Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 931-935
Received: 13-11-2019
Accepted: 15-12-2019

Ningdalli Mallikarjun
Department of Horticulture
University of Agricultural Sciences Raichur, Karnataka, India

MG Patil
Department of Horticulture
University of Agricultural Sciences Raichur, Karnataka, India

Shekhargouda Patil
Department of Horticulture
University of Agricultural Sciences Raichur, Karnataka, India

AR Kurubar
Department of Horticulture
University of Agricultural Sciences Raichur, Karnataka, India

BK Desai
Department of Agronomy
University of Agricultural Sciences Raichur, Karnataka, India

MV Ravi
Department of Soil Science and Agriculture Chemistry
University of Agricultural Sciences Raichur, Karnataka, India

Corresponding Author:
Ningdalli Mallikarjun
Department of Horticulture
University of Agricultural Sciences Raichur, Karnataka, India

Influence of management practices on the growth and yield of muskmelon (*Cucumis melo* L.)

Ningdalli Mallikarjun, MG Patil, Shekhargouda Patil, AR Kurubar, BK Desai and MV Ravi

Abstract
The a field experiment laid out with treatment combinations of training system, fruit load and foliar spray of different water soluble fertilizers and water spray as control was carried out during late kharif 2017-18 and 2018-19. The objectives of the study to identify the suitable treatment combination for better growth and fruit yield of muskmelon. It was evident that the single stem training system per vine has resulted in increased the vine length of 25.15, 126.80 and 202.91 cm at 20, 40 and 60 DAT respectively. Leaf blade length was maximum with 7.25, 8.75 and 8.97 cm at 20, 40 and 60 DAT of crop growth respectively. Leaf blade width was maximum with 9.43, 9.47 and 9.59 cm. The leaf area at 20 DAT was 950.65 cm^{-2} in the treatment of two stems per vine, at 40 DAT it has increased up to 1348.52 and at 60 DAT it has reached up to 1363.41 cm^{-2} per vine. Leaf area index was high in in one stem per vine it was 1.59, 2.21 and 2.28 at 20, 40 and 60 DAT. Training with single stem per vine, retention of three fruits per stem resulted in the heavy fruits of 1.67 kg and 1.95 kg per vine resulted in The foliar spray with the sulphate of potash @ 0.5% has given highest weight of fruits per vine with 2.13 kg per vine. The training with two stems per vine has yielded 29.74 t ha^{-1}as compare to the training with one stem per vine 22.03 t ha^{-1}. Fruit load also effected significantly on fruit yield, highest fruit yield was obtained in (F_3) three fruits per stem 26.46 t ha^{-1}.Among the foliar spray, the highest yield was noticed in the (S_4) foliar spray with sulphate of potash @ 0.5% was 28.30 t ha^{-1}.

Keywords: Management practices, growth, yield, muskmelon, *Cucumis melo* L.

Introduction
The arithmetic and geometric progression of production and population of India has lead to the industrialization and urbanization. This constricted the agricultural productive land. Shrinking of land has put pressure on cultivation of horticultural crop, making the vertical space for horticulture production has been found to be an opportunity for boosting the horticulture production which can meet out present demand for the fruits and vegetables. In this regard the crops which are growing horizontally on the ground demanding more area per plant are to be habituated to grow vertically with higher yield without compromising with the quality. Muskmelon being the member of cucurbitaceous which spreads horizontal covering more area found to be suitable crop to acclimatize it to grow vertically on trellising, with different management practices of crop husbandry.

The Muskmelon (*Cucumis melo* L.) belonging to the family Cucurbitaceae is considered as vegetable crop being used as a deliciousfruit. It is fourth most important fruit in the world fresh fruit market with several varieties (Mabalaha *et al.,* 2007) [5]. It may also be used as a cooked vegetable in its green stage. The ripe fruits are very nutritious and are used for table as well as refreshing drinks. Fruit pulp contains 90-94 per cent of water, 5 per cent of carbohydrates, 1per cent of protein, 3420 IU of vitamin A (beta-carotene) and 33 mg vitamin C (Rashid and Mahmoud, 2004) [7]. In addition fruit pulp also contains traces of vitamin B_6, vitamin K, Niacin, vitamin B_2 and vitamin $B_1$with more than 90 per cent water, folic acid and potassium as well as a number of other human health-bioactive compounds (Lester and Hodges, 2008) [4]. Melons grown in dry regions are sweeter and tastier than those of wet situation. Consumer preference for this fruit is determined largely by its sweetness (sugar content) flavour or aroma, texture and more recently as a rich source of phytonutrients (Lester, 2008) [3, 4].

