2957 + flourchloridone	4.48+ .42	20	0	95	95
flourchloridone	.42	3	93	89	93
SMY 1500 + DPX-R7910-9	1.12	0	95	93	93
SMY 1500 + DPX-R7910-9	1.68	2	92	93	93
check		0	0	0	0

1/ 100% = plant death
0% = no phytotoxicity

2/ 100% = complete control
0% = no control

Average over four replications

Metribuzin and ethyl metribuzin for downy brome control in winter wheat. Whitesides, R.E. and D.G. Swan. Two field experiments were established in the fall of 1984 to evaluate downy brome control from applications of metribuzin and ethyl metribuzin. All treatments were applied with a compressed air bicycle wheel plot sprayer that delivered 187 l/ha at 207 kPa pressure. Plots were 2 m by 6 m and, in both experiments each treatment was replicated four times. Average annual precipitation for location I is 508 mm and for location II, 356 mm. Herbicide applications were made at location I in the fall of 1984 and the spring of 1985. At location II, herbicides were applied at two intervals in the spring.

Ethyl metribuzin, alone at 1.12 kg/ha, or a reduced rate in combination with a low rate of metribuzin, was nearly as good or better in controlling downy brome than was metribuzin alone. In both locations, weed control from all herbicide treatments was improved greatly if precipitation occurred within 2 weeks after application. Herbicide treatments applied in April were not as effective as earlier treatments due to larger weed and less precipitation. Ethyl metribuzin can effectively control downy brome when the herbicide is applied alone or in combination with metribuzin and there is adequate precipitation after application. (Washington State University, Dept. of Agronomy and Soils, Pullman, WA 99164-6420)

Metribuzin and ethyl metribuzin for downy brome control in winter wheat

Herbicide	Rate (kg ai/ha)	Time of application	Downy brome control (%)
----- Location I -----			
metribuzin	0.43	Nov 5, 1984	88
ethyl metribuzin	1.12	"	81
ethyl metribuzin + metribuzin	0.56 0.14	"	84
metribuzin	0.43	Apr 12, 1985	45
ethyl metribuzin	1.12	"	59
ethyl metribuzin + metribuzin	0.56 0.14	"	61
----- Location II -----			
metribuzin	0.43	Mar 20, 1985	99
ethyl metribuzin	1.12	"	95
ethyl metribuzin + metribuzin	0.56 0.14	"	
metribuzin	0.43	Apr 8, 1985	18
ethyl metribuzin	1.12	"	46
ethyl metribuzin + metribuzin	0.56 0.14	"	28

The efficacy of several diclofop formulations for downy bromegrass control in winter wheat. Fay, P. K. and E. S. Davis. Downy bromegrass (*Bromus tectorum* L.) is the most troublesome weed in winter wheat in Montana. Diclofop is labeled for use, however, only the 3 E.C. formulation is presently being used on a very limited basis due to cost. This experiment was established to test fertilizer impregnated with diclofop and granular diclofop formulations.

Diclofop was applied to ammonium nitrate and urea fertilizers with an atomizer to give a final concentration of 2 2/3 pts. of formulated Hoelon 3 E.C. on 200 lb. of ammonium nitrate, and 2 2/3 pts. on 100, 150 or 200 lb. urea. Granular diclofop was also prepared with an atomizer. Formulated Hoelon was sprayed on granules to give a 5% and 10% final concentration (W/W). The 2.5% granules were prepared by the American Hoescht Corp. The 3 E.C. formulation, the impregnated fertilizer formulations and the granular formulations were applied on August 10, 1984 at a diclofop rate of 1 lb. a.i./A to 7 by 25 ft. plots arranged in a randomized complete block design. There were 3 replications. The herbicides were incorporated with a fixed tine harrow operating 2 ins. deep. The plots were incorporated twice in the same direction. 'Winridge' winter wheat was seeded at a rate of 80 lbs./A in 6 in. rows. Downy bromegrass stand counts were taken on October 3, 1984 and May 3, 1985 by counting the number of plants emerged per square foot in 3 random locations per plot. Downy brome control was visually rated on June 7, 1985 and crop yields were measured on August 5, 1985 using a small plot combine which cut 5 feet wide and 22 feet long.

Fertilizer impregnated with diclofop did not provide satisfactory control of Downy bromegrass (Table). The results from stand counts indicate that there was no reduction in plant numbers by impregnated fertilizer. Visual ratings taken on June 7, 1985 indicate some control did occur possibly due to plant stunting. The 2.5 and 5.0% granules worked almost as well as the 3 E.C. formulation. Since diclofop must be taken up by foliage to kill wild oats, and by root uptake to kill downy brome, the granular formulation would not be of use in the wild oat market. It would be a viable product for downy brome control in winter wheat. The manufacturer could therefore introduce a granular product into the winter wheat market at a reduced cost which would be cost effective. The granular product would not interfere with the wild oat market of the 3 E.C. formulation. (Plant and Soil Science Dept., Montana State Univ., Bozeman, MT 59717-0002)

Effect of diclofop formulation on control of downy bromegrass in winter wheat.

Diclofop formulation	Fertilizer rate lb./A	Downy brome plants per ft.^{2} 10-3-84	5-3-85	% Control Downy brome on 6-7-85	Crop yield
				(%)	(Bu/A)
Ammonium Nitrate	200	6.3	3.2	67	30.1
Urea	100	5.0	3.7	53	32.1
Urea	150	7.3	2.7	53	33.2
Urea	200	7.7	4.8	45	31.9
3 E.C. and Urea w/o diclofop	200	2.0	1.0	83	37.5
2.5% granules	---	2.7	1.9	87	32.8
5% granules	---	1.7	0.9	80	36.4
10% granules	---	6.3	2.0	78	37.8
3 E.C.	---	1.3	0.7	89	37.6
Control	---	6.7	3.6	0	32.6

The effect of rate of seeding on metribuzin and atrazine tolerance in wheat. Rydrych, D.J. Metribuzin and atrazine are common herbicides that are used in winter wheat rotations for downy brome control. Atrazine is currently being used in chemical fallow rotations. Field observations have shown that these herbicides are more injurious when winter wheat stands have been damaged or when plant populations are less than 5 plants/linear ft of row. A trial was established on the Pendleton Experiment Station in the fall of 1984 using 15, 30, 60, 120, and 240 lbs/A of wheat seed per acre with 14 inch row spacings. The emerged populations averaged 3, 7, 12, 28, and 48 plants/linear ft respectively. The recommended seeding rate is 60 lb/A with at least 10 to 12 wheat seedlings per linear foot with a 14 inch row spacing. Metribuzin (.50 lb ai/A) and atrazine (.50 lb ai/A) were applied preplant surface on five seeding rates on October 10, 1984. Plots were 8 by 20 feet and replicated four times in a randomized block design. The results of the trial are recorded in the table.

Metribuzin and atrazine gave excellent downy brome control at all seeding rates, but severe crop injury was observed at 15 and 30 lbs/A. Wheat, in the nonweeded controls, was able to compete more effectively at the higher seed levels (60 to 240 lbs/A), but yield was still considerably lower than in the chemical plots.

Metribuzin and atrazine gave excellent downy brome control at seeding rates of 15 to 30 lbs/A; however, yield reductions were highest at these levels. Maximum yield levels were obtained when wheat plant populations were maintained at 60 to 120 lbs/A (12 to 28 plants/linear ft). Based on the results of these tests, it is essential that adequate plant populations are maintained when herbicides such as metribuzin or atrazine are used for weed control. (Oregon State University, CBARC, Pendleton, OR 97801).

The effect of rate of seeding on metribuzin and atrazine tolerance in winter wheat

Treatments1/	Seed rate lb/A	Downy brome control %	Winter wheat injury2/ %	Wheat yield lb/A
metribuzin	15	90	25	2000
metribuzin	30	93	12	2400
metribuzin	60	97	4	3200
metribuzin	120	98	2	3300
metribuzin	240	99	0	3700
atrazine	15	95	20	1700
atrazine	30	95	5	2700
atrazine	60	98	0	3300
atrazine	120	99	0	3500
atrazine	240	99	0	3500
control	15	0	0	690
control	30	0	0	1380
control	60	5	0	2130
control	120	2	0	2640
control	240	8	0	3050

1/ Treatments applied preplant surface on October 10, 1984 using .50 lb ai/A for atrazine and metribuzin.

2/ Crop injury as visual evaluation on June 17, 1985 100=100% control or injury, 0=none.

Evaluation of metribuzin and SMY-1500 for weed control in winter wheat. Evans, J.O. and R.W. Gunnell. A dryland site in Box Elder County infested with bur buttercup (seedling-early flower), downy brome (3-6 leaf), small seed flaseflax (3-7 leaf) and Canada bluegrass (2.5-5.1 cm) was selected for the evaluation of SMY-1500 and metribuzin. Winter wheat was tillered and 10.2-15.2 cm tall on April 15, 1985 when herbicide treatments were applied with a bicycle sprayer in 187 l/ha. Environmental conditions at the time of application were as follows: air temperature = 20°C, soil temperature = 20°C at 5.1 cm, relative humidity = 40% and wind 3-6 mph. The experimental design was a randomized complete block with four replications.

No phytotoxicity to the wheat crop was discernable from any of the treatments. Treatments containing SMY-1500 provided excellent control of bur buttercup. None of the treatments provided acceptable control at Canada bluegrass or downy brome. (Plant Science Department, Utah State University 84322-4820)

Evaluation of metribuzin and SMY-1500 for weed control in winter wheat

			Weed Control 2/ 3/ 4/	
Herbicide	Kg ai/ha	Crop 1/	POACO	CCFTE
SMY-1500	1.12	0	28	92
SMY-1500	1.4	0	28	97
SMY-1500 + metribuzin	0.56 + 0.07	0	15	94
SMY-1500 + metribuzin	0.56 + 0.14	0	30	95
SMY-1500 + metribuzin	0.84 + 0.07	0	35	95
SMY-1500 + metribuzin	0.84 + 0.14	0	35	95
SMY-1500 + metribuzin	1.12 + 0.07	0	30	95
SMY-1500 + metribuzin	1.12 + 0.14	0	40	95
metribuzin	0.14	0	15	71
check	0.0	0	10	20

1/ Crop Phytotoxicity. 0 = no effect, 100 = complete kill

2/ Weed Control Rating: 0 = no control, 100 = complete control, rating conducted on May 13, 1985.

3/ Weed Designations: CMAMI - small seed falseflax, POACO = Canada bluegrass, BROTE = downy brome, CCFTE = bur buttercup

4/ Comments: CMAMI and BROTE were present but were not rated numerically because of erratic stands.

Broadleaf weed and downy brome control in winter wheat. Morishita, D. W., D. C. Thill, and R. H. Callihan. In many small-grain cereal fields of northern Idaho, the weed spectrum usually includes both broadleaf and grass weeds, requiring the use of broad-spectrum herbicides and/or herbicide tank mixtures. A herbicide experiment was initiated near Genesee, ID in the fall of 1984 to determine the control of prickly lettuce (LACSE), common lambsquarters (CHEAL), and downy brome (BROTE). Several herbicide treatments were applied pre and postemergence to winter wheat (var. Stephens and Daws). The experiment was established as a randomized complete block design with 10 by 25 ft plots and four replications. Soil type at this site was a silt loam containing 3.4% organic matter, a pH of 5.4 and CEC of 18.8 meq/100 g soil. Application data are listed in Table 1.

Table 1. Environmental conditions during herbicide application

Date of application	10/10/84	10/24/84	4/10/85	4/29/85
Type of application	PPS	PES	1to 3 lf	tillering
Air temperature (F)	72	41	73	60
Soil temperature (F, 2 in)	72	40	70	55
Relative humidity (%)	38	92	44	68
Cloud cover (%)	90	100	70	20
Wind speed (mph)	2 to 8	0 to 3	0 to 6	0
Sprayer type	backpack	backpack	bicycle	bicycle

Preplant surface (PPS) treatments were applied the same day as planting and were followed by about 0.25 in precipitation approximately four hours later. Preemergence surface (PES) treatments were followed by about 0.30 in precipitation approximately 16 h after application. Postemergence treatments were applied at the 1 to 3 leaf and early tillering stages of the downy brome. The experiment was evaluated for crop injury and weed control June 12, and harvested August 7, with a small-plot combine.

Chlorsulfuron, applied PPS and PES, controlled 100% of the broadleaf weeds (Table 2). All rates of SAN-567 H applied at the 1 to 3 leaf stage and several rates of ethyl metribuzin alone, and in tank mixtures applied at the 1 to 3 leaf and tillering stages controlled 83 to 100% of the broadleaf weeds. The combination of diclofop + chlorsulfuron applied PPS and PES and ethyl metribuzin + chlorsulfuron applied PES had the best overall control of downy brome, prickly lettuce, and common lambsquarters. No herbicide treatment had grain yields higher than both check treatments, however chlorsulfuron applied PES and ethyl metribuzin + metribuzin at 1.5 + 0.125 lb ai/A applied at the 1 to 3 leaf stage had yields greater than check 1. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 2. Downy brome and broadleaf weed control in winter wheat.

Treatments	Rate	Appl. date	Crop injury	Weed Control BROTE	LACSE	CHEAL	Yield
	(lb ai/A)		-----------(%)------------				(bu/A)
check #1	-		-	-	-	-	85
check #2	-		-	-	-	-	94
diclofop	1.0	10/10	0	95	0	0	97
chlorsulfuron	0.016	10/10	0	27	100	100	86
diclofop + chlorsulfuron	1.0 + 0.016	10/10	3	100	100	100	85
diclofop + metribuzin	1.0 + 0.125	10/10	0	95	60	67	99
diclofop	1.0	10/24	0	93	0	33	99
chlorsulfuron	0.016	10/24	0	30	100	100	104
diclofop + chlorsulfuron	1.0 + 0.016	10/24	2	83	100	100	102
diclofop + metribuzin	1.0 + 0.125	10/24	3	92	40	65	81
SAN-567 H	0.8	4/10	0	13	93	83	98
SAN-567 H	1.2	4/10	0	18	100	100	84
SAN-567 H	1.6	4/10	3	23	100	100	87
SAN-567 H	2.4	4/10	2	13	100	100	94
ethyl metribuzin + chlorsulfuron	1.0 + 0.016	10/24	0	90	100	100	102
ethyl metribuzin	0.5	4/10	0	27	98	100	96
ethyl metribuzin	1.0	4/10	0	58	100	100	70
ethyl metribuzin	1.5	4/10	0	15	100	100	95
ethyl metribuzin + metribuzin	0.5 + 0.125	4/10	0	7	97	97	94
ethyl metribuzin + metribuzin	1.0 + 0.125	4/10	3	13	83	100	92
ethyl metribuzin + metribuzin	1.5 + 0.125	4/10	0	18	87	100	105
ethyl metribuzin + chlorsulfuron[1]	0.5 + 0.016	4/10	0	47	98	100	94
ethyl metribuzin + chlorsulfuron	1.0 + 0.016	4/10	0	50	100	100	98
ethyl metribuzin + chlorsulfuron	1.5 + 0.016	4/10	0	50	78	100	84
ethyl metribuzin	0.5	4/29	0	32	92	100	73
ethyl metribuzin	1.0	4/29	2	0	0	33	91
ethyl metribuzin	1.5	4/29	0	22	92	100	89
ethyl metribuzin + metribuzin	0.5 + 0.125	4/29	2	53	67	100	91
ethyl metribuzin + metribuzin	1.0 + 0.125	4/29	3	13	95	100	85
ethyl metribuzin + metribuzin	1.5 + 0.125	4/29	0	27	98	100	99
$LSD_{(0.05)}$			NS	40	31	35	18

[1] 0.5% v/v nonionic surfactant added to postemergence chlorsulfuron treatments

Ripgut brome competition in winter wheat--1985. Rydrych, D.J. Ripgut brome is often found in mixed populations with downy brome and is a serious competitor in eastern Oregon grain fields. Information on the competitive ability of this weed is limited. A study was established in the fall of 1984 on the Pendleton Experiment Station to determine the competitive effect of ripgut brome in winter wheat (var. Stephens). Plots were 8 by 20 feet and replicated four times in a randomized block design. Ripgut brome populations of 8 plants/ft^2 were established in winter wheat that was planted at 60 lb/A in a 14 inch row spacing. Ripgut brome was removed from selected plots in October and kept weed free until harvest. Ripgut brome was maintained as a pure population in the control plots and other weeds were removed as they appeared. The results of the competition study are recorded in the table.

Ripgut brome populations of 8 plants/ft^2 reduced winter wheat yield by 28%. Winter wheat straw yield was reduced by 45%. Ripgut brome produced 740 lb/A of seed grain in the control plots which represents an enormous weed population for future crops. Another experiment was established in the fall of 1985 to measure ripgut brome competition in fall wheat. (Oregon State University, CBARC, Pendleton, OR 97801)

Ripgut brome competition in winter wheat--1985

Treatment	Ripgut brome control %	Ripgut brome grain lb/A	Winter wheat grain lb/A
weeded control	100	0	2550
control	0	740	1840

Ripgut brome--8 plants/ft^2.

Ripgut brome control in winter wheat using four soil applied herbicides --1985. Rydrych, D.J. The experiment was established on the Pendleton Experiment Station in the fall of 1984 to measure the soil activity of four herbicides for the selective control of ripgut brome control in winter wheat. Ripgut brome is rapidly becoming a serious problem in winter cereals where supplemental irrigation is used or in areas that receive moderate rainfall (16 inches annually). Diclofop methyl was applied at 1.25 lb ai/A, ethyl metribuzin at 1.5 lb ai/A, SD 95481 at 1.0 lb ai/A, and acetochlor at 4.0 lb ai/A. Selected treatments were applied in the fall as preplant incorporated (PPI), preplant surface (PPS), preemergence surface (PES), or postemergence in a volume of 20 gpa. The results are recorded in the table.

Wheat tolerance and crop injury was evaluated by visual observation in June after ripgut brome had produced a panicle. Wheat tolerance and ripgut brome control was excellent using diclofop methyl or ethyl metribuzin either PPI or PPS. Ripgut brome control averaged 97% in the series with no crop injury. Ethyl metribuzin was not effective (17%) on ripgut brome when applied postemergence in April. SD 95481 and acetochlor, which were applied PPS and PES, gave excellent ripgut brome control but caused considerable crop injury and suppression. SD 95481 had the best crop safety when applied PPS. Acetochlor had the least crop tolerance of the four herbicides.

Ethyl metribuzin and diclofop methyl show excellent activity on ripgut brome when applied in early fall. Both compounds have a distinct crop safety advantage on small wheat. (Oregon State University, CBARC, Pendleton, OR 97801)

Ripgut brome control in winter wheat using four soil applied herbicides--1985

Treatment1/	Time	Rate ai/A	Percent2/ Ripgut control	Crop injury
diclofop methyl	PPI	1.25	97	0
diclofop methyl	PPS	1.25	99	0
ethyl metribuzin	PPI	1.50	99	0
ethyl metribuzin	PPS	1.50	99	0
ethyl metribuzin	POST	1.50	17	1
SD 95481	PPS	1.00	100	1
SD 95481	PES	1.00	91	5
acetochlor	PPS	4.00	100	16
acetochlor	PES	4.00	100	6
control	---	----	0	0

1/ Treatments - Applied October 15, 1984 Preplant Incorporated (PPI), Preplant Surface (PPS), and Preemerge Surface (PES). Applied Postemergence (POST) April 4, 1985.

2/ Visual control evaluated June 10, 1985.

Jointed goatgrass control in winter wheat. Yenne, S. P., D. C. Thill, and R. H. Callihan. Two field experiments were established in the fall of 1984 near Genesse, Idaho to determine the effect of herbicides applied at different times for the control of jointed goatgrass (Aegilops cylindrica Host) in winter wheat (var. Daws). Burning was also evaluated as a possible control practice.

The experiments were arranged as randomized complete blocks with three replications. Plots were 10 by 25 feet. Treatments were applied with a CO_2 pressurized backpack or bicycle sprayer calibrated to deliver 20 gpa at 3 mph and 40 psi. The various herbicides were applied singly or in tank mix at four different times; preplant incorporated (PPI), preemergence surface (PES), 1 to 3 leaf stage of the jointed goatgrass, and tillering of the winter wheat. Herbicides were incorporated at right angles with a spike tooth harrow. However, a high amount of surface residue interfered with the uniform incorporation of the herbicides. Weather data at the time of application is in Table 1.

Table 1. Weather data at the time of application.

Date of application	9/28/84	10/3/84	4/9/85	5/8/85
Type of application	PPI	PES	1-3 lf	tillering
Air temperature (F)	59	74	70	55
Soil temp at 2 in (F)	76	74	62	60
Relative humidity (%)	40	36	39	80
Cloud cover (%)	0	0	0	5
Soil surface	dry	dry	moist	moist

The control of jointed goatgrass (AEGCY), downy brome (BROTE), and mayweed chamomile (ANTCO) was visually evaluated in the first herbicide experiment May 22, 1985 (Table 2). Crop tolerance was not evaluated in this experiment because the wheat stand was poorly established. None of the herbicide treatments effectively controlled jointed goatgrass. However, the PES application of ethyl-metribuzin at 1.5 lb/A plus metribuzin at 0.13 lb/A controlled 86% of the jointed goatgrass, 95% of the downy brome, and 90% of the mayweed (Table 2). Herbicide treatments that controlled downy brome 90% or more were ethyl-metribuzin at 1.5 lb/A and ethyl-metribuzin at 1.0 or 1.5 lb/A plus metribuzin applied PES; ethyl-metribuzin at 1.5 lb/A plus metribuzin applied at the 1 to 3 lf stage; and diclofop plus chlorsulfuron and diclofop plus metribuzin applied PES. Herbicide treatments that controlled mayweed chamomile 90% or more were ethyl-metribuzin at 1.5 lb/A plus metribuzin, and diclofop plus chlorsulfuron applied PES; and all treatments applied at the 1 to 3 lf stage except ethyl-metribuzin at 1.0 lb/A.

In the second experiment, herbicide treatments were applied PES and at the 1 to 3 lf stage of the jointed goatgrass. The control of jointed goatgrass, field pennycress (THLAR), henbit (LAMAN), coast fiddleneck (AMSIN), tumble mustard (SSYAL), mayweed chamomile, and catchweed bedstraw (GALAP) was evaluated May 22, 1985 (Table 3). None of the treatments controlled jointed goatgrass. All herbicide treatments controlled (>85%) field pennycress, tumble mustard, and mayweed chamomile. SAN 567 H applied at the 1 to 3 lf stage of the jointed goatgrass also controlled 93 to 97% of the henbit, coast fiddleneck, and catchweed bedstraw, while the PES treatments did not (Table 3).

It was observed in treatments where downy brome was controlled early, the jointed goatgrass appeared more vigorous and had more tillers, whereas, in the treatments where downy brome was not controlled there were fewer jointed goatgrass plants.

The experimental site was burned August 16, 1985. The amount of combustible surface residue was 3,439 lb/A with 6% moisture. Wind speed was approximately 7 to 10 mph. Four samples of 100 joints of jointed goatgrass were randomly placed on the soil surface within the plot before burning. Oven thermometers were placed by three of the samples, and the temperature was recorded within ten minutes after burning. After the plot was burned, the four samples of jointed goatgrass joints previously placed on the soil surface were collected along with two samples that contained joints that were left on the stem before burning. All samples were taken to the laboratory and the joints were separated into three categories; charred (>50%), partially charred(<50%), and uncharred. The caryopses were removed from the joints and placed on moistened blotter paper in petri dishes. The caryopses were incubated in the dark at 15 C for 20 days. Percent germination was calculated at the end of the germination period.

The temperature on the soil surface was at least 480 F after burning. As the percent charred of the joints increased the germination of the caryopses decreased (Table 4). These results also show that burning reduced the viability of this years seed by at least 49%. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Weed control with ethyl-metribuzin.

Treatment	Rate	Time of Application	Weed control AEGCY	BROTE	ANTCO
	(lb ai/A)		----(%	of check)	---
ethyl-metribuzin	0.5	PES	53	55	56
ethyl-metribuzin	1.0	PES	40	70	73
ethyl-metribuzin	1.5	PES	71	93	80
ethyl-metribuzin + metribuzin	0.5+0.13	PES	50	61	85
ethyl-metribuzin + metribuzin	1.0+0.13	PES	58	93	81
ethyl-metribuzin + metribuzin	1.5+0.13	PES	86	95	90
ethyl-metribuzin	0.5	1-3 lf	46	51	90
ethyl-metribuzin	1.0	1-3 lf	35	88	86
ethyl-metribuzin	1.5	1-3 lf	56	88	91
ethyl-metribuzin + metribuzin	0.5+0.13	1-3 lf	45	70	90
ethyl-metribuzin + metribuzin	1.0+0.13	1-3 lf	58	85	91
ethyl-metribuzin + metribuzin	1.5+0.13	1-3 lf	66	51	93
ethyl-metribuzin	0.5	Tillering	66	51	81
ethyl-metribuzin	1.0	Tillering	78	80	65
ethyl-metribuzin	1.5	Tillering	68	70	88
ethyl-metribuzin + metribuzin	0.5+0.13	Tillering	73	75	71
ethyl-metribuzin + metribuzin	1.0+0.13	Tillering	78	78	65
ethyl-metribuzin + metribuzin	1.5+0.13	Tillering	73	80	71
diclofop	1.0	PPI	40	58	53
diclofop	1.0	PES	41	75	23
ethyl-metribuzin	0.5	PPI	51	63	51
ethyl-metribuzin	1.0	PPI	58	73	75
ethyl-metribuzin	1.5	PPI	46	53	58
ethyl-metribuzin + chlorsulfuron	1.0+0.02	1-3 lf	63	51	95
diclofop + chlorsulfuron	1.0+0.02	PPI	65	61	45
diclofop + chlorsulfuron	1.0+0.02	PES	38	91	93
diclofop + ethyl-metribuzin	1.0+1.0	PES	61	86	81
diclofop + metribuzin	1.0+0.13	PES	75	90	36
LSD (0.05)			34	31	24
plants/sq ft			30-40	50-70	10-15

Table 3. Weed control with SAN-567 H.

Treatment	Rate	THLAR	AEGCY	LAMAN	AMSIN	SSYAL	ANTCO	GALAP
		Weed control						
	(lb ai/A)	(% of check)						
SAN 567H[1]	1.2	90	3	43	36	95	90	35
SAN 567H	1.6	85	6	43	13	95	93	20
SAN 567H[2]	1.2	97	23	94	97	97	97	96
SAN 567H	1.6	97	20	93	97	97	97	93
LSD (0.05)		6	9	31	36	2	6	27
plants/sq ft		1-5	20-30	5-10	1-5	1-5	10-15	1-3

[1]Applied PES.

[2]Applied at the 1 to 3 lf stage of the jointed goatgrass.

Table 4. Percent germination of jointed goatgrass joints after burning.

Percent of Joint Charred	Placement	Germination	Reduction in Germination
		(%)	
Check		97	---
0	soil surface	51	47
< 50	soil surface	22	77
> 50	soil surface	0	100
0	stem	32	67
< 50	stem	7	93
> 50	stem	0	100
LSD (0.05)		7.4	

Ethyl metribuzin for jointed goatgrass control in winter wheat. Rydrych, D.J. In 1985, preplant surface (PPS) applied ethyl metribuzin was successful in controlling jointed goatgrass in winter wheat. The experiment was established in the fall of 1984 on four sites in eastern Oregon. Plots were 1.8 m by 6 m and replicated three times in a randomized block design. Ethyl metribuzin was applied at 1.12 kg/ha and pronamide at .28 kg/ha with a compressed air sprayer in a volume of 187 l/ha and was compared with a nontreated control.

Wheat tolerance was measured by visual evaluation in May after jointed goatgrass had produced a visible spike. Wheat tolerance using ethyl metribuzin was excellent at all locations and jointed goatgrass control was considered adequate. Pronamide gave erratic jointed goatgrass control and crop tolerance was poor. Previous experience has shown that jointed goatgrass is much easier to control when herbicides are applied in the fall. The best control was obtained at the Holdman site (94%) and the least was recorded at Pendleton (70%). Ethyl metribuzin has a distinct safety advantage over pronamide when treatments are applied within four weeks of planting or in the fall. (Oregon State University, CBARC, Pendleton, OR 97801)

Ethyl metribuzin for jointed goatgrass control in winter wheat at four Eastern Oregon locations

Location treatments1/	Jointed goatgrass control %	Winter wheat injury2/ %
Pendleton		
pronamide	92	8
ethyl metribuzin	70	0
Elgin		
pronamide	40	10
ethyl metribuzin	85	2
Holdman		
pronamide	38	2
ethyl metribuzin	94	0
Wasco		
pronamide	40	25
ethyl metribuzin	88	2

1/ Averages of 3 replications; pronamide @ .28 kg/ha, ethyl metribuzin @ 1.12 kg/ha.

2/ Crop injury rating; 0=none, 100=100%.

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 able to establish a strong root system in early fall and thrives in soils that remain saturated and wet throughout the growing season. Bulbous bluegrass is difficult to control with selective herbicides once the plants start to tiller. A postemergence trial was established in the spring of 1985 to evaluate the efficacy of four herbicides on well tillered bulbous bluegrass seedlings. The herbicides metribuzin, ethyl metribuzin, SAN 567 H, and chlorsulfuron were applied postemergence on March 20, 1985 when bulbous bluegrass was 4 to 5 leaf and in 2 and 4 inch clumps. Winter wheat (Stephens) had 4 to 5 leaves with 1 to 2 tillers. Plots were 8 by 20 feet and replicated three times in a randomized block design. Metribuzin (.50 lb ai/A), ethyl metribuzin (1.50 lb ai/A), SAN 567 H (2.40 lb ai/A) and chlorsulfuron (.50 oz ai/A) were applied using 8002 nozzles at 20 gpa at 30 psi.

