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Effect of topping, pinching, cincturing, and PCPA on the yield of Zante currant (Vitis vinifera var.)

by

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Introduction

More than 50 per cent of the flowers of the Zante currant vine (*Vitis vinifera* var. Zante currant, Black Corinth) may set fruit naturally (unpublished data), but these berries fail to develop satisfactorily without extra stimulation, which can be through such cultural practices as topping, pinching or cincturing (girdling), or by growth regulators.

Topping (removal of 15 cm or more from the shoot tip) and pinching (removal of 8 cm or less from the succulent tip) were found to increase set and yield of grape vines if practiced during flowering (Coombe 1959, Oprea 1963). Generally growers in the irrigation areas around Mildura (Victoria, Australia) top their currant vines two or three times during the growing season, mainly to keep the shape of the vines and for easier management particularly before spraying, but the effect of this topping on yield has not been measured precisely.

Cincturing (complete removal of a ring of bark about 3 mm wide around the trunk of the vine) has been an established practice in Australia since its introduction here in 1897 to improve set and increase yield of Zante currant (Jones 1955). In a trial comparing times of cincturing the present authors found that cincturing the vines at 50 per cent cap fall gave both the best fresh and dried yields and highest sugar content of the juice, but satisfactory results could be obtained by cincturing up to 10 days after completion of capfall.

Annual cincturing for many years has been found to weaken the vines considerably and the process itself is laborious, so that the introduction into Australia of spraying with para-chlorophenozyacetic acid (PCPA) as a substitute for cincturing (Coombe 1953; Jones 1955) was quickly followed by widespread adoption of the new practice.

Lately PCPA spraying has in its turn lost favour with growers in the Mildura district, because of its reputed unreliability.

The trial described in this paper was designed to compare the effect of topping, pinching, and cincturing alone and in combination with PCPA sprays.

Materials and Methods

Forty-year-old Zante currant vines on a commercial property were used. They were planted 2.4 m apart in rows 3.3 m apart, running north-east to south-west, and were pruned to two buds above the basal group on single spurs. Up until 1956 they had been cinctured each year, however since then and up until the time of the trial they were sprayed with PCPA at 20 ppm at flowering.

Single vine plots were laid out in a factorial trial of 12 treatments with 10 replications of each in randomized blocks in spring 1966. The treatments were carried out during flowering and are detailed in Table 1.

Table 1

Treatments and method and time of application

	Treatment	Method of application	Time of application
1.	Control	No topping, no pinching, no cincturing, no PCPA	
2.	Topping	Removal of 12 to 15 cm of the shoot tip	At 20 to 30% capfall
3.	Pinching	Removal of 5 to 8 cm of the shoot tip	At 20 to 30% capfall
4.	Cincturing	Removal of a complete ring (2 to 3 mm) of bark from around the trunk of each vine, by using a double bladed cincturing knife	At 70 to 80% capfall
5.	Topping + Cincturing		Cincturing was done 6 days after topping or pinching
6.	Pinching + Cincturing		
7.	PCPA 20 ppm	PCPA at 20 ppm sprayed by hand directed nozzles, one from each side of the vine	At 50—60% capfall
8.	Topping + PCPA 20 ppm		PCPA was sprayed 4 days after topping or pinching
9.	Pinching + PCPA 20 ppm		
10.	PCPA 20 ppm + Cincturing		Cincturing was done 2 days after PCPA spray
11.	Topping + PCPA 20 ppm + Cincturing		
12.	Pinching + PCPA 20 ppm + Cincturing		

In 1967 three bulk samples of 200 berries each were collected from the 10 replications four and two weeks before harvest and at harvest, in 1968 a sample of 100 berries was picked from each vine the day before harvest. From these samples average berry weight was determined as well as a refractometer measurement of the sugar content of the juice. At harvest the total fresh fruit yield of each vine was recorded and the dried fruit yield was calculated from the relationship between fresh weight and sugar content of the juice described by Lyon and Walters (1941)

for sultanas. This calculated dry weight for currants has been shown by Antcliff (1967) to be slightly less than the actual dry weight.

Results

As no significant interactions between the combined treatment have been established and the individual treatments act independtly, the results presented here are those of the main effects of the individual treatments.

The effects of the treatment components on fresh and dry yields, berry size and sugar content, are shown separately in Tables 2, 3, and 4.

It is seen from Table 2 that topping and pinching have no significant effects on fresh or dry yield. Both treatments increased berry size slightly in one season only and at the same time reduced sugar content; in the second season the only effect was a reduction in sugar content with topping.

Table 3 compares PCPA treatments with non-PCPA treatments. It is seen that the only significant difference in yield due to PCPA is a decrease in yield of dried fruit in the second year. Berry size is nearly doubled by PCPA in both years, and sugar is reduced.

