

Effect of Pruning Severity on Quality of Grapes Cv. Red Globe for Summer Season

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Abstract

Effect of pruning severity on quality of grapes cv. red globe in summer season were studied at Horticulture Orchard, Tamil Nadu Agricultural University, Coimbatore during 2012-2013. The vines were pruned at four different levels in a Randomized Block Design with five replications. TSS, TSS/acid ratio, titrable acidity, sugar-acid ratio, reducing, non-reducing and total sugars for quality parameters were determined. Results revealed that, all the vines which were pruned at 2 bud level for summer season crop registered highest Total soluble solids (17.82 °Brix), TSS/acid ratio (35.95), lower titrable acidity (0.49%), whereas, the maximum reducing sugar (15.65%), total sugars (17.24%) and sugar-acid ratio (34.17) was observed in vines pruned to 50% of the canes for vegetative growth and 50% of the canes for crop yield in summer season and it was found to be better performed among different pruning intensities. Among the pruning intensities the vines which were pruned to 50% canes to 6 bud level and remaining 50% canes to 2 bud level performed better.

Keywords: Grape; Pruning; TSS (Total soluble solids); Acidity; Sugars; Summer season; Red Globe

Introduction

Grape (*Vitis vinifera* L.) is considered as one of the most important commercial fruit crops of temperate, tropical and sub-tropical regions of the world. Grape cultivation in India assumes great significance due to its high productivity (21.08 tonnes/ha) as compared to many other grape producing countries. The area under grape cultivation in the last three decades is increasing steadily with the introduction of exotic varieties. In India, grape is grown over an area of 0.118 million hectares with annual production of 2.48 million MT [1] and production share of 3.1% among fruit crops. The major grape growing states of India are Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Recently, the exotic cv. Red Globe, introduced from University of California, USA which is popular in Australia, China and USA, is also slowly gaining importance in India among the grape growers and consumer's preference is also much higher for this exotic variety.

In a fruit crop like grape, that too a table variety more than the yield, quality is important to get better price in the market. Hence, optimum canopy size and bunch number per vine are to be maintained for achieving better fruit quality which calls for a proper balancing between vigour and capacity. Quality is generally judged by chemical components of berries such as total soluble solids, titrable acidity, TSS/acid ratio, sugars (reducing, non-reducing and total sugars) and sugar-acid ratio etc. Among different cultural practices, pruning is of immense importance as it helps to control the growth, crop load and also the quality of bunches [2]. The time of pruning varies greatly with the variety and local climatic conditions in different grape-growing regions in India. In the present investigation, attempts were made to aim the quality bunches exclusively for summer season by striking a balance between vigour and capacity through regulating the pruning intensities.

Materials and Methods

The present investigation 'Effect of pruning intensity on quality of red globe grapes in summer season' was undertaken at Horticulture Orchard, TNAU, Coimbatore on eight years old grapevines which were trained on bower system spaced at 3.0 × 2.5 m apart. For summer

season crop vines were pruned on 2nd fortnight of December, 2012 and harvested during the months of June, 2013 with four pruning intensities replicated five times in a randomized block design. Different pruning levels adopted are, I. Pruning all the canes to 2 bud level for vegetative growth. II. Pruning all the canes to 6 bud level for crop load. III. Pruning 33% of the canes for vegetative growth (2 bud level) and remaining 67% of the canes for crop load (6 bud level). IV. Pruning 50% of the canes for vegetative growth (2 bud level) and 50% of the canes for crop load (6 bud level). Total of four vines were observed in each replication under each treatment for the collection of data. The soil samples collected from the experimental plot were analysed for organic carbon (0.85%), available N (390.67 kg/ha), P (35.43 kg/ha), K (809.13 kg/ha) before imposition of treatments. A nutrient dosage consisting of 5 kg FYM along with 0.75: 0.75: 0.50 kg NPK per vine was applied in 2 split doses, at vegetative and fruiting phase as recommended by NRC, Grapes. Proper plant protection measures and cultural practices were also followed whenever needed.

