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Growth and quality parameters of grapes (cv. THOMPSON SEEDLESS) under low and high yielding vineyards in Bijapur Taluk

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ABSTRACT

A systematic investigation was conducted on growth and quality parameters of grapes (cv. THOMPSON SEEDLESS) under low and high yielding vineyards in Bijapur Taluk. The growth and quality parameter varied under low and high yielding vineyards. The cane girth of vines ranged from 0.30 to 0.44 cm and girth of fruiting shoot of vines ranged from 0.32 to 0.45 cm in the low yielding vineyards at 45 days after April pruning. In case of high yielding vineyards, cane girth of vines ranged from 0.35 to 0.47 cm and girth of fruiting shoot ranged from 0.38 to 0.55 cm. The total soluble solids (TSS) ranged from 18 to 24^{0}B and 19 to 25^{0}B with an average of 21.33 and 22.0^0 Brix of low and high yielding vineyards, respectively. In low and high yielding vineyards, the reducing sugar per cent ranged from 8.10 to 9.96 and 8.85 to 10.38 with a mean value of 9.51 and 9.81 per cent, respectively. The non-reducing sugar varied from 2.85 to 3.97 and 3.15 to 4.31 per cent with mean values of 3.46 and 3.73 per cent in low and high yielding vineyards, respectively. The total sugar content in low and high yielding vineyard berries varied from 10.95 to 13.93 and 12.04 to 14.69 per cent with a mean 12.98 and 13.56 per cent, respectively. The acidity of the berries in low and high yielding vineyards ranged from 0.40 to 0.89 and 0.39 to 0.82 per cent with an average value of 0.56 and 0.50 per cent, respectively. The sugar: acid ratio of berries in low and high yielding vineyards varied from 14.04 to 34.82 and 15.05 to 37.66 with mean values of 24.99 and 27.98, respectively.

Key words : Growth, Quality, Low yielding, High yielding, Vineyards

INTRODUCTION

Grape (*Vitis vinifera* L.) cv. THOMPSON SEEDLESS belongs to the family vitaceae, is perhaps the most widely cultivated fruit crop of the world in varying climatic zones extending from temperate to the tropics. Grape is cultivated over an area of 8.94 million hectares in the world with an annual production of 64.87 million tonnes (Chadha and Pareek, 1993). In India, it is cultivated over an area of 60 thousand hectares with an annual production of 16 lakh tonnes (Anonymous, 2005). In Karnataka an annual production of grapes was 3,07,664 tonnes during 2003. Grape cultivation in India has acquired greater significance due to its high productivity compared to many other grape producing countries in the world (Anonymous, 1989). Commercial viticulture in India is hardly a few decades old and major grape growing states are Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Punjab and Haryana. Among all the grape growing states, Maharashtra occupies the largest area (16,000 ha) followed by Karnataka (8,500 ha). As for as productivity is concerned Karnataka stands first followed by Maharashtra (Negi, 1999). Grape cultivation has assumed great significance in semi-arid region of Karnataka. Now, there is an increasing area under grape cultivation in Bijapur district. It has been experiencing decline in grape production also. Studies in the country have shown that the problem is mainly related to nutrient imbalance. Keeping these facts in view, a comprehensive study of growth and quality of grape in Bijapur taluk of Bijapur district was undertaken.

MATERIALS AND METHODS

A systematic investigation was conducted on growth and quality parameters of grapes (cv. THOMPSON SEEDLESS) under low and high yielding vineyards in Bijapur Taluk. The soils of the investigation site were shallow black, having alkaline pH and belongs to the Vertisol. Composite soil samples from a depth of 0 to 30 cm were collected in the low and high yielding vineyards before application of nutrients. Soil samples were also collected after October pruning for analysis. Sixty vineyards were surveyed during 2006-07. Out of sixty vineyards, thirty vineyards were selected based on previous year yield data for the purpose of collecting growth and quality parameters. The vineyards which produced less than 10 tonnes per acre were categorized as low yielding vineyards and vineyards produced more than 10 tonnes per acre were categorized as high yielding vineyards. The growth parameters *viz.,* girth of cane and girth of fruiting shoot were recorded by using vernier calipers between

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fourth and fifth node at two stages namely 45 and 90 days after April pruning during 2006. Quality parameters *viz.,* total soluble solids (^{0}brix) was recorded by hand Refractometer (Anonymous, 1970), titrable acidity (%) was determined in terms of tartaric acid method (Anonymous, 1970), reducing sugar (%) in the juice was determined by Dinitro-salicylic acid (DNSA) method (Miller, 1972) and non-reducing sugar (%) was determined by substracting the per cent reducing sugar from the per cent total sugar and multiplying the same with 0.95 as given below (Somogyi, 1952).

