IASET: International Journal of Agricultural & Bio-Chemical Science (IASET: IJABS)
ISSN(P): Applied; ISSN(E): Applied
Vol. 1, Issue 2, Jul-Dec 2017; 1-8

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

INFLUENCE OF PRUNING LEVEL ON BUD FERTILITIES IN FLAME SEEDLESS AND SHARAD SEEDLESS GRAPE VARIETIES UNDER MILD TROPICS

MOHAMMAD GULAB OMARI[1], RASHAD AHMAD SHERZAD[2] & M. K. HONNABYRAIAH[3]

[1] Ph.D. Scholar, College of Horticulture, UHS campus, GKVK (Po), Bengaluru, India

[2]Ph.D. Scholar, College of Horticulture, UHS campus, GKVK (Po), Bengaluru, India

[3]Professor and Head Department of Fruit Science, Bengaluru, India

ABSTRACT

Influence of pruning level on growth and yield attributes of Flame seedless and Sharad seedless. The vines were halt at thirteen different nodes levels in a randomized block design with five replications. Results revealed that, lesser day taken for bud sprout from pruning (18.02 Flame seedless and 17.04Sharad seedless) lesser inter nodal length (3.37 cm Flame Seedless and3.41cm Sharad seedless) productive cane per vine (39.08 Flame seedless and 39.82 Sharad seedless) unproductive cane per vine (4.55 Flame seedless and 5.01 Sharad seedless) leaf area(2601.22 cm^2 Flame seedless and2572.46cm^2Sharad seedless) maximum cane length at 5^{th}, 10^{th} and 15^{th}leaf in T_{13}Flame seedless andat 5^{th} , 10^{th},15^{th}in T_{13}Sharad seedless maximum cane diameter T_1Flame seedless and T_1Sharad seedless, mother cane and sub cane length were maximum T_{13}treatment in both varietieswhile its diameter was maximum with T_1in both varsities as well as fresh weight of the pruned wood was maximum with treatment T_{13} in both varieties. Petiole nutrient contentsN,P,Kpercentage (2.82, 0.89, 2.88 Flame seedless and 2.95, 0.91, 2.88 Sharad seedless),Commencement of flowering (27.28 days Flame seedless and28.33 days Sharad seedless),days from flowering to harvest (85.55 days Flame seedless and 82.67 days Sharad seedless) yield per vine (12.42 kg Flame seedless and13.71 kg Sharad seedless) yield tonnes per hectare (23 t/ha Flame seedless and24.58 t/ha Sharad seedless)

KEYWORDS: Pruning Level, Flame Seedless, Sharad Seedless, Grape

INTRODUCTION

The grape cv. Flame seedless and Sharad seedless has been recommended recently for commercial cultivation in south India. The cluster of theses varieties are loose with lesser number of shot berries. Pruning is one of the most important cultural practices which have a profound influence on yield and quality parameters. Proper pruning regulates good annual yields, size and quality of berries it helps to improve the microclimate in the canopy, promote good ripening of the grapes and creates less suitable conditions for the development of pathogens. Chougule (2004)reported maximum bunch weight, yield with 4-bud pruning in Perlette. The 3-bud pruning resulted in the lowest percentage of shot berries in Perlette which was significantly less compared to other pruning treatments Lopes*et al* (2000).Pruning technique is a variety-specific in grapes and need to be standardized to fulfil specific aims. The present study was aimed to investigate the Influence of pruning level on bud fertilities in Flame seedless and Sharad seedless grape varieties under mild tropics.

MATERIALSAND METHODS

The present investigation Influence of pruning level on bud fertilities in Flame Seedless and Sharad Seedless

grape varieties under mild tropicswas undertaken 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 x 1.8 m apart. For summer season crop vines were pruned on Oct, 2014 and harvested during the Feb, 2014 with thirteen pruning intensities replicated five times in a randomized block design. The following haltingtreatments were applied.

