

Studies on Pruning Severity on Productivity of Grape (*Vitis vinifera* L.) Variety Muscat Hamburg

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ABSTRACT

A field experiment on standardization of pruning practices for different cropping patterns of grapes (*Vitis vinifera* L.) on Muscat Hamburg and Thompson Seedless varieties was undertaken during the period from 2013 -2014 at farmer's field, located at Kamayagoundanpatty, Cumbum Valley of Theni district in Tamil Nadu. Double pruning and double cropping system was adopted during winter (December) and summer season (June) in these varieties respectively. The pruning treatment three times with five vines per replication in randomized block design. Eleven treatments were imposed on ten year old uniform sized grape vine grown under a spacing of 3 x 2 m. The treatments are spur pruning 1-2 bud level in June and forward pruning in December, Spur pruning 1-2 bud level in December and forward pruning in June, spur pruning 3-4 bud level in June and forward pruning in December, spur pruning 3-4 bud level in December and forward pruning in June, spur pruning 5-6 bud level in June and forward pruning in December, spur pruning 5-6 bud level in December and forward pruning in June, spur pruning 8-9 bud level in June and forward pruning in December, spur pruning 8-9 bud level in December and forward pruning in June, spur pruning 5-6 bud level in June and cane pruning in December, spur pruning 5-6 bud level in December and cane pruning in June and cane pruning both December and June. The highest number of canes per vine was recorded in T₂ (44.03) in winter pruning. In summer pruning, the highest number of canes per vine was recorded in T₁ (48.21). The maximum weight of the pruned material was recorded in T₂ and T₁ (1.62 and 2.23 kg vine⁻¹) during winter and summer pruning. The treatment T₂ (5.53 cm) recorded the maximum internodal length was recorded and was on par with T₄ in winter pruning. In summer pruning, the maximum internodal length was recorded in T₁ (6.17 cm). The treatments T₈ (51.02) registered the maximum number of bunches per vine in winter pruning. In summer pruning, T₇ (55.10) treatment recorded the maximum number of bunch per vine.

Key words Pruning severity, grapes, Muscat hamburg

Grape vine (*Vitis vinifera* L.) originally a temperate fruit crop and it is also grown successfully under tropical condition. Grape is one of the major important fruit crops grown in India. The majority of the grape produced in the country is used for table purpose and the small quantity is converted into raisin, wine and juice. At presents in India, grape is grown over an area of 1,18,000 ha with annual production of 2,483,000 MT tonnes and a productivity of 21.1 tonnes ha⁻¹. The major grape growing states of India are Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. In Tamil Nadu, grapevine is grown in an area of 2,680 ha with a production of 43.3 MT ha⁻¹ and productivity 16.2 tonnes ha⁻¹ (Indian Horticulture Database, 2013). In India, 74.5 per cent of produced grape is available for table purpose, nearly 22.5 per cent is dried for raisin production, and 1.5 per cent for winemaking and 0.5 per cent is used for juice making (Somkuwar *et al.*, 2013).

Theni (Cumbum Valley), Dindigul and Coimbatore are the traditional areas for grapevine cultivation in Tamil Nadu. Grape grower of cumbum valley could able to harvest five crops in two years which is very unique feature that cannot be observed anywhere in the world. Nearly 90 per cent of the grape growing area in Tamil Nadu is dominated by the seeded grape variety Muscat Hamburg. Bunches are medium to large in size and compact in nature. Berries are smaller in size, with deep purple skin colour, spherical in shape and seeded. The berries are sweet in taste, having the TSS of 16-18 oBrix. This variety is having poor to moderate keeping quality and used for table purpose.

Pruning is one of the important factors than other cultural operations that play a vital role in fruitfulness and quality of grapevine. However, varied climatic conditions, vine vigour, health status and other viticultural practices as a whole could affect the fruitfulness, berry growth, berry size, yield and quality. The fruitfulness of grapes is predominantly influenced by the genetic potential of the cultivar and could be altered by adopting the

Table 1. Effect of pruning severity on number of canes per vine and pruning mass (kg) in grape variety Muscat Hamburg under different pruning season

Treatments	Muscat Hamburg			
	Number of canes per vine		Pruning Mass (Kg)	
	Winter pruning	Summer pruning	Winter pruning	Summer pruning
T ₁	35.31	48.21	1.37	2.23
T ₂	44.03	36.20	1.62	1.32
T ₃	34.17	47.00	1.39	2.00
T ₄	43.20	35.71	1.58	1.45
T ₅	32.20	45.47	1.24	1.90
T ₆	43.53	34.10	1.27	1.43
T ₇	30.52	43.82	1.15	1.20
T ₈	42.61	32.28	1.22	1.19
T ₉	41.38	42.52	1.50	1.50
T ₁₀	42.00	38.32	1.43	1.87
T ₁₁	37.03	41.03	1.45	1.62
SE(d)	1.16	1.21	0.04	0.05
CD (0.05)	2.49	2.60	0.09	0.10

suitable pruning practices. Hence, the optimum pruning mechanism should be evolved for getting yield and in commercial grape varieties. Above all, pruning is essential tools that have profound influence on retaining enough quality fruiting wood to ensure fruitfulness count and optimum crop load.

