

Evaluation of wine grape varieties for growth and yield under northern dry zone of Karnataka



Horticulture

KEYWORDS : Berry Diameter, Bunch Weight, Evaluation, Shoot Length, Wine Grape, Yield.

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ABSTRACT

The present study was conducted during 2014-15 to know the variation in growth and yield of eleven wine grape genotypes. The highest shoot length (75.34 cm) was recorded in Chenin Blanc at 60 days after back pruning. The maximum shoot girth (1.61 cm) was recorded in Sauvignon Blanc at 105 days after pruning. The vigour of individual shoot increased with the decreased canes per vine. Chenin Blanc registered the maximum number of leaves per shoot (17.94) at 90 days after pruning and also Chenin Blanc had long period (20.00 days) for panicle emergence.

The genotype Medika recorded the maximum length of berry (1.64 cm), diameter of berry (1.59 cm) and mean weight of berry (3.08 cm) at different intervals. The bunch length and weight of 50 berries varied significantly among the treatments. The maximum bunch length (23.33 cm) was found in Medika. However, Medika had the highest 50 berry weight (121.53 g) among the genotypes, Sirius was found to be an early where harvesting was done in 115 days. The maximum number of bunches per vine (110.44) was recorded in Grenache Blanc. The genotype Medika recorded the maximum bunch weight (419.15 g). However, the genotype Tempranillo registered the highest tonnage (60.88 t/ha) followed by Grenache Blanc (53.98 t/ha).

INTRODUCTION

Grape (*Vitis vinifera* L.) is one of the most important fruit crop of the world, it belongs to the family Vitaceae. It is a commercially important sub-tropical fruit crop of peninsular India. It is the world's most important fruit in terms of total production and economic stand point. In India, the area under grape is estimated as 1.20 m ha (Anon, 2014) with an annual production of 258.53 m tonnes. The major portion of the produce is made into wine, raisin and a small quantity is considered as dessert in many growing countries. In Karnataka, the major area in grapes is occupied by the northern districts. Keeping these in view the experiment was under taken during 2014-15. The investigation consisted of 11 genotypes which were evaluated to know the variation in growth and yield parameters among the genotypes.

MATERIAL AND METHODS

The present investigation on "Evaluation of wine grape varieties for growth, yield and quality under northern dry zone of Karnataka" was under taken during the year 2014-15. The experimental station is situated at Division of Fruit Science, University of Horticultural Sciences, Bagalkot which comes under northern dry zone of Karnataka (Zone-3) located at 16° 10' North latitude, 74° 42' East longitude with an altitude of 542 meters above the mean sea level. The soil of the experiment site is red sandy loam with good physical properties and drainage. The depth of the soil is well over a meter. The design of experiment employed in the present investigation was randomized block design. The data collected were subjected to Fishers 'F' test. The degree of probability employed in deciding the critical difference was done at 1 and 5 per cent ($P= 0.01$ and 0.05). The eleven treatments under study were T₁-Cabernet Sauvignon, T₂-Medika, T₃-Grenache Noir, T₄-Shiraj, T₅-Tsimlyansk charny, T₆-Tempranillo, T₇-Sauvignon Blanc, T₈-Chenin Blanc, T₉-Bianca, T₁₀-Sirius, T₁₁-Grenache Blanc. The shoot length was measured from the base

of the shoot on the cane to the growing point. It was measured at 60th day after fore pruning and expressed in centimeters. Shoot length was restricted to 60 days due to sub caning after fore pruning.

The girth of the shoot was recorded from the base of the shoot by using digital vernier calipers. The observations were recorded at 105th day after fore pruning and expressed in centimeters. Number of leaves was recorded by counting the number of leaves in the selected 4 canes. Then mean number of shoots was worked out. This was recorded at 105th day after fore pruning. The observation panicles on panicle initiation on cane under each vine was made and the number of days taken from pruning to panicle initiation was recorded. The data on number of days taken for harvesting was recorded by counting the days from the date of fore pruning to date of harvesting. Mean length of berry was measured at fortnightly intervals after fruit set, till 120th day measuring 6 berries with the help of digital vernier calipers and was expressed in centimeters. Mean diameter of berry was measured during harvesting by measuring 6 berries with the help of digital vernier calipers and was expressed in centimeters. The mean weight of berry was derived by averaging the weight of 6 randomly selected berries borne on the bunches and was expressed in gram. This was recorded at the time of harvesting. The berries after taking fresh weight were dried in a forced draft electric oven at 80° C until a constant weight was observed in two successive weighings at an interval of 72 hours. The dry weight was recorded and mean dry weight of the berry was derived. Dry weight of the berry was recorded at during harvesting and was expressed in grams.