Methods and Material
Twenty four treatments combinations imposed with two main (T_1-training with one stem per vine and T_2-two stems per vine) three sub (F_1-one fruit, F_2-two fruits and F_3-three fruits per stem) and 4 sub-sub treatments (S_1-foliar spray with water, S_2-19:19:19 @1%, S_3-potassium

nitrate @ 0.5% and S_4-sulphate of potash @ 0.5%). The treatments were replicated three times. The treatments were assigned to different plots in each replication by using random table. The experiment was objectivised to know the effect of training system; fruit load and foliar spray with fertilizers on the growth and yield, of muskmelon crop in field condition. The land was ploughed and harrowed to bring the soil into fine tilth and levelled further in each plot beds of width of 1 m were raised up to 20 cm height. Drip irrigation system supported with fertigation facility was engaged. The beds were irrigated then the holes were made on the mulching sheet at the spot of transplanting using the hot iron rod circled at one end and 19 days old seedlings were transplanted. The spacing of a half metre was maintained between two plants in a row. Water soluble fertilizers were used for the nutrient management applied through fertigation system and the recommended schedule was followed. The crop was irrigated through drip irrigation system at different growth stages. Manual weeding was done in the holes around the stem of vine and in between the bed space.In order to facilitate the vine to grow vertically, the wooden poles of eucalyptus trees were erected at the 20 feet intervals and horizontal GI wire was tied connecting the poles. The vines were tagged to the GI wire using the jute and plastic wires.

The observations on growth parameters were recorded at 20, 40, and 60 DAT. The vine length was measured from cotyledon leaves node to the growing tip of the longest branch at scheduled observation stages and expressed in centimetres. Leaf area (cm^2) is measured by graphical method by laying the leaves on centimetre grid and tracing their outline and containing the number of square centimetres covered. The area of the partial squares was estimated and added to the number of full square centimetres. Leaf area index (LAI) is the leaf area per unit land area. It was calculated by dividing the leaf area $plant^{-1}$ by land area occupied by single plant (Sestak *et al.*, 1971) [8]. The ratio of total weight of fruits harvested at the edible stage to total number of fruits per vine was recorded as the average fruit weight and was expressed in kilo grams. The fruit yield per hectare was calculated by multiplying the yield per plot. Plot size (1.5 m × 5 m) with a multiplication factor and expressed in tonnes.

Result and discussion

Vine length

The vine length at 20, 40 and 60 DAT was not differed significantly among the treatments as depicted in Table 1. The highest vine length at 20 DAT was 25.97 cm and lowest was 21.33 cm, at 40 DAT highest vine length was 126.59 and minimum length was 125.57 cm. The vine length of 198.26 and 203.52 cm was lowest and highest vine length respectively at 60 DAT.

Leaf blade length and Leaf blade width

Though the observational data on the leaf blade length and leaf blade width did not shown significant difference among the treatments of training system, number of fruits load and foliar sprays at different stages. The minimum leaf blade length was 7.13, 8.59 and 8.91 and maximum was 7.25, 8.75 and 8.97 cm at 20, 40 and 60 DAT of crop growth respectively. Similarly the maximum leaf blade width 9.43, 9.47 and 9.59 cm whereas minimum of 9.26, 9.32 and 9.45 during 20, 40 and 60 DAT of crop growth respectively.

Leaf area

Training system with varied stem influenced the leaf area $plant^{-1}$ significantly at different growth stages. The leaf area at 20 DAT was 950.65 cm^{-2} in the treatment of two stems per vine, during 40 DAT it has increased up to 1348.52cm^{-2} and during 60 DAT it has reached up to 1363.41 cm^{-2} per vine. Neither sub plot treatment with number of fruit retention treatment nor sub-sub plot treatment of foliar spray with fertilizers have influenced significantly on leaf area. At any of the growth stages leaf area was not influenced by interaction of the treatment of training system, fruit load and foliar spray with fertilizers. Shivaraj *et al.* (2018) [9] in the study on cucumber under protected conditions the highest leaf area reported by training and pruning.