MATERIALS AND METHOD

An investigation on standardization of pruning practices for different cropping patterns on grapes (*Vitis vinifera* L.) was undertaken at farmer's field, located at Kamayagoundanpatty, Cumbum Valley of Theni district during 2013 - 2014. The experiment was laid out in a ten year old vines with uniform canopy spaced at 3 x 2 m. The design was randomized block design having eleven treatments and three replication. Each treatment unit consisted of five vines per replication. The pruning treatments imposed were as follow: T₁ - spur pruning 1-2 bud level in June and forward pruning in December, T₂ - spur pruning 1-2 bud level in December and forward pruning in June, T₃ - spur pruning 3-4 bud level in June and forward pruning in December, T₄ - spur pruning 3-4 bud level in December and forward pruning in June, T₅ - spur pruning 5-6 bud level in June and forward pruning in December, T₆ - spur pruning 5-6 bud level in December and forward pruning in June, T₇ - spur pruning 8-9 bud level in June and forward pruning in December, T₈ - spur pruning 8-9 bud level in

December and forward pruning in June, T₉ - spur pruning 5-6 bud level in June and cane pruning in December, T₁₀ - spur pruning 5-6 bud level in December and cane pruning in June and T₁₁ - cane pruning both December and June. Data were recorded on number of canes per vine, pruning mass (kg) internodal length (cm) and number of bunches per vine. Data collected on this above aspects were subjected to statistical analysis as per the methods suggested by Panse and Sukhatme, 1985.

RESULTS AND DISCUSSION

Pruning the vines for optimum cropping according to the vigour is the most reliable method to maintain balance between growth and production. The vine should carry moderate number of canes in order to maintain the uniform vigour throughout its life span. So, canopy, vigour and productivity can be balanced through pruning levels. In the present investigation, the treatment (T₂ and T₁) spur pruning in 1-2 buds level during winter and summer pruning recorded the highest number of canes per vine. This result clearly indicated that spur pruning during June month recorded the highest number of canes per vine. This may be due to release of dormant buds by removal of apical dominance. With higher number of buds available on the shoot, the reserves directed from trunk could have contributed to highest

Table 2. Effect of pruning severity on internodal length (cm) and number of bunches per vine in grape variety Muscat Hamburg under different pruning season

Treatments	Muscat Hamburg			
	Internodal length (cm)		Number of bunches per vine	
	Winter pruning	Summer pruning	Winter pruning	Summer pruning
T ₁	4.87	6.17	43.29	50.00
T ₂	5.53	4.78	49.21	48.00
T ₃	4.50	5.96	41.00	49.25
T ₄	5.32	5.17	44.52	47.19
T ₅	4.49	5.65	41.89	53.68
T ₆	4.23	5.14	43.51	50.74
T ₇	3.59	4.41	43.02	55.10
T ₈	3.95	4.22	51.02	51.84
T ₉	5.31	5.38	44.00	54.03
T ₁₀	5.12	5.73	45.09	50.86
T ₁₁	5.07	4.86	44.42	52.35
SE(d)	0.14	0.16	1.32	1.52
CD (0.05)	0.30	0.33	2.83	3.25

number of canes per vine. It seems to be a response of the vine to the modifications occurring with hormonal balance. Similar finding was reported by Somkuwar *et al.*, 2012 in grape cv. Tas-A-Ganesh.

Generally, the term vigour is assessed by the accumulation of vegetative biomass. Pruning always results in loss of biomass in plant system. In the present study, pruning mass of pruned branches was the highest was recorded in spur pruning during December (T₂) by winter pruning. In case of summer pruning the treatment spur (1-2 buds) pruning in June (T₁) in summer pruning. Increase in pruning mass with increase in pruning level was observed. This was quite expected, because in both these treatments, were subjected for pruning at 1 - 2 bud level in the said seasons. Pruning mass in grapes is an indirect measure of vigour, representing the growth made during the previous season. Among the treatments allowing the canes for getting crop in both the season, the treatment T₂ and T₁ had higher pruning weight in both pruning seasons, indicating the high vigour of cv. Muscat Hamburg due to spur pruning. Similar observations were made in number of earlier studies also by other workers (Joon and Singh, 1983; Morris *et al.*, 1985; Kilby, 1999; Lopes *et al.*, 2000 and Senthil kumar, 2014). Another major criterion to judge the vigour in grape vine is the internodal length. In a well maintained vineyard,

the vines with thicker canes and shorter internodes are known to bear a good bunch as it is reflecting an optimum vigour in vines (Ghugare and Mukherjee, 1967; Rangareddy, 1996; Somkuwar and Ramteke, 2006 and Chalak, 2008). In the present investigation, the treatment T₂ and T₁ recorded the maximum length of internode in winter and summer pruning. Its well known facts that spur pruning always enhance the vegetative growth especially intermodal length in which, severely pruned vines had more vegetative growth compared to lightly pruned vines in cv. Bangalore Purple grapes (Shinde and Rane, 1979). Similar results were reported by Brandon *et al.*, 2012 and Senthil Kumar, 2014. Besides, the shortest intermodal length was registered in the treatments T₇ and T₈ during winter and summer pruning respectively. It might be due to spur pruning 8-9 buds level. Sommer *et al.* (1995) observed that minimal pruning had a stunting effect on growth, resulted in shorter shoots with shorter internodes and smaller leaves.

Yield in grape is a cumulative actor that includes the sum of number of bunches per vine. In the present investigation, in var. Muscat Hamburg, the treatment (T₈ and T₇) spur pruning 8-9 buds level recorded the highest number of bunches per vine during both winter and summer pruning, probably because as all the available spur

were pruned to 8-9 bud level it will sufficient to produce more number of bunches per vine. Nikov and Pandey, 1982 reported that increase in bud load per vine increased the mean number of bunches, but reduced their mean weight. In general, number of bunches per vine increased during summer pruning than winter pruning. This may be attributed to the higher photosynthetic capacity and better partitioning efficiency of the crop in response to climatic variations prevailing during summer.

Based on the results of this study, it can be concluded that the number of canes per vines, pruning mass and internodal length was maximum in spur pruning 1-2 bud level in winter and summer pruning. Through 8-9 bud level treatment has given maximum number of bunches per vines had a positive effective on productivity of grape variety Muscat Hamburg.

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