Weed Control In Carrots, Celery, And Parsley

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THE UMBELLIFEROUS CROPS that are grown in California include carrots, celery, and parsley. Carrots are grown on about 23,000 acres. Weed control costs for carrots are about $30 per acre and losses are estimated at $7.50 per acre for a total loss of $860,000 per year to California growers. Most of the estimated cost of weed control in carrots comes from the use of selective aromatic oil and hand hoeing.

Celery and parsley weed control represents a smaller total cost because of the smaller acreage in California. However, these crops require more hand labor than carrots because aromatic oils have proven less satisfactory for selectively controlling weeds.

Each of the three is grown as a direct-seeded crop on raised beds with one or more rows per bed. However, celery is also transplanted and large amounts of water are used during the rooting period and early growth. In many areas, celery is planted in a single-row bed. This heavy irrigation practice, to insure germination and rooting, results in heavy weed growth and substantial weeding costs because hoeing crews cannot get in the field at the optimum time.

Chemical weed control offers considerable economic advantage because of the high costs of hand weeding in these intensively grown crops. Even in carrots, the variability of aromatic oil often requires a number of hand weedings which increase production costs.

Weed problems

In a recent survey of carrot crops covering 11,000 acres, 65% were treated with herbicides for weed control. The primary problem weeds of these crops are common groundsel, burning nettle, lambsquarter, cheeseweed, London rocket and nightshade. Others found in these crops include pigweed, shepherdspurse, and purslane. In the desert, some of the winter grasses such as canarygrass, perennial ryegrass, and annual bluegrass have been a problem over the years.

Herbicides

As indicated earlier, selective (carrot) oil has been the standard practice for weed control in carrots for a number of years. This herbicide has limited use in celery or parsley because of the frequency of damage to the crop. Even in carrots, considerable damage has occurred at herbicidal rates. Because the competition from weeds can be more damaging than the phytotoxicity from the herbicide, many growers have continued to use carrot oil. An application of linuron, applied when the carrots are 3 to 4 inches high, has given contact as well as residual weed control and reduced weed control costs in the crop. Recently, trifluralin (Treflan) has received federal registration with a 1 ppm tolerance. There are no effective herbicides registered to date for chemical weed control in celery or parsley.

Research

Recent field research on chemical weed control in carrots, celery, and parsley has produced new herbicides for California growers.

CARROTS—Linuron (Lorox) and trifluralin (Treflan) are herbicides registered for chemical weed control in carrots and offer promise for controlling a large number of weed species in carrots.

Preplant applications of trifluralin applied to preshaped beds and incorporated to a shallow depth (2 to 3 inches) prior to seeding has given excellent chemical weed control of a number of weed species, including lambsquarter, knotweed, purslane, and pigweed. However, trifluralin has limited effectiveness on a number of the mustard family (Cruciferae) and other species such as the nightshades and ground cherry and several composite species such as groundsel and fleabane. Early-fall grasses or late-summer grasses are readily controlled by trifluralin where these present a problem. Russian thistle has been controlled with preplant treatments of ¾ lb per acre prior to bed shaping.

Pre-emergence application of herbicides such as linuron and prometryne, although showing a degree of selectivity in the Monterey trials, under furrow irrigation, were not selective enough in the Kern and Los Angeles county trials. However, these same herbicides have been adequately safe when applied in the early postemergence stage (3 to 4 inches) (table 1).

One of the safest materials, especially in carrots, has been FW 925 (TOK-E-25); however, it does not have registration. FW 925 has given good weed control at rates of 2 to 4 lbs per acre with no injury. More study is needed in the hotter seasons and under sprinkler irrigation.

The early postemergence use of linuron has been effective in most carrot-growing areas and has been used commercially in Los Angeles, Kern and Monterey counties. The amount of herbicide required in the lighter soils of Kern County (generally less than 1% organic matter)

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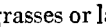

was much less than necessary to control weeds in Monterey County. When linuron was applied to carrots later than the two-leaf stage, 3 to 4 inches in height, a good margin of safety was obtained in most locations. Less selectivity has been observed in the Imperial Valley. Phytotoxicity has been observed in some tests when used earlier than this stage. Weed control with linuron can be somewhat marginal when the weeds are too large. Currently, combinations of herbicides are being studied. Herbicides which complement each other in the types of weeds controlled are trifluralin (effective in controlling lambsquarter, pigweed and the annual grasses) and linuron (effective on the crucifer and solanaceous weed species).

Another combination being studied is trifluralin and TOK-E-25 (effective on groundsel, nettle and *Solanum* species). Timed applications of oil and of linuron are used where mustard is a problem. Linuron should follow oil no sooner than 14 days.