Leaf area index

Significant variations were not observed with respect to leaf area index at all the growth stages due to different treatments except for training system. In general, the leaf area index increased from 20 DAS and reached maximum at 60 DAS. The trend of variation in leaf area index was obviously similar to that of leaf area $plant^{-1}$ (Table 2). The leaf area in the treatment two stem per vine was 2.12, 3.00 and 3.04 whereas in one stem per vine it was 1.59, 2.21 and 2.28 at 20, 40 and 60 DAT. The increased leaf area index might be due to increased density of stem in two stems per vine. The similar results were obtained by Nereu *et al.* (2014) [6] in cassava. Treatment effect of fruit load and foliar spray and their interactions were found non-significant factor with respect to leaf area index at all the growth stages of crop during experiment.

Average fruit weight

The data depicted in the Table 3 shows the significant variation for the average fruit weight as influenced by the treatments of training systems with number of stems, varied fruit load on the stems and the foliar sprays individually.

Vine with one stem have given fruits with significantly higher average weight of 0.95 kg and two stems per vine have given the fruits of 0.7 kg. The number of fruit load per stem also shows significant influence on average fruit weight. The treatment with one fruit per stem has helped to obtain fruit with significantly higher average weight (1.3 kg.) and least was in three fruits per vine with 0.48 kg. Among the foliar spray with fertilizers of different grades the variation existed for the average fruit weight was significant. Foliar spray with sulphate of potash @ 0.5% has given significantly higher average of fruit weight 0.91 followed by the spray of potassium nitrate spray @ 0.5% with 0.86 kg. Influence of combination of treatment training with number of fruit load (T and F) the interaction of training with one stem and loaded with one fruit has a significantly higher average weight of 1.35 kg. Which implies lower density of fruits with bearing stem in a vine will favours the production of fruits with more average fruit weight. The interaction of treatment combination of training with foliar spray of potassium has shown significant influence on average fruit weight. However higher values for average fruit weight is noticed in the treatment T_1S_4 (Training with single stem and foliar spray with sulphate of potash @ 0.5%) 0.95. The effect of fruit load combined with foliar spray is also found to be significant on average fruit weight. The treatment combination of F_1S_4 has produced heavier fruits of 1.42 kg. The interaction effect of training system, fruit load and foliar spray with potassium found influencing significantly throughout the experiment period.

The fruits of maximum weight were produced by $T_1F_1S_4$ with 1.47 kgon par with the 1.41 kg produced by $T_1F_1S_3$. This leads to draw a conclusion that single stem training system with one fruit and foliar spray with either sulphate of potassium @ 0.5% or potassium nitrate will produce the higher average fruit but spray of sulphate of potash proven numerically better than the earlier with respect to fruit weight. Similar work carried out by Kashi and Abedi (1993) [1] that pruning the vines and thinning the fruits resulted in an increase in the length of the fruits in melons, Duong (1999) reported that pruned cucumber had higher weight of fruits than the non-pruned ones.

Fruit yield (kgvine^{-1})

The influence of training system, fruit load and foliar spray was found to be significant with respect to fruit yield per vine as depicted in Table 3

The significantly higher yield per vine was obtained in the vines trained with two stems per vine with (T_2) 2.21 kg, whereas in case of one stem per vine it was 1.67 kg. The influence on fruit yield per vine due to sub plot treatment number of fruit load was found non-significant throughout the experiment, however the fruit load with three fruit per vine has given numerically the higher weight of fruits 1.95 kg. Effect of foliar spray with different potassium has given significant variation in fruit weight. The foliar spray with the sulphate of potash @ 0.5% has given highest weight of fruits per vine with 2.13 kg per vine. The interaction of training system and fruit retention has also contributed significantly towards fruit weight per vine. The significantly higher weight of fruits were obtained in the training system with one stem and one fruit per stem 2.52 kg of fruits per vineand was followed by (T_2 F_2) training with two stem and two fruit per stem was 2.10 kg per vine. Kashi and Abedi (1998) [2] in melon have opined similar in their study of fruit thinning and pinching on melon which is confirmative with present study. The interaction of training system with foliar spray of potassium, fruit load with foliar spray and the interaction of training system, fruit load and foliar system did not affect the fruit weight per vine.

