FIELD BINDWEED CONTROL IN VINEYARDS

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FIELD BINDWEED (*Convolvulus arvensis*) is a widespread problem in coastal vineyards of central and northern California. Field trials by the Agricultural Extension Service since 1963 have compared several formulations, rates, and timing of 2,4-dichlorophenoxyacetic acid (2,4-D) sprays. Wax bars impregnated with 2,4-D have also been tried. None of the treatments in these trials have given commercial season-long control (table 1).

Five years of spray treatment with 2,4-D amine at various intervals in the Wente vineyard, Livermore, did not result in a significant decrease in bindweed in an evaluation in the sixth year. (A rating of 7.0 using a 0–10 scale of evaluation is considered minimum for commercial acceptance in this study).

Leaf symptoms and growth reduction from 2,4-D amine on the Sylvaner variety grapevines in the tests also presented a problem. Deformed leaves were found during the season 2,4-D was applied, and also in the year following application (table 2).

It appears that a fall application of 2,4-D can be translocated into the grapevine, stored over winter, and be retranslocated into the new shoots the next year.

Grapevines appeared most sensitive to 2,4-D between shoot emergence and fruit shatter, approximately two weeks following bloom in these studies. After fruit shatter and before many shoots came down, 2,4-D reacted like a contact spray and did not move back into the plant. Grapes were easily injured from 2,4-D after this period.

Dichlobenil (Casoron) is another herbicide which has shown promise for bindweed control in vineyards. There has been considerable research on the herbicidal activity of dichlobenil in the soil. Trials were started in a Livermore vineyard in 1967. In the first test, dichlobenil granules (4G) were applied in winter and spring on the surface and compared with a soil-mixed application using a power-driven tiller. Monosodium methane arsenate (MSMA) and 2,4-D amine treatments (tables 3, 4, and 5) separately and in a combination with dichlobenil were also tested. The treatments were repeated the second year.

Commercial control of bindweed was obtained the season following the first winter treatment of dichlobenil. When dichlobenil was followed with 2,4-D (oil soluble amine) in June, even better control was obtained with no injury to the vines (table 3).

Although bindweed control was ac-

TABLE 1. BINDWEED CONTROL ONE YEAR AFTER FIVE YEARS OF TREATMENT WITH 2,4-D AMINE AT VARIOUS INTERVALS

Treatment	Dates of application	Weed control* Evaluation dates 4/22/69	6/30/69	10/9/69
2#/A 2,4-D amine	June, July, September	7.5	4.0	1.25
4#/A 2,4-D amine	June, September	8.0	1.75	1.0
8#/A 2,4-D amine	June	5.0	2.75	0.5
4#/A 2,4-D amine	September	2.0	0.5	0.25
Dinitro + weed oil	June, July, September	2.75	1.5	0.
No treatment		0.5	0.	0.

* 0 = bindweed control; 10 = complete control; average 4 replications

TABLE 2. EVALUATION OF SYMPTOMS OF 2,4-D AMINE ON SYLVANER GRAPES THE SEASON FOLLOWING FIVE YEARS OF TREATMENTS AT VARIOUS INTERVALS

Treatment	Dates of application	Average 4 replications evaluated May 1969*
2# 2,4-D amine	June, July, September	3.0
4# 2,4-D amine	June, September	3.75
8# 2,4-D amine	June	0.75
4# 2,4-D amine	September	4.0
Dinitro + weed oil	June, July, September	1.5
No treatment		0.

* 0 = no symptoms; 3.0 = easily detectable symptoms; 10 = killed vine

TABLE 3. WEED CONTROL EIGHT MONTHS AFTER APPLICATION

Herbicide	Rate lbs/A	Application method	Weed control* 8 months After appl.
Dichlobenil 4G + 2,4-D	6 + 1	Winter surface + June 1968 spray	9.2
Dichlobenil 4G + 2,4-D	6 + 1	Winter incorporated + June 1968 spray	8.7

* 0 = no bindweed control; 10 = 100% control

TABLE 4. TREATMENTS SHOWING LEAF BURN DURING SEASON AFTER SECOND APPLICATION

Herbicide	Rate lbs/A	Application method
Dichlobenil 4G + MSMA	6 + 4	Winter surface + June & August 1968 spray
Dichlobenil 4G	12	Winter incorporated
Dichlobenil 4G + MSMA	6 + 4	Winter incorporated + June & August 1968 spray
Dichlobenil 4G + 2,4-D	6 + 1	Winter incorporated + June & August 1968 spray
Dichlobenil 4G + 2,4-D	6 + 1	Winter surface + June & August 1968 spray

TABLE 5. TREATMENTS SHOWING SEVERE GRAPE LEAF BURN AFTER SECOND APPLICATION OF D

Herbicide	Rate lbs/A	Application method
Dichlobenil 4G	12	Winter incorporated
Dichlobenil 4G + 2,4-D O.S. amine	6 + 1	Winter incorporated + June–August 1968 and July 1969
Dichlobenil 4G + MSMA	6 + 4	Winter incorporated + June–August 1968 and July 1969

