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Effect of cane pruning on Thompson seedless and Sharad seedless varieties of grape under Buldana district

S.S. BHOSALE, N.A. NALAGE, P.U. GHADGE AND D.A. MHETRE

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See end of the article for authors' affiliations

Correspondence to :

S.S. BHOSALE
Department of Horticulture, Ratnai College of Agriculture, Akluj, Malshiras, SOLAPUR (M.S.) INDIA

ABSTRACT

Bud burst was maximum at terminal and first lateral bud position regardless of pruning severity levels and these buds were mostly fruitful. In Thompson seedless 7th leaf (P_3) cane pruning treatment gave maximum bunches and higher yield, whereas in Sharad seedless 6th leaf (P_2) cane pruning treatment gave maximum bunches (32 bunches in Thompson seedless and 36.20 bunches per vine in Sharad seedless) and high yield (8.4 kg in Thompson and 8.6 kg in Sharad seedless) than rest of the treatments. Significantly the maximum berry weight, berry size and berry volume were obtained from 7th leaf (P_3) treatment in Thompson seedless variety and 6th leaf (P_2) treatment in Sharad seedless variety. Maximum TSS : acid ratio and low acidity, high reducing sugar were obtained from treatment 7th leaf (P_3) in Thompson seedless, whereas treatment 6th leaf (P_2) in Sharad seedless variety.

Key words : Cane pruning, Thompson seedless, Sharad seedless, Grape

Most of the fruit crops unlike grape which are evergreen seldom require pruning. Pruning in grape is carried out to regulate the crop. In South India, pruning is done twice in year, once in summer and again in winter. Some times due to delay in marketing of the produce, proper rest period of 2-3 weeks do not get to the grapevines and thus become unfruitful after October pruning and this creates the problems to the cultivators. To overcome this situation new practice of pruning was developed in Maharashtra, which is known as sub-cane pruning. In this pruning system, there will be 60 to 80 per cent fruitfulness under even adverse condition.

Sometimes growers pruned their vine yard late in April pruning to get the more price to their grapes and due to which possibility of development of reproductive primordial is negligible. Here levels of absisic acid increase and internodal distance is lesser. Thus there is 60-90 per cent possibility of development of reproductive primordial (Anon., 2005). Though, this practice of grape pruning is popular in Maharashtra but the research information on this technique to get maximum fruitfulness during adverse climate condition is meagre.

MATERIALS AND METHODS

Four year old healthy vines having uniform growth and vigour of varieties Thompson seedless and Sharad seedless were selected for the experiment. These vines were trained on extended 'y' trellies. The experiment was laid in analysis of variance technique with four replications. Trees were planted with spacing 240 x 120 cm.

The treatment details studied in the experiment were Cane pruning (April pruning), P_1 - Main cane pruning at 5th leaf, P_2 - Main cane pruning at 6th leaf, P_3 - Main cane pruning at 7th leaf, P_4 - Main cane pruning at 8th leaf, P_5- Main cane pruning at 9th leaf and P_6- Unpruned (Control)

(Note : Sub-cane was topped at 5th leaf in each treatment)

Cane pruning (October pruning)

(Note :- Sub-cane was topped at 2nd leaf in each treatment and in control treatment main cane was pruned at 12th leaf)

Pruning operations:

Vines selected for the experiment were pruned in March, 2006 for summer (foundation) pruning. The shoots emerged after April pruning. The cane was allowed to grow up to 5, 6, 7, 8 and 9 leaf and then topped. The sprouts canes on digital bud of their shoots were again topped at 5th leaf.

The vegetative growth obtained after this pruning was pruned in the month September for forward pruning. During the September pruning, the vines were pruned by retaining 2 buds on each sub-cane and in control treatment 12 buds retained on the main cane.

RESULTS AND DISCUSSION

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

Growth:

Bud burst:

The different severity of cane pruning had exhibited

significant effect on the period required for bud burst in both the varieties of grape *i.e.* Thompson seedless and Sharad seedless. In variety Thompson seedless (Table 1), the grape vine pruned at 5th leaf (P_1) hastened the bud bursting by about 3 days (9.33 days) as compared to unpruned (P_6) grape vine (12.33 days). Similarly, in variety Sharad seedless also vine pruned at 5th leaf stage took 9.6 days for bud bursting which was about 3 days earlier than unpruned (P_6) vine (12.39 days). Thus from the above results, it is clear that, with the decrease in pruning severity, the time required for bud burst was increased.

