

# CONTROL OF LESSER-SEEDED BITTERCRESS IN CONTAINER-GROWN ORNAMENTALS

## Progress Report

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In about 1968, lesser-seeded bittercress, *Cardamine oligosperma* L., in the Cruciferae family, was found to be a major weed problem in ornamentals in Santa Barbara County. Observations indicated an association with high organic matter (peat moss) in ground-bed azalea plantings. Gilkey (1957) describes *C. oligosperma* as an annual plant native to the Pacific Northwest in moist wooded areas, which becomes a weed in cultivated land. Although it has not been described as a weed in California, it is found in many moist gardens and container nurseries, as well as in woody areas, particularly along the Pacific Coast.

*Cardamine oligosperma* is considered a weed in container nurseries because it produces abundant seeds (12 to 20 per pod) that germinate quickly, thus perpetuating a succession of plants under moist conditions during the cool season. Flowers and seeds are produced rapidly after germination. The pods split by two upcurling valves, forcibly expelling seeds for a considerable distance (hence the local common name "popweed").

Herbicides evaluated for control of other problem nursery weeds, principally annual bluegrass, *Poa annua*, and creeping wood-sorrel, *Oxalis corniculatus*, have been only partially effective against bittercress.

In 1972, herbicide studies (Elmore and Humphrey) were conducted specifically to evaluate potential herbicides to supplement the hand-weeding required to control this weed. Bittercress was seeded onto established containers of *Pyracantha coccineum* Roem. Evaluations of bittercress control indicated the herbicide oxadiazon (Ronstar®) at 2 and 4 pounds per acre gave excellent control for 6 months without injuring *P. coccineum*.

The following season two preemergence tests were established in containers with known bittercress infestation potential. Test A was begun in March 1974 using the granular formulations of oxadiazon, alachlor, and napropamide. The plant species used were *Hebe menziesii*, *Hypericum* 'Sun Gold,' and *Buxus sempervirens*. The herbicides were applied to 1-gallon cans with a shaker

can. All containers were weeded by hand before treatment. A re-treatment was made in July, again on freshly weeded containers. Although all herbicides gave at least 90 per cent weed control for 8 weeks after the first treatment, only oxadiazon continued to give complete control when the plots were evaluated 16 weeks after the first treatment. Oxadiazon at 4 pounds per acre also controlled mosses growing in the container at treatment. No phytotoxicity was observed on any plant species with any herbicide or rate (table 1).

Test B was established in April 1974 using the granular formulations of oxadiazon, alachlor, and napropamide. Each treatment was applied to *Ligustrum japonicum* Thunb. and *Juniperus sabina* 'Tamariscifolia.' Each herbicide at each rate was applied to 10 single 1-gallon-can replications. A second group of 10 plants, for each treatment, was treated in April but also re-treated in October 1974.

TABLE 1. CONTROL OF LESSER-SEEDED BITTERCRESS WITH THREE PREEMERGENCE HERBICIDES

Herbicide	Rate (lb./A)	Weed Control <sup>1</sup>	
		8 weeks	16 weeks
oxadiazon (Ronstar®)	2	10.0	10.0
	4	10.0	10.0
alachlor (Lasso®)	4	9.0	— <sup>2</sup>
	8	9.1	8.2
napropamide (Devrinol®)	4	9.5	9.0
	8	10.0	7.5
control	—	4.5	0

<sup>1</sup>0 = no control; 10 = complete control.

<sup>2</sup>Containers inadvertently overtreated with oxadiazon.

TABLE 2. EFFECT OF HERBICIDE APPLICATIONS ON CONTROL OF LESSER-SEEDED BITTERCRESS AND ON DRY WEIGHT OF *Ligustrum japonicum*

Herbicide	Rate (lb./A)	Control over 6-month period <sup>1</sup>		Dry weight of <i>L. japonicum</i> <sup>4</sup> (grams)	
		ST <sup>2</sup>	RT <sup>3</sup>	ST <sup>2</sup>	RT <sup>3</sup>
oxadiazon (Ronstar®)	2	5.8	9.5	87.3 a	66.9 bcd
	4	9.1	9.6	72.0 abcd	77.1 ab
alachlor (Lasso®)	4	1.9	8.9	48.2 e	63.6 bcde
	8	5.7	9.0	58.3 cde	67.8 bcd
napropamide (Devrinol®)	4	3.2	7.4	70.3 abcd	63.9 bcde
	8	6.0	—	74.4 abc	—
control	—	0	0	62.5 bcde	62.5 bcde

<sup>1</sup>0 = no control; 10 = complete control.