Fruit yield

The influence on fruit yield due to training system, fruit load and foliar spray with potassium was found significant throughout the experiment presented in Table 3. The variation in the yield per hectare was significant due to the training system. The training with two stems per vine has yielded 29.74 t ha^{-1}as compare to the training with one stem per vine 22.03 t ha^{-1}. Fruit load also effected significantly on fruit yield, highest fruit yield was obtained in (F_3) fruit load of three fruits per stem 26.46 t ha^{-1}.Among the foliar spray the variation existing was significant for fruit yield, the highest yield was noticed in the (S_4) foliar spray with sulphate of potash @ 0.5% was 28.30 t ha^{-1} and found on par with sulphate of potash @ 0.5% was 29.72 t ha^{-1}. The interaction effect of training system and fruit load was significant throughout the experiment. The highest yield was obtained in two stems per vine and one fruit per stem (T_2F_1) was 33.29 t ha^{-1} respectively followed by T_2F_2 27.89 t ha^{-1}.In the interaction of training system and foliar spray the variation in the yield was significant. The maximum yield was by T_2S_4 (training with two stems foliar spray with sulphate of potash @ 0.5% with 32.14 t ha^{-1}respectively and was found on par with F_2S_3(32.08 t ha^{-1}). The influence of interaction of fruit load and foliar spray was significant. The highest was yield 34.85; 30.05t ha^{-1} was obtained in fruit load with tree fruits and foliar spray with potassium nitrate @ 0.5% respectively.

The interaction of training system, fruit load and foliar spray with potassium sources, the significant variation was noticed. The treatment interaction of training system with two stems, one fruit per stem and foliar spray with sulphate of potash @ 0.5% has yielded maximum 36.48 t ha^{-1}, The overall conclusion from the above results can be made that training system with two stems and one fruit per stem with foliar spray of sulphate of potash @ 0.5% can be adopted to obtain higher yield per hectare. This treatment will facilitate to get more bearing area on the stems with optimum leaves, better light penetration and good aeration to get higher weight of marketable and better quality musk melon fruits

Table 1: Effect of training systems, fruit load and foliar sprays of fertilizers on vegetative growth parametersat different growth stage of muskmelon grown in open condition

Treatment	vine length (cm)			leaf blade length (cm)			leaf blade width (cm)		
	20 DAT	40 DAT	60 DAT	20 DAT	40 DAT	60 DAT	20 DAT	40 DAT	60 DAT
Main plot(No. of stems per vine) (T)									
T_1: Single stem per vine	25.15	126.80	202.91	7.17	8.64	8.96	9.36	9.38	9.49
T_2: Two stems per vine	21.33	125.57	200.99	7.14	8.73	8.90	9.43	9.47	9.54
S.Em. ±	0.67	1.16	1.62	0.10	0.02	0.06	0.01	0.02	0.02
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	0.09
Sub plot(No. of fruits per stem) (F)									
F_1: One fruit per stem	25.97	126.37	202.46	7.20	8.66	8.97	9.26	9.35	9.49
F_2: Two fruits per stem	21.90	126.59	200.88	7.13	8.65	8.91	9.33	9.35	9.50
F_3: Three fruits per stem	21.84	126.10	203.52	7.15	8.73	8.89	9.41	9.44	9.59
S.Em. ±	0.81	0.34	2.09	0.12	0.03	0.05	0.01	0.02	0.01
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sub-Sub plot(Foliar sprays) (S)									
S_1: Spray with water	21.86	126.15	203.40	7.25	8.59	8.92	9.37	9.32	9.48
S_2: 19:19:19 @1.0%	21.81	126.22	202.92	7.15	8.70	8.92	9.38	9.33	9.52
S_3: 13:0:45 @ 0.5%	23.70	126.19	203.24	7.18	8.69	8.91	9.39	9.36	9.45
S_4 : 0:0:50 @ 0.5%	21.86	126.19	198.26	7.04	8.75	8.90	9.43	9.39	9.52
S.Em. ±	0.91	0.26	2.44	0.13	0.04	0.03	0.02	0.03	0.040
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (T × F × S)									
S.Em. ±	2.23	0.64	5.97	0.33	0.10	0.07	0.06	0.08	0.06
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