Table 1: Treatment Details

Flame Seedless		Sharad Seedless	
Treatment	**Treatment Details**	**Treatment**	**Treatment Details**
T_1	halt at 3th node 1 sub cane & 1 bud	T_1	halt at 4th node 1sub cane & 1 bud
T_2	halt at 3th node 1 sub cane & 2 buds	T_2	halt at 4th node 1sub cane & 2 buds
T_3	halt at 3th node 2 sub cane & 1 bud	T_3	halt at 4th node 2sub cane & 1 bud
T_4	halt at 3th node 2 sub cane & 2 buds	T_4	halt at 4th node 2 sub cane & 2 buds
T_5	halt at 4th node 1 sub cane & 1 bud	T_5	halt at 5th node 1 sub cane & 1 bud
T_6	halt at 4th node1 sub cane & 2 buds	T_6	halt at 5th node1 sub cane & 2 buds
T_7	halt at 4th node 2 sub cane & 1 bud	T_7	halt at 5th node 2 sub cane & 1 bud
T_8	halt at 4th node 2 sub cane & 2 buds	T_8	halt at 5th node 2 sub cane & 2 buds
T_9	halt at 5th node1 sub cane & 1 bud	T_9	halt at 6th node 1 sub cane &1 bud
T_{10}	halt at 5th node1 sub cane & 2 buds	T_{10}	halt at 6th node 1 sub cane & 2 buds
T_{11}	halt at 5th node 2 sub cane &1 bud	T_{11}	halt at 6th node 2 sub cane &1 bud
T_{12}	halt at 5th node 2 sub cane & 2 buds	T_{12}	halt at 6th node 2 sub cane & 2 buds
T_{13}	No halting straight cane	T_{13}	No halting straight cane

RESULTS AND DISCUSSION

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

Vegetative Attributes

Bud Sprout

The different severity of cane halting had exhibited significant effect on the period required for bud sprout in both verities of grape *i.e.* Flame seedless and Sharad seedless. In variety Flame seedless (Table 2), the cane(T_1) halt at 3th node 1 sub cane & 1 bud hastened the bud sprout by about 10 days (18.02 days) as compared to (T_{13}) no halting straight cane (24.38 days). Similarly, in variety Sharad seedless also cane halt at 4th node 1sub cane & 1 bud took (17.04 days) for bud sprouting which was about 7 days earlier than (T_{13}) no halting straight cane (24.36 days). Thus from the above results, it's clear that, with the decrease in cane halting severity, the time required for bud sprout increased. In respect of internodal length per cane were significantly, influenced by the cane halting treatment. Minimum internodal length per cane in variety Flame seedless (3.37 cm) were observed in treatment 4th node 1 sub cane & 1 bud and maximum internodal length per cane recordedinno halting straight cane (T_{13}). However, in Sharad seedless minimum (3.41) and maximum (5.59) were observed in treatment (T_1) and (T_{13}) respectively. Internodal lengths per cane were decrease due to ABA accumulation in cane and

increase in cane pruning severity. These findings are in close conformity with the observation recorded by (Ranpise*et al*., 2002).

Productive, Unproductive Cane per Vine

In Flame seedless variety maximum number of productive cane per vine (39.08) and minimum unproductive cane per vine (4.55) were found in 4th node 1 sub cane & 1 bud, while in case of Sharad seedless variety, maximum productive cane per vine (39.82) and minimum unproductive cane per vine (5.01) were found in 6th node 1 sub cane &1 bud.Another criterion to judge the productivity of cane in a well maintained vineyard, the vines with thicker canes and shorter internodes are known to regulate productivity of cane per vines.Similar results were noticed by Gicheol and Chool(1999).

