EFFECTS OF SOME PLANT GROWTH REGULATORS ON BUD BURST AND ROOTING OF *VITIS VINIFERA* L. CV. CHAUSH CUTTINGS

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ABSTRACT

This experiment was carried out to determine the effects of GA_3, (50, 100, 200 and 400 ppm); CEPA (100, 200, 400 and 800 ppm); CCC and B-9 (500, 1000 and 2000 ppm) on bud burst and rooting of Chaush cv. cuttings taken during imposed dormancy (at the end of February under Central Anatolia conditions). GA_3 at 50 ppm, CEPA at all concentrations, and B-9 at 500 and 1000 ppm markedly delayed bud burst. CCC treatments hastened bud growth significantly. All growth regulators had no significant effect on % bud break. GA_3 treatments and B-9 at 1000 and 2000 ppm definitely inhibited root formation. CEPA treatments markedly delayed root formation, decreased % rooting and fresh root weight per cutting. CCC treatments had no effect on bud burst and % rooting but only 2000 ppm markedly increased fresh root weight per cutting.

There are many exogenous and endogenous factors affecting termination of dormancy in buds of *Vitis vinifera* (8). Exogenous factors include temperature (15,16,20), light intensity and day length (2), oxygen (17), water (14), minerals (11) and cultural operations (6). On the other hand, endogenous factors such as plant growth regulators, enzymes, amino acids, proteins, lipids and carbohydrates alone or interactive may be effective (8).

Many studies have been made to clarify the relationships between the levels of endogenous plant growth regulators and dormancy in plants, but this phenomenon is still not clear (5,23).

Certain hormones have value in breaking dormancy or delaying bud burst in horticultural plants. Late spring freeze is a very important factor for grape growing in Central Anatolia. GA_3 (7), BOA (24), CCC (7,24), ethephon and morphactin (25,26) have markedly delayed bud burst in *Vitis vinifera* varieties. But the effects of these chemicals differ widely. A delay of 15 to 20 days induced by use of certain compounds could provide considerable protection against spring frost in this region. This experiment was carried out to determine the effects of GA_3 , CEPA, CCC, and B-9 on the bud burst and rooting of Chaush grapevines grown in Central Anatolia.

MATERIALS AND METHODS

One-year-old shoots of Chaush canes were collected from vineyards of the Horticultural Department of Ankara University at the end of February. Eighteen single bud cuttings from these shoots were prepared for each treatment and for each repeat.

Basal ends of cuttings were immersed for 24 hours in one of the following solutions: GA_3 at 50, 100, 200 or 400 ppm; CEPA (ethephon) at 100, 200, 400 or 800 ppm; B-9 (Alar) and CCC (Cycocel) at 500, 1000 or 2000 ppm. After treatment, cuttings were placed in containers under diffuse light (1000 lux), at 24 to 26°C and 75 to 80 R.H.; the bottom 5 to 7 cm of the cuttings were immersed in water. Cuttings were observed for bud and root growth three times per week. Growth was considered to have commenced when the green color of an enlarging bud became visible. A randomized complete block design with three repeats was used and mean separation was by the Tukey test.

RESULTS AND DISCUSSION

Effect of growth regulators on bud burst: GA_3 at 50 ppm; CEPA at 200, 400 or 800 ppm; and B-9 at 500 ppm markedly delayed the time of bud burst. On the contrary, CCC at 500 and 2000 ppm markedly hastened the bud burst (Table 1). Cuttings treated with GA_3 did not show normal bud growth. Buds treated with GA_3 dried soon after burst.

Cuttings treated with CEPA, CCC and B-9 had normal bud growth after burst. CEPA at 800 ppm was the most effective concentration and caused a 19-day delay on bud burst. GA_3 at 50, 100 or 200 ppm; CEPA at 100 ppm markedly delayed 50% bud burst (Table 1).

All concentrations of GA_3, CEPA, CCC and B-9 had no significant effect on % bud break at the end of the

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Table 1. Effect of GA_3, CEPA, CCC, and B-9 on bud burst of cuttings of Chaush grape.

