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VARIATION IN THE RIPENING OF THOMPSON SEEDLESS AND ARKAVATI GRAPES ON DIFFERENT TIERS OF TATURA TRELLIS

P.L. SAROJ*, S.D. SHIKHAMANY AND G.S. PRAKASH

Indian Institute of Horticultural Research, Bangalore 560 089

INTRODUCTION

The method of training system provides a strong base for prolific and quality fruiting of the vines growing upon them by manipulating micro-climate with judicious utilization of light energy. The factors which decide the selection of a particular training system are mainly their light harvesting capacity, provision for mechanization as well as cost for initial establishment. A good deal of work was carried out by different workers so far on the effect of different training systems on yield and quality parameters (Shaulis *et al.*, 4; Shaulis and May, 5; Smart, 6; Wali *et al.*, 8) but it is also a matter of great interest that within a same training system having different tiers like tatura trellis, it is possible that the quality attributes of berries can vary. Therefore, a trial has been undertaken to study the variation in ripening behaviour of important grape varieties, i.e., Thompson Seedless and Arkavati on different tiers in tatura system of training.

MATERIALS AND METHODS

The investigation was carried out at the Indian Institute of Horticultural Research, Bangalore during 1992. Tatura trellis consisted of 3 m long iron poles placed at 60° angle forming V-shape structure. The V-shape frames were fixed at 9 m spacing along the rows in east-west direction leaving 1.5 m between the tips of assemblies of adjacent rows. Three horizontal wires on each side of the structure were erected at a space of 0.5 m from each other while the bottom wire was 1 m above the ground level. The vines planted 3 × 3 m apart within a row were trained on all the wires of V-trellis to have three pairs of arms on either side.

In the second year of fruiting, a composite sample of 50 berries were collected at the rate of one per cluster from the middle portion of fifty uniform clusters tagged during flowering stage from each tier on either side on every alternate day commencing from 93rd day after full bloom. These berries were crushed and T.S.S. was measured by using hand refractometer. The total titrable acidity was determined by titrating against N/10 NaOH using phenolphthalein as indicator. The T.S.S./acid ratio was computed.

*Present address: Scientist (Horticulture), Division of Plant Sciences, 218, Kaulagarh Road, CSWCRTI, Dehradun 248 195.

RESULTS AND DISCUSSION

The berry weight increased continuously till the 6th sampling (18th March) and thereafter the increase in berry weight was either nil or very little in both the varieties on all the tiers (Table 1 and 2). However, there was slight decrease in the berry weight on top tier at final sampling (20 March). The reduction of berry weight on top tier could be due to more exposure to sunshine and shrinkage of berries. Rate of increase in berry growth was marked for a longer period in the bottom tier as compared to the rest of the tiers in both the varieties. Berries gained weight considerably until 16th March in the bottom tier in Arkavati while in Thompson Seedless it was only upto 11th March in the corresponding tier. At final sampling, the berry weight was maximum on bottom tier followed by middle and top tiers in both the varieties.

The T.S.S. content of juice increased till the final sampling in both the varieties (Table 1 and 2). Rate of increase in T.S.S. content of both varieties was more on the top tier when compared to the other tiers. It can be attributed to the availabilty of more light and temperature to the berries on the top tier. At final stage of sampling, the maximum T.S.S. was recorded on bottom tier (20.50 per cent) followed by middle (19.60 per cent) and top tier (19.10 per cent) in Thompson Seedless whereas in Arkavati it was maximum on the top tier (22.30 per cent) followed by middle (21.50 per cent) and bottom tier (20.0 per cent). The opposite trend of T.S.S. content between these two varieties might be due to their differences in growth behaviour. Arkavati is more vigorous as compared to Thompson Seedless. Comparatively the bearing shoots on top tiers in Thompson Seedless had less number of leaves as compared to those on the other tiers and also less than in Arkavati on the corresponding tier. Therefore, the initial level of T.S.S. on top tier in Thompson Seedless on the first day of sampling itself was lowest. On the contrary, in Arkavati, the initial level of T.S.S was although least but due to availability of adequate leaf area and sunlight, the berries on top tiers accumulated more sugars in subsequent days when compared to those on lower tiers. Contribution of leaf area to the T.S.S. content of berries has been clearly shown by Purohit *et al.* (3) and Chittiraichelvan *et al.* (1) under the agro-climatic conditions similar to those of present investigation.

It is very apparent from the data (Table 1 and 2) that the titrable acidity decreased continuously till the final sampling in both the varieties. At final stage of sampling, the acidity was 0.68, 0.69 and 0.66 per cent in Thompson Seedless, and 0.71, 0.72 and 0.74 per cent in Arkavati on top, middle and bottom tiers, respectively although the differences were very narrow. Generally, the titrable acidity was more on bottom tier as compared to top and middle tiers in case of Arkavati but in Thompson Seedless the acidity was more on middle and top tiers as compared to bottom tier. The variation in acid content on different tiers within the same training system was probably due to differences in the exposure of clusters to radiation on account of differential growth of shoots on different tiers. Influence of shading on the titrable acid content has been well documented by Smart *et al.* (7) and Williams *et al.* (9).