Cane Length and Diameter

Highercane length (Table 3) was recorded at various stages namely 5th, 10th and 15th leaf stages. As regard cane pruning severity (T_{13}) no halting straight cane recorded maximum cane length at 5thleaf stage (25.48 cm) 10thleaf(47.85 cm) and 15thleaf(94.38 cm) and maximum diameter were observed at (T_1) 5thleaf(3.80 cm) 10thleaf(6.46 cm) and 15thleaf(9.68 cm) while it was minimum with (T_{13}) no halting straight cane in Flame seedless. Similar results were obtained in case of Shard seedless. Cane length regulated with (T_{13}) no halting straight cane by 5th, 10th and 15th leaf stages. While their diameters wereregulated by (T_1) 4th node 1sub cane & 1 bud respectively.This showed that, severe the pruning, less was the length of the cane andsevere 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 by Christensen *et al*., (1994).

Mother Cane and Sub Cane Length and Diameterand Leaf Area:

In Flame seedless variety(Table 4) maximum mother cane length (18.47 cm) were recorded in (T_{13}) no halting straight cane and minimum (12.19 cm) registered in 3th node 1 sub cane & 1 bud. In case of Sharad seedless it was minimum with 5th node1 sub cane & 2 buds while it was maximum with (T_{13}) no halting straight cane.In Flame seedless maximum mother cane diameter were observed in 4th node 1 sub cane & 1 bud and minimum (8.88 cm) noticed in (T_{13}) no halting straight cane while in Sharad seedless it was minimum in no halting straight cane and maximum with4th node 1sub cane & 1 bud.Sub cane length were maximum with no halting straight cane (17.57 cm) and it was minimum (6.66 cm) with 3th node 1 sub cane & 1 bud in Flame seedless similar observation were recorded in Sharad seedless. With respect to sub cane diameter both varietiesrecorded maximum diameter in (T_5) and minimum with (T_{13}) no halting straight cane.

However, comparing the effect of halting on mother cane and sub cane length as well as diameter, differential response could be noticed. Halted canes for vegetative growth resulted in higher mother cane and sub cane diameter. Similar results were obtained earlier by Reddy (1982).Maximum leaf area (2601.22 cm^2) were found in 3th node 1 sub cane & 1 bud and minimum (2056.51cm^2) noticed in no halting straight cane, while in case of Sharad seedless variety maximum leaf area (2572.46 cm^2) were observed in treatment 4th node 1sub cane & 1 bud and minimum (1976.64 cm^2) were recorded inno halting straight cane. They pointed out necessity of higher temperature for better regulative growth (Edson *et al*., 1993). 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

Fresh Weight of Pruned Wood

Fresh weight of the pruned wood (Table 5)was significantly maximum with no halting straight cane in both varsities while it decreases with severity of halting respectively. The above results indicated that the vigour for vegetative growth was influenced greatly by the reserves in the trunk and canes left over after pruning. Balanced pruning level tends to distribute the reserves to more growing points and hence, the lower leaf area and shoot length. Similar observations were made in number of earlier studies also by other workers.(Chadha and Kumar1970,Joon and Singh 1983).

Petiole Nutrient Content

Fruiting is an exhaustive process and heavy crop load generally leads to depletion of nutrient reserves of the vine resulting in early senility. In this contextpetiole 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 %) potassium (2.88 %) recorded in 4th node 1 sub cane & 1 bud while minimum total nitrogen, phosphors and potassium were observed in (T_{13}) no halting straight cane in Flame seedless in case of Sharad seedless total nitrogen (2.95 %), phosphors (0.91 %) and potassium (2.88 %) was higher in 6th node 1 sub cane &1 bud, while it was minimum with no halting straight cane.No halting straight cane exhibited lower level 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 supported by the results of(Kumar and Tomer 1978, Godara, *et al*., 1977)

Flowering

Commencement of flowering was significantly affected time and severity, the number of days required for commencement of flowering was minimum (27.28 days) in 3th node 1 sub cane & 1 bud and maximum period (43.72 days) inno halting straight cane in variety Fame seedless, whereas, in Sharad seedless minimum period (28.33 days) was noticed in 4th node 1sub cane & 1 bud and maximum period (46.01 days) inno halting straight cane for commencement of flowering with delay in flowering time and consequent lowering temperature, the time required for flowering was increased. These results agree with the finding of (Salem et *al*., 1997, Dhillon *et al*., 1998).In Flame seedless days from flowering to harvest was minimum (85.55 days) in3th node 1 sub cane & 1 bud and maximum (92.98 days) in no halting straight cane while, in case of Sharad seedless days from flowering to harvest was minimum (82.67 days) in4th node 1 sub cane & 1 bud and maximum (98.55 days) in no halting straight cane.