Wheat tolerance and crop injury was evaluated in June and plot yield was measured on July 20, 1985.

SAN 567 H and ethyl metribuzin gave 80 to 90% control of bulbous bluegrass with excellent crop safety. Metribuzin gave 60% control and chlorsulfuron gave only 12% visual control. A combination of metribuzin (.25 lb ai/A) and ethyl metribuzin (.75 lb ai/A) gave 75% control of bulbous bluegrass with excellent crop safety. The yield values are recorded in the table.

SAN 567 H and ethyl metribuzin show excellent activity on well tillered bulbous bluegrass when applied in early spring. Both compounds show excellent crop tolerance and ethyl metribuzin may have better utility if combined with metribuzin. (Oregon State University, CBARC, Pendleton, OR 97801)

Bulbous bluegrass control in winter wheat
using spring postemergence herbicides--Mission, Oregon--1985

Treatments[1/]	Rate lb/A	Bulbous bluegrass control %	Winter wheat injury[2/] %	Winter wheat yield lb/A
metribuzin	.50	60	2	3200
ethyl metribuzin	1.50	80	0	3000
metribuzin + ethyl metribuzin	.25 + .75	75	0	3350
chlorsulfuron	.50 oz	12	0	2900
SAN 567 H	2.40	90	0	3600
control	----	0	0	2140

1/ Treated postemergence March 20, 1985 using 3 replications.

2/ Crop injury: 0=none, 100=100%.

Effect of SAN 567 on 'Stephens' winter wheat and weeds. Brewster, B.D., A.P. Appleby, and R.L. Spinney. 'Stephens' winter wheat, rattail fescue, Italian ryegrass, and birdsrape mustard were seeded across 2.5 m by 12 m plots at the Hyslop research farm. The wheat was seeded in the back half of each plot while the weed seeds were broadcast in 1-m wide strips in the front half of each plot. A natural infestation of annual bluegrass covered the trial site. The plots were arranged in a randomized complete block with three replications. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha. Diuron was included as a standard.

Visual evaluations on April 16, 1985, indicated that the postemergence treatments were more effective than the preemergence treatments on rattail fescue and Italian ryegrass. Since there was little weed interference in the wheat, wheat yields were primarily a measure of crop tolerance. The postemergence application of SAN 567 seemed less injurious to the wheat, especially at the 1.8 kg/ha rate. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Wheat yield and weed control from SAN 567 applications in winter wheat

Treatment	Rate (kg/ha)	Rattail fescue	Italian ryegrass	Annual bluegrass	Birdsrape mustard	Wheat yield (kg/ha)
		(% control)				
Preemergence, Oct. 16, 1984						
SAN 567	0.9	70	80	97	100	7916
SAN 567	1.35	63	98	100	100	7869
SAN 567	1.8	96	99	100	100	7170
SAN 567	2.7	97	100	100	100	6122
diuron	1.8	90	99	88	100	7318
Postemergence, Nov. 15, 1984						
SAN 567	0.9	93	95	100	100	8098
SAN 567	1.8	100	100	100	100	8756
diuron	1.8	100	99	100	97	7916
Check	0	0	0	0	0	7768
					$LSD_{.05}$ =	1297
					$LSD_{.01}$ =	1734
					C.V. =	13.1%

Bay FOE 3440 for selective wild oat control in winter wheat. Rydrych, D.J. A replicated trial was established to compare the efficacy of three postemergence herbicides: Bay FOE 3440, diclofop methyl, and AC 222293 on 4 to 5 leaf wild oat in winter wheat. The herbicides were applied on May 15, 1985 using 8002 nozzles at 20 gpa at 30 psi. There were 17 wild oat plants/ft^2 in the experimental area. The soil was classed as a silt loam (28% sand, 52% silt, and 23% clay with 1.8% organic matter and a 7.2 pH.

Weed control and crop injury readings were made on June 8, 1985 and plots were harvested for yield August 11, 1985. Bay FOE 3440 was applied at 2, 4, 6, and 8 oz ai/A, diclofop methyl at 1 and 1.5 lbs ai/A, and AC 222293 at .50 and .75 lbs ai/A. None of the treatments except Bay FOE 3440 at 8 oz ai/A caused wheat injury or reduced yield compared with the untreated control. Wild oat control was 90% or greater with all treatment containing Bay FOE 3440 or diclofop methyl. AC 222293 gave 55 to 60% control when applied to wild oat in the 3 to 4 leaf stage. Wild oat control was more effective (3 to 4 leaf) using Bay FOE 3440 or diclofop methyl. Four ounces of Bay FOE 3440 has about the same activity as diclofop methyl at 1.25 lbs ai/A. Bay FOE 3440 has excellent wheat tolerance with rates of 2 to 6 oz ai/A. Bay FOE 3440 was not applied in combination with other herbicides. (Oregon State University, CBARC, Pendleton, OR 97801)

Wild oat control in winter wheat using premixtures of HOE 33171, MCPA, and bromoxynil. Morishita, D. W., D. C. Thill, and R. H. Callihan. Several preformulated mixtures of HOE 33171 (Whip) plus MCPA and bromoxynil were tested for wild oat (AVEFA) control in winter wheat (var. Stephens) at four northern Idaho locations. Herbicides were applied at the 2 to 3 leaf and 3 to 5 leaf stage of wild oat growth at 2 locations each. Diclofop and tank mixtures of diclofop, MCPA, and bromoxynil were included as standard treatments. A randomized complete block design with four replications and 3 by 7.6 m plots was used at each location. All herbicide treatments were applied with either a CO_2 pressurized bicycle or backpack sprayer. Both were calibrated to deliver 187 L/ha at 275 kPa and 1.3 m/s. Crop injury was evaluated three times: 1, 2 and 4 to 6 weeks after herbicide application. Wild oat control evaluations also were made 4 to 6 weeks after application. The crop was harvested July 14, and August 14 and 15 with a small-plot combine. Environmental and edaphic data are listed in Table 1.

Table 1. Application information and soil data

Location	Potlatch	Genesee	Genesee	Moscow
Date of application	4/30	5/2	5/17	5/21
Leaf stage of growth	2 to 3	2 to 3	3 to 5	3 to 5
Air temperature (C)	20	18	23	22
Soil temperature (C, 2 in)	17	18	27	13
Relative humidity (%)	50	26	74	68
Cloud cover (%)	20	95	0	10
Wind speed (m/s)	0	0 to 1	0	0 to 1
Soil type	silt loam			
Organic matter (%)	3.2	3.9	3.9	4.3
pH	5.7	5.6	5.6	5.4
CEC (meq/100 g soil)	18.0	19.5	19.5	21.6

There was no crop injury on the early evaluation at the Genesee (2 to 3 leaf) location or at any time at the Moscow (3 to 5 leaf) location (Tables 3 and 5). The greatest crop injury was generally associated with the higher rates of HOE 7115-01H, HOE 7115-02H, HOE 7117-01H, HOE 7117-02H, and HOE 171-05H (Tables 2, 3, and 4). Exceptions to this were at the Genesee (3 to 5 leaf) location where AC 222,293 and difenzoquat caused the most crop injury. Wild oat control at both 2 to 3 leaf locations was virtually identical (Table 2 and 3). Only diclofop and diclofop tank mixes controlled Italian ryegrass (LOLMU) 94% or better (Table 2). No other herbicide treatment effectively controlled Italian ryegrass. Wild oat control at the Moscow location (3 to 5 leaf) was confounded by an aerial application of MCPA (Table 5). Consequently, no herbicide treatment controlled wild oat. At the Genesee (3 to 5 leaf) location only HOE 7115-02H at 3.0 L/ha, diclofop alone, and diclofop + bromoxynil did not adequately control (<80%) wild oat. Crop yields were different only at the Genesee (2 to 3 leaf) location; however, no herbicide treatment had yields greater than either nontreated check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 2. Wild oat control with HOE 33171, MCPA, and bromoxynil premixtures applied at 2 to 3 leaves (Potlatch).

Treatments	Rate	Crop injury E[3]	M	L	Weed control AVEFA	LOLMU	Yield
	(L/ha)	(%)					(kg/ha)
check 1	-	-	-	-	-	-	3687
check 2	-	-	-	-	-	-	3866
HOE 7115-02H	2.25	4	0	0	75	0	4044
HOE 7115-02H	3.0	8	1	3	100	16	3866
HOE 7115-02H	6.0	9	8	4	100	10	3747
HOE 7115-01H	2.25	1	0	1	98	31	4401
HOE 7115-01H	3.0	4	1	0	100	13	4223
HOE 7115-01H	6.0	5	5	6	90	24	4163
HOE 7117-01H	2.5	4	0	0	100	0	4282
HOE 7117-01H	3.0	4	1	3	99	25	3747
HOE 7117-02H	2.5	4	1	5	99	13	3687
HOE 7117-02H	3.0	4	3	4	99	5	3985
HOE 171-05H	3.0	3	3	5	100	0	3866
HOE 171-05H	6.0	8	6	19	100	53	3390
diclofop + MCPA + bromoxynil[1]	0.80 + 0.03 + .028	3	1	0	93	95	4460
AC 222,293[1]	0.42	1	1	0	93	34	4223
diclofop[1]	1.12	1	0	0	96	96	4223
diclofop + bromoxynil[1]	0.90 + 0.28	3	0	0	95	94	4639
diclofop + MCPA + bromoxynil[1]	0.90 + 0.06 0.28	3	0	0	94	96	4163
diclofop + MCPA + bromoxynil[1] + COC[2]	0.90 + 0.06 0.28	6	0	0	96	98	4341
$LSD_{(0.05)}$		5	3	8	NS	28	NS

[1] application rate is kg ai/ha.
[2] COC = crop oil concentrate applied at 1.16 L/ha.
[3] E = 1 week, M = 2 weeks, L = 4 to 6 weeks after application.

Table 3. Wild oat control with HOE 33171, MCPA, and bromoxynil premixtures applied at 2 to 3 leaves (Genesee).

Treatments	Rate	Crop injury E[3]	M	L	AVEFA control	Yield
	(L/ha)	----------(%)----------				(kg/ha)
check 1	-	-	-	-	-	4019
check 2	-	-	-	-	-	4822
HOE 7115-02H	2.25	0	0	5	99	3215
HOE 7115-02H	3.0	0	0	4	100	3751
HOE 7115-02H	6.0	0	4	8	100	3416
HOE 7115-01H	2.25	0	1	3	99	3617
HOE 7115-01H	3.0	1	1	9	100	3282
HOE 7115-01H	6.0	0	1	4	100	3416
HOE 7117-01H	2.5	1	1	1	100	3148
HOE 7117-01H	3.0	1	4	10	100	3215
HOE 7117-02H	2.5	0	1	8	100	3215
HOE 7117-02H	3.0	1	4	11	100	3215
HOE 171-05H	3.0	3	3	13	100	2612
HOE 171-05H	6.0	1	8	19	100	4219
diclofop + MCPA + bromoxynil[1]	0.80 + 0.03 + 0.28	0	0	0	99	4219
AC 222,293[1]	0.42	0	0	0	95	4219
diclofop[1]	1.12	0	0	0	100	4219
diclofop + bromoxynil[1]	0.90 + 0.28	0	0	0	99	4286
diclofop + MCPA + + bromoxynil[1]	0.90+ 0.06 0.28	1	0	0	99	4353
diclofop + MCPA + bromoxynil[1] + COC[2]	0.90+ 0.06 + 0.28	0	0	0	99	4353
$LSD_{(0.05)}$		NS	3	9	3	1005

[1] application rate is kg ai/ha.
[2] COC = crop oil concentrate applied at 1.16 L/ha.
[3] E = 1 week, M = 2 weeks, L = 4 to 6 weeks after application.

Table 4. Wild oat control with HOE 33171, MCPA, and bromoxynil premixtures applied at 3 to 5 leaves (Genesee).

Treatments	Rate	Crop injury E[3]	M	L	AVEFA control	Yield
	(L/ha)	----------(%)			-----------	(bu/A)
check 1	-	-	-	-	-	4644
check 2	-	-	-	-	-	4580
HOE 7115-02H	2.25	0	3	0	89	4453
HOE 7115-02H	3.0	0	1	1	63	4644
HOE 7115-02H	6.0	3	5	4	95	4135
HOE 7115-01H	2.25	1	0	0	89	4771
HOE 7115-01H	3.0	0	1	1	93	4326
HOE 7115-01H	6.0	0	1	3	94	4517
HOE 7117-01H	2.5	1	1	0	89	4771
HOE 7117-01H	3.0	0	1	0	91	4898
HOE 7117-02H	2.5	1	0	1	89	3944
HOE 7117-02H	3.0	1	1	1	80	4453
HOE 171-05H	3.0	0	1	3	93	4517
HOE 171-05H	6.0	0	4	1	95	4517
diclofop + MCPA + + bromoxynil[1]	0.80 + 0.03 + 0.28	6	3	0	94	4453
AC 222,293[1]	0.42	0	0	9	91	4962
diclofop[1]	1.12	0	0	0	68	3944
diclofop + bromoxynil[1]	0.90 + 0.28	0	0	0	68	4580
diclofop + MCPA + bromoxynil[1]	0.90 + 0.06 0.28	0	0	0	85	4708
diclofop + MCPA + bromoxynil[1] + COC[2]	0.90 + 0.06 0.28 + 0.50	5	0	1	86	4326
difenzoquat[1]	1.12	0	0	16	98	4262
HOE 33171 + MCPA[1]	0.18 + 0.28	1	5	3	91	4453
HOE 33171 + MCPA[1]	0.36 + 0.56	4	6	4	95	4453
$LSD_{(0.05)}$		3	3	5	NS	NS

[1] application rate is kg ai/ha.
[2] COC = crop oil concentrate applied at 1.16 L/ha.
[3] E = 1 week, M = 2 weeks, L = 4 to 6 weeks after application.

Table 5. Wild oat control with HOE 33171, MCPA, and bromoxynil premixtures applied at 3 to 5 leaves (Moscow).

Treatments	Rate	Crop injury E[3]	M	L	AVEFA control	Yield
	(L/ha)	-----------(%)----------				(kg/ha)
check 1	-	-	-	-	-	2258
check 2	-	-	-	-	-	3416
HOE 7115-02H	2.25	0	0	0	41	3301
HOE 7115-02H	2.0	0	0	0	51	3590
HOE 7115-02H	6.0	0	0	0	70	4053
HOE 7115-01H	2.25	0	0	0	60	4111
HOE 7115-01H	3.0	0	0	0	56	4111
HOE 7115-01H	6.0	0	0	4	58	3822
HOE 7117-01H	2.5	0	0	0	38	3590
HOE 7117-01H	3.0	0	0	0	38	3590
HOE 7117-02H	2.5	0	0	0	56	3880
HOE 7117-02H	3.0	0	0	3	73	4285
HOE 171-05H	3.0	0	0	0	55	3358
HOE 171-05H	6.0	0	0	0	10	3648
diclofop + MCPA + + bromoxynil[1]	.80 + 0.03 + 0.25	0	0	0	28	3995
AC 222,293[1]	0.42	0	0	0	28	4459
diclofop[1]	1.12	0	0	0	51	3648
diclofop + bromoxynil[1]	0.90 + 0.28	0	0	0	50	4111
diclofop + MCPA + bromoxynil[1]	0.90 + 0.05 + 0.28	0	0	0	56	4169
diclofop + MCPA + bromoxynil[1] + COC[2]	0.90 + 0.05 0.28 + 0.50	0	0	0	25	3590
difenzoquat[1]	1.12	0	0	3	45	3648
HOE 33171 + MCPA[1]	0.18 + 0.28	0	0	0	61	3880
HOE 33171 + MCPA[1]	0.36 + 0.56	0	0	0	68	4806
$LSD_{(0.05)}$		NS	NS	NS	23	NS

[1] application rate is kg ai/ha.
[2] COC = crop oil concentrate applied at 1.16 L/ha.
[3] E = 1 week, M = 2 weeks, L = 4 to 6 weeks after application.

Wild oat control in winter wheat with AC-222293. Whitesides, R.E. and D.G. Swan. A field experiment was established in the spring of 1985 in winter wheat (cv. Stephens) to evaluate crop tolerance and wild oat control from applications of AC-222293. The AC-222293 was applied alone and in combination with some herbicides used for broadleaf weed control. Treatments were applied when the wild oats had one to three leaves and the winter wheat three to six tillers. All treatments were applied with a compressed air bicycle wheel plot sprayer that was calibrated to deliver 187 l/ha at 207 kPa pressure. Herbicides were applied on May 15, 1985 and visual evaluations taken on July 22, 1985. Plots were 2 m by 6 m and the experiment contained four replications.

Diclofop, difenzoquat, and AC-222293 all gave better wild oat control than barban, but no differences in yields were measured. AC-222293 was the most effective wild oat herbicide in this study.

When 2,4-D low volatile ester or dicamba was combined with the AC-222293, wild oat control was significantly reduced, growth of wheat was suppressed, and wheat yields were depressed. Bromoxynil and the sulphonylurea herbicides (chlorsulfuron, DPX-M6316, and DPX-L5300) were mixed with AC-222293. These combinations did not reduce wheat yields or wild oat control. AC-222293 was an effective wild oat herbicide, but should not be tank-mixed with the phenoxy herbicides or dicamba. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Wild oat control in winter wheat with AC-222293

Herbicide	Rate (kg ai/ha)	Suppressed crop growth	Wild oat[a] control	Wheat yields[b] (kg/ha)
		%	%	
diclofop	1.1	0	93	5179 ab
difenzoquat + X-77(0.25%)	1.1	0	93	5381 a
barban	0.43	0	85	4574 ab
AC-222293 + X-77(0.25%)	0.53	0	99	5045 ab
AC-222293 + 2,4-D LVE	0.53 1.1	14	66	4439 b
AC-222293 + dicamba	0.53 0.14	16	50	3699 c
AC-222293 + bromoxynil	0.53 0.3	0	93	5179 ab
AC-222293 + chlorsulfuron + X-77(0.25%)	0.53 0.018	0	99	5381 a
AC-222293 + DPX-M6316 + X-77(0.25%)	0.53 0.053	0	98	5314 ab
AC-222293 + DPX-L5300 + X-77(0.25%)	0.53 0.018	10	96	5246 ab
Untreated control		0	0	3027 c

[a] 0 = no control and 100 = total control

[b] Means followed by the same letter are not significantly different at the 5% level.

Wild oat and broadleaf weed control in winter wheat. Flom, D. G., D. C. Thill, and R. H. Callihan. An experiment was initiated May 17, 1985, near Moscow, Idaho to study the effects of various herbicide treatments for controlling wild oat (AVEFA) and broadleaf weeds in winter wheat (var. Stephens). Herbicides in this experiment and their formulation are listed in Table 1. Plots were 10 by 30 ft and treatments were replicated four times in a randomized complete block design. Treatments were broadcast applied using a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 3.3% organic matter, pH 5.5, and CEC of 20.8 meq/100 g soil. All treatments, except those containing difenzoquat, applied May 17 when the wild oat had 2 ato 3 leaves. Treatments containing difenzoquat were applied May 27 when the wild oat had 4 to 5 leaves. Climatological data at the time of application on May 17 and May 27 were: air temperature, 78 and 79 F; soil temperature at 2 in, 72 and 80 F; relative humidity, 43 and 50%; and cloud cover, 0 and 75%, respectively. Early evaluation of wild oat and broadleaf weed control was made June 16 and a late evaluation of wild oat and field bindweed (CONAR) control was made August 8. Crop height was measured August 18 and all plots were harvested August 23 using a small plot combine.

Herbicide treatments containing AC 222,293, except those containing dicamba, controlled (80% or greater) wild oat (Table 2). Wild oat control was better with treatments containing AC 222,293 than with treatments containing diclofop or difenzoquat. Early season wild oat control was reduced 24% when DPX-L5300 at 0.02 lb/A was tank mixed with diclofop at 1.0 lb/A compared to diclofop alone. Broadleaf weed control was reduced when difenzoquat was added to treatments containing DPX-M6316 or DPX-L5300. Crop height was less in plots receiving treatments containing difenzoquat than in the check plots. Treatment with bromoxynil at 0.38 lb/A resulted in reduced test weight and yield. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 1. Formulations of herbicides used in this study

Herbicide	Formulation
AC 222,293	2.5 WS
diclofop	3.0 EC
difenzoquat	2.0 WS
dicamba	4.0 WS
DPX-M6316	75 DF
DPX-L5300	75 DF
bromoxynil	4.0 EC
bromoxynil/MCPA (3+3)	3.0 EC
2,4-D-LVE	4.0 EC
MCPA-LVE	4.0 EC

Table 2. Wild oat and broadleaf weed control in winter wheat at Moscow, Idaho

			Weed Control								
			AVEFA		CONAR		POLCO	ANTCO	LAMAM		
Treatment[1]	Rate	Crop height	E[2]	L	E	L	E	E	E	Yield	Test weight
	(lb ai/A)	(in)	%							(bu/A)	(lb/bu)
check1	0.0	29	-	-	-	-	-	-	-	51	52.4
check2	0.0	29	-	-	-	-	-	-	-	57	49.8
AC 222,293	0.5	28	84	93	0	0	29	0	3	62	52.0
AC 222,293	1.0	27	90	97	0	0	38	0	23	72	53.8
diclofop	1.0	28	53	38	0	0	0	0	0	56	52.7
difenzoquat	1.0	27	58	78	0	0	0	0	0	61	52.6
AC 222,293+dicamba	0.5+0.09	27	64	49	11	8	41	26	28	65	53.7
AC 222,293+dicamba	0.5+0.13	27	64	51	8	5	45	34	40	75	53.8
AC 222,293+DPX-M6316	0.5+0.03	28	85	89	0	45	49	65	43	81	53.1
AC 222,293+DPX-L5300	0.5+0.02	27	81	95	0	0	55	80	55	78	52.8
AC 222,293+DPX-M6316 +DPX-L5300	0.5+0.02 +0.01	28	80	95	11	11	53	73	40	67	52.1
AC 222,293+bromoxynil	0.5+0.38	28	54	95	0	0	91	14	48	69	52.2
AC 222,293+bromoxynil /MCPA	0.5+0.38	28	75	94	13	0	91	53	58	70	52.6
AC 222,293+2,4-D-LVE	0.5+0.5	27	88	83	6	5	46	19	15	66	54.0
AC 222,293+MCPA-LVE	0.5+0.5	28	80	92	10	42	41	23	23	76	52.6
diclofop+DPX-M6316	1.0+0.03	28	63	63	0	0	59	69	24	74	53.2
diclofop+DPX-L5300	1.0+0.02	29	29	35	0	0	29	65	29	69	52.4
diclofop+DPX-M6316 +DPX-L5300	1.0+0.02 +0.01	28	55	55	18	8	58	83	64	74	53.0
diclofop+bromoxynil	1.0+0.38	29	60	72	3	13	35	5	5	71	53.3
difenzoquat+DPX-M6316	1.0+0.03	27	74	76	0	8	39	33	18	75	54.0
difenzoquat+DPX-L5300	1.0+0.02	25	58	61	5	0	19	31	34	58	54.1
difenzoquat+DPX-M6316 +DPX-L5300	1.0+0.02 +0.01	27	53	55	5	28	35	41	30	69	54.2
difenzoquat+bromoxynil	1.0+0.38	25	73	96	10	8	61	33	29	62	52.5
difenzoquat+bromoxynil /MCPA	1.0+0.38	25	55	83	20	0	68	40	6	68	53.8
DPX-M6316	0.03	29	0	0	26	20	73	70	46	64	52.8
DPX-L5300	0.02	28	3	5	3	5	43	80	33	74	53.0
DPX-M6316+DPX+L5300	0.02+0.01	27	0	0	18	13	78	85	49	62	52.6
bromoxynil	0.38	29	1	0	0	0	24	6	3	50	50.8
bromoxynil/MCPA	0.38	27	16	75	16	9	88	53	35	73	54.3
dicamba	0.13	28	0	0	10	15	38	29	3	74	52.8
LSD(0.05)		1	23	27	NS	21	29	30	18	15	2.6

[1] All AC 222,293, difenzoquat, DPX-M6316, and DPX-L5300 treatments included 0.5% v/v nonionic surfactant (R-11)

[2] E=early evaluation, L=late evaluation

Evaluation of preemergence and postemergence herbicides for weed control in winter wheat. Morishita, D. W., D. C. Thill, and R. H. Callihan. An experiment was established in the fall of 1984 to investigate the efficacy of several herbicides in winter wheat (var. Stephens) for the control of interrupted windgrass (APEIN), wild oat (AVEFA), mayweed chamomile (ANTCO), and pineappleweed (MATMT). The experiment was designed as a randomized complete block with four replications and 10 by 25 ft plots. The herbicides were applied preplant incorporated (PPI), preemergence surface (PES), and at the 1 to 3 leaf and early tillering stages of interrupted windgrass growth. The soil type in the experiment was a silt loam with a pH, CEC, and organic matter content of 5.9, 18.7 meq/100 g soil, and 2.9%, respectively. Weed control and crop injury evaluations were made July 16, and the crop was harvested August 14 with a small-plot combine. Environmental conditions at the time of each application are listed in Table 1.

Table 1. Environmental conditions for herbicide application

Date of application	9/30/84	10/3/84	4/29/85	5/28/85
Stage of crop growth	PPI	PES	1to3 lf	tillering
Air temperature (F)	64	75	62	56
Soil temperature (F, 2 in)	69	74	60	50
Relative humidity (%)	39	36	70	62
Cloud cover (%)	50	0	25	100
Wind speed (mph)	4 to 9	0 to 4	0 to 2	3 to 4

No herbicide treatment visibly injured the crop (Table 2). Diclofop and ethyl metribuzin applied PPI controlled 95 to 97% of the interrupted windgrass. Preemergence surface applications of diclofop EC, ethyl metribuzin, ethyl metribuzin + metribuzin, and SC-0574, as well as 1 to 3 leaf applications of ethyl metribuzin + metribuzin and AC 222,293 controlled 92 to 98% of the interrupted windgrass. No single herbicide or tank mix treatment controlled all weed species. Ethyl metribuzin at 1.0 lb/A and ethyl metribuzin + metribuzin at 1.0 + 0.125 lb/A applied PES, controlled 95 to 100% of all weeds except wild oat.

The four highest yielding treatments had good to excellent (88 to 100%) control of at least two of the four weed species; however, no herbicide treatment had a grain yield significantly higher than the nontreated check. Only SC-0574 had a grain yield lower than the check. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Table 2. Broadleaf and grassy weed control in winter wheat

Treatment	Rate	Appl. date	Crop injury	Weed control APEIN	AVEFA	ANTCO	MATMT	Yield
	(lb ai/A)		-----------------	----------	(%)	----------	----------	(bu/A)
check	-	-	-	-	-	-	-	65
diclofop EC	1.0	9/30	0	97	60	0	33	44
ethyl metribuzin	1.0	9/30	0	95	63	55	88	82
diclofop EC	1.0	10/3	0	98	67	0	32	49
ethyl metribuzin	1.0	10/3	0	97	20	95	98	72
diclofop GR	1.0	10/3	0	33	28	0	0	56
ethyl metribuzin + metribuzin	1.0 + 0.125	10/3	0	98	13	97	100	44
SC-0574	4.0	10/3	0	93	0	12	20	36
ethyl metribuzin	1.0	4/29	0	80	27	40	57	70
ethyl metribuzin + metribuzin	1.0 + 0.125	4/29	0	92	10	70	100	57
AC 222,293	1.0	4/29	0	93	93	0	7	79
ethyl metribuzin	1.0	5/28	0	47	48	88	92	60
ethyl metribuzin + metribuzin	1.0 + 0.125	5/28	0	57	48	90	97	74
metribuzin	0.375	5/28	0	35	35	90	96	66
metribuzin	0.5	5/28	0	30	18	90	95	61
metribuzin + terbutryn	0.25 + 0.8	5/28	0	50	20	100	100	47
$LSD_{(0.05)}$			NS	45	49	33	42	22

Broadleaf weed control in winter wheat at Potlatch, Idaho. Mengel, M. L., D. C. Thill, and R. H. Callihan. This experiment was initiated April 26 to study the effects of various herbicides on broadleaf weeds in winter wheat (var. Hill 81). The experiment was located near Potlatch, Idaho. Experimental units measured 10 by 30 ft in a randomized complete block design with four replications. Treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Early postemergence treatments were applied April 26, while terbutryn + MCPA and 2,4-D LVE were applied May 21 at the tillering stage of crop growth. Soil type was a silt loam with 2.6% organic matter, pH 5.3 and CEC 13.5 meq/100 g soil. Weather data and crop stage of growth at the time of application are given in Table 1. Crop injury and weed control were visually evaluated June 4 and July 15. Grain was harvested August 14 with a small plot combine.

No herbicide treatment injured the wheat. Field pennycress control was excellent (100%). Mayweed chamomile was effectively (>90%) controlled by all treatments except 2,4-D LVE. Common lambsquarters was effectively controlled (80% or better) early by all treatments except DPX-L5300 at 0.13 oz ai/A and DPX-M6316 + DPX-L5300 at 0.13 + 0.06 oz ai/A. By the late evaluation, there were no differences among treatments in the control of common lambsquarters. Grain yield did not differ among treatments. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data.

