

EFFECT OF ETHEPHON ON COLOR AND FRUIT CHARACTERISTICS OF 'TOKAY' AND 'EMPEROR' TABLE GRAPES

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The authors are indebted to Amchem Products, Ambler, Pennsylvania, for financial and technical assistance.

Accepted for publication March 20, 1975.

ABSTRACT

Ethephon enhanced color development in 'Tokay' and 'Emperor' table grapes. The most effective concentrations were 200 ppm for 'Tokay' and 100 to 200 ppm for 'Emperor.' Berry firmness was reduced.

The most effective time of application in one of

two 'Tokay' vineyards was shortly after color development began. Application when 10 to 80% of the berries showed color was equally effective with 'Emperor.'

Table grapes may reach all minimum maturity standards except adequate color. Ethephon has shown potential in coloring grapes. Weaver (2) applied ethephon to the table-grape cultivars 'Tokay' and 'Emperor.' He reported no color enhancement of 'Tokay.' Some concentrations on some sampling dates increased color in 'Emperor.'

Jensen et al (1) obtained color enhancement by ethephon applied at 300 and 600 ppm on the cultivars 'Tokay' and 'Emperor.' Results were generally best from applications made shortly after color initiation. Ethephon produced a reduction in berry firmness.

Since those trials showed that no more than 300 ppm was required for color enhancement, 100, 200, and 300 ppm were tested in 1973 to determine whether color benefit could still be obtained with less loss of berry firmness.

MATERIALS AND METHODS

Trials were located in two 'Tokay' vineyards in the Lodi area (San Joaquin County); and three 'Emperor' vineyards in the Reedley area (Fresno County), the Delano area (Kern County), and the Exeter area (Tulare County). The leafroll infection status of the vines is unknown. A completely randomized design was employed in the two 'Tokay' trials and randomized complete block design in the

three 'Emperor' trials. There were eight replications of each treatment, with single vines used as replications. Volume of spray was 1.89 liters per vine.

The first treatment to 'Tokay' was made on July 30 (5% color) and the second on August 9 (15% color). The 'Emperor' vineyards were treated as follows: Vineyard 3, first treatment, August 6 (30% color), second treatment, August 20 (80% color); Vineyard 4, first treatment, August 9 (15% color), second treatment, August 23 (30% color); Vineyard 5, first treatment, August 10 (10% color), second treatment, August 23 (40% color).

Fruit characteristics were determined on 50-to-100-berry samples in 'Tokay,' and 100-berry samples in 'Emperor.' Fruit was harvested selectively to conform to U. S. No. 1 color standards.

Berry firmness was evaluated with a U.C. firmness tester. Readings were made on the exposed flesh at the stylar end of the berries using a flat-ended 4.8-mm-diameter probe. Twenty berries were tested for each replication.

Fruit kept for firmness evaluation and quality observation after various periods of storage was placed in commercial cold storage.

Ethephon concentration and time of application were investigated simultaneously in factorial experiments. When date of application was not significant, the concentration effects are shown with mean separation by Duncan's multiple-range test.

Table 1. Effect of date of ethephon application and concentration on amount of fruit picked at first harvest, Aug. 24.

Vineyard and date treated	Kg per vine				Av. effect of date
	Conc. ethephon (ppm)				
	0	100	200	300	
'Tokay' no. 1					
July 30	.198	4.63	8.67	6.76	5.04
Aug. 9	.958	1.95	4.54	3.65	2.78
Av. effect of concentration	.581	3.28	6.63	5.22	
LSD 0.05	conc. = 1.79, date = 1.27, interaction = NS				
'Tokay' no. 2					
July 30	1.54	4.63	7.40	7.22	5.22
Aug. 9	1.66	3.91	5.13	5.45	4.08
Av. effect of concentration	1.60	4.28	6.04	6.36	
LSD 0.05	conc. = 3.21, date = NS, interaction = NS				

RESULTS

'Tokay': Table 1 shows a significant date effect in Vineyard 1 but not in Vineyard 2. Concentration effects (Table 2) show the most favorable response with 200 ppm for the first harvest. All ethephon concentrations (Table 3) significantly reduced berry firmness compared to no ethephon.

'Emperor': Date of treatment was not significant in any trial. The concentration effects in Table 2 show greater first harvests with 100 ppm compared to no ethephon in Vineyard 3 and 4, and with 200 ppm in all vineyards. In Vineyard 3, the fruit treated with 200 or 300 ppm colored excessively.