Quality parameters (Chemical characteristics of berry)

Randomly selected 10 berries per replication in each treatment were used for assessing quality parameters. Total soluble solids in berry juice (T.S.S.) were determined by means of digital hand refractometer having a scale of 0-50°Brix and expressed as degrees Brix at 21°C and titrable acidity was expressed as tartaric acid (%). TSS/acid ratio was calculated by dividing TSS (°brix) by acidity (%) and the total, reducing and non-reducing sugars were estimated as per the method suggested by Somogyi [3]. and expressed in percentage. Sugar-acid ratio was calculated by dividing total sugar content with acidity.

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Treatments	TSS (°Brix)	Titration acidity (%)	TSS/acid ratio	Reducing sugars (%)	Non-reducing sugars (%)	Total sugars (%)	Sugar-acid ratio
T ₁	17.55	0.56	31.16	14.85	1.43	16.28	28.9
T ₂	17.82	0.49	35.95	15.05	1.4	16.45	33.6
T ₃	17.58	0.52	33.47	14.97	1.91	16.88	32.12
T ₄	17.67	0.5	35.03	15.65	1.59	17.24	34.17
S.Ed	0.01	0.01	0.09	0.01	0.01	0.02	0.1
CD (0.05%)	NS	NS	0.19	0.03	0.02	0.04	0.22

T₁: Pruning all the canes to 2 bud level (100%) for vegetative growth.

T₂: Pruning all the canes to 6 buds level (100%) for crop load.

T₃: Pruning 1/3rd or 33% of the canes for vegetative growth (2 bud level) and 2/3rd or 67% of the canes for crop load (6 bud level).

T₄: Pruning 50% of the canes for vegetative growth (2 bud level) and 50% of the canes for crop load (6 bud level).

Table 1: Effect of pruning intensity on quality characteristics of grapes cv. Red Globe in summer season.

Statistical analysis

Resultant data were subjected to Randomized block design as outlined by Panse et al. [4]. The various results were made after working out the standard errors and CD at 5% level of significance.

Results and Discussion

In a fruit crop like grape, that too a table variety more than the yield, quality is important to get better price in the market. Quality is generally judged by chemical components of berries such as total soluble solids, titration acidity, TSS/acid ratio, sugars (reducing, non-reducing and total sugars) and sugar-acid ratio etc. In the present study, invariably, severely pruned vines *i.e.*, pruning all the canes to 2 bud level had produced with higher TSS (17.82°Brix), TSS/acid ratio (35.95) and lesser acidity (0.49%) (Table 1) than less severely pruned vines, it was followed by the vines which were pruned to equal number of canes to 2 bud and 6 bud level. This clearly indicates that crop load has a negative effect on the quality of bunches and we have to regulate the crop load in order to produce the quality bunches. The reason for high TSS (Total soluble solids), TSS/acid ratio in severely pruned vines might be due to lesser competition for metabolites, among the limited number of bunches per vine, availability of more photosynthates consequent to better vigour and physiological activities induced in them. The predominant acids found in grapes *viz.*, malic and tartaric acid are synthesized in leaves, these acids are translocated from leaves to bunch. This higher quantum of acids might have deposited in bunch during development and this resulted in higher acidity in less intensive pruning levels. These results are in conformity with earlier studies given by [5-7].

The data (Table 1) in respect of sugars such as reducing, non-reducing, total sugars and sugar-acid ratio are depicted. Among the pruning intensities, the vines which were pruned 50% of canes for vegetative growth (2 bud level) and remaining 50% for crop yield (6 bud level) registered the maximum percentage of reducing sugars (15.65%), total sugars (17.24%) and sugar-acid ratio (34.17) (Table 1). The reason for accumulation of high reducing and total sugars in balanced pruning of vegetative and reproductive growth might be

due to lesser competition of metabolites, limited number of bunches per vine, availability of more photosynthates consequent to better vigour and physiological activity induced in them where source-sink relationship was well balanced. These results are in accordance with similar earlier results of ref. [8,9].

Conclusion

It was observed that among the different intensities of pruning level of pruning 50% of the canes for vegetative growth and 50% of the canes for crop yield was found to be better quality bunches.

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