Date of application	April 26	May 21
Type of application	post	post
Air temperature (F)	42	89
Soil temp @ 2 in (F)	45	78
% relative humidity	80	44
% cloud cover	100	5
Wind (mph) & direction	3 to 6 SE	1 to 3 W
Soil surface condition	moist	dry
Crop stage of growth	3 to 5 lf	fully tillered

Table 2. Broadleaf weed control in winter wheat at Potlatch, Idaho.

Treatment[1]	Rate[2]	Crop injury		Weed control[3]						Yield
				ANTCO		CHEAL		THLAR		
		E	L	E	L	E	L	E	L	
	(lb ai/A)	---------------(%)------------								(bu/A)
check	-	-	-	-	-	-	-	-	-	78
DPX-M6316 + X-77	0.13+0.50	0	0	91	75	85	100	100	100	72
DPX-L5300 + X-77	0.13+0.50	0	0	99	99	65	100	100	100	83
DPX-L5300 + X-77	0.25+0.50	0	0	100	100	94	100	100	100	73
DPX-L5300 + X-77	0.25+0.50	0	0	100	100	100	100	100	100	81
DPX-L5300 + X-77	1.0 +0.50	0	0	100	100	100	100	100	100	82
DPX-M6316 + DPX-L5300 + X-77	0.50+0.25+0.50	0	0	100	100	98	100	100	100	86
DPX-M6316 + DPX-L5300 + X-77	0.25+0.13+0.50	0	0	100	100	80	99	100	100	84
DPX-M6316 + DPX-L5300 + X-77	0.13+0.06+0.50	0	0	100	100	78	88	100	100	80
DPX-M6316 + DPX-L5300 + X-77	0.13+0.13+0.50	0	0	100	100	96	100	100	100	75
chlorsulfuron + bromoxynil + X-77	0.13+0.25+0.50	0	0	100	100	95	100	100	100	82
chlorsulfuron + X-77	0.20+0.50	0	0	100	100	100	100	100	100	86
chlorsulfuron + X-77	0.25+0.50	0	0	100	100	100	100	100	100	79
chlorsulfuron + X-77	0.31+0.50	0	0	100	98	100	100	100	100	74
DPX-G8311 + X-77	0.25+0.50	0	0	100	85	100	100	100	100	87
DPX-G8311 + X-77	0.31+0.50	0	0	100	100	100	100	100	100	77
DPX-G8311 + X-77	0.37+0.50	0	0	100	100	100	100	100	100	87
chlorsulfuron + bromoxynil + X-77	0.20+0.25+0.50	0	0	100	100	100	100	100	100	77
chlorsulfuron + bromoxynil + X-77	0.25+0.25+0.50	0	0	100	100	95	100	100	100	79
chlorsulfuron + dicamba + X-77	0.20+0.13+0.50	0	0	100	100	100	100	100	100	83
chlorsulfuron + dicamba + X-77	0.25+0.13+0.50	0	0	100	100	100	100	100	100	89
DPX-M6316 + X-77	0.25+0.50	0	0	95	100	100	100	100	100	73
DPX-M6316 + X-77	0.50+0.50	0	0	100	100	93	100	100	100	72
DPX-M6316 + chlorsulfuron + X-77	0.75+0.66+0.50	0	0	100	100	100	100	100	100	91
bromoxynil MCPA	0.38	0	0	100	100	100	100	100	100	81
check	0.0	-	-	-	-	-	-	-	-	75
terbutryn + MCPA(NA+)	0.80+1.0	10	0	27	100	100	100	100	100	62
bromoxynil + diuron	0.25+0.60	0	0	100	100	86	100	100	100	84
2,4-D LVE	1.0	0	0	3	23	100	100	100	100	73
check	0.0	-	-	-	-	-	-	-	-	88
$LSD_{(0.05)}$		NS	NS	14	18	20	NS	NS	NS	NS

[1] X-77, a nonionic surfactant was added at 0.5% v/v.
[2] Rates for DPX compounds and chlorsulfuron are in oz ai/A.
[3] ANTCO = Anthemis cotula, mayweed chamomile; CHEAL = Chenopodium album, common lambsquarters; THLAR = Thlaspi arvense, field pennycress.
Early evaluations were taken June 4 and late evaluations July 15.

Broadleaf weed control with fluorochloridone in winter wheat. Mengel, M. L., D. C. Thill, and R. H. Callihan. In the fall of 1984 an experiment was initiated near Potlatch, Idaho to study the effects of split applications of various herbicides on broadleaf weed control in winter wheat (var. Hill 81). Plots were 10 by 25 ft and arranged in a randomized complete block design with four replications. Treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 3.0% OM, pH 5.4 and CEC 16.3 meq/100 g soil. Climatological data at the time of application is given in Table 1. Weed control and crop injury were visually evaluated June 4 and July 15, 1985. Plots were harvested August 14 with a small plot combine.

Table 1. Application data

Date of application	October 10	May 18
Type of application	pes	post
Air temperature (F)	63	65
Soil surface temp (F)	59	72
Soil temp @ 2 in (F)	64	78
% relative humidity	58	72
% cloud cover	60	0
Stage of crop growth	pe	3 to 4 lf

Fall applied herbicides that were most effective on mayweed chamomile were flourochloridone + chlorsulfuron and chlorsulfuron (Table 2). Fluorochloridone (alone) applied in the fall did not control (37 to 50%) mayweed chamomile but did control (100%) field pennycress and popcorn-flower. Of the split timing applications, fluorochloridone/ fluorochloridone at 0.25/0.25 lb ai/A provided the best (98 to 100%) late season control of broadleaf weeds. All split applications of fluorochloridone did not acceptably control (49 to 68%) mayweed chamomile late in the season, but did control other broadleaf weeds. Broadleaf weed control with spring applied treatments was fair (76%) to excellent (100%). There were no differences among treatments for crop injury and grain yield. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 2. Broadleaf weed control with fluorochloridone in winter wheat

Treatment[1]	Rate[2]	Timing	Crop injury E	Crop injury L	Weed control[3] ANTCO E	ANTCO L	THLAR E	THLAR L	PLASC E	PLASC L	Yield
	(lb ai/A)		(%)								(lb/A)
check	0.0	-	-	-	-	-	-	-	-	-	4906
fluorochloridone	0.25	PES	0	0	65	37	99	77	100	100	4169
fluorochloridone	0.38	PES	0	0	46	50	100	100	100	100	5286
chlorsulfuron	0.25	PES	0	0	89	99	99	100	100	100	5497
SC-0574	4.00	PES	0	0	57	37	100	100	100	100	4983
bromoxynil + diuron	0.25 + 0.40	Post	0	0	66	96	67	100	67	100	4439
fluorochloridone chlorsulfuron	0.25 + 0.25	PES	0	0	96	99	100	100	100	100	4772
fluorochloridone SC-0574	0.25 + 4.00	PES	0	0	83	59	100	100	100	100	4548
fluorochloridone/ fluorochloridone	0.25 + 0.25	PES/ Post	0	0	83	98	100	100	100	100	4725
fluorochloridone/ fluorochloridone	0.25 + 0.13	PES/ Post	0	0	61	82	100	100	100	100	4531
fluorochloridone/ fluorochloridone	0.13 + 0.13	PES/ Post	0	0	72	68	100	100	100	100	4433
fluorochloridone/ fluorochloridone	0.13 + 0.25	PES/ Post	0	0	63	49	100	100	100	100	4743
bromoxynil MCPA	0.38	Post	0	0	76	98	100	100	99	100	5165
chlorsulfuron + R-11	0.25 + 0.50	Post	0	0	85	100	98	100	60	100	5176
DPX-M6316 + R-11	0.50 + 0.50	Post	0	0	83	100	99	100	57	100	5338
$LSD_{(0.05)}$			NS	NS	58	58	NS	NS	NS	NS	NS

[1] R-11 is a nonionic surfactant added at 0.5% v/v
[2] Rates for chlorsulfuron and DPX-M6316 are in oz ai/A; both are 75% DF formulations
[3] ANTCO = Anthemis cotula; mayweed chamomile
THLAR = Thlaspi arvense; field pennycress
PLASC = Plagiobothrys scouleri; popcorn-flower

<u>Broadleaf weed control in no till winter wheat</u>. Mengel, M. L., D. C. Thill, and R. H. Callihan. An experiment was initiated near Waha, Idaho, April 6, 1985 to study the effects of various herbicide treatments on broadleaf weed control in no till winter wheat (var. Daws). Plots were 10 by 25 ft and were arranged in a randomized complete block design with treatments replicated four times. Soil type was a silt loam with 4.1% OM, pH 5.3 and CEC 22.2 meq/100 g soil. Treatments were applied April 6 using a bicycle sprayer when the crop was at the 3 to 5 leaf stage of growth. Treatments were applied April 29 using a backpack sprayer. Both spray systems were CO_2 pressurized and calibrated to deliver 20 gpa at 40 psi and 3 mph. Environmental data at application are listed in Table 1. Visual evaluations for crop injury and weed control were made July 16, and grain was harvested July 25 with a small plot combine.

Herbicide treatments did not injure the crop. Infestations of flixweed and field pennycress were sparse, averaging four and one plant per square foot, respectively, in the unsprayed checks. Control of broadleaf weeds ranged from fair (75%) to excellent (100%) with no differences among treatments. Grain yield from treated plots was not different than untreated checks. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data.

Date of application	April 6	April 29
Type of application	early post	post
Air temperature (F)	58	52
Soil temp at 2-inches (F)	40	61
% relative humidity	80	86
% cloud cover	0	5
Soil surface condition	dry	moist
Wind (mph) & direction	0 to 3 SE	0
Crop stage of growth	3 to 5 lf	fully tillered

Table 2. Broadleaf weed control in no till winter wheat

Treatment[1]	Rate[2]	Crop injury	Weed control[3] DESSO	THLAR	Yield
	(lb ai/A)	--------	(%)	-------	(bu/A)
check	0.00	-	-	-	50
DPXM6316	0.13	0	85	100	46
DPXL5300	0.13	0	100	100	53
DPXL5300	0.25	0	96	100	51
DPXL5300	0.50	0	100	100	37
DPXL5300	1.00	0	96	100	52
DPXM6316 + DPXL5300	0.50+0.25	0	100	100	47
DPXM6316 + DPXL5300	0.25+0.13	0	100	100	49
DPXM6316 + DPXL5300	0.13+0.06	0	100	100	54
DPXM6316 + DPXL5300	0.13+0.13	0	100	95	55
chlorsulfuron + bromoxynil	0.13+0.25	0	100	100	56
chlorsulfuron	0.20	0	100	100	56
chlorsulfuron	0.25	0	100	100	49
chlorsulfuron	0.31	0	75	75	53
DPXG8311	0.25	0	100	100	55
DPXG8311	0.31	0	100	100	51
DPXG8311	0.37	0	100	100	49
chlorsulfuron + bromoxynil	0.20+0.25	0	100	100	55
chlorsulfuron + bromoxynil	0.25+0.25	0	100	100	50
chlorsulfuron + dicamba	0.20+0.13	0	100	100	46
chlorsulfuron + dicamba	0.25+0.13	0	100	100	51
DPXM6316	0.25	0	95	100	57
DPXM6316	0.50	0	100	100	55
DPXM6316 + chlorsulfuron	0.25+0.13	0	100	100	59
DPXM6316 + chlorsulfuron	0.50+0.13	0	100	100	54
bromoxynil/MCPA	0.38	0	100	100	54
check	0.00	-	-	-	48
bromoxynil + diuron	0.25+0.60	0	100	100	54
2,4-D LVE[4]	1.00	0	100	100	58
check	0.00	-	-	-	53
LSD (0.05)		NS	NS	NS	NS

[1] X-77, a nonionic surfactant, was added at 0.5% v/v to all treatments containing DPX compounds and chlorsulfuron

[2] Rates for DPX compounds and chlorsulfuron are in oz ai/A

[3] DESSO= Descurainia sophia; flixweed
THLAR= Thlaspi arvense; field pennycress

[4] 2,4-D LVE applied April 29; all other treatments applied April 6

Broadleaf weed control in winter wheat at Moscow, Idaho. Mengel, M. L., D. C. Thill, and R. H. Callihan. On May 24 an experiment was initiated near Moscow, Idaho to study the effects of various herbicide treatments on broadleaf weed control in winter wheat (var. Stephens 50%, Hill 81 50%). Plots measured 10 by 25 ft in a randomized complete block design replicated four times. Treatments were broadcast applied May 24 with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 3.5% OM, pH 5.6 and CEC 13.2 meq/100 g soil. Environmental conditions at the time of application were as follows; air temperature 59 F, soil surface temperature 60 F, soil temperature at 2-inch depth 60 F, relative humidity 58%, cloud cover 80%, and wind 3 to 5 mph. Visual evaluations for crop injury and weed control were taken June 27. Grain was harvested August 28 with a small plot combine.

Crop stand thinning was most apparent from fluorochloridone + metribuzin (21%) and fluorochloridone + terbutryn (32%) treatments. Minor injury (8 to 19%) was apparent as leaf tip burn from most tank mixes containing terbutryn. There were no differences among treatments in the control of wild buckwheat or common lambsquarters. Control of shepherdspurse was excellent (92 to 100%) with terbutryn tank mixes, XRM-4757 + metribuzin, fluroxypyr + metribuzin, fluorochloridone (alone and in tank mixes), 2,4-D, DPX-L5300 and DPX-M6316 + DPX-L5300. All treatments containing MCPA, dicamba, 2,4-D, XRM-4757 or DPX-L5300 suppressed the growth of Canada thistle (data not shown). Terbutryn (FL) + bromoxynil, MCPA or dicamba, fluroxypyr + terbutryn (FL), and all treatments containing fluorochloridone (alone and in tank mixes) yielded less than the check. XRM-4757 at 0.47 and .63 lb ai/A had the highest grain yield. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Formulation of herbicides

Herbicide	Formulation
terbutryn	4.0 FL, 80WP
MCPA	2.0 WS
bromoxynil	4.0 EC
dicamba	4.0 EC
XRM-4757	2.5 EC
metribuzin	75% DF
fluroxypyr	1.7 EC
fluorochloridone	2.0 EC
diuron	80 WP
2,4-D	3.8 EC
DPX-M6316	75% DF
DPX-L5300	75% DF

Broadleaf weed control in winter wheat at Moscow, Idaho.

Herbicide[1]	Rate[2]	Crop Injury	Weed control[3] POLCO	CHEAL	CAPBU	Yield
	(lb ai/A)	------------(%)			------------	(lb/A)
check	0.0	5	75	100	46	2536
XRM-4757	0.47	0	100	100	47	2669
XRM-4757	0.63	3	100	100	47	2651
XRM-4757 + bromoxynil	0.31+0.13	1	100	100	71	2242
XRM-4757 + terbutryn(FL)	0.31+0.60	10	100	100	99	2174
XRM-4757 + metribuzin	0.31+0.13	2	100	100	98	2524
XRM-4757 + fluroxypyr	0.31+0.13	0	98	100	69	2518
fluroxypyr	0.13	8	100	100	50	2294
fluroxypyr + bromoxynil	0.13+0.13	0	100	100	75	2621
fluroxypyr + terbutryn	0.13+0.60	9	100	100	50	1858
fluroxypyr + metribuzin	0.13+0.13	0	100	100	99	2046
fluroxypyr + MCPA	0.13+0.50	1	100	100	75	2478
fluroxypyr + dicamba	0.13+0.13	0	100	100	50	2023
fluroxypyr	0.19	0	100	100	73	2300
fluorochloridone	0.25	14	100	100	100	1589
fluorochloridone + metribuzin	0.25 + 0.25	21	100	100	100	1850
fluorochloridone + terbutryn(FL)	0.25 + 0.50	33	100	100	100	1522
fluorochloridone + diuron	0.25 + 0.50	18	100	100	100	1380
2,4-D	1.00	0	100	100	100	2398
DPX-6316	0.50	0	100	100	92	2052
DPXL5300	0.25	8	100	100	95	2221
DPXM6316 + DPXL5300	0.25+0.13	-	100	100	99	2257
check	0.0	-	-	-	-	2457
$LSD_{(0.05)}$		11	NS	NS	43	521

[1] All DPX compounds were applied with a nonionic surfactant (X-77 or R-11) at 0.5% v/v.

[2] Rates for DPX compounds are in oz ai/A

[3] POLCO = Polygonum convolvulus; wild buckwheat
CAPBU = Capsella bursa-pastoris; shepherdspurse
CHEAL = Chenopodium album; common lambsquarters

Broadleaf weed control with PPG-1013 in winter wheat. Mengel, M. L., D. C. Thill, and R. H. Callihan. This experiment was initiated November 19, 1984, near Potlatch, Idaho to study the effects of fall and spring herbicide applications on control of broadleaf weeds in winter wheat (var. Hill 81). Plots measured 10 by 30 feet and were arranged in a randomized complete block design with four replications. Treatments were broadcast applied either with a CO_2 pressurized backpack or bicycle sprayer, calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 2.9% organic matter, pH 5.3 and CEC 18.5 meq/100 g soil. Environmental data at application are given in Table 1. Weed control and crop injury were visually evaluated May 24 and July 15. Grain was harvested August 14 with a small plot combine.

All fall applications, except chlorsulfuron, and spring applications containing PPG-1013 severely injured the crop at the early evaluation. By the late evaluation, crop injury was still visible as stand reduction, but was not as severe due to apparent compensation by increased tillering of the wheat. Fall applied PPG-1013 at 0.04 lb ai/A, PPG-1013 + chlorsulfuron at 0.02 + 0.13 lb ai/A, and spring applied PPG-1013 at 0.01 lb ai/A all showed 21% crop injury.

Mayweed chamomile control, at the early evaluation, ranged from 92 to 100% for most treatments except PPG-1013 at 0.01 lb ai/A which was 85%. Field pennycress control ranged from good (82%) to excellent (100%) for all treatments. There were no differences among treatments in the control of common lambsquarters. At the late evaluation date, mayweed chamomile was not controlled by any fall applied herbicides except chlorsulfuron. All other treatments, except PPG-1013/PPG-1013 split application and PPG-1013 at 0.02 lb ai/A applied in the spring, controlled mayweed chamomile.

Fall applied PPG-1013 at 0.04 lb ai/A, PPG-1013 + chlorsulfuron at 0.02 lb ai/A + 0.13 oz ai/A and the split application of PPG-1013/PPG-1013 at 0.01/0.02 lb ai/A yielded less than the check. Grain yield from other treatments was not different than the check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data

Date of application	Nov 19	May 19
Type of application	post	post
Air temp / soil surface (F)	33 / 31	62 / 64
Soil temp at 2 in (F)	34	64
% relative humidity	95	52
% cloud cover	100	100
Wind (mph) & direction	1 to 3 W	0 to 4 W
Soil surface	dry	moist
Type of sprayer	backpack	bicycle
Stage of crop growth	1 to 3 lf	4 lf & tillering

Table 2. Broadleaf weed control with PPG-1013 in winter wheat

Treatment[1]	Rate[2]	Timing[3]	Crop injury E	Crop injury L	Weed control[4] ANTCO E	ANTCO L	CHEAL E	CHEAL L	THLAR E	THLAR L	Yield
	(lb ai/A)		(%)								(bu/A)
check	0.0	-	-	-	-	-	-	-	-	-	78
PPG-1013 + R-11	0.01+0.50	Fall	43	8	85	25	99	100	82	100	73
PPG-1013	0.02	Fall	43	10	92	20	97	100	82	100	75
PPG-1013	0.04	Fall	54	21	97	3	99	100	99	100	64
PPG-1013 + chlorsulfuron + R-11	0.02 + 0.13 + 0.50	Fall	54	21	99	20	100	100	98	100	61
PPG-1013 + R-11/ PPG-1013	0.01+0.50/ 0.02	Fall/ Spring	54	15	99	75	100	100	100	100	59
PPG-1013 + R-11/ bromoxynil	0.01+0.50/ 0.25	Fall/ Spring	46	19	99	100	100	100	100	100	69
chlorsulfuron + R-11	0.25+0.50	Fall	19	6	100	97	100	100	98	100	84
PPG-1013 + R-11	0.01+0.50	Spring	46	21	99	97	100	100	100	100	69
PPG-1013	0.02	Spring	25	6	93	55	100	100	100	100	73
PPG-1013	0.04	Spring	36	3	98	89	100	100	100	100	74
PPG-1013 + chlorsulfuron + R-11	0.01 + 0.13 + 0.50	Spring	40	10	98	96	100	100	100	100	70
PPG-1013 + bromoxynil	0.01+0.25	Spring	28	6	100	99	100	100	100	100	75
PPG-1013 + dicamba	0.02+0.13	Spring	23	12	100	99	100	100	100	100	68
PPG-1013 + 2,4-D	0.02+0.50	Spring	24	7	95	99	100	100	100	100	76
bromoxynil	0.25	Spring	13	0	100	96	100	100	100	100	85
bromoxynil MCPA	0.38	Spring	6	0	99	100	100	100	100	100	86
chlorsulfuron + R-11	0.25+0.50	Spring	6	5	96	100	100	100	100	100	82
$LSD_{(0.05)}$			13	9	7	35	NS	NS	12	NS	11

[1] R-11 is a nonionic surfactant added at 0.5% v/v
[2] Rates for chlorsulfuron are in oz ai/A
[3] Fall treatments applied on Nov 19, spring treatments applied May 19
[4] ANTCO = Anthemis cotula; mayweed chamomile
CHEAL = Chenopodium album; common lambsquarters
THLAR = Thlaspi arvense; field pennycress

Evaluation of herbicides for broadleaf weed control in winter wheat. Miller, S.D. A series of postemergence herbicide treatments were applied at the Torrington Research and Extension Center on April 22, 1985 to evaluate their efficacy for broadleaf weed control in winter wheat (Var. Archer). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (78% sand, 10% silt, and 12% clay) with 1.3% organic matter and a 7.7 pH. The winter wheat was in the 4 to 5-leaf stage (5 to 7 tillers), tansy mustard 4 to 6 in. and common lambsquarters 1 to 2 in. at the time of treatment.

Visual weed control and crop damage evaluations were made on May 21 and plots harvested for yield July 23, 1985. Weed infestations were moderate and uniform throughout the experimental area. SAN-567 at 1.6 lb/A and treatments containing dicamba injured wheat slightly. Wheat yields generally reflected weed control and/or crop injury. Weed control was good to excellent with SAN-567 at 0.8 to 1.6 lb/A or bromoxynil at 0.5 lb/A alone and combinations containing 0.25 to 0.37 lb/A bromoxynil or 0.01 lb/A chlorsulfuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1380 .)

Broadleaf weed control in winter wheat

Treatment[1]	Rate lb ai/A	Wheat injury %	Wheat yield bu/A	Percent control Tamu	Percent control Colq
bromoxynil (2E)	0.37	0	88	85	98
bromoxynil	0.5	0	89	93	99
bromoxynil + chlorsulfuron	0.25 + 0.01	0	86	99	99
dicamba	0.125	15	80	48	85
dicamba + 2,4-D (DMA)	0.06 + 0.37	5	87	62	87
dicamba + chlorsulfuron	0.06 + 0.01	5	87	96	98
SAN-567	0.8	3	85	99	99
SAN-567	1.2	3	80	99	99
SAN-567	1.6	10	67	99	99
SAN-567 + bromoxynil	0.8 + 0.25	3	75	99	99
2,4-D	0.5	0	79	73	85
picloram + 2,4-D	0.015 + 0.37	2	77	67	87
picloram + 2,4-D	0.023 + 0.37	2	80	77	90
picloram + bromoxynil	0.015 + 0.37	2	82	88	98
picloram + bromoxynil	0.023 + 0.37	2	77	95	99
picloram + 2,4-D + dicamba	0.015 + 0.37 + 0.125	12	75	73	87
picloram + 2,4-D + dicamba	0.023 + 0.37 + 0.125	12	78	73	93
picloram + chlorsulfuron	0.015 + 0.01	2	82	94	96
picloram + chlorsulfuron	0.023 + 0.01	3	81	95	99
clopyralid + 2,4-D (PM)	0.09 + 0.37	0	82	55	80
clopyralid + 2,4-D (PM)	0.12 + 0.5	0	85	65	87
clopyralid + 2,4-D (PM) + bromoxynil	0.09 + 0.37 + 0.25	0	88	87	92
clopyralid + 2,4-D (PM) + bromoxynil	0.12 + 0.5 + 0.25	0	88	90	98
clopyralid + 2,4-D (PM) + dicamba	0.09 + 0.37 + 0.125	10	80	63	88
clopyralid + 2,4-D (PM) + dicamba	0.12 + 0.5 + 0.125	10	83	72	96
clopyralid + 2,4-D (PM) + chlorsulfuron	0.09 + 0.37 + 0.01	1	86	95	96
clopyralid + 2,4-D (PM) + chlorsulfuron	0.12 + 0.5 + 0.01	0	83	96	97
clopyralid + 2,4-D (PM) + fluroxypyr	0.09 + 0.37 + 0.06	0	82	57	93
clopyralid + 2,4-D (PM) + fluroxypyr	0.12 + 0.5 + 0.06	0	78	72	95
Check	- - - - - - - - - - -	0	72	0	0

[1]PM = package mix; DMA = dimethylamine

Broadleaf weed control in winter wheat with sulfonyl urea herbicides. Miller, S.D. A series of sulfonyl urea herbicide treatments were applied at the Torrington Research and Extension Center on April 22, 1985 to evaluate their efficacy for broadleaf weed control in winter wheat (Var. Archer). Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 20 gpa at 40 psi. The soil was classified as a sandy loam (78% sand, 10% silt, and 12% clay) with 1.3% organic matter and a 7.7 pH. The winter wheat was in the 4 to 5-leaf stage (5 to 7 tillers), tansy mustard 4 to 6 in. and common lambsquarters 1 to 2 in. at the time of treatment.

Visual weed control and crop damage evaluations were made on May 21 and plots harvested for yield July 23, 1985. Weed infestations were moderate and uniform throughtout the experimental area. No significant wheat injury was observed with any treatment. Wheat yield in herbicide treated plots were 8 to 17 bu/A higher than in the untreated check plot. Weed control was generally good with all treatments. Tansy mustard control was 85% or better with all treatments except bromoxynil and common lambsquarters control 90% or better with all treatments except DPX-M6316 at 0.0075 lb/A. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1360 .)

Broadleaf weed contol in winter wheat with sulfonyl urea herbicides

Treatment[1]	Rate lb ai/A	Wheat injury %	Wheat yield bu/A	Percent Control Tamu	Percent Control Colq
DPX-M6316 + X-77	0.0075	2	81	87	85
DPX-M6316 + X-77	0.015	0	90	91	90
DPX-L5300 + X-77	0.0037	0	82	92	93
DPX-L5300 + X-77	0.0075	0	89	91	92
DPX-L5300 + X-77	0.015	0	83	93	95
DPX-R9674 + X-77	0.006	0	82	95	92
DPX-R9674 + X-77	0.012	0	86	95	92
DPX-M6316 + DPX-L5300 + X-77	0.0075 + 0.0075	0	82	95	95
DPX-E8698 + X-77	0.015	0	81	96	93
DPX-E8698 + X-77	0.03	0	91	96	98
DPX-R9521 + X-77	0.009	0	86	96	97
DPX-R9521 + X-77	0.013	0	89	96	93
DPX-R9521 + X-77	0.018	0	88	98	98
metsulfuron + X-77	0.0037	3	87	88	90
bromoxynil (ME4)	0.37	0	85	83	98
Check	- - - - - - - - -	0	73	0	0

[1] X-77 applied at 0.25% v/v

Evaluation of clopyralid for broadleaf weed control in winter wheat. Evans, J.O. and R.W. Gunnell. This trial was established at a dryland site in Box Elder County to study the efficacy of several herbicides for broadleaf weed control in winter wheat. The study area was infested with bur buttercup, flixweed, smallseed falseflax and blue mustard. Herbicides were applied on April 18, 1985 with a bicycle sprayer calibrated to deliver 187 l/ha. The experimental design was a randomized complete block with four replications. Environmental conditions at the time of application were as follows: air temperature = 12°C, soil temperature = 9°C at 5.1 cm, relative humidity = 65%. Dew was present on the foliage and the air was calm.

All of the treatments provided excellent control of broadleaf except clopyralid + 2,4-D (0.07 + 0.28 Kg ai/ha) and clopyralid + 2,4-D (0.105 + 0.42 Kg ai/ha). Both treatments were weak on flixweed while the former treatment gave only fair control of bur buttercup and blue mustard.
(Plant Science Department, Utah State University, Logan, UT 84322-4820)

Evaluation of clopyralid for broadleaf weed control in winter wheat

Herbicide	Rate Kg ai/ha	Crop Phytotoxicity 1/	Weed Control 2/ 3/ CCFTE	DESSO	CMAMI	COBTE
clopyralid + 2,4-D	0.07 + 0.28	0	81	63	95	82
clopyralid + 2,4-D	0.105 + 0.42	0	95	71	97	83
clopyralid + 2,4-D	0.14 + 0.56	0	97	78	97	93
clopyralid + 2,4-D + chlorsulfuron	0.07 + 0.28 + 0.0091	0	94	89	98	94
clopyralid + 2,4-D + chlorsulfuron	0.105 + 0.42 + 0.0091	0	96	95	98	97
clopyralid + 2,4-D + chlorsulfuron	0.14 + 0.56 + 0.0091	0	98	95	98	98
clopyralid + 2,4-D + metribuzin	0.07 + 0.28 + 0.14	0	97	93	98	98
clopyralid + 2,4-D + metribuzin	0.105 + 0.42 + 0.14	0	98	95	98	96
clopyralid + 2,4-D + metribuzin	0.14 + 0.56 + 0.14	0	98	94	98	98
clopyralid + 2,4-D + bromoxynil	0.07 + 0.28 + 0.175	0	98	97	98	97
clopyralid + 2,4-D + bromoxynil	0.105 + 0.42 + 0.175	0	98	98	98	98
clopyralid + 2,4-D + bromoxynil	0.14 + 0.56 + 0.175	0	98	98	98	98
check		0	0	0	0	0

1/ Crop Phytotoxicity: 0 = no effect, 100 = complete kill.

