METHODS OF WEED CONTROL IN VINEYARDS

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Summary

In a long term vineyard trial in which cultivation versus chemical routines of weed control were carried out, results showed that the cultivation method was the most productive. Assessments were made from grape yields measured throughout the years 1969 to 1974, with cane weights taken as a secondary dimension.

INTRODUCTION

Although Lynn (1969) considered it doubtful if many weeds offer significant competition to established grapevines, it is nevertheless important to control tall growing species which commonly invade vineyards. Weeds such as fathen (*Chenopodium album* agg), redroot (*Amaranthus hybridus*), willow weed (*Polygonum persicaria*), wild turnip (*Brassica campestris*), oxtongue (*Picris echioides*), paspalum (*Paspalum dilatatum*) and others with similar growth habits may be a contributory cause of yield reduction. Any or all of these weeds in sufficient numbers could compete with the vines for life support requirements and could interfere with harvesting and irrigation procedures, besides acting as a vector for disease and insect pests.

In vineyard management the choice of weed control practice lies mainly between forms of cultivation and the simple application of herbicides or herbicide combinations.

In New Zealand the most practical method of cultivation for weed control purposes is carried out by tractor mounted discs and rotary hoe. This type of tillage undoubtedly assists in the conservation of soil moisture and allows an efficient soil-incorporation of fertiliser dressings but may jeopardise root systems and damage vine shoots.

In dry weather, fine dust particles raised from the cultivation may adhere to the grape clusters and pose a minor problem in the wine making process. Furthermore, any soil disturbance prior to rain almost certainly increases weed seed germination, requiring additional mechanical work for weed elimination.

As an alternative measure for control of weeds in vineyards, the application of herbicides is progressively superseding mechanical cultivation in a considerable number of wine producing countries. Although a variety of herbicides such as diuron, dichlobenil, amitrole plus additive and others of a non-selective nature are being utilised, probably the most widely known and accepted chemical within this field is simazine.

Simazine used as a basic pre-emergent soil surface treatment has proved to be economically effective on a wide range of annual weeds. While vines in newly set vineyards may exhibit toxic symptoms from this material, documentation exists which shows that high dosage rates (in excess of 10 kg/ha) have not resulted in phytotoxic effects on mature vines or left residues in the fruit (Leonard and Lider, 1969). Other accounts report it as having beneficial effects on grapevine growth and berry yield; results which could not alone be attributable to destruction of weed vegetation (Gast and Grob, 1964). Further reference states that simazine applications had no significant long term effects on fruit maturity, total leaf nitrogen, phosphorus, potassium and soil organic matter, pH and cation exchange capacity (Weiss, 1970).

In view of the reticence of vineyard managers to depend more fully on chemicals, this experiment was set to determine to what extent yields from the herbicide treatments differ from those of cultivation.

EXPERIMENTAL

The study under review was prosecuted in a section of Seibel-C5437 (Cintara) variety grapevines located at Te Kauwhata on clay loam soil containing 8.4% organic matter throughout a profile 0 to 15 cm deep.

The trial consisted of eight replications of treatments, each plot containing three rows of seven vines spaced 3 m between rows and 2.4 m between vines. Statistical analyses of grape yields and associated data including cane weights were obtained from the harvest of five vines in the centre row of each plot.

Regular observations on the foliage for signs of simazine poisoning were made throughout the course of the trial.

Treatment details:

1. Untreated control
2. Cultivation
Essentially soil tillage (as required) to a depth of approximately 10 cm over the plot. Frequency of tillage varied between three and four times each season.
3. Herbicide treatment
Annual wide-band intra-row application of simazine 2.2 kg/ha plus paraquat 0.56 kg/ha made prior to bud burst.

Exceptions to this treatment occurred in 1970 and 1973 when dichlobenil 5.6 kg/ha plus amitrole/ ammonium thiocyanate 0.56 kg/ha and simazine 2.2 kg/ha plus glyphosate 2.0 kg/ha respectively, were applied to the plots. All solutions were applied by knapsack sprayer in not less than 480 litres of water per hectare. Inter-row areas were mown as required and clippings left in situ.

