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Effect of Pinching Levels on Sub Cane Development in Grape (*Vitis vinifera* L.) cv Flame Seedless and Sharad Seedless

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Abstract The vines were halt at seven different nodes levels in a randomized block design with five replications. Results revealed that, lesser day taken for bud sprout from pruning (16.59 Flame seedless and 18.03 Sharad seedless) number of buds sprouted per spur (3.79 Flame seedless and 3.39 Sharad seedless) lesser internodal length (3.71 cm Flame seedless and 3.35 cm Sharad seedless) total leaf area (2583.62 cm^2 Flame seedless and 2559.61 cm^2) Sharad seedless)maximum cane length at 5^{th} leaf, 10^{th} leaf and 15^{th} leaf stage in T_7 Flame seedless and at 5^{th} leaf, 10^{th} leaf, 15^{th} leaf in T_7 Sharad seedless) maximum cane diameter T_1 Flame seedless and T_1 Sharad seedless) Petiole nutrient contents NPK percentage (2.82%, 0.89%, 2.88% Flame seedless and 2.81%, 0.82%, 2.86% Sharad seedless).

Keywords Pinching levels, Flame seedless, Sharad seedless, Grape.

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Introduction

The grape cv Flame seedless and Sharad seedless are gaining popularity among the grape growers in Southern India. It is universally recognised fact that the yield of grape vine is profoundly influenced by the method of pinching. Pinching is the sole means of regulating not only the quantity and quality of grapes during a particular season but also the quantity of next years. The knowledge of flowering and fruit development in relation to growth pattern of the cultivar under different agro-climatic regions is of great importance for a judicious pinching program. Kohale et al. [1], the quality of grape was affected with the number of buds on the cane with increase in cane length, sprouting of the basal buds was depressed. The process of bud differentiation during foundation phase determines fruitfulness in grape it is also depend on CHO content and other nutrient through biochemical reaction as well as the utilization of light is governed by the canopy arrangements. The fruitfulness take place after back pruning during this period light is more important for effective fruitfulness where the pinching levels plays major role therefore it was thought desirable to conduct a pinching trail on these varieties to see the effect of pinching severity on growth parameters. The present studies are also aimed at this target Josan et al. [2].

Materials and Methods

The present investigation effect of pinching levels on sub cane development in Flame seedless and sharad seedless varieties under mild tropics was un-

Table 1. Effect of pinching levels on growth parameters in grapes cv Flame seedless and Sharad seedless (Back pruning).

Treatments	Flame seedless No. of days for bud sprouting from pruning	No. of buds sprouted per spur	Inter nodal length (cm) (3^{th}–5^{th}) node	Total leaf area per shoot (cm^2)	Sharad seedless No. of days for bud sprouting from pruning	No. of buds sprouted per spur	Inter-nodal length (cm) (4^{th}–6^{th}) node	Total leaf area per shoot (cm^2)
T_1	16.59	2.29	3.71	2409.80	18.03	2.98	3.49	2449.65
T_2	17.34	2.49	3.98	2410.42	18.74	2.56	3.94	2405.03
T_3	16.39	3.79	3.43	2583.62	19.25	2.89	3.73	2349.60
T_4	17.79	3.08	4.42	2314.14	20.04	2.54	4.28	2238.40
T_5	17.96	2.84	4.56	2308.91	19.70	3.39	3.35	2559.61
T_6	18.78	2.47	4.60	2328.28	21.20	2.58	4.29	2430.26
T_7	21.36	1.91	5.38	2210.21	23.68	1.77	5.56	1915.93
SEm±	0.27	0.16	0.09	11.29	0.22	0.22	0.17	19.21
CD @ 5%	0.79	0.47	0.27	32.96	0.65	0.65	0.49	56.08
CV %	3.35	12.76	4.73	1.07	2.46	18.71	9.10	1.84

dertaken at Indian Institute of Horticultural Research Hesserghatta, Bangalore during 2014-2015. On nine years old grapevines which were trained on extended 'Y' trellies spaced at 3.0 × 1.8 m apart. For winter season all the canes pruned up to 1 bud levels for vegetative growth. Vines were pruned on April, 2014 with seven pinching intensities replicated five times in a randomized block design. The following halting treatments were applied.