2/ Weed Control: 0 = no control, 100 = complete control.

3/ Weed Designations: CCFTE = bur buttercup, DESSO = flixweed, CMAMI = small seed falseflax, COBTE = blue mustard.

Control of blue mustard in winter wheat from applications of bromoxynil and sulphonylurea herbicides. Whitesides, R.E. and D.G. Swan. A field experiment was established in the spring of 1985 to evaluate the control of blue mustard and the influence on winter wheat yield after application of bromoxynil, chlorsulfuron, and DPX-M6316. Herbicide applications were made with a compressed air bicycle wheel plot sprayer that delivered 187 l/ha at 207 kPa pressure. On March 20, 1985 blue mustard plants were 1 to 5 cm in diameter and the winter wheat (cv. Daws) had two to four leaves. By April 9 the wheat had four to seven leaves and the blue mustard was 5 to 18 cm in diameter.

When blue mustard plants were small, the control from an application of bromoxynil or chlorsulfuron was nearly perfect. When plants were larger, control was greatly reduced. DPX-M6316 was not effective in controlling blue mustard unless it was mixed with bromoxynil. When reduced rates of bromoxynil and chlorsulfuron were combined before application, weed control was excellent. (Washington State University, Dept. of Agron. and Soils, Pullman, WA 99164-6420)

Wheat yield and blue mustard control after application of bromoxynil, chlorsulfuron and DPX-M6316

Herbicide	Rate (kg ai/ha)	Time of application	Blue mustard control (%)[a]	Wheat yields[b] kg/ha
bromoxynil	0.43	Mar 20, 1985	100	3161 a
chlorsulfuron + X-77(0.25%)	0.018	"	99	3027 ab
DPX-M6316 + X-77(0.25%)	0.036	"	49	2489 b
bromoxynil + chlorsulfuron	0.20 0.009	"	100	3161 a
chlorsulfuron + X-77(0.25%)	0.018	Apr 9, 1985	51	3027 ab
DPX-M6316 + X-77(0.25%)	0.036	"	35	2556 b
bromoxynil + chlorsulfuron	0.20 0.009	"	99	3228 a
bromoxynil + DPX-M6316	0.20 0.036	"	96	3027 ab
Untreated Control			0	1413 c

[a] 0 = no control and 100 = total control
[b] means followed by the same letter are not significantly different at the 5% level.

Evaluation of bromoxynil and sulfonylurea herbicides in winter wheat. Evans, J.O. and R.W. Gunnell. This trial was conducted at a dryland site in Box Elder County infested with flixweed (2.5 cm. diam), blue mustard (2.5 cm tall), bur buttercup (bud stage), and small seed falseflax (5 leaf stage). Winter wheat was tillered and 16 cm tall on April 18, 1985 when herbicide treatments were applied with a bicycle sprayer calibrated to deliver 187 l/ha. Environmental conditions at the time of application were: air temperature = 12°C, soil temperature = 9°C at 5.1 cm, relative humidity = 65%. Dew was present on the foliage and there was no wind. The experimental design was a randomized complete block with four replications.

Bromoxynil and combinations of bromoxynil with sulfonylurea herbicides (DPX-M6316, metsulfuron and chlorsulfuron) provided excellent weed control at all rates. Low rates of the sulfonylureas alone appear to be weak on small seed falseflax and blue mustard. (Plant Science Department, Utah State University, Logan, UT 84322-4820)

Evaluation of bromoxynil and sulfonylurea herbicides in winter wheat

Herbicide	Rate Kg ai/ha	Crop Phytotoxicity 1/	Weed Contol 2/ 3/ CCFTE	CMAMI	DESSO	COBTE
bromoxynil	0.28	0	97	98	98	98
bromoxynil	0.42	0	98	98	98	98
bromoxynil	0.56	0	98	98	98	98
DPX-M6316	0.0175	0	96	53	76	40
DPX-M6316	0.035	0	96	70	69	30
DPX-M6316 + bromoxynil	0.0175 + 0.28	0	97	98	98	97
DPX-M6316 + bromoxynil	0.0175 + 0.28	0	98	98	98	97
DPX-M6316 + bromoxynil	0.0133 + 0.28	0	97	97	97	95
metsulfuron	0.0042	0	87	60	48	65
metsulfuron + bromoxynil	0.0042 + 0.21	0	98	98	95	98
metsulfuron + bromoxynil	0.0042 + 0.28	0	98	98	97	98
metsulfuron + bromoxynil	0.0042 + 0.42	0	98	98	98	98
chlorsulfuron	0.0091	0	93	95	88	84
chlorsulfuron	0.0175	0	90	98	92	93
chlorsulfuron + bromoxynil	0.0091 + 0.21	0	98	98	97	98
chlorsulfuron + bromoxynil	0.0091 + 0.42	0	99	99	99	99
check	0	0	0	0	0	0

1/ Crop Phytotoxicity: 0 = no effect, 100 = complete kill. Rated on May 21, 1985.

2/ Weed Control: 0 = no control, 100 = complete control. Rated on May 21, 1985.

3/ Weed Designations: CCFTE = bur buttercup, CMAMI = Small seed falseflax, DESSO = flixweed, COBTE = blue mustard.

Dicamba-chlorsulfuron antagonism study. Mengel, M. L., D. C. Thill, and R. H. Callihan. The purpose of this experiment was to determine if there is antagonism between dicamba and chlorsulfuron when tank mixed for the control of mayweed chamomile in winter wheat (var. Stephens 50%, Hill 50%). Plots were established near Joel, Idaho, May 21. Each plot measured 10 by 25 ft and the experiment was arranged as a randomized complete block design with four replications. Treatments were broadcast applied with a CO_2 pressurized backpack sprayer calibrated to deliver 20 gpa at 40 psi and 3 mph. Soil type was a silt loam with 3.0% OM, pH 4.9 and CEC 17.0 meq/100 g soil. Climatological data and stage of plant growth at application are given in Table 1. Weed control and crop injury were visually evaluated June 14 and July 15. Grain was harvested in mid-August with a small plot combine.

Crop injury and grain yield were not affected by herbicide treatments. Early mayweed chamomile control was best with chlorsulfuron and chlorsulfuron + dicamba + X-77, while all treatments except dicamba controlled mayweed chamomile later in the season. Control of pineappleweed was very similar to that of mayweed chamomile (Table 2). Early control of field pennycress was poor (2 to 8%) to fair (54 to 74%) with all treatments, probably due to the age of the plants at application. By the late evaluation, field pennycress control was excellent (>93%) for all treatments except dicamba alone. Common lambsquarters control was best (>98%) with dicamba + chlorsulfuron + X-77 and chlorsulfuron + X-77. Early season control of all broadleaf weeds was less effective if a surfactant was not included with the dicamba + chlorsulfuron tank mix. However, later season control was usually equal between surfactant and no surfactant treatments.

There was no antagonism in mayweed chamomile or other broadleaf weed control when dicamba, chlorsulfuron and a surfactant were tank mixed. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Table 1. Application data

Date of application	May 21
Type of application	post
Air temp / soil surface (F)	78 / 92
Soil temp at 2-in depth (F)	68
% Relative humidity	52
% Cloud cover	2
Wind (mph) & direction	0 to 3 S
Dew present	none
Soil surface	dry, no clods
Crop stage of growth	4 lf & tillering
Weed stage of growth	
mayweed chamomile	2 in rosette
lambsquarters	2 in vegetative
pineappleweed	2 in rosette
pennycress	8 in & flowering

Table 2. Dicamba-chlorsulfuron antagonism study.

Treatment[1]	Rate[2]	Crop injury E	Crop injury L	Weed control[3] ANTCO E	ANTCO L	MATMT E	MATMT L	THLAR E	THLAR L	CHEAL E	CHEAL L	Yield[4]
	(lb ai/A)	(%)										(lb/A)
check	-	-	-	-	-	-	-	-	-	-	-	3445
dicamba	0.09	0	0	0	13	0	8	2	53	4	35	2748
dicamba	0.13	0	0	5	35	4	56	8	43	13	43	3436
chlorsulfuron + X-77	0.13+0.50	0	0	92	96	93	100	66	100	99	99	3250
chlorsulfuron + X-77	0.25+0.50	0	0	94	99	94	100	65	100	99	100	3228
dicamba + chlorsulfuron	0.09+0.13	0	0	81	98	83	100	55	93	55	90	3277
dicamba + chlorsulfuron	0.13+0.13	0	0	75	90	75	99	54	95	61	77	2892
dicamba + chlorsulfuron	0.09+0.25	0	0	81	93	83	99	66	100	60	69	2690
dicamba + chlorsulfuron	0.13+0.25	0	0	73	91	83	99	56	98	68	92	3115
dicamba + chlorsulfuron + X-77	0.09+0.13 +0.50	0	0	86	97	88	100	58	93	97	98	3135
dicamba + chlorsulfuron + X-77	0.13+0.13 +0.50	0	0	86	99	93	100	66	100	99	100	3363
dicamba + chlorsulfuron + X-77	0.09+0.25 +0.50	0	0	94	97	94	100	73	100	99	100	3569
dicamba + chlorsulfuron + X-77	0.13+0.25 +0.50	0	0	91	100	93	100	73	100	99	100	2862
$LDS_{(0.05)}$		NS	NS	10	14	8	18	20	31	14	25	NS

[1] X-77 is a nonionic surfactant added at 0.5% v/v

[2] Rates for chlorsulfuron are in oz ai/A. Chlorsulfuron is formulated as a 75% DF; dicamba as a 4.0 WS

[3] ANTCO = Anthemis cotula; mayweed chamomile
MATMT = Matricaria matricariodes; pineappleweed
THLAR = Thlaspi arvense; field pennycress
CHEAL = Chenopodium album; common lambsquarters
Early evaluation taken June 14; late evaluation taken July 15

[4] Yield data from replications 1,2 and 3. Replication 4 contained a dense, late emerging stand of windgrass (Apera interrupta) and was not harvested.

Bedstraw control in winter wheat. Brewster, B.D., A.P. Appleby, and R.L. Spinney. The performance of fluroxypyr on catchweed bedstraw in wheat was compared with that of dinoseb and bromoxynil plus chlorsulfuron. The plots were 2.5 m by 7.5 m, arranged in a randomized complete block with three replications. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha. The bedstraw was in the cotyledon to four-whorl stage on January 18, and had 8 to 10 cm runners on March 7.

Visual evaluations on April 4, 1985 indicated that fluroxypyr applied on March 7 was more effective than when applied on January 18. The later fluroxypyr treatments were also slightly better than dinoseb or bromoxynil plus chlorsulfuron. No injury was observed on the wheat. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Catchweed bedstraw control in winter wheat

Treatment	Rate (kg/ha)	Wheat injury	Catchweed control
		(%)	
January 18, 1985			
fluroxypyr	0.22	0	63
dinoseb amine	1.68	0	85
bromoxynil + chlorsulfuron	0.56 + 0.03	0	87
March 7, 1985			
fluroxypyr	0.22	0	92
fluroxypyr	0.45	0	93
Check	0	0	0

Winter wheat tolerance and mayweed chamomile control with clopyralid. Brewster, B.D., A.P. Appleby, and R.L. Spinney. Winter wheat ('Stephens') was planted separately in the same plot with mayweed chamomile so that crop tolerance and efficacy could be measured in the same plot without weed and crop interference. A 1-m wide strip of mayweed chamomile was seeded in the back of each plot. Clopyralid was applied at four growth stages. In addition, combinations with MCPA, 2,4-D, and fluroxypyr were included in some timings. Dicamba was used as a standard for the first two timings. The 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.

Mayweed chamomile control with clopyralid was most effective when applied in the first two timings. The addition of 2,4-D or MCPA improved control, but fluroxypyr had no effect. Clopyralid was better than dicamba at both timings. None of the treatments had an adverse effect on wheat yields. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Effect of clopyralid on mayweed chamomile control and winter wheat grain yield when applied at four growth stages

Treatment	Rate (kg/ha)	Mayweed chamomile control	Wheat grain yield
		(%)	(kg/ha)
February 13, 1985		cotyledon	1-3 leaf
clopyralid	0.14	87	8010
dicamba	0.14	50	7929
April 1, 1985		2-3 leaf	3-4 tillers
clopyralid	0.14	90	7506
clopyralid + 2,4-D	0.14 + 0.56	97	7479
clopyralid + fluroxypyr	0.14 + 0.45	88	7795
dicamba	0.14	10	7365
April 26, 1985		5-8 cm dia.	1-2 nodes
clopyralid	0.14	74	7553
clopyralid + 2,4-D	0.14 + 0.56	91	7802
clopyralid + MCPA	0.14 + 0.78	90	7479
July 1, 1985		full bloom	soft dough
clopyralid	0.14	36	7607
clopyralid + 2,4-D	0.14 + 0.56	60	7513
clopyralid + MCPA	0.14 + 0.78	56	7560
Check	0		7459

$LSD_{.05}$ = n.s.

<u>Tolerance of 'Stephens' winter wheat to fluroxypyr.</u> Brewster, B.D., A.P. Appleby, and R.L. Spinney. Fluroxypyr was applied at four growth stages to evaluate the tolerance of 'Stephens' winter wheat. Treatments were applied with a unicycle plot sprayer calibrated to deliver 234 l/ha. The plots were 2.5 m by 7.5 m and were arranged in a randomized complete block design with five replications.

No differences in wheat yield were obtained from the four timings. Since the trial area was essentially weed-free, there was no yield response from weed interference. (Crop Science Dept., Oregon State Univ., Corvallis, OR 97331)

Effect of fluroxypyr on winter wheat grain yield when applied at four growth stages

Treatment	Rate (kg/ha)	Wheat grain yield
		(kg/ha)
<u>February 13, 1-3 leaf</u>		
fluroxypyr	0.45	7391
<u>March 6, 3 leaf-1 tiller</u>		
fluroxypyr	0.45	7493
<u>April 1, 3-4 tillers</u>		
fluroxypyr	0.45	7332
<u>April 26, 1-2 nodes</u>	0.45	7748
Check	0	7459

$LSD_{.05}$ = n.s.

C.V. = 6.7%

The use of chlorsulfuron and metsulfuron in small-grain pulse crop production systems in Idaho. Mengel, M. L., K. G. Beck, D. C. Thill and R. H. Callihan. A longterm experiment was established in the fall of 1981 to assess the effects of several rates of chlorsulfuron and an analog, metsulfuron (DPX-T6376), on crop injury and weed control in winter wheat and spring barley (nonrotational); additionally, residual effects of the test herbicides are evaluated in lentil, pea and spring barley (rotational) systems. Three basic rotational schemes are used: a regime of alternating cereals (nonrotational) with rotational crops every other year; two consecutive years of cereals (nonrotational) followed by rotational crops; and three consecutive years of cereals (nonrotational) followed by rotational crops. Test herbicides are reapplied each year a nonrotational cereal is planted. Registered herbicides are used to control weeds in the rotational crops.

Soil samples are taken from nonrotational plots immediately prior to and after application of test herbicides to determine dissipation rates. Also, prior to planting rotational crops, soil samples are taken to determine residual amounts of test herbicides. At harvest, lentil biomass samples are collected then frozen for later analysis of test herbicide residue. Grain samples from nonrotational cereals are collected postharvest to determine germination percentages.

Alternate year rotational scheme. Lentils and peas were treated with dinoseb while rotational spring barley was treated with bromoxynil for broadleaf weed control (application data, Table 4; rates Table 1). Also, rotational spring barley was sprayed with diclofop at 0.8 lb ai/A for wild oat control. No crop injury was observed in spring barley due to previous test herbicide treatment; however, crop injury was apparent in lentils and peas with chlorsulfuron at 0.5 oz ai/A (Table 1). Broadleaf weed control in rotational crops was excellent (> 89%) with chlorsulfuron at 0.125 and 0.5 oz ai/A, and metsulfuron at 0.25 oz ai/A (Table 1), compared to the bromoxynil sprayed check. Pea biomass yield was not different among test herbicide treatments. Biomass yield of lentils from the sprayed check was less than for test herbicide treatments (Table 1). Highest seed yield for lentils was with chlorsulfuron at 0.125 oz ai/A, and while pea seed yields were best with chlorsulfuron at 0.125 and 0.25 oz ai/A and metsulfuron at 0.125 oz ai/A. The sprayed check had the lowest lentil and pea yield. There were no differences among herbicide treatments in grain yield of spring barley (Table 1).

Regime of three consecutive years in nonrotational cereals followed by rotational crops. Lentils and peas were treated with dinoseb at 6 lb ai/A, and rotational spring barley was treated with bromoxynil at 0.5 lb ai/A and diclofop at 0.8 lb ai/A for weed control (application data, Table 4). The highest rates of chlorsulfuron and metsulfuron injured the lentils early in the growing season (Table 2). No crop injury was observed in rotational spring barley or peas for any herbicide treatment. Broadleaf weed control, at early evaluation was fair (61%) to excellent (94%) for all treatments except the sprayed check. By late evaluations, weed control ranged from fair (76%) to excellent (95%) for all treatments except chlorsulfuron at 0.0625 oz ai/A and the sprayed check. Lentil and pea biomass was not different from the check at any rate of chlorsulfuron or metsulfuron.

There were no differences among treatments for lentil or pea seed yield (Table 2). The lowest grain yield in rotational spring barley was with chlorsulfuron at 0.0625 oz ai/A.

Regime of two consecutive years in nonrotational cereals followed by rotational crops, then nonrotational spring barley. Check plots were treated with bromoxynil for broadleaf weed control and diclofop for wild oat control (footnotes, Table 3). metsulfuron at 0.25 oz ai/A injured the spring barley (nonrotational). Weed control in spring barley was evaluated for individual species. All treatments controlled redroot pigweed (AMARE) and mayweed chamomile (ANTCO) except the sprayed check. Common lambsquarters (CHEAL) were controlled similarly by all treatments except metsulfuron at 0.0625 oz ai/A (Table 3). Grain yield of spring barley did not differ among treatments. To compare this report with last year's, please refer to 1985 WSWS Research Progress Reports, page 250. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Table 1. Influence of chlorsulfuron and metsulfuron on crop injury, broadleaf weed control, and seed yield of lentils and peas and on grain yield of spring barley, in an alternate year regime.

		Crop injury[2]				Broadleaf weed control in rotational cereal		Biomass[3]		Seed yield		Grain yield
		lentils		peas								
Herbicide[1]	Rate	E	L	E	L	E	L	lentil	pea	lentil	pea	sp. barley
	(oz ai/A)	(%)						(lb/A)				
chlorsulfuron[4]	0.0625	0^{c}[5]	0^{c}	0^{c}	0^{b}	31^{b}	68^{b}	2764^{a}	3121^{a}	124^{abc}	231^{ab}	3480^{a}
	0.125	15^{bc}	8^{c}	5^{b}	5^{b}	88^{a}	92^{a}	3121^{a}	3781^{a}	157^{a}	279^{a}	3544^{a}
	0.25	5^{bc}	4^{c}	0^{b}	0^{b}	86^{a}	80^{ab}	2568^{a}	3888^{a}	129^{ab}	276^{a}	3192^{a}
	0.5	35^{a}	38^{a}	15^{a}	14^{a}	95^{a}	94^{a}	2497^{a}	3336^{a}	124^{abc}	231^{ab}	3181^{a}
metsulfuron[4]	0.0625	0^{c}	1^{c}	0^{c}	0^{b}	39^{b}	50^{c}	2461^{a}	2943^{a}	107^{bc}	183^{bc}	3392^{a}
	0.125	0^{c}	0^{c}	0^{c}	0^{b}	29^{b}	66^{b}	2318^{a}	2586^{a}	107^{bc}	195^{bc}	3401^{a}
	0.25	15^{b}	20^{b}	5^{b}	6^{b}	85^{a}	89^{a}	2532^{a}	3175^{a}	138^{a}	276^{a}	3442^{a}
Check		0^{c}	0^{c}	0^{b}	0^{b}	0^{b}	43^{c}	1445^{b}	2532^{a}	83^{c}	126^{c}	3206^{a}

[1] Rotational crops treated with test herbicides 363 days (5-19-84) prior to planting; previously treated with test herbicides 4-26-82.
[2] Early evaluation for weed control and crop injury taken 6-20-85, late evaluation taken 7-5-85.
[3] Dried weight.
[4] Test herbicides applied with 0.5% v/v nonionic surfactant (X-77).
[5] Numbers followed by the same letter are not different at the 0.05 level of probability according to Duncan's New Multiple Range Test.

Table 2. Influence of chlorsulfuron and metsulfuron on crop injury, broadleaf weed control, seed yield of lentils and peas, and grain yield of spring barley.

Herbicide[1]	Rate	Crop injury[2] lentils E	Crop injury lentils L	Crop injury peas E	Crop injury peas L	Weed Control E	Weed Control L	Biomass[3] lentils	Biomass peas	Seed yield lentils	Seed yield peas	Grain yield sp. barley
	(oz ai/A)	(%)						(lb/A)				
chlorsulfuron[4]	0.0625	0^{a5}	3^{a}	0^{a}	0^{a}	61^{a}	64^{c}	2853^{a}	2461^{b}	119^{a}	174^{a}	2573^{b}
	0.125	0^{a}	1^{a}	0^{a}	0^{a}	84^{a}	89^{a}	3210^{a}	3264^{ab}	145^{a}	231^{a}	3099^{ab}
	0.25	5^{ab}	6^{a}	3^{a}	4^{a}	90^{a}	95^{a}	3103^{a}	3531^{ab}	136^{a}	243^{a}	3177^{a}
	0.5	9^{a}	8^{a}	0^{a}	3^{a}	94^{a}	91^{a}	2943^{a}	3887^{a}	138^{a}	276^{a}	3044^{ab}
metsulfuron[4]	0.125	0^{b}	0^{a}	0^{a}	0^{a}	70^{a}	76^{abc}	2604^{a}	3567^{ab}	124^{a}	236^{a}	3165^{a}
	0.25	0^{b}	0^{a}	0^{a}	0^{a}	79^{a}	83^{abc}	2711^{a}	3389^{ab}	117^{a}	233^{a}	3046^{ab}
	0.5	9^{a}	4^{a}	0^{a}	0^{a}	89^{a}	86^{ab}	3014^{a}	3317^{ab}	124^{a}	224^{a}	3461^{a}
Check		0^{b}	0^{a}	0^{a}	0^{a}	29^{b}	66^{bc}	2711^{a}	2639^{ab}	121^{a}	190^{a}	3237^{a}

1 Rotational crops previously treated with test herbicides 4-26-82 (w. wheat) 4-26-83 (w. wheat) and 6-23-84 (spring barley).
2 Early evaluation for crop injury and weed control taken 6-20-85, late evaluations taken 7-5-85.
3 Dry weight.
4 Test herbicides applied with 0.5% v/v nonionic surfactant (X-77).
5 Numbers followed by the same letter are not different at the 0.05 level of probability according to Duncan's New Multiple Range Test.

Table 3. Influence of chlorsulfuron and metsulfuron on crop injury, broadleaf weed control and grain yield of spring barley.

Herbicide[1]	Rate	Crop injury E	Crop injury L	Weed control[2] AMARE E	AMARE L	CHEAL E	CHEAL L	ANTCO E	ANTCO L	Yield
	(oz ai/A)	(%)								(lb/A)
chlorsulfuron[3]	0.0625	0^{b4}	4^{b}	86^{a}	96^{a}	84^{ab}	94^{a}	80^{bc}	99^{a}	2677^{a}
	0.125	0^{b}	4^{b}	90^{a}	97^{a}	89^{ab}	97^{a}	88^{abc}	98^{a}	2546^{a}
	0.25	0^{b}	4^{b}	91^{a}	96^{a}	90^{a}	96^{a}	91^{ab}	100^{a}	2505^{a}
	0.5	1^{b}	5^{b}	94^{a}	99^{a}	94^{a}	99^{a}	93^{a}	100^{a}	2402^{a}
metsulfuron[3]	0.0625	1^{b}	5^{b}	89^{a}	96^{a}	76^{b}	77^{b}	88^{abc}	99^{a}	2414^{a}
	0.125	3^{b}	6^{b}	89^{a}	98^{a}	86^{ab}	98^{a}	89^{abc}	100^{a}	2543^{a}
	0.25	11^{a}	11^{a}	91^{a}	98^{a}	88^{ab}	98^{a}	93^{a}	100^{a}	2436^{a}
Check[5]		0^{b}	5^{b}	64^{b}	74^{b}	89^{ab}	91^{ab}	78^{c}	90^{b}	2483^{a}

1 Non-rotational spring barley previously treated wtih test herbicides 4-26-82, 4-26-83, 6-9-85.
2 Early evaluations for weed control and crop injury taken 6-20-85, late evaluations taken 7-5-85.
3 Test herbicides applied with 0.5% v/v nonionic surfactant (X-77).
4 Numbers followed by the same letter are not different at the 0.05 level of probability according to Duncan's New Multiple Range Test.
5 Check plots in non-rotational barley treated with bromoxynil at 0.5 lb ai/A and diclofop at 0.8 lb ai/A.

Table 4. Application data for 1985.

	Rotation crops		nonrotational crops		
	sp. barley	peas & lentils	sp. barley	w. wheat	sp. barley
Date of application	6-9-85	5-9-85	6-9-85	5-19-84	6-23-84
treatment applied	bromoxynil diclofop	dinoseb	chlorsulfuron metsulfuron bromoxynil	chlorsulfuron metsulfuron bromoxynil	chlorsulfuron metsulfuron bromoxynil
Method of application	broadcast	broadcast	broadcast	broadcast	broadcast
Type of application	post	pre-emergence	post	post	post
Temp. air (F)/soil surface	62/66	64/64	71/73	64/60	60/-
Soil temp (F)@ 2-in depth	63	64	70	52	56
% relative humidity	60	--	40	60	74
% cloud cover	10	90	60	100	0
wind (mph)/direction	0-4/NW	0-3/W	0-4.5/SW	0-4W	0-4E
dew present	--	none	--	yes	yes
carrier/volume (gpa)	water/10	water/31	water/20	water/20	water/20
nozzle size (flat fan)	8001	8003	8002	8002	8002
Boom pressure (psi)/ht (in)	40/20	40/20	40/20	40/20	40/20
Sprayer type/speed (mph)	tricycle/2.3	tricycle/2.3	backpack/3	backpack/3	backpack/3

Pendimethalin for summer annual weed control in a chemical fallow program. R. L. Anderson. Atrazine at 1.1 kg/ha, when applied after wheat harvest, generally provides weed control until the following June of the fallow season in northeastern Colorado. This results in a period before wheat planting in September where weed growth is controlled by either postemergence herbicide applications or tillage. Pendimethalin controls germinating weed seeds, especially warm season annuals such as foxtails, witchgrass, stinkgrass, and redroot pigweed. This study was initiated in 1985 to determine if various rates of pendimethalin will control summer annual weeds without injuring winter wheat planted 120 days after application. Rates of 0.6, 1.1, and 1.6 kg/ha of pendimethalin were applied on May 16, 1985 to a wheat stubble field being chemically fallowed. The soil was a Platner loam soil with 1.2% organic matter and a pH of 6.8. Redroot pigweed seed was distributed over the plot area before spraying.

Soil samples of 0-1.3 cm and 1.3-3.8 cm depths were taken after two cm of rain to measure leaching. No herbicide activity was found below 1.3 cm using a wheat bioassay. Pendimethalin in the 0-1.3 cm soil depth reduced the length of primary roots of wheat 64 to 88%. The duration of effective weed control (treated area > 85% weed free) is shown in the table. Pendimethalin at 0.6 kg/ha controlled witchgrass emergence until July 3. The higher rates of pendimethalin maintained weed control until August 15. Witchgrass did not survive in these plots, but 30-50 redroot pigweed seedlings/m^2 were established by August 15. The emergence of winter wheat planted on September 18 was not affected by any rate of pendimethalin. The amount of precipitation received over the study period was similar to the 75-yr average for Akron, CO. These results indicate that pendimethalin at 1.1 and 1.6 kg/ha may fit in a chemical fallow program, controlling summer annual weeds without injuring fall-planted wheat. (USDA-ARS, Akron, CO 80720).

Period of effective weed control (treated area greater than 85% weed free) when pendimethalin was applied on May 16, 1985.

Pendimethalin	Duration of weed control		Precipitation after May 15	75-yr. Ave.
kg/ha	Days	Date	cm	(cm)
0.6	48	July 3	6.5	10.1
1.1	91	August 15	19.2	19.4
1.6	91	August 15	19.2	19.4

Evaluation of post harvest herbicide treatments for weed control in fallow. Miller, S.D. Research plots were established on August 16, 1984 at Chugwater, Wyoming to evaluate individual and/or herbicide combinations applied after harvest for weed control in fallow. 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 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (62% sand, 20% silt, and 18% clay) with 1.3% organic matter and a pH 7.7. Volunteer winter wheat was emerging to 1-leaf at the time of treatment.

