

Alternatives to Lorox in Carrot Production

W.S. Braunworth, D. Curtis, D. McGrath, and G. Crabtree
Department of Horticulture
Oregon State University

In anticipation of the possible loss of the registration status of the herbicide, Lorox (linuron), for weed control in carrot production, a program was initiated in 1988 to find alternative weed control measures. The objectives of this study were to:

1. Obtain data on the weed control efficacy and crop safety of herbicides currently registered for use in carrots.
2. Identify other herbicides not currently registered for use in carrots, which might serve as a substitute for Lorox.
3. Obtain data which could be used toward the registration of suitable herbicides.

One field trial was established at the Oregon State University Vegetable Research Farm. This trial was made up of 42 herbicide treatments, one being Lorox, and one being a newly registered material, Sencor (metribuzin). A hand weeded check and a weedy check were also included. Experimental procedures, treatment list, treatment averages with analyses, and a brief discussion of the results are included in this report.

EXPERIMENTAL PROCEDURES

The trial was initiated on 4-28-88 at the Oregon State University Vegetable Research Farm in Corvallis OR. There were 44 treatments total, organized in a randomized complete block design, with 4

replications. Plot size was 8 feet by 30 feet, with 1 foot boarders between plots. The soil series at this site is a Chehalis silty clay loam, with an organic mater content of 3.3% and a pH of 6.2. The previous crop was wheat. 800 pounds per acre of 8-24-8 fertilizer was broadcast on the site. Dyfonate was incorporated into the soil before planting for symphylum control (non-registered treatment). Prior to planting, preplant incorporated treatments (ppi) were applied and then incorporated to a depth of 3 inches using a rotera. Royal chantenay carrots were then planted 24 inches between rows and .25 inches deep using a Planet Junior hand seeder. The intended stand density was 25 plants per foot of row, although we ended up with about half of that level on average. Due to extremely wet conditions immediately following planting, the preemergence treatments (pre) were not applied until 5-5-88. The first post emergence treatments (post) were applied at the 2-3 leaf stage of the carrots. At this timing, weeds were approximately 3 inches tall. The next post emergence spray (post 1) was applied on 6-8-88 at the 5 leaf stage of the carrots. At this timing, the weeds were approximately 6 inches high and the canopy was 50% closed. The last post emergence spray (post 2) was applied on 6-21-88, at which time the carrots were .5 inches in diameter and the weeds were 10-12 inches tall. The canopy was closed. Treatments were applied using a compressed air propellant based, unicycle small plot sprayer. This was equipped with five 8003 flat fan nozzles. The sprays were broadcast at 22.68 gallons per acre at 30 psi. Predominate weed species at the sight included; pineapple weed (Matricaria matricariodes), wild mustard (Brassica arvensis), shepards purse (Capsella bursa-pastoris), groundsel (Senecio vulgaris), hairy nightshade (Solanum sarrachoides), redroot pigweed

DISCUSSION

Significant crop injury, manifesting itself in the form of severe stand reductions and greatly reduced harvests, was found with treatments containing Cobra, Tackle, and Herbicide 273. No one treatment besides Lorox was able to control all weeds present at the site. Outstanding treatments were Command, which did well in controlling shepards purse, groundsel, nightshade and annual bluegrass, and Tycor applied preemergence, which controlled pineapple weed, shepards purse, wild mustard and pigweed as well as annual bluegrass. A combination of these 2 materials might be an alternative to Lorox. The Sencor treatments might of performed better if the weeds were not as large at the time of application. The higher rates of Prowl also showed some fair control which was apparent at harvest.

In conclusion, this was only the first year of the trial, but some treatments did show promise as possible replacements for Lorox. Further research is needed to examine combinations and timings of materials to find suitable replacement weed control measures for Lorox.

(Amaranthus retroflexus) and annual bluegrass (Poa annua). Crop injury ratings (stand counts and crop height) were recorded on 5-23-88 and 6-21-88. Weed control ratings were recorded on 6-21-88. The crop was harvested (10 feet of the center row in each plot) on 10-25-88.

