

WEED CONTROL

in California Vineyards

A. LANGE · B. FISCHER · D. HAMILTON · H. AGAMALIAN

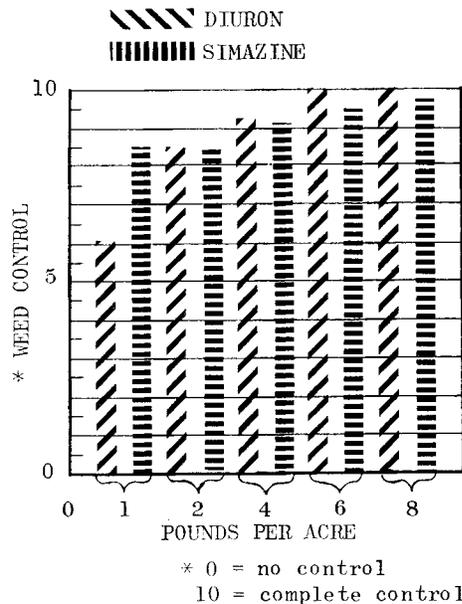
AN ESTIMATED 12 per cent of the nearly 500,000 acres of grapes growing in California were treated with herbicides for weed control in 1965-66. As much as 15 to 20 per cent of the acreage is expected to be treated this year (1967-68). A high potential exists for further weed control with herbicides in California vineyards.

Annual weeds are the major weed control problem in grapes, according to a 1963-64 survey of California farm advisors. Eight counties listed annual weeds as the major problem for table grapes, and 18 counties listed annuals as the main weed control problem in wine grapes. Bermudagrass ranked first in a 1965-66 survey among the perennials as a weed problem for grapes, followed closely by johnsongrass. Bindweed and two annuals (lambsquarter and pigweed), were also considered major weed problems facing California vineyardists.

Simazine was listed as the herbicide used most in vineyards, followed by diuron (Karmex). Other herbicides used included dalapon, paraquat, 2,4-D, amitrole, and weed oil. In addition to the herbicides mentioned in the survey, CIPC (Chloro IPC) and DNBP (dinitrophenol) are registered for annual weed control in grapes but are not often being used. Trifluralin (Treflan) is also registered for non-bearing grapes as a pre-plant, incorporated treatment, or as a post-plant treatment on established non-bearing vines. Dichlobenil (Casoron) has just recently been registered for use in vineyards.

Current University of California recommendations for weed control in vineyards include aromatic emulsions of weed oil at 40 to 100 gallons per acre, dalapon for spot treatment of perennial grasses; diuron and simazine for annual weed control applications during the dormant season; paraquat or amitrole with diuron or simazine for winter emerged weeds; and 2,4-D for broadleaf perennial weed control. Most of these treatments are limited to use in vines three or more years old. Trifluralin (Treflan) is now recommended in young vines for shallow, pre-plant incorporation.

GRAPE WEED CONTROL SUMMARY
1961-1965



Average data for all weed control trials from 1961 to 1965 from seven counties for simazine and diuron.

A series of experiments have been conducted during the past several years on mature bearing vines in several counties; on young, newly established vineyards; and on rooted and non-rooted cuttings in nursery and greenhouse trials.

Results reported here are for experimental applications during the past few years, and are not to be considered official recommendations of University of California. Recommendations for weed control in vineyards may be found in the current publication of "Weed Control Recommendations," available at local Farm Advisor offices.

Tests for annual weed control were conducted in the following counties: Alameda, Santa Clara, Fresno, San Diego, Monterey, San Bernardino, and Merced. Soil persistent herbicides were applied during the dormant season—in some trials prior to the planting, before weed emergence, and in other trials, after

emergence to young weeds. Where weeds were present, amitrole was added at one pound per 100 gallons per acre to all of the treatments. Herbicide tests of simazine and diuron in all seven counties have shown these herbicides to be both safe and effective (table 1, and graph). Occasional failures could usually be attributed to the amount of rainfall, herbicide applications after weeds have emerged (where amitrole or other contact herbicides were not applied), or the presence of resistant weed species. Speedwell, groundsel, and wild oats were occasionally found in diuron test plots, whereas barnyard grass, crabgrass, cupgrass, and prostrate pigweed were sometimes found in the simazine plots later in the season. Generally both simazine and diuron at 2 to 4 lbs per acre lasted longer than 10 months. Even at the 1-lb-per-acre rate, simazine gave many months of weed control.

Simazine was safe at rates up to 4 lbs per acre. Diuron showed some phytotoxicity at 4 lbs or more per acre in a few tests. Diuron has been observed to be somewhat less safe than simazine on a pound-for-pound comparison in fields with sandy or gravelly soils, and in greenhouse tests where washed river sand is used as a growing medium.

Perennial weed control

Perennial weeds were observed to grow better where annual weeds were controlled. Perennial bindweed has been con-

TABLE 1. SUMMARY OF NUMBER OF PRE-EMERGENCE HERBICIDE TRIALS SHOWING SATISFACTORY WEED CONTROL (+) AND SAFETY (+) ON ESTABLISHED GRAPE VINES (ALL AGES) 1958-1967.

Herbicide	Lb/A	Weed control		Safety	
		+	-	+	-
Simazine	1	4	1	5	0
	2	9	2*	10	0
	4	10	3*	11	0
	6	5	2*	2	1
	8	9	1	6	3
	16	1	0	0	1
Diuron	1	4	0	3	0
	2	13	2†	9	0
	4	14	0	9	3
	6	7	0	2	2
	8	7	0	3	4
	16	1	0	0	1

* Failures usually due to crabgrass, barnyard grass or withgrass.