RESULTS AND DISCUSSION

The results obtained from the present study as well as relevant discussion have been presented under following heads:

Growth parameters:

The growth parameters *viz.*, cane girth and average fruiting shoot girth of vines were influenced by fertility status of vineyard soils and petiole nutrient composition. The mean cane girth of vines in low yielding vineyards was 0.38 and 0.76 cm at 45 and 90 days after April pruning, respectively (Table 1). Whereas, in case of high yielding vineyards, it was 0.41 and 0.81 at 45 and 90 days after April pruning, respectively. During crop growth it was increased, which might be due to better absorption and accumulation of nutrient in the plant tissue. Similar results were obtained by Srivastava and Soni (1989). An average fruiting shoot girth of vines in low yielding vineyards was 0.39 and 0.79 cm at 45 and 90 days after October pruning, respectively (Table 2). Whereas, in case of high yielding vineyards, it was 0.46 and 0.82 cm at 45 and 90 days after October pruning (Table 2). It might be due to the accumulation of dry matter in the plant tissue during crop growth. These findings are in accordance with the reports of Srivatsava and Soni (1989) and Chitkara *et al.* (1972).

Quality parameters:

The quality parameters like TSS, reducing and non-reducing sugar, total sugar, acidity and sugar acid ratio were influenced by fertility status of vineyard soils and petiole nutrient composition. The total soluble solids (TSS) ranged from 18 to 24^{0}B and 19 to 25^{0}B with an average of 21.33 and 22.00^{0}Brix of low and high yielding vineyards, respectively. In low and high yielding vineyards, the reducing sugar per cent ranged from 8.10 to 9.96 and 8.85 to 10.38 with a mean value of 9.51 and 9.81 per cent, respectively. The non-reducing sugar varied from 2.85 to 3.97 and 3.15 to 4.31 per cent with mean values of 3.46 and 3.73 per cent in low and high yielding vineyards, respectively. The total sugar content in low and high yielding vineyard berries varied from 10.95 to 13.93 and 12.04 to 14.69 per cent with a mean 12.98 and 13.56 per cent, respectively. The acidity of the berries in low and high yielding vineyards ranged from 0.40 to 0.89

Table 1: Cane girth (cm) at 45 and 90 days after April pruning of low and high yielding vineyards

Low yielding vineyards			high yielding vineyards		
Farmer's code	45 days after April pruning	90 days after April pruning	Farmer's code	45 days after April pruning	90 days after April pruning
LYF_1	0.42	0.82	HYF_1	0.44	0.85
LYF_2	0.37	0.71	HYF_2	0.44	0.79
LYF_3	0.36	0.70	HYF_3	0.40	0.81
LYF_4	0.43	0.83	HYF_4	0.45	0.87
LYF_5	0.44	0.83	HYF_5	0.39	0.76
LYF_6	0.30	0.69	HYF_6	0.38	0.77
LYF_7	0.41	0.79	HYF_7	0.44	0.87
LYF_8	0.36	0.74	HYF_8	0.35	0.74
LYF_9	0.41	0.80	HYF_9	0.41	0.81
LYF_{10}	0.33	0.73	HYF_{10}	0.47	0.89
LYF_{11}	0.32	0.69	HYF_{11}	0.35	0.74
LYF_{12}	0.39	0.77	HYF_{12}	0.40	0.80
LYF_{13}	0.38	0.76	HYF_{13}	0.40	0.80
LYF_{14}	0.40	0.81	HYF_{14}	0.41	0.81
LYF_{15}	0.38	0.80	HYF_{15}	0.44	0.86
Mean	0.38	0.76	Mean	0.41	0.81