<sup>2</sup>ST = single treatment.

<sup>3</sup>RT = re-treatment using the same rates after 4 months.

<sup>4</sup>Any means followed by the same letter are not significantly different (p = 0.05).

A single oxadiazon treatment at 4 pounds per acre (table 2) gave 91 percent control of bittercress for 6 months. All other treatments gave less than 58 percent control. However, when plants were re-treated after 4 months, control from all herbicides was above 70 percent 2 months after the second treatment (6 months after the first treatment). Oxadiazon at 2 and 4 pounds per acre gave 95 and 96 percent control, respectively. Alachlor at 4 and 8 pounds per acre gave 89 and 90 percent control.

The *Ligustrum japonicum* plants were cut off at ground level and dried (table 2) to determine phytotoxic effects. Significantly reduced dry weight was observed with the single alachlor application at 4 and 8 pounds per acre compared to oxadiazon at 2 pounds per acre. Oxadiazon and napropamide at 4 pounds per acre were not significantly different from hand-weeded control plants. When re-treated, *L. japonicum* had a higher dry weight from oxadiazon at 4 pounds per acre than plants of all other treatments.

Since oxadiazon gave excellent control of lesser-seeded bittercress, postemergence tests were established on emerged bittercress. Two tests were established at two growth stages. In test A oxadiazon (2%

granules) was used at 1, 2, and 4 pounds per acre on seven species of stock grown in 1-gallon cans. Granules were applied to 1/2-inch-tall weeds and sprinkled immediately after application. Control of the established bittercress was excellent at 36 days at all three oxadiazon rates (table 3). After 71 days, oxadiazon gave 82 and 93 percent control of established bittercress. No injury was observed on *Thuja orientalis* 'Aurea Nana,' *Berberis darwinii*, *Ilex cornuta* 'Rotunda,' *Cotoneaster pannosa* 'Nana,' *Viburnum tinus*, *Buxus sempervirens*, and *Rhus lancea*.

Test B was established on bittercress plants 2 to 5 inches in height, with some of the plants seeding. Test plant species were *Magnolia grandiflora* 'Samuel Somers' and *Camellia japonica* 'Glen #40.' Oxadiazon granules were applied followed by hand-watering. Since some of the older weeds were partially hand-weeded, evaluations were made on weeded and unweeded containers (table 4). Fifty days after treatment, oxadiazon at 4 pounds per acre was the only treatment giving 90 percent control in unweeded containers. Where the old plants (seeding) had been removed, oxadiazon at 1, 2 or 4 pounds per acre or the combination of napropamide plus oxadiazon gave 80 percent control or higher.

TABLE 3. POSTEMERGENCE CONTROL OF LESSER-SEEDED BITTERCRESS WITH OXADIAZON GRANULES IN CONTAINER-GROWN ORNAMENTALS

Herbicide	Rate (lb./A)	Weed control <sup>1</sup>	
		36 days	71 days
oxadiazon (Ronstar®)	1	7.0	6.1
	2	8.9	8.2
	4	9.8	9.3
control	—	0	0

<sup>1</sup>0 = no control; 10 = complete control.

TABLE 4. POSTEMERGENCE CONTROL OF LESSER-SEEDED BITTERCRESS  
IN CONTAINER-GROWN ORNAMENTALS.

Herbicide	Rate (lb./A)	Weed control <sup>1</sup>			
		50 days		109 days	
		weeded	nonweeded	weeded	nonweeded
oxadiazon (Ronstar®)	1	8.0	2.5	6.0	1.4
	2	9.0	4.2	8.6	3.1
	4	9.3	9.0	9.5	6.5
napropamide (Devrinol®) plus oxadiazon	4 plus 2	9.0	6.2	9.0	2.9
napropamide	4	1.5	4.0	5.5	1.2
control	—	0.5	0.0	0.0	0.2

<sup>1</sup>0 = no control; 10 = complete control.

In these trials, oxadiazon has controlled lesser-seeded bittercress both preemergence and early postemergence at rates of 1 to 4 pounds active ingredient per acre. Rates of 2 to 4 pounds per acre have given 90 to 96 percent control for 4 months. With retreatment after 4 months, this high level of control is maintained. Alachlor at 8 pounds per acre has also been highly effective when re-applied after 4 months, yielding 90 percent control. Other herbicides have not given the same measure of control.

Hand-weeding programs are necessary to keep plants not controlled by herbicides from seeding and reinfesting the nursery.

The herbicides evaluated in these tests are not registered for use on container-grown ornamentals, and such use would be illegal at this time.

#### LITERATURE CITED

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