OREGON STATE UNIVERSITY
HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

TREATMENT LIST

TRT. NUM.	COMPOUND TESTED	FORMUL. AI/UNIT	RATE	UNITofRATE	APPLIC. TYPE
01A	PURSUIT	SC 2.00	.062	LBai/A	PRE
02A	PURSUIT	SC 2.00	.125	LBai/A	PRE
03A	PURSUIT	SC 2.00	.062	LBai/A	POST
04A	PURSUIT	SC 2.00	.125	LBai/A	POST
05A	PURSUIT	SC 2.00	.062	LBai/A	PRE
05B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
06A	PURSUIT	SC 2.00	.062	LBai/A	POST
06B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
07A	COMMAND	EC 4.00	0.50	LBai/A	PPI
08A	COMMAND	EC 4.00	1.00	LBai/A	PPI
09A	COMMAND	EC 4.00	0.50	LBai/A	PPI
09B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
10A	COBRA	EC 2.00	0.125	LBai/A	PRE
11A	COBRA	EC 2.00	0.250	LBai/A	PRE
12A	COBRA	EC 2.00	0.50	LBai/A	PRE
13A	COBRA	EC 2.00	0.125	LBai/A	PRE
13B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
14A	COBRA	EC 2.00	0.125	LBai/A	PRE
14B	PROWL	EC 4.00	1.00	LBai/A	PRE
15A	SCEPTER	SC 1.50	.062	LBai/A	PRE
16A	SCEPTER	SC 1.50	0.125	LBai/A	PRE
17A	SCEPTER	SC 1.50	0.062	LBai/A	POST
18A	SCEPTER	SC 1.50	0.125	LBai/A	POST
19A	TACKLE	SC 2.00	0.25	LBai/A	PRE
20A	TACKLE	SC 2.00	0.50	LBai/A	PRE

OREGON STATE UNIVERSITY
HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

TREATMENT LIST (CONTINUED)

TRT. NUM.	COMPOUND TESTED	FORMUL. AI/UNIT	RATE	UNITofRATE	APPLIC. TYPE
21A	TACKLE	SC 2.00	0.25	LBai/A	POST
22A	TACKLE	SC 2.00	0.50	LBai/A	POST
23A	TACKLE	SC 2.00	0.25	LBai/A	PRE
23B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
24A	PROWL	EC 4.00	0.50	LBai/A	PRE
25A	PROWL	EC 4.00	1.00	LBai/A	PRE
26A	PROWL	EC 4.00	2.00	LBai/A	PRE
27A	SENCOR	DF 75%	0.25	LBai/A	POST1
27B	PROWL	EC 4.00	1.00	LBai/A	PRE
28A	SENCOR	DF 75%	0.25	LBai/A	POST1
28B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
29A	SENCOR	DF 75%	0.25	LBai/A	POST1
30A	SENCOR	DF 75%	0.50	LBai/A	POST1
31A	SENCOR	DF 75%	0.25	LBai/A	POST1
31B	SENCOR	DF 75%	0.25	LBai/A	POST2
32A	SENCOR	DF 75%	1.00	LBai/A	POST1
33A	TYCOR	DF 50%	1.00	LBai/A	PRE
34A	TYCOR	DF 50%	2.00	LBai/A	PRE
35A	TYCOR	DF 50%	0.75	LBai/A	POST
36A	TYCOR	DF 50%	1.00	LBai/A	POST
37A	TYCOR	DF 50%	2.00	LBai/A	POST
38A	TYCOR	DF 50%	1.00	LBai/A	PRE
38B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
39A	LOROX	WP 50%	0.75	LBai/A	POST
39B	LOROX	WP 50%	0.75	LBai/A	POST1

OREGON STATE UNIVERSITY
HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

TREATMENT LIST (CONTINUED)

<u>TRT.</u> <u>NUM.</u>	<u>COMPOUND</u> <u>TESTED</u>	<u>FORMUL.</u> <u>AI/UNIT</u>	<u>RATE</u>	<u>UNITofRATE</u>	<u>APPLIC.</u> <u>TYPE</u>
40A	HERB273	SC 3.00	1.50	LBai/A	POST
41A	HERB273	SC 3.00	3.00	LBai/A	POST
42A	HERB273	SC 3.00	1.50	LBai/A	POST
42B	TREFLAN	EC 4.00	0.75	LBai/A	PPI
43A	HNDWDCHK				POST
44A	CHECK				