Visual weed control evaluations were made on July 3, 1985. Volunteer wheat infestations were moderate and kochia, Russian thistle and cutleaf nightshade infestations light but uniform throughout the experimental area. Broadspectrum weed control was excellent with atrazine at 0.62 lb/A alone or in combination with other herbicides and good with FMC-57020 alone at 1.0 and 1.25 lb/A or at 0.75 lb/A in combination with metribuzin. FMC-57020 combinations with chlorsulfuron were weak on cutleaf nightshade. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1363.)

Weed control in fallow with post harvest treatments

Treatment[1]	Rate lb ai/A	Percent Control			
		Kocz	Ruth	Cuns	Vowh
cyanazine + X-77	2.0	70	33	20	10
cyanazine + paraquat + X-77	2.0 + 0.5	69	27	33	43
cyanazine + metribuzin + X-77	2.0 + 0.62	97	99	73	83
cyanazine + metribuzin + paraquat + X-77	2.0 + 0.62 + 0.25	95	90	76	76
cyanazine + dicamba	2.0 + 0.25	62	27	40	36
metribuzin + paraquat + X-77	0.75 + 0.5	97	99	52	84
metribuzin + dicamba	0.75 + 0.25	98	97	72	78
chlorsulfuron + X-77	0.016	100	100	0	0
chlorsulfuron + X-77	0.03	100	100	0	0
chlorsulfuron + dicamba + X-77	0.016 + 0.25	100	100	13	0
chlorsulfuron + dicamba + X-77	0.03 + 0.25	100	100	13	0
chlorsulfuron + dicamba + paraquat + X-77	0.016 + 0.25 + 0.75	100	100	10	23
chlorsulfuron + dicamba + paraquat + X-77	0.03 + 0.25 + 0.75	100	100	10	23
FMC-57020	0.5	58	63	20	93
FMC-57020	0.75	80	55	55	100
FMC-57020	1.0	87	87	82	100
FMC-57020	1.25	93	87	90	100
FMC-57020 + paraquat + X-77	0.75 + 0.25	83	60	43	93
FMC-57020 + chlorsulfuron	0.75 + 0.012	100	100	55	100
FMC-57020 + chlorsulfuron	0.75 + 0.016	100	100	75	100
FMC-57020 + chlorsulfuron	0.75 + 0.023	100	100	63	100
FMC-57020 + metribuzin	0.75 + 0.62	100	97	86	100
FMC-57020 + atrazine	0.75 + 0.62	100	100	100	100
atrazine + X-77	0.62	100	100	100	100
atrazine + paraquat + X-77	0.62 + 0.5	100	100	100	100
Check	- - - - - - - - - -	0	0	0	0

[1] X-77 applied at 0.25% v/v

Evaluation of postemergence herbicide applications for weed control in fallow. Miller, S.D. Research plots were established on May 10, 1985 at Chugwater, Wyoming to evaluate individual and/or herbicide combinations for weed control in fallow. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block design. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit deliverying 10 gpa at 40 psi. The soil was classified as a sandy loam (67% sand, 20% silt, and 13% clay) with 1.3% organic matter and a 7.8 pH. Volunteer wheat was 5 to 7 in. (3 to 7 tillers), kochia 1 to 2 in. and cutleaf nightshade emerging to 1 in. at the time of treatment.

Visual weed control evaluations were made on July 3, 1985. Weed infestations were moderate and uniform throughout the experimental area. No treatment provided excellent control of all weed species; however, broad spectrum weed control was generally good with FMC-57020 in combination with terbutryn or BAS-517 and cyanazine in combination with BAS-517. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1361 .)

Weed control in fallow with postemergence herbicide applications

Treatment[1]	Rate lb ai/A	Percent Control		
		Vowh	Cuns	Kocz
glyphosate + FMC-57020 + X-77	0.38 + 0.5	82	75	88
glyphosate + chlorsulfuron + X-77	0.38 + 0.03	40	33	100
glyphosate + dicamba + X-77	0.38 + 0.25	57	90	93
glyphosate + 2,4-D (PM)	0.38 + 0.67	59	57	80
glyphosate + 2,4-D (PM) + cyanazine	0.28 + 0.5 + 2.0	63	100	100
terbutryn (80W) + X-77	2.0	73	100	100
terbutryn (4L) + X-77	2.0	72	100	100
terbutryn (80W) + FMC-57020 + X-77	2.0 + 0.5	82	100	100
terbutryn (80W) + 2,4-D + X-77	2.0 + 0.5	63	100	100
terbutryn (4L) + 2,4-D + X-77	2.0 + 0.5	73	100	100
terbutryn (80W) + metsulfuron + X-77	2.0 + 0.015	67	100	100
terbutryn (4L) + metsulfuron + X-77	2.0 + 0.015	73	100	100
BAS-517 + FMC-57020 + oc	0.25 + 0.5	100	90	90
BAS-517 + cyanazine + oc	0.25 + 2.0	83	100	100
BAS-517 + metsulfuron + oc	0.25 + 0.015	97	40	97
BAS-517 + chlorsulfuron + oc	0.25 + 0.03	100	0	100
paraquat + FMC-57020 + X-77	0.5 + 0.5	67	93	97
paraquat + cyanazine + X-77	0.5 + 2.0	63	100	100
paraquat + chlorsulfuron + X-77	0.5 + 0.03	43	30	97
paraquat + metsulfuron + X-77	0.5 + 0.015	40	27	100
Check	- - - - - - - -	0	0	0

[1] PM = package mix; X-77 applied at 0.25% v/v, oc = At Plus 411 F at 1 qt/A

Evaluation of herbicides applied in the early spring for weed control in fallow. Miller, S.D. Research plots were established on March 25, 1985 at Chugwater, Wyoming to evaluate individual and/or herbicide combinations applied in the early spring for weed control in fallow. Plots were 9 by 30 ft in size with 3 replications arranged in a randomized complete block. The herbicide treatments were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 40 gpa at 40 psi. The soil was classified as a sandy loam (70% sand, 15% silty, and 15% clay) with 2.0% organic matter and a pH 7.6. Volunteer wheat was in the 2 to 3-leaf stage at the time of treatment.

Visual weed control evaluations were made on July 3, 1985. Volunteer wheat infestations were moderate to heavy and cutleaf nightshade and prickly lettuce infestations light. Broadspectrum weed control was excellent with FMC-57020 combinations with atrazine, cyanazine or metribuzin and good with FMC-57020 at 1.0 lb/A or metribuzin combinations with cyanazine, chlorsulfuron and metsulfuron. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1354.)

Weed control in fallow with early spring treatments

Treatment	Rate lb ai/A	Percent Control		
		Vowh	Cuns	Prlt
FMC-57020	0.5	33	60	50
FMC-57020	1.0	80	92	93
FMC-57020 + atrazine	0.5 + 0.5	93	100	100
FMC-57020 + cyanazine	0.5 + 2.0	93	98	100
FMC-57020 + chlorsulfuron	0.5 + 0.023	58	73	100
FMC-57020 + metsulfuron	0.5 + 0.015	40	76	100
FMC-57020 + metribuzin	0.5 + 0.5	94	100	100
cyanazine + metribuzin	2.0 + 0.5	87	90	100
cyanazine + chlorsulfuron	2.0 + 0.023	33	77	100
cyanazine + metsulfuron	2.0 + 0.015	50	97	100
metribuzin + chlorsulfuron	0.75 + 0.023	83	85	100
metribuzin + metsulfuron	0.75 + 0.015	87	93	100
Check	- - - - - - -	0	0	0

Evaluation of additives with glyphosate for weed control in fallow. Miller, S.D. A series of postemergence herbicide treatments were applied at Chugwater, Wyoming on May 31, 1985 to evaluate their efficacy for weed control in fallow. Plots were 9 by 30 ft in size with three replications arranged in a randomized complete block. The herbicides were applied broadcast with a CO_2 pressurized 6-nozzle knapsack unit delivering 10 gpa at 40 psi. The soil was classified as a sandy loam (67% sand, 20% silt, and 13% clay) with 1.3% organic matter and a 7.8 pH. Downy brome was 8 to 10 in., volunteer wheat 6 to 8 in. (5 to 7 tillers) and Russian thistle 2 to 3 in. at the time of treatment.

Visual weed control evaluations were made on July 2, 1985. Weed infestations were moderate and uniform throughout the experimental area. Downy brome control was not adequate with any treatment. The addition of ammonium sulfate enhanced weed control with glyphosate treatments. Dequest or LI700 were ineffective in enhancing weed control with glyphosate. (Wyoming Agric. Exp. Sta., Laramie, WY 82071 SR 1352 .)

Weed control with glyphosate treatments in fallow

Treatment[1]	Rate lb ai/A	Percent Control Ruth	Vowh	Dobr
glyphosate	0.38	8	89	54
glyphosate + LI700	0.38 + 0.5%	0	90	47
glyphosate + Dequest	0.38 + 2.0%	0	88	47
glyphosate + AMS	0.38 + 10 ppm	15	99	72
glyphosate + 2,4-D (PM)	0.38 + 0.68	91	69	55
glyphosate + 2,4-D (PM) + LI700	0.38 + 0.68 + 0.5%	92	71	55
glyphosate + 2,4-D (PM) + Dequest	0.38 + 0.68 + 2.0%	94	76	48
glyphosate + 2,4-D (PM) + AMS	0.38 + 0.68 + 10 ppm	92	98	72
glyphosate + dicamba	0.38 + 0.25	99	74	55
glyphosate + dicamba + LI700	0.38 + 0.25 + 0.5%	94	83	52
glyphosate + dicamba + Dequest	0.38 + 0.25 + 2.0%	98	86	52
glyphosate + dicamba + AMS	0.38 + 0.25 + 10 ppm	100	97	65
Check	- - - - - - - - - - - -	0	0	0

[1]PM = package mix; AMS = ammonium sulfate

<u>Weed control in chemical fallow with spring applied herbicides.</u> Lish, J. M. and D. C. Thill. Herbicides were applied to a standing wheat stubble field on April 7, 1985 near Lewiston, Idaho. Volunteer wheat (TRZAX) was in the five leaf stage but the first two leaves had winter-killed. Herbicides were applied in water at 10 gal/A with a CO_2 pressurized backpack sprayer at 42 psi. Air temperature, soil temperature at 2 in, and relative humidity were 55 F, 53 F, and 52%, respectively. Volunteer wheat, downy brome (BROTE), wild oat (AVEFA), catchweed bedstraw (GALAP), henbit (LAMAM), and prickly lettuce (LACSE) control were evaluated June 12.

Volunteer wheat control was similar with all treatments (Table) but no treatment controlled 100% of the volunteer wheat. Downy brome control was good with most herbicide combinations except dicamba or picloram applied with MON8776 (glyphosate + 2,4-D) at 0.68 lb/A and dicamba applied with glyphosate. Heavy wild oat populations in the combine chaff rows caused large variability across the study. Wild oat control tended to be best with metsulfuron combinations and glyphosate plus DPXG8311 (chlorsulfuron: metsulfuron, 5:1 w/w). Broadleaf weed control was best with MON8776 at 1 lb/A applied with either metsulfuron, DPXG8311, or picloram at 0.13 lb/A; glyphosate or SC0224 applied with metsulfuron; and glyphosate applied with DPXG8311 at 0.03 lb/A. Catchweed bedstraw control generally was less than henbit or prickly lettuce. (Agric. Exp. Stat. Moscow, Idaho 83843)

Weed control in chemical fallow with spring applied herbicides at Lewiston, Idaho.

Herbicide[2]	Rate[3]	Weed control[1]					
		TRZAX	BROTE	AVEFA	GALAP	LAMAM	LACSE
	(lb ai/A)	(%)					
MON8776 + metsulfuron	0.68+0.03	93	90	4	85	100	100
MON8776 + metsulfuron	0.68+0.06	82	99	1	68	100	100
MON8776 + metsulfuron	1.00+0.03	89	91	2	80	100	100
MON8776 + metsulfuron	1.00+0.06	96	99	1	100	100	100
MON8776 + dicamba	0.68+0.25	85	80	15	90	75	80
MON8776 + dicamba	1.00+0.25	95	88	14	69	20	46
glyphosate + dicamba	0.28+0.50	85	76	33	62	49	86
MON8776 + dicamba	0.68+0.50	78	80	10	99	22	78
MON8776 + oxyfluorfen	1.00+0.04	96	87	24	42	0	25
MON8776 + oxyfluorfen	1.00+0.06	90	88	22	50	0	22
MON8776 + oxyfluorfen	1.00+0.13	96	89	30	85	22	54
glyphosate + oxyfluorfen	0.38+0.13	99	96	23	41	18	25
MON8776 + oxyfluorfen	0.68+0.06	89	89	18	59	38	55
MON8776 + oxyfluorfen	0.68+0.13	91	91	31	18	0	46
MON8776 + DPXG8311	1.00+0.016	95	96	23	100	100	100
MON8776 + DPXG8311	1.00+0.03	94	97	13	100	100	100
glyphosate + DPXG8311	0.28+0.016	89	98	9	95	75	75
glyphosate + DPXG8311	0.28+0.03	88	97	4	96	100	100
SC0224	0.28+0.50	97	100	10	44	20	19
glyphosate	0.28+0.50	96	94	14	20	18	12
SC0224 + metsulfuron	0.28+0.06	95	93	2	89	100	100
glyphosate + metsulfuron	0.28+0.06	97	99	6	94	100	100
MON8776	0.68+0.50	89	95	9	30	46	76
MON8776	1.00+0.50	96	94	10	54	56	95
MON8776 + picloram	1.00+0.06	89	86	10	75	85	100
MON8776 + picloram	1.00+0.13	91	96	6	100	99	100
MON8776 + picloram	0.68+0.06	86	76	15	62	46	100
MON8776 + picloram	0.68+0.13	91	80	19	85	98	100
LSD 0.05		NS	16	NS	44	38	38
C.V.		9	12	113	43	45	36
Plants/ft^2		13	2	--	0.7	8	0.3

[1] Values are expressed as percent of the control except AVEFA which is expressed as percent ground cover.
[2] Nonionic surfactant at 0.5% (v/v) was added to all treatments.
[3] MON8776 and glyphosate are expressed as lb ae/A.

Imazapyr as a soil sterilant. Evans, J.O., R.W. Gunnell and R.W. Downard. Imazapyr was evaluated as a soil sterilant in comparison with soil sterilants such as chlorsulfuron, methsulfuron methyl, sulfometuron methyl, diuron and diuron+bromacil. The experiment was established in Logan, Utah on a loam soil with a pH of 7.8 and an organic matter of 3.46. The herbicides were applied on May 15, 1985 with a bicycle sprayer at 30 psi using a 8002 nozzle with water as the carrier at 20 GPA. The plots were 2.44 meters by 7.62 meters arranged in a randomized complete block design with three replications.

Control of weeds was evaluated as percent control. Weeds that were present at time of spraying were blue mustard and filaree. Blue mustard was controlled by all treatments. Good control of filaree was obtained with imazapyr at rates of 8, 12 and 16 oz/A, chlorsulfuron at 2 oz/A alone and in combination with sulfometuron methyl at 2 oz/A, metsulfuron methyl at 2 oz/A alone and in combination with sulfometuron methyl at 2 oz/A, sulfometuron methyl at 2 oz/A and in combination with diuron + bromacil at 32 oz/A, and diuron at 32 oz/A. (Plant Science Department, Utah State University, Logan, UT 84322-4820).

Soil Sterilants

Treatments	Rate (oz/A)	Percent Weed Control* Blue Mustard	Filaree
Imazapyr	8	100	100
Imazapyr	12	100	100
Imazapyr	16	100	100
chlorsulfuron	2	100	100
chlorsulfuron + sulfometuron methyl	2 + 2	100	100
metsulfuron methyl	2	100	100
metsulfuron methyl + sulfometuron methyl	2 + 2	100	100
sulfometuron methyl	2	100	99
sulfometuron methyl + diuron	2 + 32	100	67
sulfometuron methyl + diuron + bromacil	2 + 32	100	87
diuron	32	100	80
diuron + bromacil	32	97	63
check		0	0

*average of 3 replications
100% = complete control
0% = no control

PROJECT 6.

AQUATIC, DITCHBANK WEEDS AND NON-CROP WEEDS

David F. Spencer - Project Chairman

Herbicide evaluation in black cottonwood grown for biomass production. Libbey, C. R., and S. W. Howard. A field study was conducted to evaluate herbicides for use during the first year of cottonwood growth. Cottonwood hybrids, grown from cuttings and in 6 to 8 years ready for harvest, are being produced for biomass. Weed control is critical until the trees have a well developed canopy, because weed competition during the first year can reduce vigor and growth of black cottonwood.

On April 1, 1985 black cottonwood (hybrid 5) whips (25 cm length) were planted into a Puget Silt Loam soil with 1.9% organic matter and a pH of 6.1. Plots were arranged in a randomized complete block design replicated three times and each plot was 1.5 by 6.1 m. Herbicides were applied on April 6 with a tractor-mounted plot sprayer, calibrated to deliver 831 l/ha at 103 kPa. Crop height, general weed control, and crop injury were evaluated on July 26. Annual weed species evaluated were common lambsquarters, Pennsylvania smartweed, Powell amaranth, prostrate knotweed, shepherdspurse, and henbit. Common lambsquarters, henbit, and Pennsylvania smartweed populations were reduced considerably throughout the entire season, whereas Powell amaranth, prostrate knotweed, and shepherdspurse were less effectively controlled. All herbicides at 1.7 kg ai/ha controlled weeds better than 0.9 kg/ha, except prometon which effectively controlled weeds at both rates. Prometon at 1.7 kg/ha was phytotoxic to the cottonwood trees and resulted in reduced growth. Though not significantly different from the handweeded check, the majority of treatments did reduce the height of black cottonwood. (Northwestern Washington Research and Extension Center, Mount Vernon, WA 98273)

Herbicide evaluation in black cottonwood

Treatment	Rate	Height	Ratings 1/ Crop Injury	Weed Control
	(kg ai/ha)	---m---		
weedy check		0.61 AB	0.0	0.0
handweeded check		0.88 A	0.0	10.0
prometryn	0.9	0.66 AB	0.5	6.7
prometryn	1.7	0.65 AB	0.7	9.0
fluometuron	0.9	0.68 AB	1.0	7.3
fluometuron	1.7	0.66 AB	1.2	10.0
ametryn	0.9	0.69 AB	0.5	6.5
ametryn	1.7	0.96 A	0.3	7.5
terbutryn	0.9	0.67 AB	0.5	6.0
terbutryn	1.7	0.60 AB	0.7	8.7
propazine	0.9	0.64 AB	1.2	8.7
propazine	1.7	0.52 AB	5.2	9.7
prometon	0.9	0.70 AB	1.2	10.0
prometon	1.7	0.26 B	8.2	10.0
simazine	0.9	0.65 AB	1.5	7.3
simazine	1.7	0.49 AB	2.5	9.7
dipropetryn	0.9	0.75 AB	0.3	4.5
dipropetryn	1.7	0.88 AB	0.5	8.5

1/ Mean of three replications. Crop injury and weed control ratings were 0 = no injury and 10 = complete kill. Evaluated July 26, 1985.

Growth of monoecious and dioecious hydrilla: effects of temperature and light. Ames, M.D., L.W.J. Anderson and D.F. Spencer. The objective of this study was to compare the growth of hydrilla varieties under conditions of temperature and light intensity which approximate those found during sprouting and early establishment of the plants.

Tubers were surface sterilized and allowed to germinate in 1% Hoagland's solution about 1 week before an experiment was initiated. Four temperatures and 5 light intensity levels (20 combinations) were investigated in a growth chamber, using a 10 hr photoperiod. At each temperature light levels were provided by the use of various layers of neutrally absorptive shade fabrics. One tuber of each variety was placed in a 1 l Erlenmeyer flask containing 250 ml of sterilized 1% Hoagland's solution which was replaced every 2 to 3 days. Each treatment was replicated 4 times. During the 21 day experimental period, fresh weight, plant length, number of shoots and roots were determined every 3 or 4 days. Relative growth rate (RGR), relative shoot elongation rate (RSER), relative shoot production rate (RSPR), and relative root production rate (RRPR), were calculated from these data. A 3-way analysis of variance was used to analyze the data ($P < 0.05$).

The monoecious RGR increased as the temperature increased from 15 to 25 C and was greater than the dioecious RGR (see following table). The monoecious RGR did not increase further above 25 C whereas the dioecious RGR was highest at 30 C. Light intensity had a minimal effect on the RGR of both varieties probably due to the presence of the tuber and its carbohydrate reserves. For both varieties, RSER was comparable and significantly higher at 25 and 30 C than at lower temperatures. As light intensity increased, the RSER decreased. In contrast the RSPR at 15 C was greater in the monoecious than in the dioecious variety. Similar results were observed for RRPR. (USDA/ARS Aquatic Weed Control Research Laboratory, University of California, Davis, CA 95616).

Growth Analysis of Hydrilla Varieties

Temperature (C)	Variety	Light Intensity ($\mu E/m^2/s$) 12	31	46	91	216
		Relative Growth Rate (% fresh weight increase/day)				
15	M[1]	0.21[2]	0.23	0.13	0.04	0.03
	D	0	0.12	0.08	0	0
20	M	1.25	1.05	1.10	1.17	1.08
	D	0.55	0.33	0.32	0.18	0.47
25	M	3.11	2.69	3.51	3.33	2.98
	D	0.48	1.21	1.68	1.95	1.72
30	M	3.09	2.74	3.65	1.78	4.23
	D	4.05	4.64	3.69	4.36	3.66
		Relative Shoot Elongation Rate (% shoot length increase/day)				
15	M	0.70	0.80	0.50	0.40	0.30
	D	0.80	1.20	0.70	0.70	0.50
20	M	1.10	0.90	0.60	0.40	0.20
	D	1.90	1.30	1.50	0.90	0.90
25	M	5.40	4.20	4.10	3.30	2.50
	D	5.20	6.80	7.00	5.10	3.90
30	M	6.00	3.60	4.50	3.90	3.20
	D	6.20	5.30	4.50	2.80	3.20
		Relative Shoot Production Rate (% shoot production/day)				
15	M	3.60	3.40	1.80	2.20	2.20
	D	0	0	0	1.30	0
20	M	2.60	2.30	2.70	3.10	3.50
	D	3.40	3.20	2.10	0.80	4.90
25	M	8.00	7.20	9.40	10.70	12.00
	D	2.20	5.00	5.80	11.40	11.30
30	M	5.20	5.30	9.00	8.00	9.70
	D	7.10	8.80	6.80	6.40	8.30
		Relative Root Production Rate (% root production/day)				
15	M	0	1.80	1.00	2.10	2.10
	D	0	0	0	0	0
20	M	5.60	4.10	5.50	5.70	5.30
	D	4.80	6.50	3.40	2.40	8.00
25	M	9.80	7.50	11.50	13.10	12.90
	D	0.90	7.30	6.80	14.50	14.10
30	M	12.40	9.00	11.10	8.90	10.60
	D	8.70	9.30	8.30	8.80	10.20

[1] M = monoecious
D = dioecious
[2] Each value is the mean of 4 replicates.

Protein composition of tubers of the dioecious biotype of hydrilla. Ryan, Frederick J. Tubers or winterbuds are the principal organs of perennation for many aquatic macrophytes. Little is known, however, of the composition of these organs or the energetics of their production. The protein composition of tubers of the dioecious biotype of the major aquatic pest hydrilla has been investigated and the principal component has been characterized.

Groups of 10 or 20 tubers were diced with a razor blade and ground in a chilled mortar and pestle with 100 mM Tris, pH 7.5 made 10% in glycerol and containing 100 µl of 2-mercaptoethanol/5 ml. The suspension was filtered through Miracloth and centrifuged at 7700 times g for 30 min. The protein content of the supernatant was measured by the method of Lowry after precipitation with trichloroacetic acid. Tubers contained 6.54 ± 1.08 mg protein/ g fresh weight (N=6, mean + s.d.). Extraction of the pellet with a basic buffer containing 1% sodium dodecyl sulfate yielded little additional protein, leading to the conclusion that most of the protein in the tuber is buffer soluble. This needs to be confirmed by a Kjeldahl analysis for total protein.

A single species of protein comprises approximately 30% of the soluble protein, as judged by quantification of the protein pattern after non-denaturing electrophoresis. This protein has been purified by precipitation between 30 and 65% of saturation with ammonium sulfate followed by gel permeation chromatography. The protein has an apparent molecular mass of 58,000 Daltons on a calibrated Sephadex G-100 column. The protein also has the same molecular mass on polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulfate, which implies that it is a monomer in solution. It does not bind to Concanavalin A in the presence of manganese and calcium, suggesting that it may not be a glycoprotein. Attempts to purify the protein further by ion-exchange chromatography on DEAE-cellulose have not been successful, but other matrices will be utilized. Further experiments are needed to confirm that this protein is a storage protein, to determine its subcellular localization, and to monitor its presence during tuber development and germination. (USDA/ARS Aquatic Weed Control Research, University of California, Davis, CA 95616).

Photointerruption of long nights inhibits production of turions and tubers in monoecious *Hydrilla verticillata*. Anderson, L.W.J. and D.F. Spencer. Monoecious hydrilla is a short-day plant with respect to turion/tuber production: 10 to 12 h days promote and 14 to 16 h days inhibit propagule initiation. To determine the ability of short, mid-night illumination to block this short-day (long-night) effect, plants were sprouted from surface-sterilized tubers under 14 h day length (ca. 150 μE m^{-2} sec^{-1} at 25 C) in 1% Hoagland nutrient medium. After 10 days, sprouted plants were planted individually in 1 l pots containing a modified "UC Mix" (90% sand, 10% peat (v/v), 0.124% kg^{-1} KNO_3, 0.082 g kg^{-1} K_2SO_4, 1.95% kg^{-1} dolomite, 0.495 g kg^{-1} gypsum and 0.879 g kg^{-1} superphosphate). Planted pots were placed in plastic tanks, filled with well water and maintained in a greenhouse under either 16 or 10 h photoperiods. One half of the plants in 10 h photoperiod were given either 20 min or 60 min illumination from strings of small, submerged, incandescent lamps (ca. 30-40 μE m^{-2} sec^{-1}) at the middle of the 14 h dark period. After 8 weeks, plants were harvested, and partitioned into shoot, root, and propagules (tuber), which were weighed. The numbers of tubers were also determined. The results (Figures 1 and 2) showed that both interruptions significantly reduced the production of tubers per plant and per unit plant weight to levels comparable to the non-inducing 16 h photoperiod. Total plant biomass was higher under 16 h or 10 h plus interruptions than under 10 h alone.

In a related field study on natural populations of monoecious hydrilla in the Potomac River (Virginia side), overhead tungsten/quartz-halogen flood lamps (400 W) inhibited propagule formation in a manner proportional to the distance from, and intensity of light (Figure 2). With this source of light, levels below ca. 15-20 μE m^{-2} sec^{-1} at the surface were not effective in reducing propagule production. These field results are preliminary, but suggest that large-scale use of proper mid-night illumination can greatly diminish the reproductive and perennating capacity of monoecious hydrilla. (USDA/ARS Aquatic Weed Control Research, Botany Dept., University of California, Davis, CA 95616).

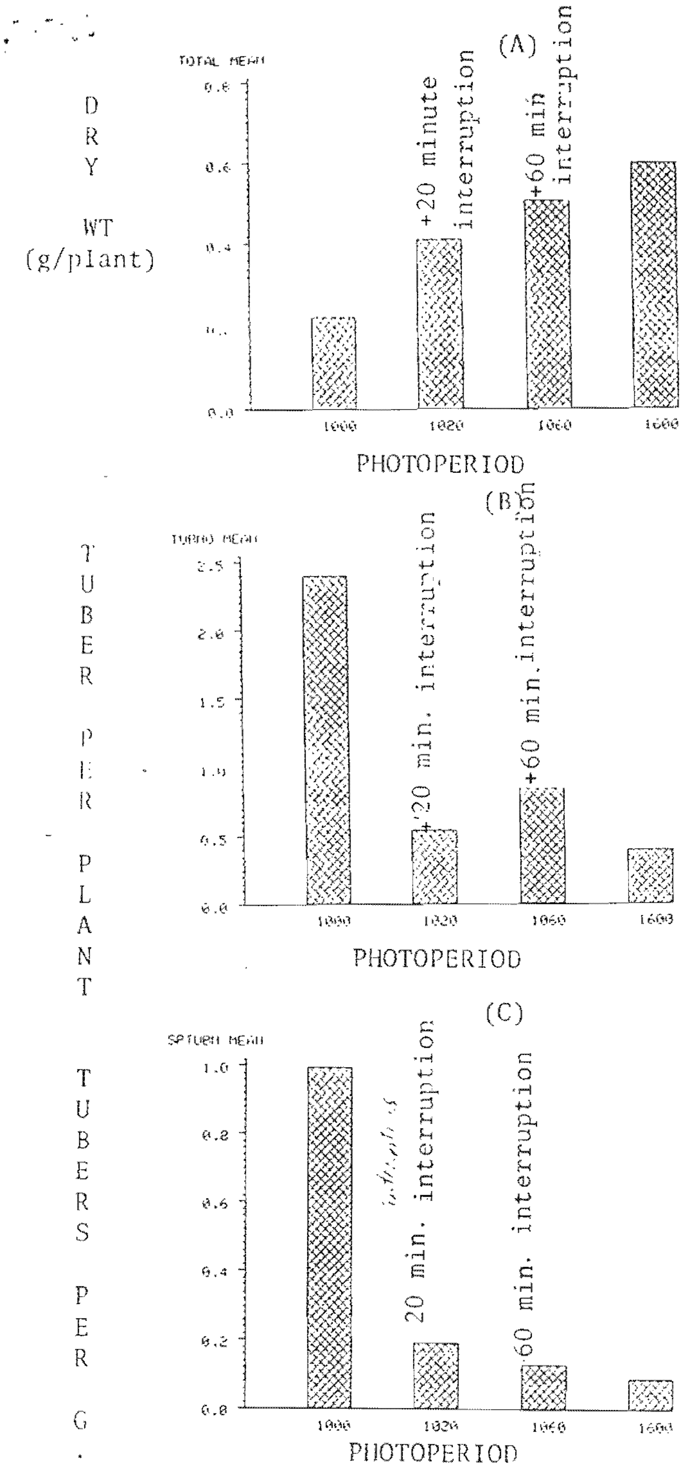
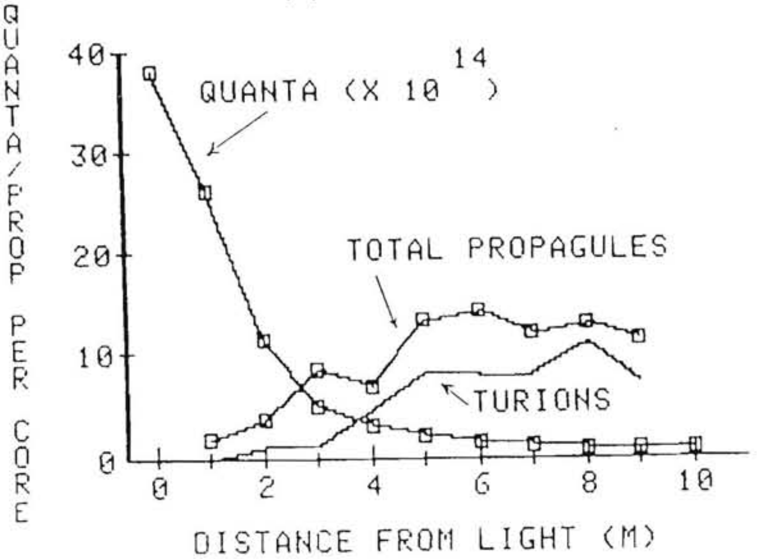


FIGURE 1.