Yield Attributes

Yield of grapes was significantly affected by cane halting severity (Table 5).The results obtained in present study in respect of yield per vine (12.42 kg) and yield toones per hectare (23.00 t/ha), showed that cane halting severity 3th node 1 sub cane & 1 bud was significantly superior than the rest of treatment in variety Flame seedless in case of Sharad seedless yield per vine (13.71 kg), and yield toones per hectare (24.58 t/ha), showed that cane halting severity 4th node 1 sub cane & 1 bud were noticed higher yield, bathe varieties yields were superior compared to no halting straight cane. The increased in yield per vine and yield to ones per hectare could be explained on the basis of leaf area available for greater carbohydrates accumulation lower yield obtained in no halting straight cane was due to less number of bunches and berries per bunch and bunch weight. These results are in conformity with the results reported by (Chalak, 2008, Morris *et al*., 1985).

CONCLUSIONS

From the above results it can be suggested that among different cane pruning level cane halt at 4th node 1 sub cane & 1 bud resulted significantly maximum and highest yield of good quality of grape in Flame seedless. Whereas, in Sharad seedless cane halt at 6th node 1 sub cane & 1 bud was found significantly superior then the rest of treatments under mild tropics condition. Since the result presented have pertained to only one season, therefore, it will be desirable to continue further study for confirmation of the result.

REFERENCES

1. Chadha, K.L. and Kumar, H., 1970, Effect of pruning with constant number of total buds, number and lengths of canes varied on growth, yield, fruit quality and bearing behavior of 'Perlette' grapes. *Ind. J. Hort*., **27**: 123-127.
2. Chalak, S.U., 2008, Effect of different levels of pruning on various wine grape varieties for yield and quality. M.Sc., Thesis submitted to MPKV, Rahuri.
3. Chougule, R.A., 2004, Studies on sub-cane pruning and cycocil application in relation to the canopy management in grapes. M.Sc., Thesis submitted to MPKV, Rahuri.
4. Christensen, L.P., Leavitt, G.M., Hirschfelt, D.J. and Bianchi, M.L., 1994,The effect of pruning level and post bud break cane adjustment on Thompson seedless raisin production and quality. *Am. J. Enol. Vitic*.,**45**(2): 141-149.
5. Dhillon, W.S., Bindra, A.S., Cheema, S.S. and Singh S., 1998, Influence of berry thinning and cluster thinning on yield and quality of Perlette grapes. *Punjab Hort. J*., **28**: 198-202.
6. Edson, C.E., Howell,G.S. and Flore, J.A., 1993,Influence of crop load on photosynthesis and dry matter partitioning of Seyval grapevines. *Am. J. Enol. Vitic*.,**44**(22): 139-147.
7. Gicheol, S. and Chool, K.K., 1999,Effect of pruning and debudding on the growth, nutrition and berry setting of *Vitislabrusca* B. cv. Kyoho. *J. Korean Soc. Hort. Sci*., **40**(2): 221-224.
8. Godara, N.R., Guptha, O.P. andSingh, J.P., 1977, Evaluation of various levels of pruning in Perlette cultivar of grapes (*Vitisvinifera* L.). In: Viticulture in tropics (Eds: K.L. Chadha, G.S. Randhawa and R.N. Pal.). Pub: Horticultural Society of India, Bangalore. 204-211.
9. Joon, M.S. and Singh,I.S., 1983, Effect of intensity of pruning on ripening, yield and quality of Delight grapes. *Haryana J. Hort. Sci*., **12**(1-2): 44-47.
10. Kumar, H. and Tomer, N.S., 1978, Pruning studies on Himrod cultivar of grape. *Haryana J. Hort. Sci.,* **7** (1-2): 18-20.
11. Lopes, C., J.,Melicias, A., Aleixo and Laureano, O., Castro,R., 2000,Effect of mechanical hedge pruning on growth, yield and quality of Cabernet Sauvignon grapevines. *Acta Hort*., **526**: 261-268.
12. Morris, J.R., Sims, C.A. and Cawthon, D.L., 1985, Yield and quality of 'Niagara' grapes as affected by pruning severity, nodes per bearing unit, training system and shoot positioning. *J. Am. Soc. Hort. Sci*., **110**(2): 186-191.
13. Rangareddy, B. 1996, Preliminary studies on the relationship of shoot thickness to capacity for production in Anab-e-Shahi grape. *Andhra Agric. J*., **13**(5): 174-177.