OREGON STATE UNIVERSITY
 HERBICIDE ALTERNATIVES TO LOX IN CARROTS, 1988

Oregon University Vegetable Research Farm

CROP INJURY (STAND COUNTS AND STAND HEIGHT)
 AND HARVEST AVERAGES

TRT. NO. NAME	CARROTS	CARROTS	CARROTS	CARROTS
	STDCNT 5/23/88	STDCNT 6/21/88	CRPLHT 6/21/88	TONS/AC 10/25/88
01 PURSUIT	28	28	7.5	21.24
02 PURSUIT	31	20	5.5	19.06
03 PURSUIT	29	25	4.0	10.35
04 PURSUIT	36	23	3.1	13.07
05 PURSUIT TREFLAN	40	31	8.1	28.59
06 PURSUIT TREFLAN	34	21	4.1	17.97
07 COMMAND	33	30	9.3	24.50
08 COMMAND	39	48	10.3	48.46
09 COMMAND TREFLAN	34	36	10.9	43.83
10 COBRA	1	4	5.3	7.80
11 COBRA	0	2	3.6	5.99
12 COBRA	0	0	0	NA
13 COBRA TREFLAN	1	7	5.3	9.80
14 COBRA PROWL	0	5	4.6	7.35
15 SCEPTER	32	28	6.3	20.96
16 SCEPTER	36	24	4.1	22.87
17 SCEPTER	33	27	5.4	8.99
18 SCEPTER	29	26	4.5	18.24

HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon University Vegetable Research Farm

CROP INJURY (STAND COUNTS AND STAND HEIGHT)
AND HARVEST AVERAGES
(CONTINUED)

TRT. NO.	NAME	CARROTS	CARROTS	CARROTS	CARROTS
		STDCNT	STDCNT	CRPLTHT	TONS/AC
		5/23/88	6/21/88	6/21/88	10/25/88
19	TACKLE	3	9	6.0	12.80
20	TACKLE	0	5	5.1	12.16
21	TACKLE	32	30	7.8	13.88
22	TACKLE	27	25	6.0	19.33
23	TACKLE TREFLAN	4	10	6.6	23.69
24	PROWL	41	38	10.5	31.85
25	PROWL	40	39	10.8	35.94
26	PROWL	32	36	10.0	46.01
27	SENCOR PROWL	38	38	10.1	32.67
28	SENCOR TREFLAN	30	29	9.4	30.22
29	SENCOR	37	31	10.8	23.41
30	SENCOR	44	38	10.0	23.14
31	SENCOR SENCOR	36	35	11.3	25.32
32	SENCOR	37	36	10.0	32.13
33	TYCOR	35	39	9.5	29.68
34	TYCOR	31	35	8.5	38.39
35	TYCOR	34	30	9.9	14.70
36	TYCOR	38	33	10.8	22.60
37	TYCOR	35	35	9.0	31.31

HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon University Vegetable Research Farm

CROP INJURY (STAND COUNTS AND STAND HEIGHT)
AND HARVEST AVERAGES
(CONTINUED)

TRT. NO. NAME	CARROTS STNDCNT 5/23/88	CARROTS STNDCNT 6/21/88	CARROTS CRPLTHT 6/21/88	CARROTS TONS/AC 10/25/88
38 TYCOR TREFLAN	36	38	10.4	44.11
39 LOROX LOROX	36	35	9.1	41.11
40 HERB273	31	16	6.4	7.08
41 HERB273	35	10	4.6	2.72
42 HERB273 TREFLAN	36	22	6.5	16.88
43 HNDWDCHK	27	34	9.0	46.01
44 CHECK	32	36	10.1	13.61
LSD(0.05) -	10	12	1.8	12.67
STD DEV -	7	8	1.2	8.78
CV -	23	31	15.9	37.25

O R E G O N S T A T E U N I V E R S I T Y
 HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