Figure 1, A.B.C. Effect of photointerruption on propagule production in monoecious hydrilla. Data are means from two replicate treatments, 10 plants per replicate harvested 8 weeks after start of 10 h or 16 h day length in greenhouse cultures.

(A)



(B)

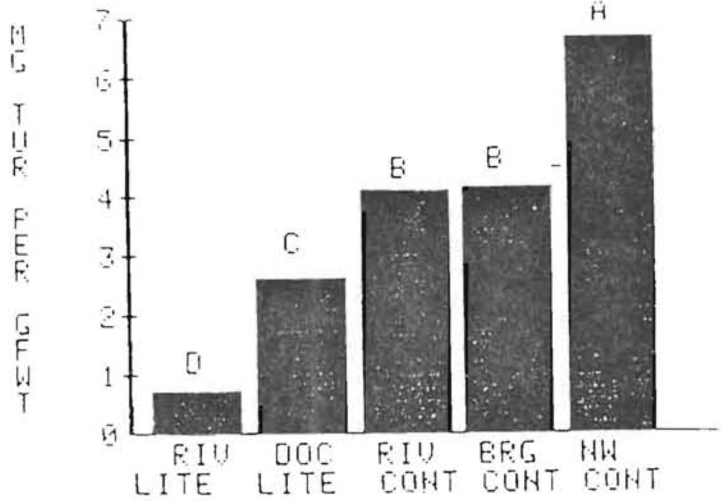


Figure 2A. Effect of 60 minute mid-night interruptions using overhead flood lamps on propagule production in natural populations of monoecious hydrilla in the Potomac River. Data are means of 3 to 4 15 cm dia. core samples taken at one meter intervals from lamp; B, effect of 60 minutes mid-night interruptions using overhead flood lamps on production of hydrilla propagules within ca. 40 m^2 test plots ("Riv", "BRG", and "MW" ore control (nonilluminated) sites. Photointerruption was begun 8/15/85; plots were sampled 10/10/85. Data are means of 15 to 17 0.25 m^2 samples in each plot.

Movement of ^{14}-C Arsenal® (imazapyr) into monoecious *Hydrilla verticillata* tubers. Anderson, L.W.J. Monoecious hydrilla was grown from surface-sterilized tubers in autoclaved UC Mix in a growth chamber at 24 C under a 14 h photoperiod (175 $\mu E\ m^{-2}\ sec^{-1}$) for 3 weeks. The daylength was then reduced to 12 h for 6 weeks to promote tuber formation. Plants forming tubers were carefully removed from culture pots and placed in an apparatus which allowed the exposure of only the shoots to 0.1 ppmw ^{14}C-imazapyr (sp. act. 29.9μCi mg^{-1} = 9.57 mCi/mM). Shoots, roots, positively geotropic shoots (bare tubers), and tubers were removed, washed, lyophilized and ^{14}C activity was determined via oxidation and liquid scintillation spectroscopy for 24 h or 96 h after exposure to ^{14}C-imazapyr. Shoots accumulated 95% of the total activity recovered in plants treated for 24 h, tubers ca. 3% (Figure 1). However, after 96 h, the proportion of activity in tubers had risen to 10%. More importantly, the specific accumulation (dpm mg^{-1}) in tubers increased nearly 200-fold between 24 h and 96 h (Figure 2). Accumulation in roots was low and did not increase between 24 h and 96 h. These preliminary results indicate that Arsenal® may be effective in reducing maturation of tubers or preventing successful development of new plants from them. (USDA/ARS Aquatic Weed Control Research Laboratory, Botany Department, University of California, Davis, CA 95616).

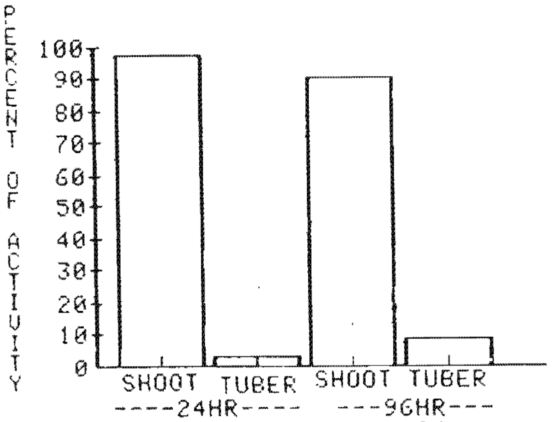


Figure 1. Distribution of ^{14}C activity in monoecious hydrilla grown under 12 h, tuber-inducing photoperiod for 6 weeks, and exposed to ^{14}C-imazapyr via shoots.

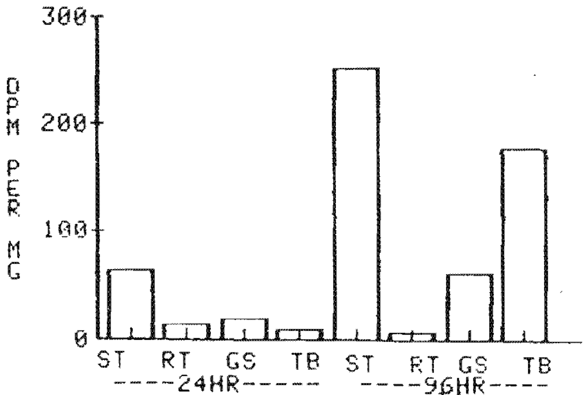


Figure 2. Accumulation of ^{14}C activity in monoecious hydrilla after exposure to ^{14}C labelled imazapyr via shoots. Plants were grown under 12 h photoperiod for 6 weeks to induce tuber formation.

Effect of calcium on the activity of three copper compounds on hydrilla. Anderson, L.W.J. and N. Dechoretz. Laboratory studies were conducted to determine whether calcium would affect the uptake of copper by hydrilla and the activity of copper on regrowth of hydrilla segments after an application of three copper based herbicides. Six apical cuttings of hydrilla (7.5 cm long) were placed in 3.8 l glass jars containing 1% Hoagland's solution modified with $CaNO_3$ to provide calcium concentrations of 0, 10, 50, 100 or 200 ppmw. The modified (Cutrine-plus©) Hoagland's solution was then treated with copper sulfate ($CuSO_4$-$5H_2O$), triethanolamine complex of copper (Cu-TEA) or ethylenediamine complex of copper (Cu-EDA) (Komeen©) at a rate of 4.0 ppm total copper. Each treatment was replicated four times. Two hours after treatment, the plants were removed from the treated solution, rinsed under flowing water 60 seconds and divided into two groups of three plants each. Plants from one group were oven-dried at 100 C for 24 hr, weighed, digested in 4N HNO_3 for 24 hr, filtered and analyzed for copper by atomic absorption spectrophotometry. Individual cuttings from the second group were planted in plastic pots containing modified UC Mix and placed in 75 l tanks containing well water. Effect of the copper on regrowth of the treated cuttings was determined four weeks after treatment when the plants were removed from the pots, oven-dried and weighed.

The presence of calcium ion at concentrations as high as 200 ppm did not affect the uptake of copper by hydrilla after applications of $CuSO_4$ or Cu-TEA (data not shown). However, the copper concentration of hydrilla after treatment with Cu-EDA was reduced when high calcium levels were present in the treated solution. Maximum reduction (50%) in copper accumulation occurred at 200 ppm calcium concentration. The inhibitory effect of both organo-copper compounds on the regrowth of hydrilla was reduced when the treated solution contained calcium at 50 ppm or higher (see following table). The activity of $CuSO_4$ was slightly reduced when calcium was present at 100 and 200 ppm. Although the activity of Cu-EDA was significantly reduced by calcium, Cu-EDA was more effective than $CuSO_4$ or Cu-TEA in reducing the regrowth of hydrilla. (USDA/ARS Aquatic Weeds Research Laboratory, Botany Department, University of California, Davis, CA 95616).

Effect of calcium on the control of regrowth from apical cuttings of hydrilla exposed to three copper compounds for 2 hours.

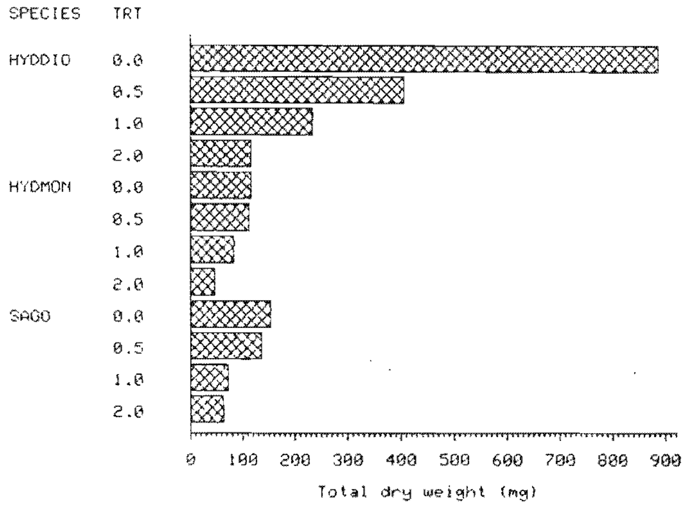
Calcium (ppmw)	% Control[1]		
	$CuSO_4$	Cu-TEA	Cu-EDA
0	38.7	61.0	87.3
10	42.6	58.3	79.9
50	41.0	40.6	52.8
100	22.8	15.0	58.3
200	22.8	24.6	41.9

[1] $\% \text{ control} = \frac{\text{DW untreated plants} - \text{DW treated plants}}{\text{DW untreated plants}} \times 100$

Herbicidal activity of PH4062 against sago pondweed and two strains of hydrilla. Spencer, D.F. and N. Dechoretz. Results from a previous experiment in which PH4062 ([N- (4 cyclohexyl-phenol)-N^1, N^1-diethylenediamine] was added to a mixed culture of monoecious hydrilla and sago pondweed suggested that monoecious hydrilla may be more susceptible to this treatment. The purpose of this study was to test this hypothesis further and to also evaluate the efficacy of PH4062 against dioecious hydrilla.

Apical segments (7.5 cm) of monoecious and dioecious hydrilla and 1 week-old germinated sago pondweed tubers were planted in 125 ml plastic pots in modified UC Mix. The plants were placed in a 1000 l tank in the greenhouse and allowed to grow for two weeks. All water used in this study was from a well and was slightly alkaline with approximately 4 meq/l total alkalinity. PH4062 treatments (0, 0.5, 1.0, 2.0 ppmw) were applied by placing 3 plants (2 for monoecious hydrilla) into a glass jar containing 20 l of water. The appropriate amount of PH4062 was added and the plants left in the treated water for 24 hours. Plants were then removed from the treatment rinsed with copious amounts of water and returned to the 1000 l tank, and allowed to grow for 28 days. Twelve replicates per treatment were used for sago pondweed and dioecious hydrilla and 8 for monoecious hydrilla. Twenty-eight days after the treatment the plants were harvested and dried at 105 C for 48 hours. We used the general linear model procedure in SAS to perform a one-way analysis of variance followed by Tukey's HSD procedure to compare treatment means. Differences were judged to be significant if the probability of obtaining the appropriate test statistic was less than 0.05.

Treatment with PH4062 significantly reduced growth of sago pondweed and monoecious and dioecious hydrilla. Sensitivity to PH4062 appears to decrease in the following order: dioecious hydrilla -> monoecious hydrilla -> sago pondweed. It thus appears that PH4062 exhibits some degree of selectivity for hydrilla when applied at 0.5 to 1.0 ppmw. (USDA/ARS Aquatic Weed Research Laboratory, Botany Department, University of California, Davis, CA 95616).



Influence of sediment composition on growth of hydrilla and American pondweed. Spencer, D. F. The purpose of this study was to test the hypothesis that high organic content of the sediment would result in decreased macrophyte growth, and to determine if nutrient content of the sediment would alter such a response. Two experiments were performed. For hydrilla, the experimental design followed a two-way analysis of variance with the treatments being the addition of peat (0, 15, 30% w/w) and the slow release fertilizer Osmacote (NPK = 18:6:12) (0, 4.92, 9.84 g/100 g) to silica sand which had been amended with 0.14 g Esmigran (trace nutrients) and 0.83 g dolomite per 100 g. Five replicates (125 ml plastic pots with three shoot apices each; shoot apices from dioecious plants originally collected from the Imperial Irrigation District, CA) were assigned to each treatment combination. The pots were placed in 20 l glass vessels filled with well water which was changed every 2 or 3 days. The 20 l glass vessels were placed on a bench in the greenhouse and the plants allowed to grow for 30 days (March 21 through April 21). The plants were harvested, dried at 70 C and weighed. The mean total dry weight for each pot was used in the subsequent statistical analysis. The experiment with American pondweed was similar except for the following changes. Plants were grown from winterbuds collected from the Richvale Irrigation District, CA. In this experiment natural sediment collected from 2 locations in the Big Main Canal (Madera Irrigation District, CA) were used in place of silica sand. Sediment from site 13 was a sandy clay loam and that from site 1 was a silty clay loam; the initial sediment organic content was approximately 5%. The sediments were amended with peat to result in final peat concentrations of 0, 10, 20, and 30% (w/w). A two-way analysis of variance was used to assess the influence of sediment type and peat concentration. For both experiments, treatment effects were judged significant if the probability of the F-statistic was less than 0.05.

Hydrilla total dry weight increased significantly in response to the addition of peat, but was unaffected by the addition of the slow release fertilizer (Fig. 1). The statistical interaction was not significant. Total dry weight for American pondweed was also significantly enhanced by the addition of peat to natural sediments (Fig. 2). Sediment type did not significantly influence total dry weight, and there was no significant interaction. These results indicate that high levels of organic matter in the sediment may not always result in decreased macrophyte growth, as has been hypothesized by others. They further suggest that the peat used in these experiments may contribute an important nutrient which may otherwise be limiting. Analysis of the peat used here indicated that the concentrations of two nutrients believed to be important in limiting aquatic macrophyte growth, iron and potassium, were 81 mg/g and 1.4 mg/g, respectively. (USDA/ARS Aquatic Weed Control Research Laboratory, Botany Department, University of California, Davis, CA 95616).

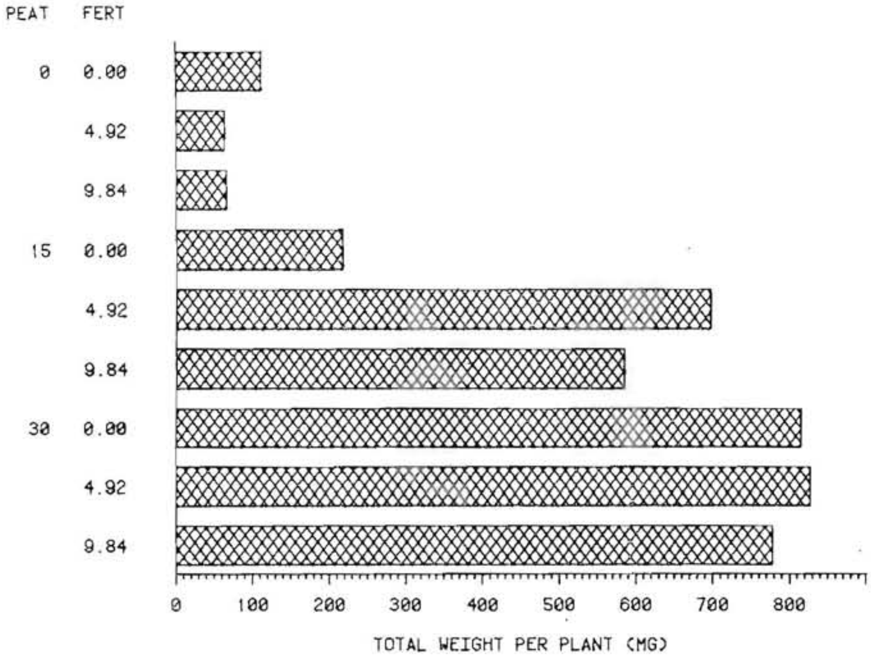


Figure 1. Mean dry weight for dioecious hydrilla grown at 3 levels of peat (%, w/w) and 3 levels of slow release fertilizer (g per 100 g).

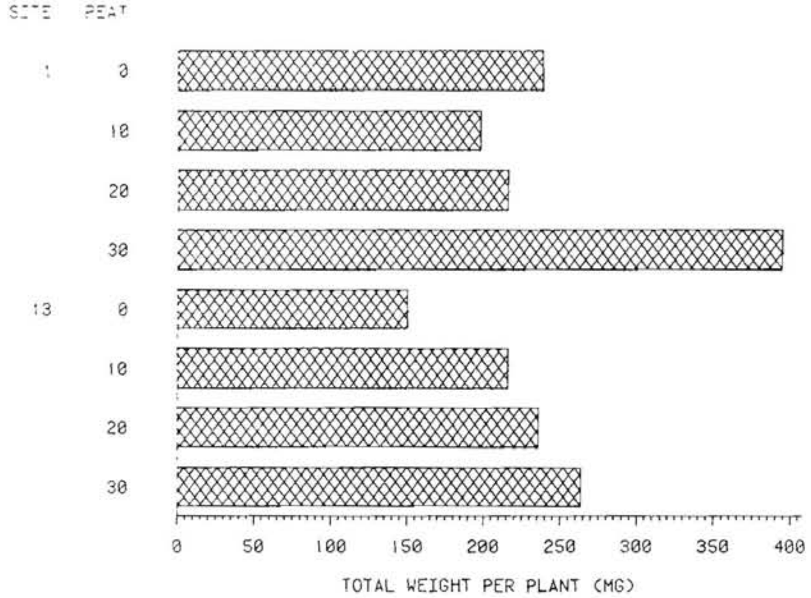


Figure 2. Mean dry weight for American pondweed grown in sediments from 2 sites in the Big Main Canal (Madera Irrigation District, CA) amended with peat (%, w/w).

Comparison of monoecious and dioecious hydrilla growth in outdoor culture. Anderson, L.W.J. and D. Gee. Monoecious and dioecious hydrilla tubers were planted in outdoor cement tanks in October 1984. The tubers were initially surface sterilized in 1% sodium hypolchlorite for 20 minutes and then rinsed thoroughly with glass distilled water. The tubers were then planted in 13cm x 13cm x 7cm white plastic trays containing either sterile soil or sand. Twenty trays, each with 10 tubers were planted for each biotype and each substrate.

Ten trays from each group were placed in 2 separate 218cm x 61cm x 70cm concrete vaults filled with tap water. Minimum/maximum temperatures were taken weekly, and trays were observed every week for germination. After the initial germination, lengths were recorded weekly for the first 5 months, and monthly for the subsequent 6 months.

Plants did not emerge until 15 weeks (January 31, 1985) after planting (Figure 1). For the next 7 weeks there were no observable increases in lengths. All plants were approximately the same length. By the 23rd week after planting (4/3/85) all plants began to show increases in length. Also, at this time, the temperature began to increase (Figure 2).

The dioecious hydrilla elongated more rapidly than the monoecious hydrilla in both sand and soil. The maximum increases in length occurred in May 1985 for both biotypes in soil when the minimum/maximum temperature was 14.7/22.5 C. However, in the sand the maximum increases didn't occur until September 1985, when the minimum/maximum temperature was 14/35 C. These results suggest that both biotypes germinate at approximately the same time, but that dioecious plants may occupy the water column to the surface more quickly than the monoecious biotype. (USDA/ARS Aquatic Weed Research Laboratory, Botany Department, University of California, Davis, CA 95616).

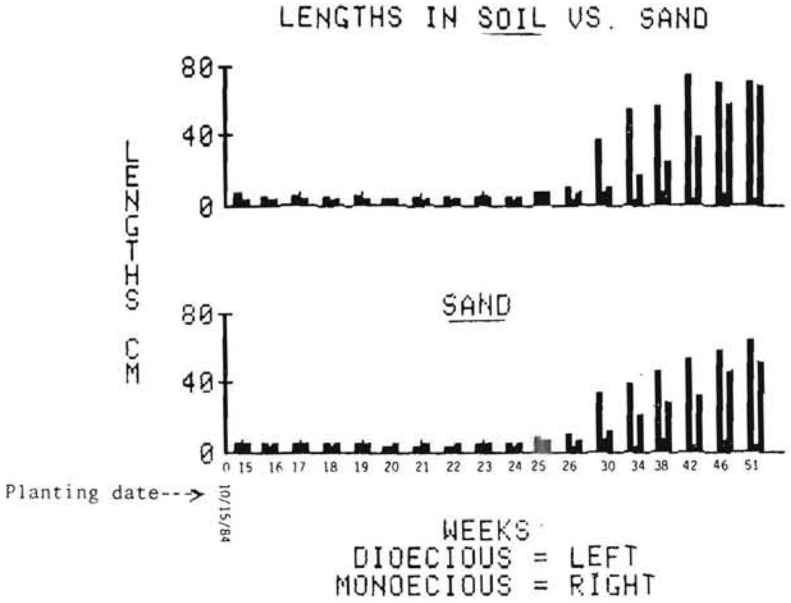


Figure 1. Elongation of hydrilla maintained in outdoor tanks. Data are means of 20 containers each planted with 10 tubers on 10/15/84.

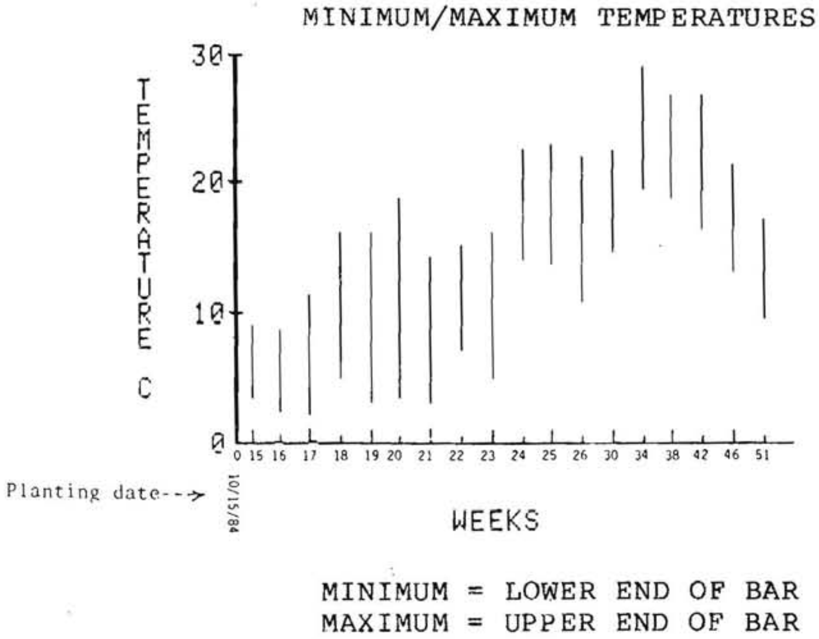


Figure 2. Weekly temperature (min/max) within outdoor culture tanks.

Growth of sago and American pondweed after short exposure to 3 herbicides applied under early postemergent conditions. Anderson, L.W.J. and N. Dechoretz. Greenhouse studies were conducted to evaluate the response of sago and American pondweed to sulfometuron methyl, cinmethylin and imazapyr when applied for short periods of time during early stages of plant growth. Vegetative propagules were planted in plastic pots containing modified UC Mix and placed in three 8 l jars containing well water. Seven days later the jars were flushed for 30 minutes and the volume of water in each jar was adjusted to 3 l. The water in the jars was then treated with one of the three herbicides at a rate of 1.0 ppmw. Each treatment was replicated three times and each replicate was comprised of 2 pots with 3 plants per pot. After the prescribed exposure period (2, 4, or 8 hr), the treated plants were transferred to a 75 l tank and flushed with water for 30 minutes and then placed in three 8 l jars containing fresh water. Four weeks after treatment the plants were removed from the pots in order to determine shoot length and dry weight of plants.

The growth of sago and American pondweed was significantly reduced after 2 hr exposure to sulfometuron methyl. Apparently, either increasing the exposure time at 1.0 ppmw or decreasing the treatment rate at the 2 h exposure will prevent the growth of sago and American pondweed.

Under these treatment conditions, imazapyr and cynmethylin were significantly less effective than sulfometuron methyl. Shoot dry weight of sago pondweed exposed to imazapyr was reduced by approximately 65%, while cinmethylin reduced the growth by 50 to 75%. Substantial reduction of sago pondweed shoot length did not occur. American pondweed was not affected by either herbicide. (USDA/ARS, Aquatic Weed Control Research Laboratory, Botany Department, University of California, Davis CA 95616).

Growth of Sago and American pondweed 4 weeks after short exposure to three herbicides.

Treatment	Exposure Period (hrs)	Plant Response: Shoot Dry Wt (mg) SP[1]	AP[1]	Shoot Length (cm) SP	AP
Control	2	213±15[2]	158±6	42±4	48±3
	4	208±10	157±11	39±2	50±2
	8	252±20	147±13	44±3	48±1
Sulfometuron methyl	2	16±4	43±4	4±1	11±1
	4	15±3	46±9	4±2	13±1
	8	19±6	48±6	4±1	10±1
Imazapyr	2	85±14	202±14	27±1	53±3
	4	77±12	232±43	31±3	39±7
	8	97±9	154±19	30±3	30±8
Cinmethylin	2	106±10	195±23	40±6	56±2
	4	100±7	213±26	37±1	53±2
	8	63±11	191±30	34±6	50±6

1 SP = Sago pondweed; AP = American pondweed
2 Value represents mean ± standard error; n = 3
3 Herbicide applied 1 week after planting. Treatment rate = 1.0 ppmw.

Response of waterhyacinth to glyphosate and SC0224. Anderson, L.W.J. and N. Dechoretz. A study was conducted to determine and compare the effects of glyphosate and SC0224, with and without surfactant, on waterhyacinth. Plants were collected from the Sacramento Delta and returned to the USDA Aquatic Weed Control Research Laboratory and placed in 75 l tanks containing UC Davis well water. The plants were treated with a hand-held aspirator which delivered a spray volume of 469 l/ha containing 0.1 or 0.5% of SC0224 or glyphosate with and without surfactants X-77 or Azone. Surfactant concentration was 0.25%. Each treatment was replicated three times and each replicate contained three plants at the time of treatment. Length of longest petiole, length of roots, number of daughter plants produced per adult plant were determined at weekly intervals for four weeks and then biweekly over the next four weeks. Eight weeks after treatment fresh and dry weights of all plants were determined.

Complete control of waterhyacinth was obtained after an application of a 0.5% solution of glyphosate or SC0224. Significant chlorosis developed in all the treated plants within one week after treatment. Under these conditions, SC0224 was not more effective than glyphosate. In addition, the surfactants used did not increase the activity of either compound.

Glyphosate and SC0224 at the 0.1% level only provided marginal control of waterhyacinth. Chlorosis did not develop over the eight week period. Although there was some reduction in the length of roots, no reduction in petiole length occurred. Total biomass per tank was reduced by 50-60%.

The effects on daughter plants were quite interesting. Number of daughter plants per adult plant and dry weight of each daughter plant were significantly less than that of the controls. Furthermore, daughter plants formed on treated plants did not develop normal elongated stolons. As a result, daughter plants appeared to develope directly from the adult plant forming a tight cluster of plants. The results did not indicate a difference between the activity of glyphosate and SC0224 on waterhyacinth. Whether changing the solution concentration or spray volume would result in differences between the two compounds is not clear at this time. (USDA/ARS Aquatic Weed Research Laboratory, Botany Department, University of California, Davis, CA 95616).