Flame seedless

T_1, halt at 3^{th} node and 1 sub cane T_2, halt at 3^{th} node and 2 sub canes T_3, halt at 4^{th} node and 1 sub cane T_4, halt at 4^{th} node and 2 sub canes T_5, halt at 5^{th} node and 1 sub cane T_6, halt at 5^{th} node and 2 sub canes T_7, no halting straight cane.

Sharad seedless

T_1, halt at 4^{th} node and 1 sub cane T_2, halt at 4^{th} node and 2 sub canes T_3, halt at 5^{th} node and 1 sub cane T_4, halt at 5^{th} node and 2 sub canes T_5, halt at 6^{th} node and 1 sub cane T_6, halt at 6^{th} node and 2 sub canes T_7, no halting straight cane.

Results and Discussion

The results of the present investigation as well as relevant discussion have been summarized under following heads :

Number of days for bud sprouted from pinching

The different severity of cane halting had exhibited significant effect on the period required for bud sprouted in both verities of grape (Table 1). In variety Flame seedless the cane halt at 3^{th} node and 1 sub cane hastened the bud sprout by about 5 days (16.59 days) as compared to no halting straight cane (21.36 days). Similarly, in variety Sharad seedless cane halt at 4^{th} node and 1 sub cane took (18.03 days) for bud sprouting which was about 5 days earlier than no halting straight cane (23.68 days). Thus from the above results, it is clear that, with the decrease in cane halting severity , the time required for bud sprouted increased Bhosale et al. [3].

Buds sprouted per spur

Number of buds sprouted per spur was significantly influenced by cane halting severity. Maximum bud sprouted per spur in variety Flame seedless (3.79) were observed in 3^{th} node and 1 sub cane and minimum buds sprouted per spur (1.91) in no halting straight cane. However in sharad seedless maximum (3.39) and minimum (1.77) buds sprouted per spur were observed in treatment no halting straight cane respectively. Numbers of buds sprouted per spur

Table 2. Effect of pinching levels on cane length and diameter of grapes in cv Flame seedless and Sharad seedless (Back pruning).

Treat-ments	Flame seedless						Sharad seedless					
	Cane length (cm)			Cane diameter (mm)			Cane length (cm)			Cane diameter (mm)		
	5th leaf	10th leaf	15th leaf	5th leaf	10th leaf	15th leaf	5th leaf	10th leaf	15th leaf	5th leaf	10th leaf	15th leaf
T_1	14.93	30.94	73.60	4.05	5.55	9.65	15.06	30.74	73.51	4.12	6.39	9.45
T_2	14.52	37.98	77.17	3.68	5.44	9.58	14.94	37.86	76.92	4.40	6.36	9.58
T_3	16.69	39.07	76.19	4.59	5.56	9.49	16.90	39.11	78.40	3.96	6.10	9.57
T_4	16.89	35.27	79.61	3.53	5.48	8.74	17.49	39.90	79.14	3.78	5.77	8.95
T_5	17.79	40.42	83.14	3.64	4.86	8.56	17.97	42.76	83.43	4.40	5.50	9.55
T_6	18.24	43.52	85.18	3.18	4.45	8.11	19.00	42.20	85.70	3.41	4.97	8.54
T_7	21.46	47.81	95.08	1.88	3.37	6.31	22.16	48.23	95.96	1.63	3.03	5.93
SEm±	0.25	0.51	0.54	0.19	0.09	0.18	0.22	0.67	0.64	0.21	022	0.21
CD @ 5%	0.72	1.49	1.59	0.55	0.27	0.54	0.64	1.96	1.86	0.61	0.63	0.60
CV%	3.19	2.90	1.50	11.99	4.21	4.77	2.77	3.74	1.74	12.83	8.83	5.23

were increased with increased in pruning severity. These finding are in close conformity with the observation recorded by Somkumar et al. [4].