LYF: Low yielding farmer HYF: High yielding farmer

Table 2 : Girth of fruiting shoot (cm) at 45 and 90 days after October pruning of low and high yielding vineyards

low yielding vineyards			high yielding vineyards		
Farmer's code	45 days after April pruning	90 days after April pruning	Farmer's code	45 days after April pruning	90 days after April pruning
LYF_1	0.43	0.80	HYF_1	0.53	0.87
LYF_2	0.37	0.78	HYF_2	0.48	0.83
LYF_3	0.32	0.77	HYF_3	0.47	0.85
LYF_4	0.44	0.81	HYF_4	0.55	0.85
LYF_5	0.45	0.83	HYF_5	0.42	0.78
LYF_6	0.35	0.76	HYF_6	0.41	0.77
LYF_7	0.43	0.80	HYF_7	0.51	0.88
LYF_8	0.34	0.72	HYF_8	0.38	0.76
LYF_9	0.45	0.82	HYF_9	0.44	0.82
LYF_{10}	0.34	0.78	HYF_{10}	0.54	0.91
LYF_{11}	0.34	0.79	HYF_{11}	0.39	0.79
LYF_{12}	0.41	0.81	HYF_{12}	0.41	0.80
LYF_{13}	0.40	0.80	HYF_{13}	0.43	0.79
LYF_{14}	0.43	0.82	HYF_{14}	0.45	0.81
LYF_{15}	0.39	0.79	HYF_{15}	0.49	0.84
Mean	0.39	0.79	Mean	0.46	0.82

LYF: Low yielding farmer HYF: High yielding farmer

Table 3: The quality and their attributes of grapes in low and high yielding vineyards

	Low yielding vineyards							High yielding vineyards					
Farmer's code	TSS (^{0}B)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)	Acidity (%)	Sugar/ acid ratio	Farmer's code	TSS (^{0}B)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)	Acidity (%)	Sugar/ acid ratio
LYF_1	23	9.91	3.61	13.52	0.45	30.04	HYF_1	21	9.82	3.41	13.23	0.46	28.76
LYF_2	19	8.72	3.07	11.79	0.84	14.04	HYF_2	22	9.86	3.50	13.36	0.43	31.07
LYF_3	18	8.10	2.85	10.95	0.72	15.20	HYF_3	20	9.67	3.39	13.06	0.75	17.41
LYF_4	20	9.23	3.36	12.59	0.65	19.37	HYF_4	22	9.91	3.61	13.52	0.43	31.44
LYF_5	22	9.78	3.53	13.61	0.43	31.65	HYF_5	19	8.89	3.15	12.04	0.82	15.05
LYF_6	22	9.81	3.56	13.37	0.49	27.28	HYF_6	24	10.32	4.15	14.47	0.41	34.39
LYF_7	23	9.93	3.62	13.55	0.45	30.11	HYF_7	23	9.96	4.08	14.04	0.42	33.42
LYF_8	19	8.70	3.02	11.72	0.89	13.17	HYF_8	24	10.25	4.23	14.48	0.40	36.80
LYF_9	22	9.82	3.38	13.20	0.53	24.91	HYF_9	22	9.87	3.58	13.65	0.45	36.33
LYF_{10}	20	9.35	3.37	12.72	0.61	20.85	HYF_{10}	22	9.89	3.59	13.48	0.44	30.63
LYF_{11}	21	9.74	3.59	13.33	0.48	27.7	HYF_{11}	20	9.30	3.42	12.72	0.42	30.28
LYF_{12}	22	9.81	3.59	13.40	0.50	26.80	HYF_{12}	19	8.85	3.21	12.06	0.78	15.54
LYF_{13}	23	9.94	3.92	13.86	0.42	33.00	HYF_{13}	24	10.33	4.25	14.58	0.41	35.56
LYF_{14}	22	9.83	3.40	13.23	0.51	25.94	HYF_{14}	23	9.89	4.12	14.01	0.42	33.75
LYF_{15}	24	9.96	3.97	13.93	0.40	34.82	HYF_{15}	25	10.38	4.31	14.69	0.39	37.66
Mean	21.33	9.51	3.46	12.98	0.56	24.99	Mean	22.00	9.81	3.73	13.56	0.50	27.98

LYF: Low yielding farmer HYF: High yielding farmer

and 0.39 to 0.82 per cent with an average value of 0.56 and 0.50 per cent, respectively. The sugar:acid ratio of berries in low and high yielding vineyards varied from 14.04 to 34.82 and 13.44 to 37.66 with a mean values of 24.99 and 27.98, respectively (Table 3). The quality parameters like TSS, reducing and non-reducing sugar, total sugar, acidity and sugar acid ratio were influenced by fertility status of vineyard soils and petiole nutrient composition. The better fruit quality might be due to increase the availability of nutrients by soil application as well as through foliar spray. The better fruit quality might be due to increase the availability of nutrients by soil application as well as through foliar spray. In the selected low and high yielding vineyards, the vine fruits significantly

varied that depends upon the fertility status of the soils. This study was supported by Beniwal *et al.* (1992), Sindhu *et al.* (1999) and Singram and Prabhu (2001).

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