Effect of Glyphosate and SC0224 with and without surfactants 8 weeks after treatment.

Treatment	Petiole length (cm)	Root length (cm)	Dry Weight[1] per plant (g)	Number of daughter plants per adult	Dry Weight of daughter plants (g)
Control	14.8[2]	52.6	44.6	17.2	1.69
X-77 (0.25%)	15.7	55.9	50.0.	16.3	2.06
Azone (0.25%)	13.2	48.7	47.5	16.8	1.84
Glyphosate (0.1%)	17.4	40.0	17.3	5.4	0.38
Glyphosate (0.5%)	12.2	26.7	3.6	0	0
SC0224 (0.1%)	15.6	42.0	16.5	4.1	0.66
SC0224 (0.5%)	11.6	29.5	3.0	0	0
Glyphosate (0.1%)+ X-77	14.7	47.0	21.6	7.9	0.63
Glyphosate (0.5%)+ X-77	12.7	25.2	4.5	0	0
Glyphosate (0.1%)+ Azone	14.4	44.1	16.4	7.7	0.45
Glyphosate (0.5%)+ Azone	13.1	18.7	4.1	0	0
SC0224 (0.1%)+ X-77	20.2	38.3	26.9	12.1	0.59
SC0224 (0.5%)+ X-77	12.5	24.6	3.2	0	0
SC0224 (0.1%)+ Azone	16.5	38.4	19.2	6.9	0.30
SC0224 (0.5%)+ Azone	15.9	27.1	5.3	0	0

1 Dry weight of adult plant plus daughter plant
2 Value represents mean of 3 replicates with 3 plants per replicate.

Evaluation of three herbicides for the control aquatic weeds in irrigation canals. Anderson, L.W.J. and N. Dechoretz. Three herbicides were applied during the fall and spring to dewatered or partially dewatered irrigation canals to control aquatic weeds during the following irrigation season. Fluorochloridone and imazapyr were applied at 2.24 kg/ha. Herbicides were applied with a power driven backpack sprayer calibrated to deliver a spray volume of 1870 l/ha. Herbicide efficacy was evaluated by determining the dry weight of plants collected from eight 0.25 m quadrats per plot. Plant samples were collected every two months starting in June. In addition to the plant samples, vegetative propagules from twelve soil cores ($0.018m^2$ by .25 m) per plot were collected at the beginning and at the end of the irrigation season to evaluate the possible long term effects of the test compounds. If significant reduction in biomass occurred during the irrigation season as a result of the herbicide treatment, then subsequent reduction in the number of vegetative propagules produced would be realized in the core samples collected at the end of the irrigation season.

Aquatic weed control was not obtained in any plots treated with fluorochloridone. As expected, the number of vegetative propagules at the end of the irrigation season in fluorochloridone treated plots increased when compared to the number of propagules present prior to the start of irrigation.

Imazapyr applied in the fall did not reduce aquatic weed growth or propagule production during the following irrigation seasons. However, imazapyr applied in the spring did produce significant reduction (75.0%) in plant biomass for most of the irrigation season (four months). However, by the time the canals were dewatered in October, plant growth had reached an unacceptable level and as a result propagule production was such that extensive growths of aquatic weeds would develop during the following year.

In contrast to fluorochloridone and imazapyr, sulfometuron methyl applied to dewatered areas in the fall and spring provided 90 to 100 percent control throughout the irrigation season. Concomitantly, vegetative propagule production was essentially prevented in the treated area. A few propagules were obtained from soil cores collected on the edge of the treated areas. These propagules were probably produced by plants which developed in untreated areas, developed immediately adjacent to the treated plots. (USDA/ARS, Aquatic Weed Research Laboratory, Botany Department, University of California, Davis, CA 95616).

Growth of American and sago pondweed from vegetative propagules exposed to DPX-F5384 (Londax®). Anderson, L.W.J. and N. Dechoretz. Greenhouse study was conducted to determine whether or not the growth of American or sago pondweed would be reduced if propagules are exposed to DPX-F5384. Propagules were placed in water treated at 0.1, 1.0, or 10.0 ppmw for 24 hours and then removed and rinsed for 60 seconds. The propagules were then planted individually in small plastic pots containing modified UC Mix and placed in 18.5 l jars containing well water. One month after treatment, the plants were harvested to determine shoot length and shoot and root dry weight. Each treatment was replicated three times with three propagules per replicate.

On a shoot length basis, sago pondweed growth from propagules exposed to DPX-F5384 at 0.1 ppmw was significantly less than American pondweed growth. Shoot length of sago pondweed was reduced by 85% while American pondweed growth was reduced by 28%. However, on a shoot dry weight basis, the effects of DPX-F5384 at 0.1 ppmw was relatively the same. Root production of sago pondweed from propagules exposed to DPX F5384 at 1.0 and 10.0 ppmw was significantly less than root production of American pondweed from propagules exposed at the same treatment rate. (USDA/ARS Aquatic Weeds Research Laboratory, Botany Department, University of California, Davis CA 95616).

Shoot length, shoot and root dry weight of American and sago pondweed 4 weeks after 24 hour exposure of vegetative propagules to Londax, DPX F5384.

Treatment Rate (ppmw)	Shoot Length (cm)		Shoot Dry Weight (mg)		Root Dry Weight (mg)	
	American	Sago	American	Sago	American	Sago
0	45.9±2.2	52.0±2.0	106±2	155±14	56±5	41±1
0.1	33.0±10.7	7.7±1.2	58±6	71±17	35±4	25±4
1.0	4.7±0.3	4.3±0.3	22±2	50±9	30±3	8±2
10.0	2.9±0.2	3.2±0.5	21±3	65±10	24±4	5±1

Growth of aquatic plants after pre- or early postemergence application of DPX-F5384. Anderson, L.W.J. and N. Dechoretz. DPX-F5384, an herbicide developed by DuPont for use in rice, was evaluated for phytocidal activity on submersed aquatic plants. The first series of experiments involved the growth of sago pondweed and hydrilla when exposed to treated water for 28 days. The second series of tests evaluated the growth of sago pondweed, American pondweed, and hydrilla, after a 14 day exposure period.

Propagules of sago and American pondweed and apical cuttings of hydrilla (15 cm long) were planted in small plastic pots and placed in 18.5 l jars containing well water. The water was then treated with DPX-F5384 at concentrations ranging from 1 to 100 ppbw. Fourteen days after treatment one half of the pots were removed from the treated jars and placed in 18.5 l jars and flushed for 30 minutes and then left undisturbed for 14 days. The plants were removed from the pots 28 days after treatment and measured and weighed for shoot length and oven dry weight, respectively.

Shoot length of sago and American pondweed 28 days after continuous exposure to DPX-F5384 treated water was reduced by approximately 50 and 80% at the 1.0 and 2.5 ppbw treatment rate, respectively. Under these treatment conditions, hydrilla appeared more resistant to DPX-F5384. Shoot length of hydrilla was reduced by 50% at the 10 ppbw treatment level. However, new shoot and root production was significantly reduced in jars treated at 1.0 ppbw and above.

The effects of a 14 day exposure of DPX-F5384 on sago and American pondweed was very similar to the effects of a 28 day exposure. However, maximum control was obtained after a 14 day exposure at 10 ppbw as opposed to 2.5 ppbw at the 28 day exposure period. Shoot length of hydrilla exposed to 10 ppbw for 14 days and root production of plants exposed to DPX-F5384 at 1.0 ppbw for 14 days was similar to hydrilla receiving a 28 day exposure at the same concentration. At the present time, DPX-F5384 appears to be a very effective aquatic herbicide. (USDA/ARS Aquatic Weeds Research Laboratory, Botany Department, University of California, Davis CA 95616).

Evaluation of cinmethylin for the control of aquatic plants. Anderson, L.W.J. and N. Dechoretz. Greenhouse studies were conducted to determine the herbicidal activity of cinmethylin on various aquatic weeds. The herbicide was applied to water as a preemergence and late postemergence treatment and as a preemergence subsurface and surface soil treatment. Water applications were made in 18.5 l jars containing well water at rates ranging from 0.05 to 1.0 ppmw, while rates for the soil applications ranged from 0.28 to 2.24 kg/ha. All treatments were replicated three times. Herbicidal activity was based on shoot length and dry weight four weeks after treatment.

The growth of sago pondweed in jars receiving a preemergence water application at 0.5 ppmw was significantly reduced four weeks after treatment (Table 1). Moderate reduction of sago pondweed growth was obtained at the 0.25 ppmw treatment level. Cinmethylin did not control sago pondweed, American pondweed, or Eurasian watermilfoil when applied to water containing mature (4 weeks old) plants.

On a shoot length basis, surface and subsurface soil applications of cinmethylin were not effective in preventing the growth of sago pondweed (Table 2). However, plant biomass was reduced in cartons receiving a surface treatment at 0.56 kg/ha and a subsurface treatment at 0.28 kg/ha. Reduction in dry weight of sago pondweed in untreated cartons placed in jars with treated cartons indicates cinmethylin moved from the treated cartons into the surrounding water column and affected the growth of sago pondweed. American pondweed was significantly more resistant to cinmethylin than sago pondweed. (USDA/ARS, Aquatic Weed Research Laboratory, Botany Department, University of California, Davis CA 95616).

Table 1. Shoot length, shoot and root dry weight of sago pondweed four weeks after preemergence water application of cinmethylin.

Treatment Rate (ppmw)	Shoot Length (cm)	Shoot Dry Weight (mg)	Root Dry Weight (mg)
0	30.6±2.8[1]	211±39	52±11
0.05	30.4±3.7	125±23	59±3
0.10	32.4±6.1	149±25	51±11
0.25	15.8±3.0	83±16	38±5
0.50	9.3±1.0	50±5	28±3
1.0	8.8±0.5	37±10	27±2

[1] Value represents mean ± standard error; n = 3

Table 2. Shoot length and dry weight of sago pondweed 4 weeks after a surface or subsurface preemergence soil application of cinmethylin

		Plant Response			
		Shoot Length (cm)		Dry Weight (mg)	
Treatment	Rate (kg/ha)	Treated Carton	Untreated Carton	Treated Carton	Untreated Carton
Surface	0	42.1±8.5[1]	38.9±8.0	666±65	656±38
	0.28	39.3±6.3	37.4±7.6	496±88	438±72
	0.56	40.1±2.7	35.3±5.0	228±39	244±50
	1.12	38.6±1.18	41.0±4.6	208±58	267±24
	2.24	33.9±7.2	39.8±4.8	215±23	272±17
Subsurface	0	31.1±7.5	33.2±7.0	630±76	618±43
	0.28	32.6±2.0	31.9±8.5	282±36	555±59
	0.56	28.3±8.0	31.4±4.0	170±56	390±53
	1.12	19.0±7.0	34.7±4.2	127±35	356±46
	2.24	22.0±2.3	37.4±1.7	92±60	471±62

[1] Value represents mean ± standard error; n = 3.

PROJECT 7.

CHEMICAL AND PHYSIOLOGICAL STUDIES

Phil J. Petersen - Project Chairman

Potato seed vigor and yield potential following herbicide drift or carryover. Haderlie, L. C., P. J. Petersen and P.W. Leino. Potato seed quality was evaluated the year after potatoes were planted into dicamba soil residue or which had received simulated herbicide drift. Seed vigor, yield potential and vine symptoms were determined.

Thirty Russet Burbank potato seedpieces/row/plot were planted with a two-row, assist-feed planter on 8 May 84. Seedpieces were 2 to 2 1/2 oz (57 to 71 g) cut sections from ends of tubers that had been produced in 1983 from potatoes treated with foliar-simulated drift treatments or grown in soils containing dicamba residue at the Research & Extension Center at Aberdeen, Idaho. Simulated drift treatments were made to potatoes on 11 Jul 83. Dicamba was applied in a separate experiment to grain stubble 29 Sep and 5 Oct 82. Potatoes were planted the following May. Seed vigor plots were 6 ft (3.7 m) by 30 ft (9.1 m) with two border rows between plots Potatoes were hilled on 5 Jun 84. Weeds were controlled by using a broadcast application of metribuzin + pendimethalin applied on 13 Jun 84 at 0.5 + 0.75 lb ai/A. The soil was a Declo silt loam, pH 8.19, with 1.25% organic matter.

Potato seed vigor was determined by counting the number of plants to emerge on 11 dates following planting and also by counting the number of stems/row in each plot on 26 Jun 84-which was 49 days after planting. Visual evaluations of the foliar symptoms were also made on 3 Jul 84.

Potato emergence rate was severely decreased by 1983 dicamba drift at 0.05 and 0.1 lb ai/A. and the dicamba + 2,4-D drift treatments (Table 1). Even by 76 days after planting, the number of plants emerged with the 0.1 lb ai/A treatment was less than half of that for the untreated check. All dicamba drift treatments had only one-half or fewer stems than the untreated check.

Glyphosate drift at 0.05, 0.1, and 0.2 lb ai/A also markedly inhibited seedling emergence, particularly at the highest two rates. At 0.2 lb ai/A, 13 of a possible 30 plants had emerged by 76 days after planting. Glyphosate at these two highest rates also caused the potatoes to produce fewer stems per plot-row (12 and 5) than any other treatment by 49 days after planting.

Bromoxynil or 2,4-D treatments and the lowest rates of dicamba and glyphosate did not significantly inhibit potato emergence. Stem counts were reduced by some treatments (Table 1).

Dicamba soil residue did not reduce plant emergence even at 4.0 lb ai/A when applied the fall prior to planting potatoes. There was a stem reduction of some dicamba residue treatments.

Injury symptoms on potato vines corresponded with the severity of seedling emergence inhibition. Dicamba and dicamba + 2,4-D at all rates tested caused readily observable to severe foliar injury symptoms. Stunting, extreme vine stem-end epinasty, leaf deformation, development of stems devoid of leaves, and a strapping appearance of leaves were symptoms in dicamba or dicamba + 2,4-D treated plants. The dicamba and dicamba + 2,4-D treated plants showed by far the greatest amount of foliar symptoms of any treatment studied. Glyphosate produced symptoms which included slight stunting (3 to 10%) in some of the plants and slight deformation of the leaves. The leaves appeared wrinkled. Bromoxynil caused very slight to no injury as did bromoxynil + MCPA. The soil carryover treatments of dicamba at 4 lb ai/A produced a few plants with strap-like older leaves and some older leaf epinasty.

Tuber yield from the seed vigor study was significantly reduced by all drift treatments containing dicamba or glyphosate (Table 2). Yields were reduced by the higher rates of dicamba or glyphosate by 73 and 92%, respectively.

Certain Bromoxynil drift treatments and 2,4-D at 0.2 lb ai/A drift rate reduced yields a little.

Seed produced from potatoes grown in soils with dicamba residue yielded as well as untreated checks. Dicamba + 2.4-D at 0.025 + 0.1 lb ai/A and glyphosate at 0.1 lb ai/A drift treatments were the only two treatments to cause a reduction in tuber specific gravity.

In summary, foliar symptoms, delayed plant emergence and reduced tuber yields were more pronounced in 1984 than in 1983's seed vigor experiment from dicamba and glyphosate drift treatments. However both experiments were consistent in that reduction in seed vigor and yield decrease occurred for the same treatments. Dicamba soil residue consistently indicates no affect on seed vigor or yield potential. (University of Idaho Research & Extension Center, Aberdeen, ID 83210).

Table 1. Potato emergence per row on various dates following planting 30 seed per row was from 1983 potatoes receiving simulated drift from herbicides in 1983 or potatoes grown in soil with dicamba residue from previous fall. Potato stem counts are also presented. Data are means of two rows per replication and five replications.

	Herbicide	Rate lb ai/A		Potato plants per row Number of days after planting											Stem counts per row
		Drift	Soil Residue	34	36	38	41	43	45	48	55	62	69	76	
1.	Untreated	--		21.0	27.1	27.8	28.0	29.3	25.4	28.4	28.4	28.4	28.4	28.4	144.5
2.	Dicamba	.01		14.1	23.1	26.2	27.3	28.0	24.9	28.0	28.0	28.0	28.0	28.0	140.7
3.	Dicamba	.05		0.2	2.2	4.7	10.2	12.4	15.8	18.8	21.4	22.3	21.3	21.3	56.7
4.	Dicamba	.10		0.6	0.8	2.1	4.8	5.2	7.1	8.4	11.4	12.7	11.1	12.8	24.3
5.	Dicamba + 2,4-D	.025+0.1		1.5	4.9	10.3	16.8	18.8	20.4	21.6	25.4	24.8	24.8	24.8	73.9
6.	Dicamba + 2,4-D	.05+0.1		1.0	7.4	12.3	17.5	18.6	19.8	23.3	23.8	23.3	23.6	23.6	78.1
7.	2,4-D	.01		18.6	26.6	28.1	28.3	28.4	25.4	28.0	28.0	28.0	28.0	28.0	137.4
8.	2,4-D	.05		20.2	27.5	28.7	28.6	29.6	25.5	29.0	28.8	28.8	28.8	28.8	140.8
9.	2,4-D	.10		19.3	26.4	28.5	29.1	29.5	24.9	28.6	28.6	28.6	28.6	28.6	134.2
10.	2,4-D	.20		18.7	26.3	28.1	27.8	29.3	25.3	27.0	28.9	28.9	28.9	28.9	117.9
11.	Glyphosate	.01		18.7	24.7	26.7	27.5	27.9	25.5	28.0	28.0	28.0	28.0	28.0	143.0
12.	Glyphosate	.05		4.2	10.0	14.3	18.7	20.3	20.3	24.4	26.6	26.6	26.6	26.6	108.2
13.	Glyphosate	.10		0	0.2	0.7	1.3	1.9	2.5	2.8	8.1	16.3	20.3	22.3	11.9
14.	Glyphosate	.20		0.1	0.2	0.2	0.5	5.4	1.0	2.7	2.9	5.7	9.2	13.4	4.8
15.	Bromoxynil	.01		17.6	25.8	28.2	28.8	29.6	26.5	28.3	28.3	25.6	28.3	28.3	131.8
16.	Bromoxynil	.05		19.8	25.8	26.3	27.3	28.0	24.5	27.4	27.4	28.1	27.4	28.1	128.1
17.	Bromoxynil	.10		20.7	26.2	28.2	27.9	28.5	26.0	28.6	28.6	28.6	28.6	28.6	123.6
18.	Bromoxynil	.20		21.3	27.7	27.9	28.4	29.3	25.9	28.7	28.7	28.7	28.7	28.7	121.0
19.	Bromoxynil + MCPA	.01+.01		18.6	26.7	28.1	27.9	28.9	25.8	28.5	28.5	28.5	28.5	28.5	145.5
20.	Bromoxynil + MCPA	.05+.05		20.8	26.8	27.4	26.7	28.9	25.0	27.4	27.4	27.4	27.4	27.4	147.3
21.	Bromoxynil + MCPA	.01+.01		21.6	26.7	28.8	28.0	29.2	25.2	28.7	28.7	28.7	28.7	28.7	112.9
22.	Untreated		--	19.2	26.7	26.9	28.0	28.6	25.7	27.9	28.1	28.1	28.1	28.1	133.2
23.	Dicamba		0.5	20.2	25.2	27.6	27.7	28.6	25.3	27.8	27.8	27.8	27.8	27.8	127.0
24.	Dicamba		1	19.5	27.3	28.2	28.7	29.1	24.6	28.5	28.5	28.5	28.5	28.5	133.9
25.	Dicamba		2	20.4	27.3	28.3	28.9	28.9	25.8	28.4	28.4	28.4	28.4	28.4	124.6
26.	Dicamba 4EC		4	19.8	25.8	28.5	27.9	27.9	26.5	28.3	28.3	28.3	28.3	28.3	126.7
27.	Dicamba 10g		4	22.4	27.6	28.1	28.1	28.6	26.2	28.2	28.2	28.2	28.2	28.2	131.7
	LSD (0.05)			3.3	2.2	1.8	1.8	3.7	2.6	2.1	1.5	2.4	1.8	1.7	16.2
	CV														11.6

Table 2. Potato tuber yield, percentage in each grade, and specific gravity from potato seed produced in 1983 after applications of simulated herbicide drift on potatoes or potatoes grown in dicamba soil residue. Data are means of five replications.

Chemical	Formulation	Rate lb ai/A		Total Yield		% of Total					Specific Gravity
		Drift	Soil residue	cwt/A	t/ha	<4 oz	4-10 oz	>10 oz	#1	Malformed	
1. Untreated		--		275	30.9	28	35	10	45	27	1.087
2. Dicamba	4 DMA	.01		231	25.9	28	34	13	47	26	1.087
3. Dicamba		.05		144	16.1	30	45	10	54	16	1.087
4. Dicamba		.10		75	8.4	28	39	15	54	18	1.088
5. Dicamba + 2,4-D	4 Amine (2,4-D)	.025+0.1		156	17.5	31	35	15	51	18	1.084
6. Dicamba + 2,4-D		.05+0.1		190	21.3	27	36	17	53	20	1.085
7. 2,4-D		.01		256	25.3	27	32	13	45	27	1.086
8. 2,4-D		.05		250	28.1	30	30	13	43	27	1.086
9. 2,4-D		.10		246	27.6	27	35	13	48	25	1.086
10. 2,4-D		.20		239	26.8	24	34	14	48	28	1.085
11. Glyphosate	3 ae	.01		219	24.6	34	30	10	39	27	1.087
12. Glyphosate		.05		191	21.4	37	36	9	45	18	1.087
13. Glyphosate		.10		71	7.9	65	20	5	25	10	1.084
14. Glyphosate		.20		23	2.6	75	21	0	21	5	1.085
15. Bromoxynil	4 ME	.01		252	28.3	29	32	12	45	27	1.087
16. Bromoxynil		.05		240	27.0	30	32	13	45	25	1.087
17. Bromoxynil		.10		237	26.7	28	31	12	43	28	1.086
18. Bromoxynil		.20		274	30.7	23	35	15	50	27	1.085
19. Bromoxynil + MCPA	3+3	.01+.01		242	27.1	31	32	11	43	27	1.087
20. Bromoxynil + MCPA		.05+.05		253	28.4	29	29	11	41	30	1.087
21. Bromoxynil + MCPA		.01+.01		243	27.3	24	30	15	45	31	1.085
22. Untreated	-			263	29.5	25	33	14	47	28	1.086
23. Dicamba	4 EC		0.5	254	28.5	23	34	13	47	31	1.086
24. Dicamba			1	265	29.7	24	31	16	47	29	1.086
25. Dicamba			2	257	28.9	26	28	15	43	31	1.085
26. Dicamba			4	284	31.9	24	37	16	53	23	1.085
27. Dicamba	10g		4	279	31.4	27	36	13	49	24	1.086
LSD (0.05)				33	3.7	8	7	6	9	8	0.003
CV				12	12.1	20	17	37	16	25	0.23

Comparison of several desiccants and adjuvants for potato vine kill. L.C. Haderlie and P.J. Petersen. Desiccants were applied to vigorously growing potato (Russet Burbank) vines on 11 Sep 1984 near Aberdeen, Idaho. Rate of vine kill, yields, and storability were, and will be, determined. All chemicals, except sulfuric acid, were applied with a tractor-mounted 12 ft boom at 17.5 gpa at 28 psi with TJ11002 nozzles. Sulfuric acid was applied at 40 psi. Plot size was 12 (four rows) by 42.5 ft but harvest was from the center two rows by 25 ft. Each treatment was replicated four times in a randomized complete block design. The soil was a Declo silt-loam with 7.5 pH and 1.6% organic matter. Vines had senesced 1 to 2% at treatment time. Chemicals included diquat (0.25, 0.38, 0.5, 1.0, 1.5 lb ai/A), dinoseb (2.2 lb ai/A), endothal (1.0 lb/A), and sulfuric acid (80 lb sulfur equivalent/A). Adjuvants tested with diquat were X-77, LI-700, and Moract. Herbimax, LI-700, Moract, and Wetsol were tested with dinoseb. A killing frost occurred on 22 Sep 84.

Vine desiccation readings one day after treatment were: sulfuric acid 43%, dinoseb + Moract and diquat (1.5 lb ai/A) + X-77, at 25% desiccation (Table 1). Sulfuric acid resulted in consistently higher vine desiccation than any other treatment over the following 10 days. Diquat (1.5 lb/A) + X-77 gave the next highest desiccation over a 10-day period followed closely by the 1.0 lb/A rate of diquat and then dinoseb + Moract. The slowest acting chemical was endothal.

The low diquat rate (0.25 lb ai/A) had consistently lower desiccation values than all higher rates of diquat, except at the last evaluation time. However, desiccation values were not statistically (at $\alpha = 0.05$) lower than the higher rates except in comparison to the 1.0 and 1.5 lb/A rates.

Although the adjuvants added to diquat had no effect on vine desiccation, there was statistically greater desiccation with the adjuvant Moract added to dinoseb at 1, 8, and 11 days after treatment than any other dinoseb/adjuvant mixture applied.

Tuber yields and specific gravities were highest for the untreated plots although most treatments were not statistically lower (at 5% level) (Table 2). Diquat + Moract and all the dinoseb treatments, except with Wetsol, reduced yields compared to the untreated check. There is no explanation why these treatments were lower than others. The untreated check should be highest because of the extra 11 days of growing conditions. The percentage of No. 1 potatoes tended to be higher with the untreated check, but was not statistically different from any other treatment (Table 2).

Tubers from diquat rate treatments will be stored for 3 or 4 months and then evaluated for internal discoloration and storability. (University of Idaho Research & Extension Center, Aberdeen, Id 83210)

Table 1. Potato vine desiccation rate with diquat and dinoseb with various adjuvants and sulfuric acid and endothal near Aberdeen, Idaho in 1984. Data are means of four replications from visual ratings of vine kill at several times after treatment on 11 Sept 84.

	Chemical	Formulation	Rate Lb ai/A, Fl oz	Vine Desiccation Evaluation Date-September 12	15	17	19	22
				---------------	---------------	%	---------------	---------------
1.	Untreated			2	13	16	19	31
2.	Diquat + X-77	2 E	0.25 + 16 fl oz	16	29	34	43	57
3.	Diquat + X-77		0.38 + 16 fl oz	16	34	38	46	56
4.	Diquat + X-77		0.5 + 16 fl oz	21	34	42	52	62
5.	Diquat + X-77		1.0 + 16 fl oz	22	42	42	60	66
6.	Diquat + X-77		1.5 + 16 fl oz	25	44	48	63	78
7.	Diquat + LI-700		0.25 + 16 fl oz	12	29	33	41	54
8.	Diquat + Moract		0.25 + 16 fl oz	13	28	33	47	54
9.	Dinoseb	5 E	2.2	15	26	36	47	53
10.	Dinoseb + Herbimax		2.2 + 16 fl oz	19	29	35	46	61
11.	Dinoseb + LI-700		2.2 + 16 fl oz	18	29	34	45	59
12.	Dinoseb + Moract		2.2 + 16 fl oz	25	34	41	57	72
13.	Dinoseb + Wetsol		2.2 + 16 fl oz	19	31	42	48	66
14.	Sulfuric acid	93%	80 lb Sulfur	43	65	70	82	89
15.	Endothal	0.52	1.0	8	25	29	38	55
LSD (0.05)				6	6	11	11	9
CV				24	13	20	16	10

Table 2. Potato tuber yields, percentage in each grade, and specific gravity after vine desiccation treatments. Diquat and dinoseb with various adjuvants, sulfuric acid, and endothal were applied 11 Sept 84, to the potato vines. Planting was on 25 May 84 and harvest on 11 Oct 84. Data are means of four replications.

Chemical	Formulation	Rate Lb ai/A, Fl oz	Total Yield cwt/A	t/ha	% of Total <4 oz	4-10 oz	>10 oz	#1	Malformed	Specific Gravity
1. Untreated			323	36.3	31	43	12	55	15	1.086
2. Diquat + X-77	2 E	0.25 + 16 fl oz	296	33.2	31	42	9	51	18	1.079
3. Diquat + X-77		0.38 + 16 fl oz	287	32.3	30	39	11	50	20	1.082
4. Diquat + X-77		0.5 + 16 fl oz	295	33.1	30	40	10	51	19	1.078
5. Diquat + X-77		1.0 + 16 fl oz	280	31.5	31	40	8	48	21	1.081
6. Diquat + X-77		1.5 + 16 fl oz	300	33.7	34	46	7	53	12	1.082
7. Diquat + LI-700		0.25 + 16 fl oz	297	33.4	38	43	8	51	12	1.081
8. Diquat + Moract		0.25 + 16 fl oz	272	30.5	36	43	9	52	12	1.081
9. Dinoseb	5 E	2.2	272	30.6	30	44	7	51	19	Not taken
10. Dinoseb + Herbimax		2.2 + 16 fl oz	260	29.2	31	46	9	55	14	1.077
11. Dinoseb + LI-700		2.2 + 16 fl oz	263	29.6	32	44	5	49	19	Not taken
12. Dinoseb + Moract		2.2 + 16 fl oz	269	30.2	31	44	7	51	17	Not taken
13. Dinoseb + Wetsol		2.2 + 16 fl oz	296	33.2	32	45	8	54	14	Not taken
14. Sulfuric acid	93%	80 lb Sulfur	286	32.1	32	44	9	53	15	1.080
15. Endothal	0.52	1.0	290	32.6	37	41	8	49	14	1.080
LSD (0.05)			44	4.9	8	6	5	8	6	0.004
CV			11	11.0	17	10	42	11	28	0.280

Table 3. A comparison of tuber quality following 4.5 months storage. Vines were desiccated 11 Sept 85 with various chemicals and rates of diquat. Tubers were harvested 11 Oct 84 and evaluated 27 Feb 85. Data are means of four replications.