14. Ranpise, S.A., Patil, T.A., More, R.M., Birade, B.T. and Ghure, T.K., 2002,Sub-cane pruning on fruitfulness and yield of grape cv. Thompson Seedless. *J. Mah. Agric. Univ.* **27**(3): 258-259.

15. Salem, A.T., Kilani, A.S. and Shaker, G.S., 1997, Growth and quality of two cultivars of grapes as affected by pruning severity. *Acta Hort*., **441**: 309-316.

APPENDICES

Table 2: Effect of Cane Regulation on Growth Parameter of Grapes in Variety Flame Seedless and Sharad Seedless

Treatments	Flame Seedless				Sharad Seedless			
	No. of Days for Bud Sprouting from Pruning	Inter Nodal Length (3th-5th) Node (cm)	No. of Productive Cane/Vine	No. of un-Productive Cane/Vine	No. of Days for Bud Sprouting from Pruning	Internodal Length (4th-6th) Node (cm)	No. of Productive Cane/Vine	No. of un-Productive Cane/Vine
T_1	18.02	3.61	38.07	5.51	17.04	3.53	39.29	5.30
T_2	18.04	3.65	37.78	6.44	17.27	3.73	39.08	5.41
T_3	18.07	3.81	37.70	5.91	18.16	3.51	38.86	5.56
T_4	18.48	3.48	37.88	6.24	17.08	3.70	38.48	5.75
T_5	18.38	3.37	39.08	4.55	19.00	3.71	38.75	5.60
T_6	19.06	4.66	38.11	5.64	20.40	4.09	38.41	6.08
T_7	19.28	3.65	38.08	6.08	20.13	4.27	39.27	5.57
T_8	19.57	4.37	38.50	5.68	20.78	3.85	38.36	6.13
T_9	19.95	4.27	38.30	5.51	21.72	3.41	39.82	5.01
T_{10}	20.31	4.37	38.32	5.85	21.72	4.05	38.20	6.07
T_{11}	21.75	4.46	38.00	5.51	22.47	4.45	38.59	6.09
T_{12}	22.19	5.16	38.54	5.86	22.57	4.03	38.81	6.18
T_{13}	24.38	5.59	34.33	9.44	24.36	5.59	35.80	8.92
S. Em. ±	0.23	0.20	0.34	0.44	0.63	0.18	0.27	0.32
C.D. @5%	0.65	0.56	0.98	1.24	1.80	0.51	0.76	0.91
CV %	2.59	10.53	2.03	16.23	6.99	10.13	1.54	11.94

Table 3: Effect of Cane Regulation on Growth Parameter of Grapes in Variety Flame Seedless and Sharad Seedless