Fifty berries were randomly selected from the selected five bunches at harvest and their weight was recorded in gram. The length of bunch was measured in centimeters from the base to

the tip of the bunch. The mean length of bunch was derived by averaging the length of five bunches at harvest used for determining the mean of bunch length. The bunch weight was measured in gram. The mean weight of bunch was derived by averaging of 5 bunch weight during harvest. The mean bunch weight was multiplied by average number of bunches per vine to get yield per vine and it was expressed in kilogram. Estimated yield t/ha was obtained by multiplying yield (kg/vine) with total number of vines per ha.

RESULTS AND DISCUSSION

At 60 days after fore pruning, the maximum shoot length (75.34 cm) was recorded in Chenin Blanc and it was on par with Bianca and Medika. Whereas, the minimum shoot length (25.33 cm) was recorded in Tsimlanski Charny and it was on par with Grenache Noir and Grenache Blanc (**Table 1**). Thus, it implies that the variety Tsimlyansk Charny was having the tendency of slow growing among the varieties.

At 105 days after fore pruning, the maximum shoot girth (1.61 cm) was recorded in Sauvignon Blanc which was on par with Chenin Blanc (**Table 1**). It was obvious that the vigour of the individual shoot increased with the decreased canes per vine which could be attributed to diversion of more metabolites to the canes. These findings are in line with the results obtained by Singhrot *et al.* (1977) in Thompson Seedless grapes and Bates (2008) in Concord grapes. At 105 days, minimum shoot girth (0.58 cm) was recorded in Shiraj which was on par with Grenache Noir, Tsimlyansk charny, Tempranillo, Sirius, Grenache Blanc. Thus, it implies that Shiraj had tendency to reduce the shoot girth due to poor vegetative growth of vine.

The maximum number of leaves (17.94) at 90 days after fore pruning was recorded in Chenin Blanc was on par with Sauvignon Blanc and Grenache Noir. Chenin Blanc might have the tendency of increasing the number of leaves per shoot. The higher shoot length may contribute to the more number of leaves. The minimum number of leaves (9.52) was recorded in Sirius and it was on par with Cabernet Sauvignon, Medika, Shiraj, Tsimlyansk Charny, Tempranillo, Bianca and Sirius (**Table 1**).

Table 1. Variation of wine grape varieties in shoot length (cm), shoot girth (cm), number of leaves per fruiting shoot, days taken for panicle emergence and days taken for harvesting.

Treatment	Shoot length (cm)	Shoot girth (cm)	No. of leaves/shoot	Panicles emergence (days)	Days taken for harvesting
T ₁ -Cabernet Sauvignon	39.36	1.03	12.62	18.00	132.67
T ₂ - Medika	54.41	1.05	12.84	16.00	120.00
T ₃ - Grenache Noir	38.13	0.77	15.83	16.00	131.67
T ₄ - Shiraj	46.82	0.58	10.91	16.00	132.33
T ₅ -Tsimlyansk Charny	25.33	0.61	11.12	19.00	127.67
T ₆ - Tempranillo	44.83	0.73	12.77	19.00	130.00
T ₇ - Sauvignon Blanc	57.73	1.61	15.68	18.00	131.00
T ₈ - Chenin Blanc	75.34	1.41	17.94	20.00	137.67
T ₉ - Bianca	54.54	1.20	13.04	15.00	129.67
T ₁₀ - Sirius	52.97	0.70	9.52	15.00	115.00
T ₁₁ - Grenache Blanc	32.66	0.67	10.03	14.00	133.00
S.Em±	4.24	0.07	1.55	0.57	1.50
C.D. at 5 %	13.14	0.22	4.57	1.69	3.30