Chemical	Formulation	Rate Lb ai/A, Fl oz	Firmness[1]	% Tubers in each category: SED rating[2] 0	1	2	3	4	0+1	0+1+2	% Rot	Specific Gravity
1. Untreated			1.8	69	27	3	1	0	48	50	0.3	1.088
2. Diquat + X-77	2 E	0.25 + 16 fl oz	1.3	86	14	0	0	0	50	50	0.3	1.083
3. Diquat + X-77		0.38 + 16 fl oz	1.5	70	25	4	1	0	48	50	0.5	1.087
4. Diquat + X-77		0.5 + 16 fl oz	1.5	72	27	1	0	0	50	50	0	1.084
5. Diquat + X-77		1.0 + 16 fl oz	1.3	77	21	1	1	0	49	50	0.5	1.085
6. Diquat + X-77		1.5 + 16 fl oz	1.3	88	12	0	0	0	50	50	0.3	1.085
10. Dinoseb + Herbimax	5 E	2.2 + 16 fl oz	1.3	70	28	2	0	0	49	50	0	1.083
14. Sulfuric acid	93%	80 lb Sulfur equiv	1.0	77	19	4	0	0	48	50	0.8	1.083
15. Endothal	0.52	1.0	1.5	57	36	4	3	0	46	48	0.5	1.084
LSD (0.05)			0.8	7	6	n.s.	1*		3*	1*	n.s.	0.005
CV			38	13	37	106	194		4	2	138	

[1] Firmness rating 1-10: 1 = firm, 10 = dehydrated.
[2] SED = Stem-end discoloration: 0 = none, 4 = severe.
*The F values are low which show protection at 6 to 11% but not at the standard 5% level. Hence the LSD's shown here are questionable.

Dicamba carryover into potatoes. Haderlie, L.C. and P.J. Petersen. The influence of dicamba soil residue, from previous fall treatment, on growth and development of potato vines and tuber yield was evaluated in the field at the Aberdeen, Idaho Research & Extension Center on a Declo silt-loam, pH 7.99 with 1.4% organic matter. The 1983 crop was barley and wheat. Dicamba treatments were applied 20 Oct 83 to the grain stubble. Spray treatments were applied with a tractor-mounted sprayer calibrated to deliver 17.5 gpa (16.7 L/ha) at 28 psi (193 kPa) with TJ8002 nozzles spaced 18 inches (45.7 cm) on a 12 ft (3.7 m) boom. The granular treatment was applied on four passes with a hand-held cyclone spreader.

A randomized complete block design with four replications per treatment was used. Plots were 15 by 50 ft (4.6 by 15.2 m) with 12 by 40 ft (3.7 by 12.2 m) being treated. Russet Burbank potatoes were planted on 9, 10 May 84. Harvest was made on the center two rows by 30 ft of treated area on 21 Sep 84.

Slight dicamba symptoms were observed on some potato vines on 31 Jul 84. Untreated checks had slight leaf puckering symptoms. Foliar symptoms included: widening of the leaf midvein, leaf cupping, 'snaking' of the midvein, small leaf epinasty, leaf malformation, and a puckered leaf appearance. The most severe symptoms appeared in the 4 lb ai/A treatments.

Tuber yields and specific gravity were not reduced by any treatment. Dicamba at 4.0 lb ai/A from granular treatment tended to increase yields over the untreated check. This was not statistically significant at α = 0.05; however, it is consistent with the previous year's data. (University of Idaho Research & Extension Center, Aberdeen ID 83210).

Table 1. Influence of dicamba on growth and development of potato vines when treated in the fall prior to potato planting.

	Chemical	Formulation	Rate Lb ai/A	31 July 1984 % Potato Injury	31 July 1984 Growth Reduction
1.	Untreated			8	0
2.	Dicamba	4 EC	0.5	13	0
3.	Dicamba		1.0	10	0
4.	Dicamba		2.0	11	0
5.	Dicamba		4.0	19	0
6.	Dicamba	10 g	4.0	23	0
		LSD (0.05)		7	0
		CV		35	

Table 2. Potato tuber yields, percentage in each grade, and specific gravity when potatoes were grown in dicamba soil residue. Dicamba was applied 20 Oct 1983 and potatoes planted 9 and 10 May 1984 at Aberdeen, Idaho. Data are means of four replications.

	Chemical	Formulation	Rate Lb ai/A	Total Yield cwt/A	t/ha	% of Total <4 oz	4-10 oz	>10 oz	Malformed	Total 1's	Specific Gravity
1.	Untreated			279	31.3	29	35	13	23	48	1.082
2.	Dicamba	4 EC	0.5	305	34.2	31	40	10	19	50	1.082
3.	Dicamba		1.0	274	30.8	31	41	10	18	51	1.083
4.	Dicamba		2 0	275	30.8	30	40	9	20	49	1.084
5.	Dicamba		4.0	276	31.0	34	36	7	23	43	1.081
6.	Dicamba	10 g	4.0	319	35.8	29	36	10	25	46	1.083
		LSD (0.05)		67	7.5	10	9	5	12	7	.003
		CV		15	15.3	21	15	32	36	10	.169

Herbicide drift and fall application at herbicide rates to potatoes. Haderlie, L.C. and P.J. Petersen. Simulated drift rates of 2,4-D, dicamba, glyphosate, bromoxynil (4 ME) and bromoxynil + MCPA (3 + 3 lb/gal) were applied two times to potatoes in the field and vine symptoms, tuber yield, appearance, and quality were determined. Dicamba and glyphosate were also applied at herbicide rates in early fall just prior to vine kill to determine if a late-season treatment for perennial weeds is feasible. High drift rates were used to compare to previous years.

Russet Burbank potatoes were planted 10 and 11 May 84 in a Declo soil with an 8.19 pH and 1.25% organic matter. A randomized complete block experimental design was used with five replications per treatment. Plots were 18 by 48 ft (5.49 by 14.63 m) but the sprayed area was 12 by 40 ft (3.7 m by 12.9 m). This ensured a sufficient border to prevent contamination between plots.

All treatments were applied using a tractor-mounted, compressed-air field sprayer delivering 17.5 gpa (164 L/ha) at 28 psi (193 kPa), with TJ11002 nozzles spaced every 18 inches (45.7 cm) on a 12 ft (3.7 m) boom. A wind shield was mounted on the boom. Weed control was achieved by applying metribuzin + pendimethalin at 0.5 + 0.75 lb ai/A over the entire field on 13 June 84 and incorporating it by irrigation.

Glyphosate and bromoxynil treatments were applied 26 June 1984 while the potatoes were covering 15 to 20% of the ground. A second set of treatments included glyphosate, 2,4-D, dicamba, and bromoxynil were applied 10 July 1984 at early flower stage. Potato foliage injury and size reduction were visually rated on 5 July 1984 for early treatments and on 24 July 1984 for later treatments. Tubers were harvested on 27 Sept. 84 from the two center rows by 30 ft.

The most severe injury, by an early treatment, was caused by glyphosate at 0.2 lb ai/A (Table 1). Potatoes were stunted approximately 50%, badly wilted and flaccid; areas of chlorosis and necrosis were evident on leaf blades. Leaf blades were slightly folded around the midvein and appeared to have a more erect orientation than normal. Bromoxynil at 0.2 lb ai/A caused a 15% growth reduction, general chlorosis and considerable leaf blade necrosis. Bromoxynil + MCPA at 0.1 + 0.1 lb ai/A showed less injury than bromoxynil at 0.2 lb ai/A but more than lower rates. Foliar symptoms were: general chlorosis and areas of leaf margin necrosis. Lower rates of these compounds produced similar but less severe symptoms.

Glyphosate at 0.2 lb ai/A applied in July caused the greatest injury (66%) and plant stunting (49%) out of other July treatments (Table 1). Glyphosate at 0.2 lb ai/A caused flowers to fall or fail to develop, general leaf chlorosis and considerable leaf necrosis. Severely injured leaves had died and fallen off by this evaluation. Dicamba + 2,4-D at 0.2 + 0.1 lb ai/A reduced potato vine growth by 40% and produced strong foliar injury symptoms (57% rating). Dicamba + 2,4-D at 0.2 + 0.1 lb ai/A caused severe epinasty, flowers to fail to develop or to fall off, berries to become larger and more numerous, and plant stunting and chlorosis. Bromoxynil at 0.2 lb ai/A also produced a 57% injury rating. Bromoxynil at 0.2 lb ai/A left no flowers on the potatoes, caused light but general chlorosis, burned and killed 30 to 40% of the existing leaves, and left 10% of the remaining live leaves with marginal necrosis. Erratic epinastic growth, particularly in the young small leaves, abnormally large and numerous berries and some flower abortion were typical symptoms of 2,4-D at 0.2 lb ai/A. Potatoes were also 10% smaller than nontreated checks.

Tubers dug in early August in plots treated with dicamba and glyphosate showed the typical developmental aberrations noted on the tubers dug at normal harvest in previous studies (Table 2). Even very small tubers had creases at the bud end, elephant hide appearance, and white, grub-like appearance. Tubers from certain drift treatments had more knobs than the untreated check (Table 2). Previous year's experiments did not have a similar trend.

More vine injury was observed in 1984 than in 1982 or 1983 from dicamba and glyphosate. The reason probably was the method of nitrogen application. Nitrogen was applied entirely preplant in 1982 and 1983 giving vigorous early vine growth. In 1984, 120 lb ai/A nitrogen was applied preplant and then 15 lb ai/A nitrogen was injected five times through the sprinkler on a weekly basis beginning about 20 July 84. The nitrogen injection should have started at least 2 wk earlier for good potato growth to continue. By 1 August, plants looked nitrogen deficient. Plant growth under the latter nitrogen management scheme would not have been so vigorous in late June and July as when all nitrogen was applied preplant.

Tubers from drift treatments, after 6 wk storage, were similar in firmness and general appearance as they were at harvest. There were some differences between tuber evaluations in August and after harvest (Tables 2,3). Glyphosate-treated vines in July had an increase in the fold or crease in the tuber bud end from 26 to 63% from August to after-harvest evaluations. There was an apparent decrease in elephant hide appearance in some dicamba or dicamba + 2,4-D treatments from the August to after-harvest evaluations. Other differences occur but may not be as significant as the ones mentioned.

Dicamba treatments, with or without 2,4-D, caused a bull's-eye appearance around buds (eyes) of the tubers (Table 3). Treatments containing dicamba also had significant amount of tuber skin aberration that appears as an elephant hide, ulcer, or shallow pitting. Both dicamba and glyphosate treatments caused a fold or crease in the tuber bud end (Table 3) often 3 to 10 cm deep. Glyphosate and dicamba also caused a tuber skin appearance that was somewhat similar to typical white-grub injury (Table 3). Glyphosate caused more of this type of tuber malformation than did dicamba. A greater proportion of the tubers had white grub-like injury from the glyphosate in July than from the same treatment 3 wk earlier (Table 3). Glyphosate also increased tuber jelly-end, which is normally caused by inadequate watering, or other stress factors.

Tuber yield was reduced significantly by early treatments of glyphosate and the high rate of bromoxynil (Table 4). Later treatments with high drift rates decreased yields more than similar earlier treatments. This yield difference could be partially due to the additional nitrogen-stress that plants were under in July. Lowest yields came from glyphosate at 0.2 b ae/A and dicamba + 2,4-D, all of which were less than 100 cwt/A (Table 4). Dicamba at 0.05 lb ai/A had a slightly higher yield than the 0.1 lb ai/A rate although the 0.05 lb ai/A rate tended to cause more tuber aberrations. There was a large difference in yields between glyphosate at 0.1 and 0.2 lb ae/A (Table 4).

Most drift treatments reduced the percentage of number one potatoes (Table 4). Bromoxynil treatments had little or no reduction in number one potatoes. Most of the decrease in number ones is accounted for in smaller tubers and malformed tubers.

Specific gravity was only reduced by dicamba at 0.1 lb ai/A, dicamba + 2,4-D, and a late glyphosate treatment at 0.2 lb ae/A (Table 4).

Early (August) tuber evaluation demonstrated that tuber malformations occur very early in the development of the tuber (Table 2). These aberrations apparently do not inhibit tuber growth but enlarge as the tuber does.

When dicamba or glyphosate, at herbicide rates, are applied as vines are dying late in the season, there was a yield reduction from glyphosate (Table 4). Glyphosate was applied at 1.5 and 3.0 lb ae/A, but yield data is shown for only the lower rate. At tuber evaluation time (15,16 Nov 84), 80% of the tubers were rotten from the high glyphosate and 30% from the lower rate. Some plots (replications) had little or no rot at the lower rate. Apparently, where vine desiccation was nearly complete at the time of treatment (13 Sept 84), there was no glyphosate moving into the tuber. Where green vines still existed at spraying time, glyphosate translocated into the tubers and rot occurred during storage from these high (herbicidal) rates. No rot was observed at harvest. In previous years, no rot has occurred from storing tubers from simulated drift rates of glyphosate to growing potato vines. Tuber integrity during storage must be rate-dependent and possibly timing of treatment dependent. (University of Idaho Research & Extension Center, Aberdeen ID 83210).

Table 1. Potato foliage injury evaluated 5 and 24 July 1984 following simulated herbicide drift applied to potatoes on 26 June (treatments 8-13) and 10 July 1984 (treatments 2-7, 14-19).

	Chemical	Formulation	Rate Lb ai/A	Date Applied	Evaluation Date (1984) 5 July Potato Injury	24 July Potato Injury	24 July Size Reduction
					%		
1.	Untreated					0	0
2.	Glyphosate (Roundup)	3 ae	0.1	June 26	25		
3.	Glyphosate		0.2	June 26	72		
4.	Bromoxynil	4 ME	0.1	June 26	31		
5.	Bromoxynil		0.2	June 26	47		
6.	Bromoxynil + MCPA	3 + 3	0.05 + 0.05	June 26	11		
7.	Bromoxynil + MCPA		0.1 + 0.1	June 26	26		
8.	Dicamba (Banvel)	4 DMA	0.01	July 10		12	1
9.	Dicamba		0.05	July 10		16	6
10.	Dicamba		0.1	July 10		21	8
11.	Dicamba + 2,4-D	4 (Amine-2,4-D)	0.025 + 0.1	July 10		18	6
12.	Dicamba + 2,4-D		0.05 + 0.1	July 10		17	7
13.	Dicamba + 2,4-D		0.2 + 0.1	July 10		57	40
14.	2,4-D		0.2	July 10		19	6
15.	Glyphosate		0.2	July 10		66	49
16.	Bromoxynil		0.2	July 10		57	15
17.	Bromoxynil + MCPA		0.1 + 0.1	July 10		22	5
		LSD 0.05			9	8	7
		CV			20	26	47

Table 2. Quality and appearance evaluation of tubers harvested from treated plots on 20-21 August 1984. Five plants were harvested/plot and tubers were combined. Evaluations were made on 22 August 1984. See evaluation summary for explanation of rating categories.

	Chemical	Formulation	Rate Lb ai/A	Date Applied	Bud-End Crease	Relative Proportion of Tubers: Elephant Hide	White Grub	Knob-biness	Bull's Eye	# Rotting Small Tubers
					----------	----------	%	----------	----------	
1.	Untreated				4	0	1	12	0	0.6
2.	Glyphosate (Roundup)	3 ae	0.1	June 26	5	0	2	46	0	1.4
3.	Glyphosate		0.2	June 26	6	0	15	45	2	0.2
4.	Bromoxynil	4 ME	0.1	June 26	1	0	0	25	0	0.0
5.	Bromoxynil		0.2	June 26	2	1	1	14	0	0.4
6.	Bromoxynil + MCPA	3 + 3	0.05 + 0.05	June 26	0	2	0	19	0	0.0
7.	Bromoxynil + MCPA		0.1 + 0.1	June 26	2	0	0	4	0	0.2
8.	Dicamba (Banvel)	4 DMA	0.01	July 10	10	0	0	4	11	0.4
9.	Dicamba		0.05	July 10	24	37	12	27	11	0.0
10.	Dicamba		0.1	July 10	23	31	8	34	4	0.2
11.	Dicamba + 2,4-D	4 Amine (2,4-D)	0.025 + 0.1	July 10	23	27	5	27	17	0.2
12.	Dicamba + 2,4-D		0.05 + 0.1	July 10	30	43	20	43	9	0.4
13.	Dicamba + 2,4-D		0.2 + 0.1	July 10	17	65	17	51	2	0.6
14.	2,4-D		0.2	July 10	6	0	2	25	3	0.2
15.	Glyphosate		0.2	July 10	26	15	43	59	0	0.8
16.	Bromoxynil		0.2	July 10	2	1	2	11	0	0.0
17.	Bromoxynil + MCPA		0.1 + 0.1	July 10	4	0	1	12	0	0.2
		$LSD_{0.05}$			12	16	14	22	6	0.9

Table 3. Tuber quality, appearance and storability evaluation of tubers after harvest and storage. Evaluations were made on 15 and 16 November 1984.

	Chemical	Formulation	Rate Lb ai/A	Date Applied	Relative proportion of tubers: Bud-End Crease	Bull's Eye	Elephant Hide	Jelly End	White Grub
					%				
1.	Untreated				3	0	0	3	4
2.	Glyphosate (Roundup)	3 ae	0.1	June 26	1	0	0	28	0
3.	Glyphosate		0.2	June 26	6	0	0	22	9
4.	Bromoxynil	4 ME	0.1	June 26	2	0	0	1	1
5.	Bromoxynil		0.2	June 26	1	0	0	1	2
6.	Bromoxynil + MCPA	3 + 3	0.05+0.05	June 26	1	0	0	6	0
7.	Bromoxynil + MCPA		0.1 + 0.1	June 26	1	0	0	2	1
8.	Dicamba (Banvel)	4 DMA	0.01	July 10	16	24	0	3	3
9.	Dicamba		0.05	July 10	27	24	25	2	3
10.	Dicamba		0.1	July 10	24	19	30	1	11
11.	Dicamba+2,4-D	4 Amine (2,4-D)	0.025+0.1	July 10	14	34	11	4	8
12.	Dicamba + 2,4-D		0.05 + 0.1	July 10	28	23	33	1	12
13.	Dicamba + 2,4-D		0.2 + 0.1	July 10	15	25	35	1	12
14.	2,4-D		0.2	July 10	1	0	0	11	0
15.	Glyphosate		0.2	July 10	63	0	8	2	39
16.	Bromoxynil		0.2	July 10	2	0	0	0	3
17.	Bromoxynil + MCPA		0.1 + 0.1	July 10	2	0	0	3	1
18.	Dicamba		1.0	Sept 13	1	0	1	2	0
19.	Glyphosate		1.5	Sept 13	3	0	47	5	5
		LSD 0.05			11	7	17	8	9
		CV			80	75	139	132	124

Table 4. Potato tuber yield, percentage in each grade, and specific gravity following simulated herbicide drift and a fall application at herbicide rates to potatoes. Planting was on 10-11 May 1984. Data are means of four replications.

	Chemical	Formulation	Rate Lb ai/A	Date Applied	cwt/A	t/ha	% Total					Specific Gravity
							<4 oz	4-10 oz	>10 oz	#1	Malformed	
1.	Untreated				234	26.3	19	43	13	56	25	1.081
2.	Glyphosate (Roundup)	3 ae	0.1	June 26	177	19.8	26	23	9	32	42	1.080
3.	Glyphosate		0.2	June 26	70	7.8	39	14	4	18	43	1.079
4.	Bromoxynil	4 ME	0.1	June 26	209	23.4	25	39	15	54	21	1.083
5.	Bromoxynil		0.2	June 26	179	20.1	34	33	8	41	25	1.083
6.	Bromoxynil + MCPA	3 + 3	0.05 + 0.05	June 26	203	22.8	21	38	15	53	26	1.083
7.	Bromoxynil + MCPA		0.1 + 0.1	June 26	209	23.5	26	42	10	53	21	1.081
8.	Dicamba (Banvel)	4 DMA	0.01	July 10	255	28.6	23	30	8	39	38	1.080
9.	Dicamba		0.05	July 10	199	22.4	42	24	3	27	31	1.079
10.	Dicamba		0.1	July 10	155	17.4	60	12	0	13	27	1.077
11.	Dicamba+2,4-D	4 Amine (2,4-D)	0.025+0.1	July 10	178	20.0	49	25	0	25	25	1.080
12.	Dicamba + 2,4-D		0.05 + 0.1	July 10	182	20.4	55	18	2	19	26	1.078
13.	Dicamba + 2,4-D		0.2 + 0.1	July 10	80	8.9	83	5	0	5	12	1.064
14.	2,4-D		0.2	July 10	191	21.5	42	19	2	20	37	1.081
15.	Glyphosate		0.2	July 10	56	6.3	78	5	0	5	17	1.071
16.	Bromoxynil		0.2	July 10	158	17.7	36	33	10	43	21	1.083
17.	Bromoxynil + MCPA		0.1 + 0.1	July 10	186	20.9	33	36	10	46	21	1.081
18.	Dicamba		1.0	Sept 13	227	25.5	22	39	18	57	21	1.080
19.	Glyphosate		1.5	Sept 13	154	17.3	30	33	11	44	26	Not taken
		$LSD_{0.05}$			46	5.2	10	9	6	12	9	.004
		CV			21	21.1	20	27	70	27	28	.293

Herbicidal effects of 5-aminolevulinic acid on hydrilla. Ryan, Frederick J. In recent years, 5-aminolevulinic acid (ALA) has been proposed as an herbicide for terrestrial plants. It promotes the synthesis of tetrapyrroles within the plant cell. These compounds, in turn, can bring about photolysis of the cell components. This report describes the interaction of ALA with the dioecious biotype of the aquatic plant hydrilla.

In the first experiment, 6-node explants were allowed to root in sand in small pots for two weeks before treatment. Three plants were used per 3 liter jar and each treatment was performed in triplicate. Plants were treated at different concentrations of ALA, after the pHs of the stock ALA and the culture solution were adjusted to approximately 7, for 24 hours or for 1 week. After another three weeks, the dry weights of the plants were recorded. It can be seen in Table 1 that a one-day exposure had little effect on plant growth at all the concentrations used. A 7-day exposure, however, resulted in the destruction of the plants exposed to 750 µM ALA, and in severe growth retardation in those exposed to 500 µM. In another experiment when 2-node explants were exposed to 1 mM ALA for 24 hr or for 1 week, the plants completely decomposed after another week. Thus, the smaller plants were much more sensitive to the ALA. In an experiment with rooted 6-node explants, exposure to ALA for 24 hours in the concentration range of 128 µM to 1.66 mM resulted in no change in dry weight (data not shown). The stress of the herbicide treatment was seen in the fact that the plants at the highest concentration of chemical developed a small number of tubers while those at lesser concentrations did not. An experiment was done to determine the rate of uptake of ALA by measuring its rate of disappearance from solution. In this experiment, a recently cut 6-node explant was put in a flask with 300 ml of 1% Hoagland's solution which was 400 µM in ALA. Samples were taken at approximately 10 hour intervals and ALA was determined spectrophotometrically after its reaction with p-dimethylaminobenzaldehyde (Ehrlich's reagent). As controls, one plant sample was treated with no ALA and one ALA treatment contained no plant material. An additional flask contained only one-half the weight of plant material used in the other flasks.The results are shown in Table 2. There was no time dependent change in ALA, so the values are shown as means. It appears that the rate of ALA uptake by the plants is quite low and, at least for hydrilla, several days' exposure is required to accumulate enough ALA that it can manifest its phytotoxicity. Methods of increasing the rate of ALA uptake may improve its efficacy as an herbicide in the aquatic system. (USDA/ARS Aquatic Weed Control Research, University of California, Davis CA 95616.)

Table 1. Duration of exposure determines the sensitivity of hydrilla to ALA.

	Time of Treatment	
	1 day	7 days
(ALA)μM	Dry weight, mg per flask	Dry weight, mg per flask
0	0.035 ± 0.020	0.037 ± 0.010
25	0.057 ± 0.006	0.045 ± 0.009
125	0.032 ± 0.009	0.040 ± 0.027
250	0.027 ± 0.004	0.022 ± 0.005
500	0.033 ± 0.016	0.013 ± 0.019
750	0.034 ± 0.029	no plant material remaining.

Three 6 node explants were used per 500 ml flask and three flasks per treatment level. The dry weights are the means and standard deviations, evaluated three weeks after the beginning of the treatment.

Table 2. Uptake of ALA by hydrilla plants.

Fresh weight of plant material	(moles ALA/ml) x 10^7
A. 1.38 g	3.73 ± 0.24
B. 0.00	4.21 ± 0.47
C. 1.15 (no ALA)	0.00
D. 0.76	3.73 ± 0.10

Plant material was treated in 300 ml of 1% Hoagland's solution with ALA. The initial pH was 7.5. One ml samples were taken at 10, 20, 30, and 40 hours after the beginning of the treatment. The values in the table represent the mean and standard deviation of these 4 measurements: there was no trend with time.

AUTHOR INDEX

HERBACEOUS WEED INDEX

(alphabetically by scientific name)

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WOODY PLANT INDEX

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CROP INDEX

HERBICIDE INDEX

(by common name or code designation)

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.e. . . . . acid equivalent
AGRIN . . . . *Agropyron intermedium*
a.i. . . . . active ingredient
ALA . . . . 5-aminolevulinic acid
AMS . . . . ammonium sulfate
AVEFA . . . . *Avena fatua*

BROTE . . . . downy brome
bu/A . . . . bushels per acre
Bygr . . . . barnyardgrass

C . . . . degree Centigrade or Celsius
CEC . . . . cation exchange capacity
CENSO . . . . *Centaurea solstitialis*
CHEAL . . . . *Chenopodium album*
CIRAR . . . . *Cirsium arvense*
cm . . . . centimeter
COC . . . . crop oil concentrate
Coda . . . . common dandelion
Colg . . . . common lambsquarters
Coma . . . . common mallow
Cosf . . . . common sunflower
CU-EDA. . . . . ethylenediamine-copper chelate
Cuns . . . . cutleaf nightshade
Cu-TEA. . . . . triethanolamine-copper chelate
C.V. . . . . coefficient of variation
cwt/A . . . . hundred weight(s) per minute

DAT . . . . days after treatment
DMA . . . . dimethylamine
Dobr . . . . downy brome
dpm . . . . disintegration(s) per minute

E . . . . ester (butoxyethyl)
EC . . . . emulsifiable concentrate

F . . . . degrees Fahrenheit
fl . . . . fluid
ft . . . . feet

g . . . . grams and gravity
G . . . . granular
gal/A . . . . gallon(s) per acre
GALAP . . . . *Galium aparine*
gpa . . . . gallons per acre
g/l . . . . grams per liter
GR . . . . granular
GS . . . . geotropic shoot

h . . . . hour
ha . . . . hectare
Hans . . . . hairy nightshade
hr . . . . hour

ABBREVIATIONS USED IN THIS REPORT (Cont'd)

in . . . . inches

kg . . . . kilogram(s)
kg/ha . . . . kilogram(s) per hectare
kg ai/ha. . . . . kilogram(s) active ingredient per hectare
Kocz . . . . Kochia
kPa . . . . kilopascal

l . . . . liter(s)
L/ha . . . . liters per hectare
lb/A . . . . pound(s) per acre
lb ai/A . . . . pound(s) active ingredient per acre
lb/bu . . . . pound(s) per bushel
lb(s) . . . . pound(s)
lf . . . . leaf
LSD . . . . least significant difference
LVE . . . . low volatile ester

m . . . . meter(s)
meq . . . . milliequivalents
mg . . . . milligram(s)
min . . . . minute(s)
ml . . . . milliliter(s)
mo . . . . month(s)
mph . . . . miles per hour
MT . . . . microtech formulation

no./plt . . . . number per plant
no./yd^2 . . . . number per square yard
n.s. . . . . non significant

OC . . . . oil concentrate
oz . . . . ounce(s)
oz ai/A . . . . ounce(s) active ingredient per acre

pe . . . . preemergence
pes . . . . preemergence surface
PH . . . . pre-harrow
PM . . . . package mix
ppbw . . . . parts per billion weight
PPI . . . . preplant incorporated
ppmw . . . . parts per million weight
Prlt . . . . prickly lettuce
Prpw . . . . prostrate pigweed
psi . . . . pounds per square inch

RGR . . . . relative growth rate
RRPR . . . . relative root production rate
Rrpw . . . . redroot pigweed
RSER . . . . relative shoot elongation rate
RSPR . . . . relative shoot production rate
RT . . . . root

ABBREVIATIONS USED IN THIS REPORT (Cont'd)

Ruth	Russian thistle
s	seconds
sf	surfactants
Shpu	shepherdspurse
Sklb	skeletonleaf bursage
SP	water-soluble powder
Sp. Act.	specific activity
sq. ft.	square feet
ST	shoot
Stgr	stinkgrass
Tamu	Tansy mustard
t/ha	metric tons per hectare
TB	tuber
Tm	tank mix
TRZAX	volunteer wheat
$uE/m^2/s$	microeinstein(s) per square meter per second
ul	microliter(s)
v/v	volume by volume
var.	variety
VERBL	*Verbascum blattaria*
Vowh	volunteer wheat
w/w	weight per weight
Wibw	wild buckwheat
ws	water soluble
Yeft	yellow foxtail