CELERY—Two new herbicides of considerable promise for weed control in transplanted celery have been found after several years of research with many herbicides in Ventura and Monterey counties. One of these is FW 925 (TOK-E-25) which is applied early-post-emergence to young weeds in newly transplanted celery. FW 925 gave excellent weed control when used in the range of 2 to 4 lbs per acre (table 2). The weeds in these trials were usually in the 2-to-4-leaf stage and were almost exclusively annual broadleaf weeds including lambsquarter, nettle, groundsel, London rocket, chickweed, hairy nightshade and shepherdspurse. The other herbicide, prometryne (Caparol), currently unregistered, likewise showed considerable safety in celery. Prometryne was particularly effective when applied early-post-emergence to young weeds in transplanted celery. Even when incorporated prior to transplanting in one Ventura County trial, prometryne showed no injury at the 4-lb-per-acre rate. Combinations of prometryne and trifluralin, and prometryne and FW 925 are being further studied.

Effective use of the herbicide linuron is shown in row of carrots to right, as compared with check row to left.

PARSLEY—Although parsley is an umbellifer, it has been somewhat more sensitive to linuron and prometryne than have carrots and celery (table 3). One pound per acre of linuron or prometryne in 100 gallons of water per acre caused excessive reduction in plant growth when the parsley plants were less than one inch in height.

FW 925, up to 4 lb/A, also applied early postemergence, caused no injury and gave good weed control. Although FW 925 is not registered, more work should be done since the selective advantage was apparent in these and subsequent trials.

TABLE 1. WEED CONTROL IN CARROTS
(Summary–1964–66)

Number of trials showing weed control and crop safety (+)—no control or safety (–)

Herbicide	lb/A	Weed control (+)	Weed control (–)	Crop safety (±)	Crop safety (–)
Postemergence					
Prometryne	½	1	1	2	0
Prometryne	1	7	3	8	0
Prometryne	2	6	1	7	0
Prometryne	4	7	0	1	4
Linuron	½	4	1	7	0
Linuron	1	17	0	16	1
Linuron	2	9	0	9	2
Linuron	4	6	0	1	2
Preplant					
Trifluralin	½	1	3	2	0
Trifluralin	1	1	1*	1	1
Trifluralin	2	0	3*	–†	–†
FW 925	2	2	1	3	0
FW 925	4	3	0	3	0

* Poor control due to the presence of resistant weed species.

† No data at this rate. Not all tests yielded both weed control and phytotoxicity data.

TABLE 2. WEED CONTROL IN CELERY
(Summary 1963–66)

Number of trials showing weed control and crop safety (+)—no control or safety (–)

Herbicide	lb/A	Weed control (+)	Weed control (–)	Crop safety (±)	Crop safety (–)
Postemergence					
Prometryne	1	11	1	11	0
Prometryne	2	13	0	12	2
Prometryne	4	8	0	8	4
Prometryne	8	1	0	0	1
Linuron	1	3	0	2	2
Linuron	2	2	0	1	1
Preplant					
Trifluralin	1	3	1	3	0
Trifluralin	2	4	1	4	0
Trifluralin	4	1	0	1	0
FW 925	2	8	4	9	0
FW 925	4	11	2	11	0
FW 925	8	8	0	8	1

TABLE 3. CROP RESPONSE AND WEED CONTROL IN DIRECT-SEEDED PARSLEY (VENTURA COUNTY)

Trial 1. Crop response averages.

Herbicide	lb/A	Phytotoxicity†	Growth vigor†
Prometryne	1	4.1	4.1
Prometryne	2	5.0	3.4
Prometryne	4	7.3	2.3
Linuron	1	4.6	4.6
Linuron	2	5.1	3.6
Linuron	4	8.9	0.9
LSD*	1%	1.7	1.8
C.V.		20.3%	38.9%

Trial 2. Weed and crop response averages†

Herbicide	lb/A	Weeds/ Plot Early	Weeds/ Plot Late	Crop Vigor†
Prometryne	½	4.5	3.0	10.0
Prometryne	1	2.5	1.8	8.5
Linuron	½	2.0	1.2	9.7
Linuron	1	0.8	0.8	9.0
FW 925	1	4.8	3.5	9.3
FW 925	2	2.0	2.8	10.0
FW 925	4	1.8	2.2	10.0
Check	0	–	8.3	9.8
LSD*	1%	N.S.		1.08
	5%	2.36	N.S.	0.81
C.V.		76.3%		7.24

* Statistical analysis does not include untreated check because this treatment did not belong in the same population data.

† Based on a rating scale of 0 to 10, with 0 indicating lack of toxic effects or lack of growth vigor and 10 indicating very toxic or very vigorous growth.

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