The number of days taken for panicle emergence differed significantly among the treatments. The number of days taken for panicle emergence are presented in **Table 1**. The maximum number of days for panicle initiation (20.00 days) was recorded in Chenin Blanc which was on par with Tsimlyansk Charny and Tempranillo. The minimum number of days for panicle emergence (14.00 days) was taken by Grenache Blanc and it was on par with Bianca and Sirius. This might be due to the genotypic character of the variety. The climatic parameters influenced the grape vine phenology and grape ripening. Reduced crop load enhanced fruit ripening and fruit quality. The similar trends were obtained by Shim *et al.* (2007) in Kyoho grapes and Eliana *et al.* (2010). The number of days taken for harvesting after fore pruning differed significantly among the treatments. The number of days taken for harvesting after fore pruning is presented in **Table 1**. Chenin Blanc took the maximum number of days for harvesting (137.67) followed by Grenache Blanc and the minimum number of days for harvesting was taken by (115.00) Sirius followed by Medika. This is because Sirius was the early to mid maturing variety.

The mean length of the berry during harvesting was 1.64 cm was recorded in Medika. This may be due to some positive interaction in varieties at different stages of berry development for increasing the berry length. Minimum berry length (1.31 cm) was recorded in Tempranillo which was on par with Tsimlyansk Charny, Shiraj and Grenache Blanc (**Table 2**). Thus, Tempranillo had tendency of reduced berry length at later stages of berry development. Reduction in number of berries per bunch there will be increased berry length and diameter due to efficient utilization of nutrients into fruiting. The similar trends were obtained by Bravdo *et al.* (1985) in Cabernet Sauvignon.

The maximum berry diameter of 1.59 cm during harvesting was recorded in Medika which was on par with Bianca. The minimum berry diameter of 1.30 cm during harvesting was recorded in Tempranillo followed by Tsimlyansk charny (**Table 2**). Tempranillo had tendency of reduced berry diameter at later stages of berry development. Reduction in number of berries per bunch there will be increased berry length and diameter due to efficient utilization of nutrients into fruiting. The similar trends were obtained by Bravdo *et al.* (1985) in Cabernet Sauvignon.

The maximum berry weight of 3.08 g during harvesting was recorded in Medika followed by Bianca. Due to lesser number of berries per bunch, Medika gained maximum berry weight (**Table 2**). As there will be less competition for nutrients for growth of berries. The minimum berry weight of 1.67 g was recorded in Tempranillo followed by Tsimlyansk Charny. Tempranillo was on par with Tsimlyansk Charny.

The maximum dry weight of berries (0.82 g) was recorded in Bianca during harvesting (**Table 2**) may be due to thicker skins of berries or possibly because of a great number of seeds per berry. The similar trends were obtained by Tripoli and Muller (1981) in grape vine cultivars. The minimum dry weight (0.33 g) was found in Tempranillo during harvesting. Medika had the highest 50 berry weight (121.53 g) followed by Bianca. The minimum 50 berry weight (71.57 g) was recorded in Tempranillo followed by Tsimlyansk Charny during harvesting (**Table 2**). This might be due to the genotypic character of the variety and also due to increase in individual berry weight.

The number of bunches per vine significantly differed among the treatments. The data obtained on number of bunches per vine is presented in **Table 3**. The maximum number of bunches per vine (110.44) was recorded in Grenache Blanc which was found on par with Bianca. Whereas, the minimum number of bunches per vine (34.44) was recorded in Grenache Noir and it was on par with Tsimlyansk Charny.

The bunch length varied significantly among the treatments. The data obtained on bunch length is presented in **Table 3**. The maximum bunch length (23.33 cm) was recorded in Medika which was on par with Tsimlyansk Charny, Chenin Blanc and Bianca. The minimum bunch length (12.33 cm) was recorded in Sirius, which was on par with Cabernet Sauvignon, Sauvignon Blanc and Grenache Blanc. The length of bunch was governed by the number of berries and size of the berries present in the bunch. The similar trends were obtained by Ibrahim *et al.* (1996) in Cv.Deiss Anz.

Table 2. Variation in berry length (cm), berry diameter (cm), berry weight (g), berry dry weight (g) and 50 berry weight (g) in wine grape varieties.