In respect of number of buds sprouted per spur were significantly inflamed by the cane pruning treatment. Maximum buds sprouted per spur in variety Thompson seedless (4.66) were observed in treatment P_6 and minimum buds sprouted per spur (3.32) in treatment P_1. However, in Sharad seedless maximum (4.33) and minimum (3.32) bus sprouted per spur were observed in treatment P_6 and P_1, respectively.

Number of buds sprouted per spur were increased with increase in pruning severity. These findings are in close conformity with the observations recorded by Tijare (1965) and Kapoor (1967) in Nagpur conditions Gautam (1998), Kulkarni (1999) under Akola conditions.

Leaf growth :

In Thompson seedless variety, maximum number of leaves and leaf area (11.6 and 1128.2 cm^2, respectively) were found in P_3 treatment (cane pruning at 7th leaf) and significantly minimum leaf growth and leaf area (9.3 and 1063.7 cm^2, respectively) in P_6 treatment (Unpruned).

While in case of Sharad seedless variety, maximum number of leaves and leaf area (12.66 and 1082.90 cm^2, respectively) were observed in treatment P_2 (cane pruning at 6th leaf) and minimum number of leaves (9.62 and 1073.2 cm^2) were found in P_6. They pointed out necessity of higher temperature for better regulative growth. Vegetative growth increases with increasing severity. It has also been established that the growth equilibrium of shoot is considerably distributed as a result of the heavy amount of bearing (Gardner *et al*., 1952). Due to severe pruning carbohydrates accumulated before pruning in the vine are diverted towards regulative growth thereby increasing shoot length. As shoot length increases, number of leaves and leaf area also increased. Present findings are in close agreement with the findings of Tijare (1965),

Table 1 : Effect of cane pruning on days required for bud burst and bud sprouted per shoot in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless		Sharad seedless	
	No. of days required for bud burst	No. of buds sprouted per spur	No. of days required for bud burst	No. of buds sprouted per spur
P_1 - Main cane pruning at 5th leaf	9.33	3.32	9.60	3.32
P_2 - Main cane pruning at 6th leaf	9.66	3.33	9.66	3.66
P_3 - Main cane pruning at 7th leaf	10.00	3.65	10.66	3.85
P_4 - Main cane pruning at 8th leaf	11.33	3.66	11.66	4.15
P_5 - Main cane pruning at 9th leaf	11.66	4.06	11.66	4.25
P_6 – Unpruned (control)	12.33	4.66	12.33	4.33
' F' test	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.38	0.40	0.33	0.30
C.D. (P=0.05)	1.14	1.21	0.98	0.90

Table 2 : Effect of cane pruning on number of leaves and leaf area in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless		Sharad seedless	
	Leaves per shoot	Leaf area per shoot (cm^2)	Leaves per shoot	Leaf area per shoot (cm^2)
P_1 - Main cane pruning at 5th leaf	10.3	1069.6	10.1	1070.80
P_2 - Main cane pruning at 6th leaf	10.6	1076.2	12.66	1082.90
P_3 - Main cane pruning at 7th leaf	11.6	1128.2	11.64	1089.40
P_4 - Main cane pruning at 8th leaf	11.3	1106.2	11.66	1086.03
P_5 - Main cane pruning at 9th leaf	10.00	1075.9	10.26	1079.80
P_6 – Unpruned (control)	9.3	1063.7	9.62	1073.20
' F' test	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.38	12.3	0.33	1.35
C.D. (P=0.05)	1.14	36.6	0.98	4.02

Kapoor (1967) under Nagpur conditions, Gondane (1997), Gautam (1998), Kulkarni (1999) they pointed out that, vegetative growth increased with reduction in bud load.

Flowering :

Commencement of flowering was significantly affected pruning time and severity (Table 3). The number of days required for commencement of flowering was minimum (15.32 days) in P_1 treatment (Pruning at 5th leaf) and maximum period (20.70 days) in P_6 treatment (unpruned) in variety Thompson seedless, whereas, in Sharad seedless, minimum period (15 days) was noticed in treatment P_1 and maximum period (19.70 days) required in P_6 for commencement of flowering with delay in pruning time and consequent lowering temperature, the time required for flowering was increased. These results agree with the findings of Tijare (1965) and Kapoor (1967) under Nagpur conditions.