Internodal length

Internodal length per cane were significantly, influenced by cane halting treatments. Minimum internodal length per cane in variety Flame seedless (3.71 cm) were observed in 3th node and 1 sub cane and maximum internodal length (5.38 cm) per cane recorded in no halting straight cane. However, in Sharad seedless minimum (3.35 cm) and maximum (5.56) were observed in 4th node and 1 sub cane and no halting straight cane respectively. Internodal length per cane was decrease due to ABA accumulation in cane and increase in cane pruning severity. These findings are in close conformity with the observation recorded by Mandeep and Sharma [5].

Leaf area

Maximum leaf area (2583.62 cm^2) were found in 3th node 1 sub cane and minimum (2210.21 cm^2) noticed in no halting, while in case of Sharad seedless variety maximum leaf area (2559.61 cm^2) were observed in 4th node 1 sub cane and minimum (1915.93 cm^2) were recorded in no halting. They pointed out necessity of higher temperature for better regulative growth. Due to sever pruning carbohydrates accumulated before pruning in the vine diverted towards regulative growth thereby increase shoot length as shoot length increase number of leaves and leaf area increased Schalkwyk and Archer [6].

Cane length and diameter

Higher cane length was recorded at various stages namely 5th,10th and 15th leaf stages (Table 2). As regard cane pruning severity no halting recorded maximum cane length at 5th leaf stage (21.46 cm) 10th leaf (47.81 cm) and 15th leaf (95.08 cm) and maximum diameter were observed at 3th node 1 sub cane 5th leaf (4.59 m) 10th leaf (5.56 mm) and 15th leaf (9.65 mm) while it was minimum with no halting in Flame seedless. Similar results were obtained in case of Shard seedless. This showed that, severe the pruning, less was the length of the cane and severe the pruning higher the diameter of cane, the cane growth was found to be higher. The cane length and diameter was influenced greatly by the reserves carbohydrates in the trunk and canes left over after pruning. Similar results were obtained earlier Waqar Ahmad [7].

Petiole nutrient content
percentage

Fruiting is an exhaustive process and heavy crop load generally leads to depletion of nutrient reserves of the vine resulting in early senility (Table 3). In this context petiole analysis of the vine was taken up for major nutrients like (nitrogen, phosphorus and potassium). Significantly maximum petiole nutrient contents total nitrogen (2.82%) phosphors (0.89%)

Table 3. Effect of pinching levels on petiole nutrient contents (%) of grape in cv Flame seedless and Sharad seedless (Back pruning).

Treatments	Flame seedless			Sharad seedless		
	Total nitogen content (%)	Total phosphorus content (%)	Total potassium content (%)	Total nitrogen content (%)	Total phosphorus content (%)	Total potassium content (%)
T_1	2.82	0.89	2.88	2.81	0.78	2.86
T_2	2.79	0.86	2.79	2.81	0.79	2.85
T_3	2.81	0.77	2.79	2.79	0.81	2.80
T_4	2.74	0.74	2.77	2.76	0.80	2.78
T_5	2.82	0.79	2.77	2.76	0.82	2.77
T_6	2.73	0.78	2.73	2.75	0.81	2.75
T_7	2.22	0.69	2.26	2.64	0.62	2.24
SEm±	0.03	0.01	0.01	0.01	0.02	0.01
CD @ 5%	0.08	0.03	0.04	0.04	0.05	0.04
CV %	2.40	3.39	1.01	1.07	5.38	1.11

potassium (2.88%) recorded in 3th node 1 sub cane and 1 bud while minimum total nitrogen, phosphors and potassium were observed in no halting straight cane in Flame seedless in case of Sharad seedless total nitrogen (2.81 %), phosphors (0.82%) and potassium (2.86%) was higher in 4th node 1 sub cane, while it was minimum with no halting. No halting exhibited lower levels of nutrients in the petiole due to relatively more number of fruiting canes per vine, competing for drawing more nutrients for development of bunches indicating higher depletion of nutrients due to heavy crop load. This finding was strongly by the results of Ahmad [8].

Conclusion

From the above results it can be suggested that among different cane pruning severity cane halt at 3th node 1 sub cane resulted highly significant growth attributes in Flame seedless. Whereas, in Sharad seedless cane halt at 6th node 1 sub cane was found significantly superior then the rest of treatments.

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