'Emperor' berry firmness was reduced by all ethephon treatments as compared to no ethephon except for 100 ppm in Vineyard 3. One hundred and

Table 2. Effect of ethephon concentration on amount of fruit harvested.

Vineyard and harvest no.	Date	Kg per vine			
		Conc. Ethephon (ppm)			
		0	100	200	300
'Tokay' no. 1					
First	Aug. 24	.581 a ¹	3.28 b	6.63 c	5.22 c
Second	Sept. 5	2.83 a	7.67 b	7.04 b	8.62 b
Third	Sept. 13	2.42 a	2.96 a	2.02 a	3.12 a
Strippings	Sept. 13	17.7 a	9.22 b	3.71 c	4.27 c
Total		23.6 a	23.1 a	19.4 a	21.2 a
'Tokay' no. 2					
First	Aug. 24	1.60 a	4.28 ab	6.04 b	6.35 b
Second	Sept. 5	7.54 a	10.9 b	13.4 b	11.8 b
Third	Sept. 13	6.72 a	6.58 a	3.81 a	5.54 a
Strippings	Sept. 13	12.8 a	3.67 b	2.00 b	2.45 b
Total		28.7 a	25.2 a	25.5 a	26.1 a
'Emperor' no. 3					
First	Oct. 1	3.01 a	14.0 b	16.3 bc	17.9 c
'Emperor' no. 4					
First	Oct. 2	1.41 a	4.99 b	8.63 c	10.1 c
Second	Oct. 12	3.33 a	4.63 a	4.17 a	4.63 a
Strippings	Oct. 12	10.9 a	5.90 b	3.15 c	2.72 c
Total		15.7 a	15.6 a	15.9 a	17.4 a
'Emperor' no. 5					
First	Oct. 18	2.58 a	4.07 ab	5.68 bc	6.81 c
Strippings	Oct. 18	10.9 a	9.72 ab	7.67 ab	6.90 b
Total		13.5 a	13.8	13.3 a	13.7 a

¹ Mean separation in rows (each date and total) by Duncan's multiple-range test, 5% level.

200 ppm were not significantly different. The effects of ethephon in reducing berry firmness were not altered by cold storage. Detailed results are in Table 3.

LITERATURE CITED

Table 3. Effect of ethephon concentration on berry firmness. 'Tokay' no. 2

Vineyard and sample description	Date tested	Berry firmness (g)			
		Conc. ethephon (ppm)			
		0	100	200	300
First harvest, Aug. 24	Aug. 27	262 a ¹	208 b	200 b	191 b
Second harvest, Sept. 5	Sept. 7	246 a	199 b	190 b	191 b
Second harvest, cold storage 3 weeks	Sept. 26	225 a	179 b	176 b	165 b
Second harvest, cold storage 7 weeks	Oct. 24	199 a	162 b	158 b	143 b
'Emperor' no. 3 Harvested Sept. 24	Sept. 25	243 a	223 ab	215 b	185 c
Harvested Oct. 1, cold stg. for 2 mo.	Dec. 3	334 a	301 ab	283 b	242 c
Harvested Oct. 1, cold stg. for 4 mo.	Feb. 1	238 a	220 ab	207 b	178 c
'Emperor' no. 4 Harvested Oct. 2	Oct. 3	425 a	377 b	363 b	333 b
'Emperor' no. 5 Harvested Oct. 15	Oct. 16	367 a	322 b	296 bc	281 c
Harvested Oct. 17, cold stg. for 2 mo.	Dec. 17	440 a	386 bc	390 b	355 c
Harvested Oct. 17, cold stg. for 4 mo.	Feb. 19	282 a	240 b	226 bc	222 c

¹ Mean separation in rows (each date) by Duncan's multiple-range test, 5% level.

1. Jensen, F., J. Kissler, D. Luvisi, B. Peacock, D. Halsey, and G. Leavitt. Effect of ethephon on table grapes. *Blue Anchor* 50:16-18 (1973).

2. Weaver, Robert J., and Robert M. Pool. Effect of (2-chloro-ethyl) phosphoric acid (ethephon) on maturation of *Vitis vinifera* L. *J. Am. Soc. Hort. Sci.* 96:725-727 (1971).