RESULTS AND DISCUSSION

The weed complex in the control plots consisted of annual fluctuations of oxtongue, redroot, wild turnip, acrid lettuce (*Lactuca virosa*), black nightshade (*Solanum nigrum* complex), dock (*Rumex obtusifolius*) and a variety of grasses and prostrate broadleaf weeds.

Cultivation gave very good control of weeds at all times.

All herbicide treatments in which paraquat or glyphosate were combined with simazine gave an effective kill of annual weeds and good follow-on weed suppression throughout the important stage of berry formation and development, but only the simazine/glyphosate combination gave adequate control of paspalum which appeared in some plots midway through the trial.

Dichlobenil plus amitrole/ammonium thiocyanate was the least effective of the chemical treatments. Plots treated with this combination became re-infested with weeds around 90 days after application.

Grape yields initially showed a close approximation for chemical and cultivation methods but subsequent values for cultivation were considerably higher (Table 1).

Cane weight figures for the various treatments were generally identified with fruit yields, except for 1973 in which prunings from the cultivation method were significantly lower than those from the herbicide treatment.

Acid and sugar percentages (Table 2) showed no recognisable trends between chemical and cultivation treatments but acids were slightly lower in untreated plots.

Orchards and Vineyards

The data (Table 1) did not show that simazine at the rate applied had increased berry yields or stimulated vine growth, but neither was there any evidence to suggest that damage from toxic residues had occurred.

In view of the almost parallel degree of weed control achieved by both the chemical and cultivation methods, reasons for the lower yields from the former treatment are hard to explain but the postulation that the green medians have contributed to yield reduction by lowering temperature and soil moisture, appears tenable.

Further research to establish reasons for the disparity in yields between chemical and cultivation treatments seems warranted.

TABLE 1: BERRY YIELD AND CANE WEIGHT (kg/ha)

Treatment	1969	1970	1971	1972	1973	1974	Total
BERRY YIELD							
untreated	5010 bA	5040 bB	5600 bB	3890 bB	10550 bAB	4630 bB	34700 cC
cultivation	7750 aA	9870 aA	10510 aA	7310 aA	14000 aA	13230 aA	62700 aA
chemical	8080 aA	9040 aA	5750 bB	3600 bB	8490 bB	11090 aA	46100 bB
CV %	34	33	36	31	28	33	15
CANE WEIGHT							
untreated	1000 a	770 bB	804 bB	*	1330 cC	1400 bB	5300 bB
cultivation	1690 a	2410 aA	2840 aA	*	2080 bB	2610 aA	11600 aA
chemical	1650 a	1590 abAB	1530 aAB	*	2850 aA	2520 aA	10100 bB
CV %	68	48	52		24	32	33

* no data

TABLE 2: SUGAR AND ACID PERCENTAGE

Treatment	1969	1970	1971	1972	1973	1974
SUGAR % (Hydrometer)						
untreated	15.94 a	19.13 a	18.32 bB	18.5 aA	16.64 a	22.3 aA
cultivation	16.13 a	19.44 a	17.30 cC	17.10 bA	16.09 a	19.4 bB
chemical	15.81 a	18.57 a	19.10 aA	17.0 bA	17.33 a	19.2 bB
CV %	7.0	7.5	1.9	6.6	8.0	6.5
ACID % (gm tartaric acid/litre)						
untreated	1.69 bA	0.97 bB	1.19 cB	1.64 a	1.21 a	0.85 bB
cultivation	1.88 aA	1.14 aA	1.43 aA	1.77 a	1.24 a	0.91 abAB
chemical	1.86 aA	1.09 aA	1.34 bA	1.72 a	1.28 a	0.96 aA
CV %	7.3	6.8	5.9	8.3	5.6	7.9

ACKNOWLEDGEMENTS

The authors wish to thank J. Whitham and the staff of the Te Kauwhata Viticultural Research Station for assistance with trial work, and the Biometrics Section of the Ministry of Agriculture and Fisheries for statistical analyses.

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