Treatments	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	13.55	29.67	77.91	3.80	6.46	9.68	20.49	40.96	68.58	3.45	6.32	9.38
T_2	13.83	37.85	78.00	3.80	6.00	9.66	18.43	40.43	69.28	3.10	6.63	9.53
T_3	15.12	38.74	79.05	3.58	5.56	9.66	19.60	40.20	68.92	3.38	6.18	9.37
T_4	15.65	38.38	82.84	3.75	5.97	9.45	19.66	40.40	69.08	3.32	6.20	9.32
T_5	15.01	36.33	81.25	3.36	5.77	9.65	19.64	39.41	72.45	3.17	5.62	9.59
T_6	15.11	39.12	82.88	3.55	5.98	9.54	19.82	41.30	73.74	3.36	5.86	9.37
T_7	15.52	42.72	83.39	3.74	5.74	8.76	20.19	41.80	76.71	2.89	5.96	9.16
T_8	15.02	39.85	85.58	3.65	5.10	9.36	21.07	42.88	79.04	3.13	6.14	9.15
T_9	18.81	43.05	86.65	3.59	5.32	9.55	21.50	43.87	84.29	3.33	5.95	8.85
T_{10}	19.53	43.54	89.30	3.30	4.87	9.46	23.62	43.16	83.11	2.55	5.82	8.68
T_{11}	20.14	41.79	88.94	3.34	5.31	9.27	24.32	45.82	83.49	2.26	5.80	8.50
T_{12}	20.68	43.55	89.23	2.86	5.34	9.05	25.63	45.19	81.92	2.44	5.62	7.82
T_{13}	25.48	47.85	94.38	1.59	3.44	6.10	27.75	54.74	93.66	1.37	4.64	6.47
S. Em. ±	0.42	0.65	0.60	0.22	0.22	0.42	0.22	0.47	0.58	0.16	0.21	0.19
C.D. @5%	1.18	1.86	1.71	0.62	0.64	1.20	0.63	1.32	1.65	0.46	0.59	0.53
CV %	5.41	3.63	1.59	14.48	9.18	10.29	2.28	2.42	1.67	12.43	7.85	4.70

Table 4: Effect of Cane Regulation on Leaf Area, Mother and Sub Cane Parameter of Grapes in Variety Flame Seedless and Sharadseedless

Treatments	Flame Seedless					Sharad Seedless				
	Total Leaf Area Per Cane (cm^2)	Mother Cane Length (cm)	Mother Cane Diameter (mm)	Sub Cane Length (cm)	Sub Cane Diameter (mm)	Total Leaf Area Per Cane (cm^2)	Mother Cane Length (cm)	Mother Cane Diameter (mm)	Sub Cane Length (cm)	Sub Cane Diameter (mm)
T_1	2601.22	12.19	12.13	6.66	10.46	2572.46	12.74	10.35	12.32	10.46
T_2	2544.84	13.43	11.96	7.52	10.23	2514.53	13.44	10.23	12.35	10.46
T_3	2531.21	13.47	12.13	8.49	10.32	2513.08	13.56	10.13	12.37	10.33
T_4	2580.85	14.40	12.09	8.38	10.26	2522.48	14.60	10.17	12.29	10.27
T_5	2598.30	15.45	12.25	8.58	10.59	2508.17	15.46	9.96	12.51	10.56
T_6	2549.02	14.26	12.14	10.17	10.45	2530.68	14.46	8.28	12.39	10.41
T_7	2551.89	13.21	12.17	11.10	9.91	2547.72	15.16	9.75	12.38	10.34
T_8	2537.07	13.43	12.05	11.41	9.12	2544.68	15.56	9.73	12.31	9.31
T_9	2566.45	14.00	11.54	12.37	9.67	2558.87	16.59	9.64	11.54	9.73
T_{10}	2557.46	14.20	11.44	12.33	9.05	2565.17	16.29	8.37	11.43	9.58
T_{11}	2561.57	15.24	11.32	13.62	9.10	2565.43	16.83	8.42	11.29	9.90
T_{12}	2565.07	15.23	11.27	13.43	9.05	2460.92	17.47	8.42	11.31	9.84
T_{13}	2056.51	18.47	8.88	17.57	7.91	1976.64	19.80	6.98	10.23	7.61
S. Em. ±	30.17	0.42	0.17	0.18	0.16	21.94	0.13	0.52	0.04	0.08
C.D.@5%	85.79	1.20	0.49	0.51	0.45	62.38	0.36	1.49	0.11	0.24
CV %	2.67	6.55	3.31	3.70	3.63	1.97	1.84	12.65	0.71	1.89