Yield :

Yield of grapes was significantly affected by cane pruning severity (Table 4 and 5). The results obtained in present study in respect of number of bunches, bunch length, number of berries per bunch and bunch weight showed that P_3 cane pruning severity (Pruning at 7th leaf) treatment was significantly superior than the rest of treatment in variety Thompson seedless, while in case of Sharad seedless treatment P_2 (Cane pruning at 6th leaf) produced significantly maximum number of berries per bunch and bunch weight than the rest of the pruning treatments.

Significantly lower yield was obtained from control treatment in both verities. Higher yield obtained in P_3 treatment in Thompson seedless and P_2 treatment in variety Sharad seedless was due to more number of bunches and more bunch weight. The increased berries per bunch and weight could be explained on the basis of leaf area available for greater carbohy- drates accumulation. Lower yield obtained in P_6 treatment was due to less number of bunches and berries per bunch and bunch weight. These results are in conformity with the results reported by Sharma *et al.* (1976), Kapoor (1967), Gautam (1998), Kulkarni (1999) on Akola condition.

Table 3 : Effect of cane pruning on period required for commencement of flowering and maturity in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless		Sharad seedless	
	Days required for flowering	Days required for maturity	Days required for flowering	Days required for maturity
P_1 - Main cane pruning at 5th leaf	15.32	113.00	15.00	104.7
P_2 - Main cane pruning at 6th leaf	15.65	115.60	15.30	102.4
P_3 - Main cane pruning at 7th leaf	16.70	112.20	16.30	104.5
P_4 - Main cane pruning at 8th leaf	18.00	118.30	17.70	105.2
P_5 - Main cane pruning at 9th leaf	19.30	120.40	19.10	106.3
P_6 – Unpruned (control)	20.70	127.00	19.70	110.0
' F' test	Sig.	Sig.	Sig.	Sig.
S.E.)±	0.38	0.81	0.43	0.60
C.D. (P=0.05)	1.14	2.42	1.27	1.79

Table 4 : Effect of cane pruning on yield of variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless		Sharad seedless	
	Yield per vine (kg)	Yield per ha (tones)	Yield per vine (kg)	Yield per ha (tones)
P_1 - Main cane pruning at 5th leaf	7.30	16.28	7.40	16.46
P_2 - Main cane pruning at 6th leaf	7.80	17.67	8.60	21.20
P_3 - Main cane pruning at 7th leaf	8.40	21.21	7.60	16.70
P_4 - Main cane pruning at 8th leaf	7.00	15.93	7.06	15.35
P_5 - Main cane pruning at 9th leaf	6.10	13.78	6.46	14.30
P_6 – Unpruned (control)	5.30	12.70	5.33	13.16
' F' test	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.23	0.17	0.14	0.23
C.D. (P=0.05)	0.70	0.51	0.42	0.68

Table 5. Effect of cane pruning on yield contributing characters in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless				Sharad seedless			
	No. of bunches per vine	Length of bunch (cm)	No. of berries per bunch	Bunch weight (g)	No. of bunches per vine	Length of bunch (cm)	No. of berries per bunch	Bunch weight (g)
P_1 - Main cane pruning at 5th leaf	25.50	16.63	98.00	203.20	30.70	17.80	96.00	235.30
P_2 - Main cane pruning at 6th leaf	27.30	18.22	97.00	205.50	36.20	18.20	108.00	274.70
P_3 - Main cane pruning at 7th leaf	32.00	18.96	109.20	233.90	30.50	17.90	84.30	243.60
P_4 - Main cane pruning at 8th leaf	25.00	17.00	92.70	217.10	29.40	17.70	74.60	236.10
P_5 - Main cane pruning at 9th leaf	22.60	16.34	85.60	186.70	28.32	17.30	65.00	222.20
P_6 – Unpruned (control)	19.00	15.13	77.30	177.90	24.00	16.20	60.30	198.80
' F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.57	0.22	1.71	1.90	0.68	0.09	1.70	2.09
C.D. (P=0.05)	1.71	0.68	4.80	5.55	1.07	0.29	5.01	6.21

Berry characters :

Physical characteristics :

As regards cane pruning severity P_3 treatment (pruning at 7th leaf) in variety Thompson seedless and P_2 treatment (pruning at 6th leaf) in variety Sharad seedless gave maximum berry weight, berry size (length and diameter) and berry volume. Treatment P_6 (unpruned) gave minimum berry weight, berry size (length and diameter) and berry volume in both the varieties. The average weight and size of the berry depends on the