Treatment	Berry length (cm)	Berry diameter (cm)	Berry weight (g)	Berry dry weight (g)	50 berry weight (g)
T ₁ -Cabernet Sauvignon	1.44	1.37	1.81	0.50	82.60
T ₂ - Medika	1.64	1.59	3.08	0.60	121.53
T ₃ - Grenache Noir	1.42	1.36	2.02	0.47	101.50
T ₄ - Shiraj	1.37	1.31	1.80	0.52	77.47
T ₅ -Tsimlyansk Charny	1.32	1.42	1.93	0.42	76.50
T ₆ - Tempranillo	1.31	1.30	1.67	0.33	71.57
T ₇ - Sauvignon Blanc	1.49	1.39	2.23	0.52	93.57
T ₈ - Chenin Blanc	1.49	1.42	2.27	0.57	95.60
T ₉ - Bianca	1.51	1.57	3.06	0.82	106.53
T ₁₀ - Sirius	1.44	1.27	1.75	0.62	78.63
T ₁₁ - Grenache Blanc	1.36	1.36	2.07	0.53	92.50
S.Em±	0.03	0.04	0.13	0.03	0.29
C.D. at 5 %	0.1	0.10	0.38	0.09	0.86

The bunch weight varied significantly among the treatments. The data obtained on bunch weight is presented in **Table 3**. The maximum bunch weight (419.15 g) was recorded in Medika which was on par with Grenache Noir. Generally the genotype Medika performed well with respect to bigger sized berries and bunch which might have added to the bunch weight. Ibrahim *et al.* (1996) reported that increase in cluster weight was probably due to the increase of berry weight and increase of leaf area per cluster in Deiss Anz cultivar. Whereas, the minimum bunch weight (114.82 g) was found significant in Sauvignon Blanc, which was on par with Sirius.

The yield in kg/ vine differed significantly among the treatments. The data obtained on yield (kg/vine) is presented in **Table 3**. The maximum yield (27.40 kg/ vine) was recorded in Tempranillo, followed by Grenache Blanc. The minimum yield (7.50 kg/ vine) was recorded in Tsimlyansk Charny which was on par with Sauvignon Blanc. Due to presence compact bunches with more number of berries per bunch in Tempranillo, the bunch weight was increased with optimum number of panicles which led to higher yield (kg/vine).

The yield in t/ ha differed significantly among the treatments. The yield in kg/ vine differed significantly among the treatments. The data obtained on yield (t/ha) is presented in **Table 3**. The maximum yield (60.88 t/ ha) was recorded in Tempranillo, followed by Grenache Blanc. The minimum yield (16.77 t/ ha) was recorded in Tsimlyansk Charny which was on par with Sauvignon Blanc. Crop recorded the negative correlation of yield per vine with average bunch weight and berry weight was recorded. The crop yield increased proportionally with the number of clusters per vine. The similar trends were obtained by Myers *et al.* (2008) in Sangiovese grape vines, Somkuwar *et al.* (2010) in grape vines and Noar *et al.* (2002) reported that Sauvignon Blanc grape crop increased proportionally with the number of clusters, up to 44 clusters per vine.

Table 3. Variation in bunch length (cm), bunch weight (g), bunches/ vine, yield in kg/ vine and ton/ ha in wine grape varieties.

Treatment	Bunch length (cm)	Bunch weight (g)	Bunches / vine	Yield	
				Kg/ vine	t/ ha
T ₁ -Cabernet Sauvignon	13.17	276.00	63.63	17.57	39.03
T ₂ - Medika	23.33	419.15	52.00	16.65	36.98
T ₃ - Grenache Noir	16.50	408.77	34.44	14.13	31.37
T ₄ - Shiraj	19.83	154.27	65.61	9.38	21.88
T ₅ -Tsimlyansk Charny	21.00	198.74	38.11	7.50	16.77
T ₆ - Tempranillo	19.67	315.45	65.22	27.40	60.88
T ₇ - Sauvignon Blanc	13.50	114.82	72.89	8.03	17.80
T ₈ - Chenin Blanc	20.17	274.65	68.44	18.48	41.07
T ₉ - Bianca	17.17	151.50	107.55	16.13	35.83
T ₁₀ - Sirius	12.33	117.88	91.55	11.00	24.40
T ₁₁ - Grenache Blanc	13.83	220.66	110.44	24.33	53.98
S.Em±	0.27	6.38	5.85	0.45	0.55
C.D. at 5 %	5.12	18.74	17.26	1.32	1.61

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