The effects of cincturing are shown in table 4. Cincturing is associated with higher fresh fruit yields, heavier berries and lower sugar in both years, but with a

Table 2

Effect of topping or pinching on yields of fresh and calculated dried fruit, average fresh berry weight and sugar content of the juice at 1967 and 1968 harvests

Treatment	Fresh fruit yield (kg per vine)		Calculated dried fruit yield (kg per vine)		Berry weight (g)		Sugar content (°Brix)	
	1967	1968	1967	1968	1967	1968	1967	1968
Not topped or pinched	19.94	12.62	6.57	3.69	0.37	0.54	21.9	25.4
Topped	21.39	14.79	6.37	4.08	0.41*	0.50	20.4	24.4**
Pinched	20.86	13.95	6.33	3.99	0.42*	0.56*	21.0	25.1
L.S.D. $P < 0.05$	3.75	2.94	1.17	0.08	0.04	0.05	0.8	0.7
$P < 0.01$	5.00	3.89	1.55	1.06	0.06	0.07	1.0	0.9

Table 3

Effect of PCPA sprays on yields of fresh and calculated dried fruit, average fresh berry weight and sugar content of the juice at 1967 and 1968 harvests

Treatment	Fresh fruit yield (kg per vine)		Calculated dried fruit yield (kg per vine)		Berry weight (g)		Sugar content (°Brix)	
	1967	1968	1967	1968	1967	1968	1967	1968
No PCPA spray	19.27	14.87	6.30	4.32	0.29	0.37	22.4	25.2
PCPA spray (20 ppm)	22.19	12.70	6.47	3.52	0.52**	0.70**	19.8**	24.8
L.S.D. $P < 0.05$	3.06	2.40	0.95	0.65	0.03	0.04	0.6	0.6
< 0.01	4.08	3.18	1.27	0.87	0.05	0.06	0.8	0.8

Table 4

Effect of cincturing on yields of fresh and calculated dried fruit, average fresh berry weight and sugar content of the juice at 1967 and 1968 harvests

Treatment	Fresh fruit yield (kg per vine)		Calculated dried fruit yield (kg per vine)		Berry weight (g)		Sugar content (°Brix)	
	1967	1968	1967	1968	1967	1968	1967	1968
Not cinctured	15.45	11.87	5.58	3.62	0.37	0.48	23.1	25.9
Cinctured	26.01**	15.70**	7.19**	4.21	0.44*	0.59**	19.2**	24.1**
L.S.D. $P < 0.05$	3.06	2.40	0.95	0.65	0.03	0.04	0.6	0.6
$P < 0.01$	4.08	3.18	1.27	0.87	0.05	0.06	0.6	0.8

significant increase in calculated dried fruit yield in the first season only — the increase for dried fruit in the second season is not significant.

Discussion

Cincturing in comparison with PCPA in this trial tends to increase the fresh and dried fruit yields of Zante currant, suggesting that the increase in currant production in the early years of PCPA applications instead of cincturing could have been largely due to the recovery of the vines from many years of continuous cincturing.

Cincturing or PCPA increased berry size significantly but PCPA has the greatest effect in this respect, which is associated with the development of 2 to 3 seed structures in most of the berries on PCPA treated vines. Weaver and Williams (1951) reported a similar situation in California, and Weaver, Krimbas and Davidis (1957) found that under Greek conditions 44 per cent of Black Corinth berries developed hard seedcoats when treated with PCPA at full bloom.

Topping when compared with pinching tends to check the increase in berry size and to reduce the sugar content of the juice, which suggests that the reduction in leaf area as a result of topping is more harmful than that of pinching as far as berry size and the accumulation of sugars in the berries are concerned.

Summary

A factorial trial was carried out by using forty-year-old Zante currant vines (*Vitis vinifera* var. Zante currant; Black Corinth), to compare the effect of some cultural practices on fresh and dried fruit yield, berry size and sugar content. It showed that cincturing over the two years of the trial increased the fresh and dried fruit yield. PCPA sprays failed to increase yield and produced excessibely large berries, while topping and pinching have no significant effect on yield.

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Literature Cited

Antcliff, A. J., 1967: A field trial with growth regulators on the Zante Currant (*Vitis vinifera* var.). Vitis **6**, 14—20.

Coombe, B. G., 1953: Setting currants by spraying with PCPA. J. Dept. Agricult. S. Austral. **57**, 107—110.

— — , 1959: Fruit set and development in seeded grape varieties as affected by defoliation, topping, girdling and other treatments. Amer. J. Enol. and Viticult. **10**, 85—100.

Jones, L. T., 1955: Hormone sprays and their effects on the setting, yield and vigour of currant grape vines. Dept. Agricult. West. Austral. Bull. **2289**.

Le Roux, M. S. and Malan, A. H., 1945: Experiments on the topping of vines. Farming S. Afr. **20**, 543—548.

Lyon, A. V. and Walters, D. V., 1941: Production of dried grapes in Murray Valley irrigation settlements. I. Viticulture. Counc. Sci. Industr. Res. Austral. Bull. **143**

Oprea, S., 1963: L'influence du pincement sur la quantité et la qualité de la production de la vigne. Lucrari Stiintifice Inst. Cerc. Hort. Vitic. (Bucarest) **6**, 621—628.

Weaver, R. J. and Williams, W. O., 1951: Response of certain varieties of grapes to plant growth regulators. Bot. Gaz. **113**, 75—85.

— — , Krimbas, B. D. and Davidis, U. X., 1957: Response of Black Corinth and Thompson Seedless grapes to plant growth regulators under Greek conditions. Proc. Amer. Soc. Hort. Sci. **70**, 169—177.

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