DAT-Days after transplanting NS –Non significant

Table 2: Effect of training systems, fruit load and foliar sprays of fertilizers on leaf area and leaf area index at different growth stage of muskmelon grown in open condition

Treatment	leaf area (cm^2)			leaf area index		
	20 DAT	40 DAT	60 DAT	2017	2018	Pooled
Main plot (No. of stems per vine) (T)						
T_1: Single stem per vine	717.49	992.79	1012.65	1.59	2.21	2.28
T_2: Two stems per vine	950.65	1348.52	1363.41	2.12	3.00	3.04
S.Em. ±	29.57	8.06	1.38	0.08	0.11	0.02
CD at 5%	182.43	49.72	8.52	0.50	0.66	0.12
Sub plot (No. of fruits per stem) (S)						
F_1: One fruit per stem	837.71	1158.71	1190.81	1.87	2.59	2.66
F_2: Two fruits per stem	827.66	1164.02	1188.02	1.84	2.60	2.66
F_3: Three fruits per stem	836.84	1169.74	1183.42	1.86	2.62	2.69
S.Em. ±	19.72	5.46	9.28	0.35	0.07	0.12
CD at 5%	NS	NS	NS	1.27	NS	NS
Sub-Sub plot (Foliar sprays) (F)						
S_1: Spray with water	842.03	1154.55	1179.86	1.88	2.57	2.63
S_2: 19:19:19 @1.0%	831.24	1164.13	1196.08	1.85	2.60	2.69
S_3: 13:0:45 @ 0.5%	847.65	1163.97	1192.55	1.89	2.60	2.68
S_4 : 0:0:50 @ 0.5%	815.35	1173.48	1181.63	1.81	2.64	2.67
S.Em. ±	25.61	8.03	4.74	0.31	0.11	0.06
CD at 5%	NS	NS	NS	NS	NS	NS
Interaction (T × F × S)						
S.Em. ±	62.74	19.66	11.62	0.75	0.26	0.16
CD at 5%	NS	NS	NS	NS	NS	NS

DAT-Days after transplanting NS –Non significant

Table 3: Effect of training systems, fruit load and foliar sprays of fertilizers on yield attributing parameters of muskmelon in grown open condition

T × F × S		average fruit weight (kg)					fruits weight (kg $vine^{-1}$)					yield(t ha^{-1})				
		S_1	S_2	S_3	S_4	T × F	S_1	S_2	S_3	S_4	T×F	S_1	S_2	S_3	S_4	T × F
T_1	F_1	1.22	1.29	1.41	1.47	1.35	1.22	1.29	1.41	1.47	1.35	16.15	17.08	18.67	19.47	17.84
	F_2	0.79	0.82	0.93	0.99	0.88	1.58	1.63	1.85	1.97	1.76	20.93	21.60	24.59	26.32	23.36
	F_3	0.56	0.59	0.65	0.69	0.62	1.74	1.85	1.96	2.09	1.91	22.40	23.73	25.85	27.58	24.89
T_2	F_1	1.16	1.22	1.27	1.38	1.26	2.33	2.47	2.54	2.75	2.52	30.70	32.43	33.56	36.48	33.29
	F_2	0.47	0.51	0.54	0.58	0.53	1.91	2.04	2.14	2.31	2.10	25.32	27.11	28.44	30.70	27.89
	F_3	0.28	0.33	0.34	0.37	0.33	1.69	1.97	2.08	2.22	1.99	22.47	26.18	34.24	29.24	28.03
S		0.71	0.79	0.86	0.91	-	1.74	1.88	2.00	2.13	-	22.99	24.69	27.56	28.30	-
		T × S				T	T × S				T	T × S				T
T_1		0.86	0.90	0.99	1.05	0.95	1.51	1.59	1.74	1.84	1.67	19.83	20.80	23.04	24.45	22.03
T_2		0.64	0.69	0.72	0.78	0.70	1.98	2.16	2.26	2.43	2.21	26.16	28.57	32.08	32.14	29.74
		F × S				F	F × S				F	F ×S				F
F_1		1.19	1.25	1.34	1.42	1.30	1.78	1.88	1.98	2.11	1.93	23.42	24.75	26.11	27.97	25.57
F_2		0.63	0.66	0.73	0.79	0.70	1.74	1.84	2.00	2.14	1.93	23.12	24.35	26.52	28.51	25.63
F_3		0.42	0.46	0.50	0.53	0.48	1.72	1.91	2.02	2.16	1.95	22.43	24.95	30.05	28.41	26.46

