Ethephon is of doubtful value on Thompson Seedless table grapes

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Use of the growth regulator ethephon to enhance maturity in the Thompson Seedless grape variety being grown for raisins has attracted considerable attention among growers in the San Joaquin Valley, California. In 13 of 17 trials conducted from 1977 to 1980, soluble solids of Thompson Seedless raisin grapes significantly improved by an average of 0.8 degree Brix (range 0.4 to 1.3) when ethephon was applied at a rate of 1 pint per acre at or near the berry softening stage. This enhancement of soluble solids translates into about three to nine days' earlier maturity.

Trials were then begun in 1979 to determine if similar benefits could be achieved on table Thompson Seedless and to learn how ethephon might affect other fruit characteristics. Table Thompson Seedless differ from those produced for raisins in that the vines are sprayed with gibberellin at bloom and at fruit set. The vines are also girdled and thinned. These operations change the shape of the berry and enlarge it by a factor of 2 to 2½.

Methods

Two trials were established in Fresno County to evaluate ethephon on table Thompson Seedless. Both trials were randomized complete block design with 15 replications of two vines per replication. Ethephon was applied at rates of 1 and 2 pints per acre with a spray volume of 200 gallons per acre.

Vineyard 1 was near Sanger in a commercial table Thompson Seedless vineyard trellised with a double cross-arm. The ethephon treatments were applied on July 6, 1979, when the soluble solids were 11 degrees Brix. Vineyard 2 near Parlier, was trellised with a high single cross-arm. The ethephon treatments were applied on July 7, 1979, when soluble solids were 9 degrees Brix.

Berries were sampled in both vineyards on three dates: each sample consisted of 100 berries. Berry firmness determinations were run on 30 berries from each replication at the last sampling date.

Results

Ethephon applications did not increase soluble solids in either table Thompson vineyard; however, total acidity had dropped significantly on the first two sampling dates in both vineyards. This reduction in total acidity was not significant by the third sampling date. Berry weight was not affected, except on the last sampling date in one trial where the 2-pint rate showed a size decrease. Berry firmness was reduced significantly with both 1 and 2 pints of ethephon. Although 2-pint treatments produced lower firmness than 1-pint, this difference was not significant.

A slight red pigmentation of the fruit appeared in both vineyards where ethephon had been applied, but was greater in vineyard 1 than in vineyard 2. The red pigmentation developed primarily on well-exposed clusters, although a lesser amount was occasionally noted on protected berries. The 2-pint rate developed more color than the 1-pint rate. The number of clusters that would have to be culled for color was estimated at 1 percent for the 1-pint rate, and 2 percent for the 2-pint rate in vineyard 1. Although color was noted in vineyard 2, with 2 pints worse than 1 pint, only a few clusters would have been lost.

Discussion

These trials show no benefit from ethephon except for reduction in total acidity. This marginal benefit, coupled with firmness reduction, militates against its use even without the color problem. The development of color alone would make it hazardous to even recommend the use of ethephon on table Thompsons. Although the losses in these trials were not severe, the potential for much greater losses due to red pigmentation must be considered a continuing hazard.

It is not clear whether ethephon failed to show increased soluble solids in these two trials because of a difference in response of table Thompsons (treated with gibberellin, girdled, and thinned) as contrasted to natural Thompsons, or simply because ethephon does not show a benefit in every vineyard when used.

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TABLE 1. Effect of Ethephon on Thompson Seedless Fruit Characteristics on Three Sampling Dates, Vineyard 1, Sanger

Ethephon treatment	July 16*			July 23*			August 3*			
	Berry weight	Soluble solids	Titratable acidity†	Berry weight	Soluble solids	Titratable acidity†	Berry weight	Soluble solids	Titratable acidity†	Berry firmness*
	grams	*°Brix*		*grams*	*°Brix*		*grams*	*°Brix*		*grams*
None	3.69 a	13.4 a	1.17 a	4.15 a	15.8 a	0.83 a	4.49 a	16.6 a	0.61 a	301 a
1 pint per acre	3.73 a	13.2 a	1.14 b	4.25 a	15.5 a	.80 b	4.42 a	16.5 a	.60 a	273 b
2 pints per acre	3.77 a	13.4 a	1.10 c	4.19 a	15.9 a	.79 b	4.37 a	16.7 a	.59 a	255 b

*Duncan's multiple range test; numbers followed by the same letter within a column of each sampling date are not significant at the 5 percent level.
†Titratable acidity as tartaric, grams per 100 ml.

TABLE 2. Effect of Ethephon on Thompson Seedless Fruit Characteristics on Three Sampling Dates, Vineyard 2, Parlier

Ethephon treatment	July 18*			July 27*			August 6*			
	Berry weight	Soluble solids	Titratable acidity†	Berry weight	Soluble solids	Titratable acidity†	Berry weight	Soluble solids	Titratable acidity†	Berry firmness*
	grams	*°Brix*		*grams*	*°Brix*		*grams*	*°Brix*		*grams*
None	3.04 a	14.6 a	1.51 a	3.38 a	16.8 a	0.97 a	3.75 a	18.0 a	0.73 a	276 a
1 pint per acre	3.07 a	14.5 a	1.44 b	3.35 a	16.9 a	.94 b	3.63 ab	18.1 a	.72 a	240 b
2 pints per acre	3.01 a	14.2 a	1.45 b	3.32 a	16.6 a	.95 ab	3.53 b	18.0 a	.72 a	224 b

*Duncan's multiple range test; numbers followed by the same letter within a column of each sampling date are not significant at the 5 percent level.
†Titratable acidity as tartaric, grams per 100 ml.