Table 5: Effect of Cane Regulation on Fresh Weight and Petiole Nutrient Contents of Grapes in Variety Flame Seedless and Sharad Seedless

Treatments	Flame Seedless				Sharad Seedless			
	Fresh Weight Pruned Material (kg)	Total Nitrogen Content (%)	Total Phosphors Content (%)	Total Potassium Content (%)	Fresh Weight Pruned Material (kg)	Total Nitrogen Content (%)	Total Phosphors Content (%)	Total Potassium Content (%)
T_1	5.39	2.82	0.79	2.77	5.39	2.81	0.78	2.86
T_2	6.48	2.79	0.78	2.77	6.74	2.81	0.79	2.85
T_3	6.44	2.81	0.77	2.79	5.30	2.79	0.81	2.80
T_4	6.79	2.74	0.74	2.77	6.63	2.76	0.80	2.78
T_5	5.42	2.82	0.89	2.88	5.52	2.76	0.81	2.77
T_6	6.69	2.73	0.86	2.73	6.45	2.75	0.82	2.75
T_7	5.32	2.70	0.80	2.69	5.38	2.78	0.84	2.75
T_8	6.81	2.70	0.76	2.67	6.92	2.81	0.86	2.80
T_9	5.47	2.65	0.77	2.57	5.29	2.95	0.91	2.88
T_{10}	6.94	2.67	0.72	2.51	5.98	2.87	0.83	2.85
T_{11}	6.29	2.54	0.75	2.42	5.30	2.82	0.74	2.77
T_{12}	6.97	2.47	0.72	2.37	6.88	2.76	0.74	2.74
T_{13}	7.47	2.22	0.69	2.26	7.38	2.64	0.62	2.24
S. Em. ±	0.31	0.03	0.01	0.02	0.21	0.01	0.02	0.01
C.D.@5%	0.87	0.08	0.04	0.05	0.59	0.04	0.05	0.04
CV %	10.81	2.28	3.74	1.38	7.67	1.10	4.77	1.10

Table 6: Effect of Cane Regulation on Flowering and Yield Attributes of Grapes in Variety Flame Seedless and Sharad Seedless

Treatments	Flame Seedless				Sharad Seedless			
	No. of Days for Flowering from Pruning	No. of Days from Flowering to Harvest	Yield/Vine (kg)	Yield(t/ha)	No. of Days for Flowering from Pruning	No. of Days from Flowering to Harvest	Yield/ Vine (kg)	Yield(t/ha)
T_1	27.28	85.55	11.67	21.61	28.33	82.67	9.34	17.31
T_2	28.32	87.62	10.51	19.44	28.59	84.73	9.67	17.91
T_3	29.30	88.65	10.52	19.47	30.92	82.90	10.46	19.37
T_4	30.33	88.94	10.06	18.43	31.78	85.88	8.82	15.89
T_5	28.24	84.65	12.42	23.00	34.35	90.79	9.77	17.13
T_6	32.30	90.69	10.42	19.29	35.37	92.86	8.87	15.94
T_7	32.21	92.01	10.23	18.95	36.34	93.81	11.18	20.70
T_8	34.28	92.56	10.01	18.53	37.44	94.71	8.52	15.76
T_9	36.36	93.40	9.09	16.85	30.94	86.02	13.71	24.58
T_{10}	38.25	93.50	9.47	17.55	38.37	95.71	10.87	20.16
T_{11}	38.50	94.65	8.84	16.37	39.35	95.67	11.11	20.58
T_{12}	38.33	94.66	8.94	16.55	40.08	96.20	12.18	22.58
T_{13}	43.72	97.98	6.90	12.67	46.01	98.55	5.84	10.81
S.Em. ±	0.32	0.16	0.30	0.54	0.17	0.18	0.64	1.25
C.D.@5%	0.90	0.45	0.84	1.54	0.49	0.50	1.82	3.55
CV %	2.10	0.39	6.68	6.60	1.10	0.44	14.26	15.21