Interactions	S.Em. ±	CD (p=5%)	S.Em. ±	CD (p=5%)	S.Em. ±	CD (p=5%)
Training systems	0.01	0.03	0.02	0.10	0.02	0.12
Number of fruits	0.01	0.02	0.06	NS	0.17	0.56
Foliar spray	0.01	0.03	0.02	0.08	0.23	0.76
T × F	0.01	0.03	0.02	0.08	0.23	0.76
T ×S	0.02	0.06	0.03	NS	0.32	0.91
F × S	0.02	0.06	0.04	NS	0.39	1.12
T × F × S	0.03	0.09	0.06	NS	0.55	1.58

T_1 - One stem per vine, T_2 - Two stems per vine F_1 - One fruit per stem, F2-Two fruits per stem, F_3 -Three fruits per stem
S_1: Spray with water S 2: 19:19:19 @ 1.0%, S 3: Potassium nitrate (13:0:45) @ 0.5%, S 4: sulfate of potash (0:0:50) @ 0.5%

Conclusion

The main treatment of two stem per vine has more influence on growth and yield parameters of muskmelon grown under shade net. Sub plot treatment of number of fruit retention and sprays with fertilizers have no much influence on vine length, leaf blade length and leaf blade width. For yield parameters like fruit yield per vine and yield per unit area, though the more fruits per vine have yielded highest but among the treatment combination two stem per vine with one fruit per vine has yielded highest yield. Over all the treatment combination of two stem per vine with fruit load of one fruit per stem and foliar spray of sulphate of potash @ 0.5% proved to be promising practice for higher yield of fruits of musk melon production.

References

1. Kashi A, Abedi B. Investigation on the effects of pruning and fruit thinning on the fruit quality of melon cultivars (*Cucumis melo* L.). Iranian J Agri. Sci. 1993; 29(3):619-626.

2. Kashi A, Abedi B. E ffects of pruning and fruit thinning on the yield melon cultivars (*Cucumis melo* L.). Indian J Agri. Sci. 1998; 9(1):525-530.
3. Lester GE. Antioxidant, sugar, mineral and phytonutrient concentrations across edible fruit tissues of orange-fleshed Honeydew melon (*Cucumis melo* L.). J Agric. Food. Chem., 2008; 56:3694-3698.
4. Lester GE, Hodges DM. Antioxidants associated with fruit senescence and human health: Novel orange fleshed non-netted honey dew melon genotype comparisons following different seasonal productions and cold storage durations. Postharvest Bio. Tech. 2008; 48:347-354.
5. Mabalaha MB, Mitei YC, Yoboah SO. A comparative study of the properties of selected melon Seeds oil as potential candidates for development into economical edible vegetable Oil. Oil J Oil Chem. Soc. 2007; 84:31-34.
6. Nereu AS, Diego GP, Alencar JZ, Luana FG, Thiago SMR, Andre TD *et al*. Effect of plant spacing on growth, development and yield of cassava in a subtropical environment. Bragantia. 2014; 73(4):22-29.
7. Rashid A, Mahmood K. melon production in Pakistan. In: vegetable crops. saeed, A. (ed.). Horticulture Foundation of Pakistan. 2004; 2(7):22-29
8. Sestak L, Castsky Y, Jarris PG. Plant synthesis in production manuals of methods. Dr. W. Junk, N. V. N. V. Publication. The Hague, 1971, 343-381.
9. Shivaraj D, Lakshminarayana D, Prasanth P, Ramesh T. Studies on the effect of pruning on cucumber cv. Malini grown under protected conditions. Int. J Cur. Microbiol. App. Sci. 2018; 7(3):2019-2023.