TABLE 6. BINDWEED CONTROL WITH DICHLOBENIL COMBINATIONS AFTER APPLICATIONS IN MARCH, 1970

Herbicide	Rate lbs/A	Weed control* Evaluation dates 5/21	7/24	11/20	Phyto
Dichlobenil	1.5	7.3	5.6	3.6	0
Dichlobenil + 2,4-D	1.5 + 2	8.6	7.0	7.6	0
Dichlobenil + MCPA	1.5 + 2	7.6	7.2	8.0	0
Dichlobenil	3.0	8.0	6.0	2.6	0
Dichlobenil + 2,4-D	3.0 + 2	6.6	4.3	6.6	0
Dichlobenil + MCPA	3.0 + 2	8.0	7.6	7.6	0
No treatment	0	3.0	0	0	0

* 0 = no control; 10 = 100% control.

ceptable with dichlobenil, noticeable leaf burn was observed nine months after the second consecutive yearly application (table 4). Since all plots were left untreated during the second season, it is not known whether a single application would be adequately safe.

Twenty and 34 months after application (second season, following second application) typical chlorosis and leaf burn was very evident in these treatments. Incorporating dichlobenil at 6 and 12 lbs per acre increased foliage damage (table 5).

In another test, dichlobenil 50 WP was applied as a spray 3 to 4 inches under the soil surface from the trailing edge of a weed knife in April 1969. Rates were 0,3,8,13, and 18 lbs per acre. Commercial season-long control was attained at all but the 0- and 3-lb rates seventeen months after one treatment. However, foliar symptoms on the vines were apparent at rates higher than 3 lbs per acre.

A second trial was made using this spray blade at a low rate of dichlobenil 50 WP (March 1970). MCPA and 2,4-D.O.S. amine treatments were also included (table 6).

In this trial 1.5 and 3.0 lb per acre rates of dichlobenil alone, applied with a spray blade, did not give commercial bindweed control. When used in conjunction with MCPA or 2,4-D, commercial control was achieved without vine toxicity.

In these tests, the oil-soluble or water-soluble amine formulations of 2,4-D and a formulation of MSMA which included a surfactant as a single treatment or a repeated application failed to safely control field bindweed for the growing season. One mid-season spray containing either of these materials after an application of dichlobenil of at least 3 lbs per acre gave commercial season-long control of bindweed.

Dichlobenil is a volatile herbicide requiring incorporation for maximum results, particulary when using the 50% wettable-powder formulation. Phytotoxicity from dichlobenil above a 3-lb per-acre rate was apparent, and was enhanced when the herbicide was incorporated with a spray blade or rotovator. Dichlobenil is long lasting in the soil when incorporated. Other studies have shown that few, if any, crops are resistant to dichlobenil when grown on sandy soils that are low in organic matter.

The application method of spraying a herbicide barrier under the ground to prevent weed growth is new and shows some promise for bindweed control. Treatments of 2,4-D did not produce residual 2,4-D activity in the soil or long-term effects in grape vines.

Needs for bindweed control have been redefined. Bindweed control is necessary in the vine row in new plantings for the first three years, or until vine growth shades it out. Eradication of bindweed from the total vineyard area is considered to be too costly in most areas as well as unsafe, and impractical at this time.

New work in bindweed control is being directed to layering a chemical barrier in the vine row, 3 to 4 inches under the soil surface, to prevent bindweed shoot emergence. The search is still continuing for a safe surface-applied herbicide. Also, expansion of the program for insect predators of bindweed is planned by University of California researchers in biological control to help reduce this weed pest.

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What happens to soil fumigants after nematode control?

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The results of research on nematicides, in addition to demonstrating remarkable yield increases of agricultural crops brought about by nematode control, have also shown that EDB, DBCP and 1,3-D have no significant persistent adverse effects on the physical and biological composition of soil, or on the nutritional value of crops grown on treated soil. These successful nematicides are physically and/or biologically degradable.

THREE SOIL FUMIGANTS, 1,2 dibromoethane (EDB), 1,3 dichloropropane (1,3-D), and 1,2 dibromo-3-chloropropane (DBCP) have been used extensively for nematode control in California soils for 15 to 25 years. These nematicides have been used at dosages ranging from 8.6 lbs per acre (0.5 gal per acre of DBCP) to 2000 lbs per acre (200 gal per acre of D-D). The chemicals are injected in well tilled, moist soils to depths of 8 to 20 inches and normally persist in the soil at nematicidal dosages for several days or weeks without need for special covers on the soil surface. (1,3 dichloropropene (1,3-D) is sold under the trade name Telone, and a 1,2 dichloropropane mixture is sold under the trade names D-D and Vidden D).

EDB and 1,3-D are used only for preplant treatments and are applied 14 days to three months prior to treatment, depending on the dosage, soil texture, and temperature. DBCP can be used as a preplant nematicide or can be applied to tolerant living plants for the control of established nematode populations.

The recommendations for the use of these three nematicides are based on performance and residue data developed by