Some Effects of Gibberellic Acid Applications on Two French Hybrid Grape Varieties

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Abstract. 'Seibel 10878' and '9549' grape flower clusters were dipped in gibberellic acid (GA) solutions at concentrations of either 50 or 100 ppm. Treatments at full bloom increased pH and sugar/acid ratio but decreased acid content of the fruit at harvest time in comparison to treatments after fruit-set. Two applications of 50 ppm increased soluble solids as much as did one application of GA at 100 ppm.

Gibberellins (GA) are stimulants of plant growth discovered by Kurosawa (3) and isolated by Yabuta and Sumiki (9) in 1938 in Japan.

In recent years (since about 1957), a significant amount of work has been done to determine the effect of gibberellins on grapes. Pronounced increase in berry size and improved fruit-set have been reported on European type *(Vitis vinifera)* seedless varieties (5, 7, 8). Although the most pronounced effects of gibberellin have been observed in seedless varieties, some favorable responses have been noted in seeded grapes (1, 2, 4, 6, 7). In a further attempt to study some effects of GA on seeded grape varieties, the following experiment was carried out on two seeded French hybrids, 'Seibel 9549' and '10878'. These are the two most important hybrid varieties in British Columbia, and little or no previous work on GA has been done in this province.

Materials and Methods

In the spring of 1971, 14 plants of the variety 'Seibel 10878' and 14 plants of the variety 'Seibel 9549' were chosen. The plants were visually uniform in trunk size and arm length and diameter. The plants were in their fifth year in the vineyard, trained to the three-wire Kniffen system.

The 14 plants of each variety were divided into two blocks of 7 plants. In each block there were 7 treatments arranged at random. They were as follows: a control, 50 ppm GA at full blossom, 100 ppm GA at full blossom, 50 ppm GA at post fruit-set, 100 ppm GA at post fruit-set, 50 ppm GA at full bloom + 50 ppm GA at post fruit-set, and 100 ppm GA at full blossom + 100 ppm GA at post fruit-set. Approximately one week before blossom all of the plants were cluster thinned to two clusters per shoot. At full blossom (taken to be when 50% of the calyptras had fallen) the pre-fruit-set treatments were applied.

The flower clusters were completely immersed in the treatment solutions. After fruit-set, when the berries were the size of small peas, the post fruit-set treatments were also applied by immersing the clusters. At the time of harvest the following measurements were taken on an individual plant basis: (a) number of bunches; (b) weight of fruit; (c) separate weights of each of three random bunches; (d) soluble solids using a Zeiss hand refractometer; (e) pH using a standard pH meter, and (f) titratable acidity was determined as grams tartrate per 100 ml of juice (% tartaric acid).

All data were analyzed with the analysis of variance and multiple linear regression techniques. Only statistically significant ($P = .05$) results

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are discussed. The hypotheses tested were not quite the same in the two analyses.

Results and Discussion

Double applications of GA at 50 ppm and single applications of GA at 100 ppm had similar effects on the percent soluble solids in the juice. These two rates of application gave greater soluble solids than did a single application of 50 ppm or a double application of 100 ppm (Table 1).

Table 1. Effect of GA on soluble solids in 'Seibel 10878' and 'Seibel 9549'.

	50 ppm	100 ppm
Single Application		
Double Application		

Applications of GA at full blossom resulted in lower percent acid, higher sugar/acid ratio, and higher pH in the juice than did applications of GA after fruit-set (Table 2). In both varieties, applications of 50 ppm GA at full blossom plus 50 ppm GA after fruit-set resulted in higher sugar/acid ratios than did the other treatments (Table 3). This effect probably would not have been observed had we not statistically held the bunch number constant in our regression analysis, since the number of bunches varied considerably and had an appreciable influence on the sugar/acid ratio. The increase in the percent soluble solids in grapes treated with GA is similar to the observations made by Clore (2) and Weaver (6). Clore (2) found an opposite effect on acid content, however.

Table 2. Effect of GA on pH sugar/acid ratio, and acid content of 'Seibel 10878' and 'Seibel 9549'.

	Time of Application of GA*	
	full bloom	post fruit set
pH		
sugar/acid ratio		
acid (% as Tartrate)		

*The time of application had a significant effect ($P = 0.05$) on each variable.

Table 3. Sugar/acid ratio influenced by several independent variables.
(Adjusted Means Fitted from the Equation, $y = a + b_1 x_1 + b_2 x_2 + b_3 x_3$).

	Bunch Numbers		
	80	100	120
Seibel 10878 – 50 ppm GA at full blossom + 50 ppm GA Post Fruit Set	8.02	7.44	6.86
Seibel 9549 – 50 ppm GA at full blossom + 50 ppm GA Post Fruit Set	10.62	10.04	9.46
Seibel 10878 – All Other Treatments	6.85	6.27	5.69
Seibel 9549 – All Other Treatments	9.45	8.87	8.29

Parameters estimated by the regression equation were:
a = constant = 9.1919,
b_1 = coef. for Bunch No. = −.292,
b_2 = coef. for 'Seibel 9549' = 2.5991,
b_3 = coef. for 50 ppm at full blossom + 50 ppm at post fruit set = 1.1661,
where x_1 = bunch number,
x_2 = 0 for 'Seibel 10878'; 1 for 'Seibel 9549',
x_3 = 1 for 50 ppm at full blossom + 50 ppm at post fruit set
= 0 for all other treatments.

Although statistically significant beneficial effects of treatment with GA were observed in this experiment, the effects were small. Moreover, our method of application of GA by dipping bunches is not practical. Nevertheless, our results indicate that further research to determine the effects of GA upon seeded varieties under commercial conditions is justified.

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The Kaller Atemoya

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Two years ago Fruit Varieties and Horticultural Digest carried my article about the "African Pride" atemoya in Florida. In that article, it was described as having originated in South Africa, and then being introduced into Australia by Langbecker's Nurseries. Langbecker's has since gone out of business.

Correspondence with Mr. Gordon McNeil of Northern Transvaal has turned up additional information about this variety. Mr. McNeil has contacted Mr. Harrington of Deepdale, Natal, who sent the budwood to Australia. Mr. Harrington wrote him that Langbecker's apparently got names confused and renamed all of the material which was sent them. He further stated that he was not sure which names had been put on which varieties, but that if the African Pride was an atemoya, it must be the "Kaller," which originated in Israel, since this is what he sent. He also said that the "Kaller" has been a heavy

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