Table 6 : Effect of cane pruning on physical characteristics of berry in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless				Sharad seedless			
	Berry wt. (g)	Length of berry (cm)	Diameter of berry (cm)	Juice (%)	Berry wt. (g)	Length of berry (cm)	Diameter of berry (cm)	Juice (%)
P_1 - Main cane pruning at 5th leaf	2.00	1.86	1.46	62.89	2.43	2.20	1.40	64.49
P_2 - Main cane pruning at 6th leaf	2.23	2.13	1.56	63.00	2.70	2.53	1.63	64.25
P_3 - Main cane pruning at 7th leaf	2.40	2.36	1.73	62.65	2.56	2.40	1.50	64.20
P_4 - Main cane pruning at 8th leaf	2.20	1.70	1.40	62.70	2.43	2.25	1.33	63.80
P_5 - Main cane pruning at 9th leaf	1.9	1.53	1.16	62.85	2.23	2.07	1.13	64.18
P_6 – Unpruned (control)	1.83	1.37	0.93	62.86	2.06	1.96	1.10	64.13
' F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.05	0.05	0.03	0.84	0.06	0.090.05	0.04	0.87
C.D. (P=0.05)	0.15	0.15	0.11	-	0.19	0.18	0.14	-

Table 7 : Effect of cane pruning on chemical composition of grape juice in variety Thompson seedless and Sharad seedless

Treatments	Thompson seedless				Sharad seedless			
	TSS (^{0}Brix)	Acidity (%)	TSS acid ratio	Reducing sugar (%)	TSS (^{0}Brix)	Acidity (%)	TSS acid ratio	Reducing sugar (%)
P_1 - Main cane pruning at 5th leaf	18.17	0.70	24.23	15.92	16.49	0.76	21.72	14.73
P_2 - Main cane pruning at 6th leaf	18.36	0.66	28.68	15.71	17.41	0.58	30.12	15.68
P_3 - Main cane pruning at 7th leaf	18.37	0.58	31.67	16.17	17.51	0.64	21.36	14.60
P_4 - Main cane pruning at 8th leaf	18.87	0.68	27.86	15.71	16.83	0.75	22.45	14.66
P_5 - Main cane pruning at 9th leaf	18.34	0.70	25.92	15.46	16.40	0.78	21.04	14.52
P_6 – Unpruned (control)	17.71	0.70	25.45	15.63	16.54	0.81	20.43	14.20
' F' test	NS	Sig.	Sig.	Sig.	NS	Sig.	Sig.	Sig.
S.E. ±	0.67	0.019	0.16	0.03	0.51	0.005	0.22	0.03
C.D. (P=0.05)	-	0.058	0.47	0.09	-	0.017	0.67	0.09

N.S.- Non significant

number of leaves and leaf area available for supply of carbohydrates at the time of berry development. The increased juice percentage and berry volume with the severity of pruning explained on the basis of additional weight gained by the berries (Table 6).

Chemical compositions :

The quality of the table grape is judged by the various organic and inorganic components present in the juice. In grape, a variety is judged as superior or inferior depending upon its TSS content percentage of sugar and juice, the acid content of juice and sugar acid blend for the taste. The data obtained in respect of TSS, acidity, TSS: acid ratio, reducing sugar are presented in Table 7 for Thompson seedless and Sharad seedless variety of grape. In respect of cane pruning severity it is observed that TSS was not affected by pruning treatment. The significantly minimum acidity, height TSS acid ratio and reducing sugar were noticed in treatment P_3 (pruning at 7^{th} leaf) in Thompson seedless and treatment P_2 (pruning at 6^{th} leaf) in Sharad seedless, respectively.

These results occurred mainly due to maximum leaf which are available per bunch compared to other treatments. Maximum leaf area available which might have synthesized carbohydrates which diverted towards developing berries and reduce acidity.

Similar results were obtained by Gautam (1998) and Kulkarni (1999) under Akola condition. They pointed out that, sever pruning increases reducing sugar and TSS : Acid ratio and lower the acidity.

Conclusion :

– From the above results it can be suggested that among the different cane pruning severity treatments seven buds per cane pruning treatment resulted in significantly maximum growth and highest yield of good quality grape in variety Thompson seedless.

– Whereas, in Sharad seedless variety six buds per cane pruning treatment was found significantly superior than the rest of the treatments.

– Since the result presented have pertained to only one season, therefore, it will be desirable to continue further study for confirmation of the result.

Authors' affiliations:
N.A. NALAGE, P.U. GHADGE AND D.A. MHETRE, Department of Horticulture, Ratnai College of Agriculture, Akluj, Malshiras, SOLAPUR (M.S.) INDIA

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