Treatments (ppm)		Days to first bud burst	Days to 50% bud burst	% bud break
GA_3	0	11.0	17.0	96.2
	50	17.3	38.7	88.9
	100	13.7	25.3	100.0
	200	11.0	27.7	88.9
	400	11.0	19.0	100.0
P	0.05	5.9	8.5	NS
	0.01	7.3	11.5	NS
CEPA	0	11.0	17.0	96.2
	100	14.0	29.0	94.4
	200	23.0	32.7	100.0
	400	22.0	33.3	100.0
	800	30.0	39.7	100.0
P	0.05	3.8	3.3	NS
	0.01	5.2	4.6	NS
CCC	0	11.0	17.0	96.2
	500	7.0	10.2	94.4
	1000	10.0	12.4	94.4
	2000	7.2	12.7	88.9
P	0.05	3.8	4.5	NS
	0.01	NS	NS	NS
B-9	0	11.0	17.0	96.2
	500	18.2	25.0	88.9
	1000	15.0	23.3	88.9
	2000	15.0	21.6	94.4
P	0.05	5.0	5.5	NS
	0.01	6.6	7.0	NS

Table 2. Effect of GA_3, CEPA, CCC, and B-9 on rooting of cuttings of Chaush grape.

Treatments (ppm)		% rooting	Fresh weight of roots per cutting (mg)
GA_3	0	85.0	745.9
	50	0.0[a]	0.0[a]
	100	0.0	0.0
	200	0.0	0.0
	400	0.0	0.0
P	0.05	—	—
	0.01	—	—
CEPA	0	85.0	745.9
	100	35.3	79.4
	200	52.0	65.1
	400	46.4	53.3
	800	18.7	17.2
P	0.05	21.2	119.4
	0.01	28.9	163.7
CCC	0	85.0	745.9
	500	71.8	741.7
	1000	74.2	793.0
	2000	74.0	871.5
P	0.05	NS	45.2
	0.01	NS	70.8
B-9	0	85.0	745.9
	500	41.2	722.5
	1000	0.0	0.0
	2000	0.0	0.0
P	0.05	13.1	17.5
	0.01	15.6	25.0

[a] No rooting was observed during experiment period (56 days).

56-day experimental period (Table 1).

Previous studies (4,18,21) indicated the marked delays on the burst of vine buds with 10 to 100 ppm GA_3 treatments. In this experiment GA_3 at 50 ppm significantly delayed the burst of buds. These experiments were carried out on vine cuttings taken during the period of dormancy. GA_3 treatments have been shown to be more effective during rest than during imposed dormancy (3). Higher rates of GA_3 (500 to 4000 ppm) during rest and imposed dormancy inhibited bud burst of Muscat of Hamburg (7).

As a result of our experiment, it has been demonstrated that GA_3 especially at 50 and 200 ppm markedly delayed 50% bud burst, but all concentrations of this chemical caused abnormal bud growth.

Previous reports indicated that CEPA treatments markedly delayed the bud burst of different fruit species (13,25,26). In this experiment, all CEPA treatments markedly delayed bud burst, but did not affect the % bud break (Table 1).

CCC and B-9 are known as growth retardants. These two chemicals delayed the bud burst in apricots, peaches, apples and grapevines (7,9,13,19). In contrast with the results above, CCC treatments markedly hastened bud burst in our experiment but the delay effects of B-9 treatments in this experiment are similar to the results in Table 1.

Effect of growth regulators on root formation: Gibberellins and growth retardants inhibited rooting (22). In our experiment, all GA_3 treatments and B-9 at 1000 and 2000 ppm definitely inhibited root formation. On the other hand, all CEPA and B-9 treatments at 500 ppm markedly decreased the % rooting and fresh root weight per cutting (Table 2).

CCC treatments slightly decreased the % rooting and increased fresh root weight per cutting (Table 2).

The effect of CEPA treatments on root formation in this experiment are in contrast to reported results (1,10,12,22). These reports indicated that CEPA increases the % rooting of cuttings. The difference may be due to the higher concentrations used in our study.

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