† Failures usually due to groundsel, wild oats, sour clover or speedwell.



Photo left shows year-around weed control after five years of repeated single annual applications of simazine or diuron at 1 lb per acre in a Santa Clara grape trial. Untreated check in the same trial is shown to right. Principal weed species include annuals such as cheeseweed, prickly lettuce, riggut, wild barley, wild mustard and others.

trolled safely in many field trials (tables 2 and 3), and in commercial applications in vineyards by using low-volatile forms of 2,4-D amine or acid, applied under low pressure with hooded blooms. The oil-soluble amine proved to be at least as good as the low-volatile amine. Problems have resulted from 2,4-D drift and equipment such as tractor tires and spray boom flaps wet with 2,4-D solution rubbing on the vines. Where hooded beams have not been used, drift has frequently been a severe problem. A new growth of grapevines is especially sensitive to 2,4-D drift. An area of research with great potential exists in experimentation with use of the low-volatile 2,4-D amine and acid formulations in small repeated applications during the growing season (table 3), and in combinations with other herbicides.

Bindweed was easier to control when irrigated than when not irrigated, probably because the irrigated weeds had more susceptible foliage, grew more vigorously, and had greater uptake and translocation of 2,4-D to the underground rhizomes. Repeated low rates of 2,4-D were effective on receptive, growing foliage under irrigation. The best results, when bindweed was not irrigated, occurred when 2,4-D was applied in June while the weed was growing actively.

TABLE 2. AVERAGE BINDWEED CONTROL PER VINE SPACE, SPRINKLER IRRIGATED, IN 4-YEAR-OLD GRAY RIESLING VINEYARD SPRAYED ONE TIME WITH 2,4-D—ALAMEDA COUNTY TRIAL.

Herbicide	Lb/A	Number of bindweed plants* at 1 mo.	Control rating at 3 mo.†
2,4-D acid	1½	3.2	5.5
2,4-D amine + X77	1½ (+12 oz)	3.6	5.6
2,4-D amine	1½	4.7	5.3
2,4-D (OSA)	1½	2.4	5.7
Check	0	0	0

* Average of 4 replications.

† 0 = no control; 10 = complete control.

Studies are continuing with repeated applications of 1 and 2 lbs of 2,4-D per acre during the growing season, and with applications of granular dichlobenil (Casoron) to the soil prior to the rainy season.

Johnsongrass

Johnsongrass is frequently a serious problem in vineyards, particularly when annual weeds have been controlled with simazine or diuron. Studies thus far indicate that repeated small applications of dalapon (3 to 4 pounds per acre) plus 0.5 per cent wetting agent in 100 to 200 gallons of water per acre have given good control. Repeated applications were made on johnsongrass regrowth at four week intervals. In experimental plots, MSMA has given outstanding control of johnsongrass in vineyards, similar to that reported in orchards. However, when the vine foliage was sprayed with MSMA, residues of arsenic appeared in the fruit. These levels were extremely small, but their presence constitutes an added obstacle to the registration of MSMA for use in vineyards.

Bermudagrass has been effectively controlled with repeated small applications of dalapon at rates of 3 to 4 lbs per acre. Dalapon is the most effective herbicide for the control of bermudagrass in grapes, however, it has also failed many times, particularly in hot, dry desert areas. Re-

peated small applications of dalapon to actively growing bermudagrass have given the best results to date. A field study is continuing, aimed at the control of bermudagrass in vineyards by the use of dalapon, with various combinations of non-phytotoxic oil and winter-applied granular dichlobenil (Casoron). Soil-persistent herbicides will be applied prior to the rainy season. Soil-persistent herbicides, in various combinations with foliar-applied herbicides, appear to offer the most promising approach to the control of perennial weeds.

A. H. Lange is Weed Control Specialist, Agricultural Extension Service, University of California, Riverside. B. Fischer, D. Hamilton, and H. Agamalian are Farm Advisors, Fresno, Alameda, and Monterey counties respectively.

Cooperators in the field work of this study included: Don Rosedale, Farm Advisor, San Diego County; L. Hendricks and V. Carlson, Farm Advisors, Merced County; C. Lynn, Farm Advisor, Fresno County; H. Kempen, Farm Advisor, Kern County; Chet Hemstreet, Farm Advisor, Lake County; Dean Halsey, Farm Advisor, Riverside County; and R. Sisson, Farm Advisor, Sonoma County. This work was supported in part by the Geigy, Eli Lilly, Thompson-Hayward, Diamond Shamrock, Dow, and Ansul chemical companies.

TABLE 3. EFFECT OF REPEATED APPLICATIONS OF 2,4-D FOR BINDWEED CONTROL UNDER IRRIGATED AND NON-IRRIGATED VINEYARD CULTURE

Herbicide	Lb/A	Timing	Bindweed control ratings*					
			1st spring		After 1 year		After 2nd year	
			Irr.	No irri.	Irr.	No irri.	Irr.	No irri.
2,4-D	2+2+2+2	June, July, Sept., Nov.	7.5	6.5	3.5	1.8	8.0	5.8
2,4-D	4+4	June & Sept.	9.5	8.0	7.8	3.2	7.2	5.8
2,4-D	8	June only	8.0	6.2	6.0	0.8	6.2	7.0
2,4-D	4	Sept only	8.8	4.2	5.5	0	4.2	2.0
DNBP+oil	—	June, July, Sept., Nov.	0	0	2.6	0	2.6	1.5
Check	0	0	0.8	1.5	1.2	0	2.6	2.2

* Average of 4 replications at each location; 0 = no control, 10 = complete control.