WEED CONTROL RATINGS

TRT. NO. NAME	PINAPLE %CONTRL 6/21/88	MUSTARD %CONTRL 6/21/88	SH. PURS %CONTRL 6/21/88	GRNDSSEL %CONTRL 6/21/88	NIGHTSH %CONTRL 6/21/88	PIGWEEED %CONTRL 6/21/88	ANBLGRS %CONTRL 6/21/88
01 PURSUIT	63	63	80	51	63	83	44
02 PURSUIT	73	89	100	75	91	96	70
03 PURSUIT	39	51	46	43	93	97	23
04 PURSUIT	58	76	73	83	98	95	39
05 PURSUIT TREFLAN	60	60	90	44	66	100	95
06 PURSUIT TREFLAN	51	58	60	45	95	100	94
07 COMMAND	85	21	94	100	100	15	95
08 COMMAND	95	40	100	100	100	43	100
09 COMMAND TREFLAN	65	26	95	100	95	66	100
10 COBRA	97	99	100	94	86	100	15
11 COBRA	99	100	100	96	94	85	41
12 COBRA	100	100	100	100	100	100	68
13 COBRA TREFLAN	95	99	100	94	95	97	89
14 COBRA PROWL	96	100	100	100	96	100	65
15 SCEPTER	65	93	96	93	54	100	70
16 SCEPTER	84	100	100	99	58	100	80
17 SCEPTER	45	61	58	44	10	75	25
18 SCEPTER	46	71	65	71	43	90	28
19 TACKLE	93	84	100	89	85	51	34

OREGON STATE UNIVERSITY
HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

WEED CONTROL RATINGS (CONTINUED)

TRT. NO. NAME	PINAPLE	MUSTARD	SH. PURS	GRNDSEL	NIGHTSH	PIGWEEED	ANBLGRS
	%CONTRL 6/21/88	%CONTRL 6/21/88	%CONTRL 6/21/88	%CONTRL 6/21/88	%CONTRL 6/21/88	%CONTRL 6/21/88	%CONTRL 6/21/88
20 TACKLE	97	100	100	100	94	100	43
21 TACKLE	53	46	41	45	44	100	13
22 TACKLE	66	79	80	76	66	95	20
23 TACKLE TREFLAN	84	100	100	93	94	100	91
24 PROWL	58	39	33	20	33	5	45
25 PROWL	40	53	69	10	83	68	81
26 PROWL	86	99	98	18	100	99	75
27 SENCOR PROWL	66	88	93	61	80	94	76
28 SENCOR TREFLAN	81	49	45	46	79	96	96
29 SENCOR	44	51	49	29	14	44	70
30 SENCOR	50	60	63	56	21	100	84
31 SENCOR SENCOR	43	53	48	38	19	43	65
32 SENCOR	71	70	75	68	25	93	93
33 TYCOR	100	100	99	53	15	96	100
34 TYCOR	100	100	100	74	34	100	100
35 TYCOR	41	64	68	34	21	100	79
36 TYCOR	41	78	76	38	18	100	79
37 TYCOR	76	96	98	60	28	100	84
38 TYCOR TREFLAN	100	100	100	33	20	100	100

O R E G O N S T A T E U N I V E R S I T Y
 HERBICIDE ALTERNATIVES TO LOROX IN CARROTS, 1988

Oregon State University Vegetable Research Farm

WEED CONTROL RATINGS (CONTINUED)

TRT. NO. NAME	PINAPLE %CONTRL 6/21/88	MUSTARD %CONTRL 6/21/88	SH. PURS %CONTRL 6/21/88	GRNDSSEL %CONTRL 6/21/88	NIGHTSH %CONTRL 6/21/88	PIGWEEED %CONTRL 6/21/88	ANBLGRS %CONTRL 6/21/88
39 LOROX LOROX	79	100	100	88	100	100	94
40 HERB273	94	11	10	50	36	18	35
41 HERB273	100	8	11	65	50	30	44
42 HERB273 TREFLAN	97	20	3	45	75	100	80
43 HNDWDCHK	100	100	100	100	100	100	100
44 CHECK	0	0	0	0	0	0	0
LSD(0.05) -	29	24	17	27	26	25	26
STD DEV -	20	16	12	19	18	18	18
CV -	27	23	15	28	28	21	26