TABLE 1

Variation in berry weight, T.S.S. and acidity of Thompson Seedless on different tiers of Tatura trellis

Dates	Heat unit summation (C)	Weight of 50 berries (g)			T.S.S.(%)			Acidity (%)		
		Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
7.3.92	86.5	113.0	114.5	116.0	16.2	17.0	18.0	0.88	0.83	0.80
9.3.92	111.5	121.5	124.5	121.5	17.6	17.6	18.0	0.85	0.74	0.75
11.3.92	136.5	124.0	127.0	127.0	17.8	18.0	18.1	0.82	0.71	0.74
13.3.92	162.5	124.5	127.5	128,5	17,8	18.9	18.6	0.77	0.69	0.71
16.3.92	201.0	126.5	127.5	131.0	18.0	19.0	20.0	0.72	0.69	0.69
18.3.92	227.5	126.5	128.0	132.0	18.6	19.4	20.4	0.69	0.69	0.66
20.3.92	257.5	125.5	128.0	132.5	19.0	19.6	20.5	0.68	0.69	0.66

TABLE 2

Variation in berry weight, T.S.S. and acidity of Arkavati on different tiers of Tatura trellis

Dates	Heat unit summation (C)	Weight of 50 berries (g)			T.S.S.(%)			Acidity (%)		
		Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
7.3.92	86.5	79.5	74.0	80.0	16.0	19.0	17.8	1.04	1.02	1.18
9.3.92	111.5	83.0	83.5	86.5	18.2	19.4	18.5	1.02	0.95	0.97
11.3.92	136.5	88.5	85.0	93.5	19.6	19.5	19.6	0.95	0.94	0.85
13.3.92	162.5	96.0	89.0	96.0	21.2	20.5	19.8	0.80	0.88	0.82
16.3.92	201.0	100.0	92.0	106.0	21.8	20.8	20.5	0.73	0.74	0.74
18.3.92	227.5	100.0	106.0	108.0	22.0	21.2	20.8	0.71	0.72	0.74
20.3.92	257.5	98.0	108.0	108.5	22.3	21.5	21.0	0.71	0.72	0.74

T.S.S./acid ratio is better indicator of ripeness in grapes than either the T.S.S. or acidity alone. T.S.S./acid ratio increased with advancing dates of sampling. These results are in agreement with Prakash and Reddy (2). Variation in the rate of increase in this ratio on different tiers in both the varieties is depicted in Fig. 1. At final stage of sampling, the T.S.S./acid ratio was 28, 28.4 and 31.0 per cent in Thompson Seedless, and 31.50, 30.0 and 28.50 per cent in Arkavati on top, middle and bottom tiers, respectively. The bottom tier showed higher T.S.S./acid ratio than top and middle tiers in Thompson Seedless while in Arkavati the reverse trend was recorded. In view of the fact that neither T.S.S. increased nor acidity reduced considerably beyond 20th March; accumulation of 257.5 degree days of centigrade, corresponding to this date seem to be adequate for ripening of these two varieties.

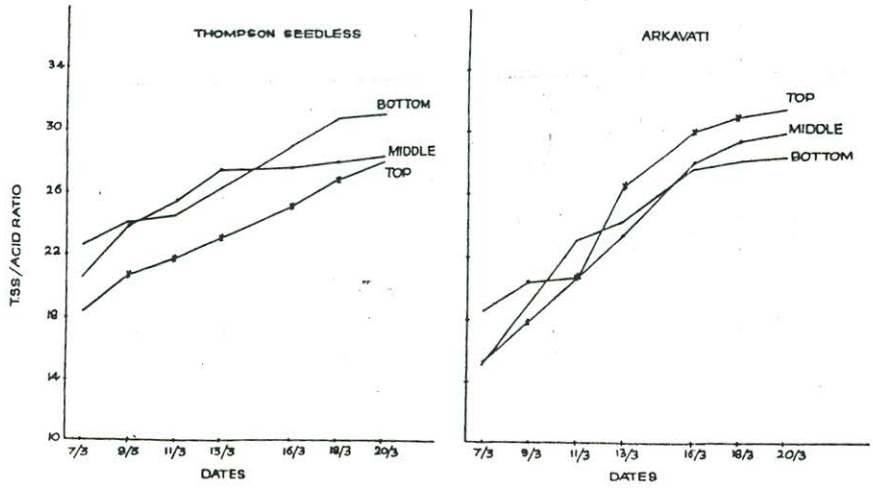

Fig. 1 Variation in T.S.S./acid ratio on different tiers in tatura trellis.

SUMMARY

The investigation was carried out to study the variation in ripening of Thompson Seedless and Arkavati berries on different tiers of Tatura trellis. Early ripening was observed on bottom tier followed by middle and top tiers in case of Thompson Seedless but the ripening behaviour was just reverse in case of Arkavati on different tiers. In Thompson Seedless, maximum T.S.S., T.S.S./acid ratio and minimum acidity were recorded in bottom tiers followed by middle and top tiers while in Arkavati the same parameters were high on top tier followed by the middle and bottom tiers at final stage of sampling. Accumulation of 257.5 degree days of centigrade was found to be adequate for ripening of these varieties.

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