INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print) 2222-5234 (Online)
http://www.innspub.net
Vol. 20, No. 3, p. 266-270, 2022

RESEARCH PAPER OPEN ACCESS

Interactive effect of different staking methods and pruning levels on the growth and yield of Tomato

Abdul Waheed*, Imtiaz Ahmed, Hussain Shah, Mohammad Abbass Khan, Naveed Ahmed, Noorullah Khan, Fayyaz Ahmed, Sohail Aslam

PARC-National Tea & High Value Crops Research Institute, Shinkiari, Mansehra

Pakistan Agricultural Research Council, Islamabad

Key words: Staking methods, Pruning levels, Yield, Tomato

http://dx.doi.org/10.12692/ijb/20.3.266-270 Article published on March 30, 2022

Abstract

The study was carried out during summer 2019 to find out the impact of different stalking methods and stem pruning on the growth and yield of tomato, in Olericulture farm of National Tea and high value crops research institute, Shinkiari, Mansehra, Pakistan. A two factor experiment consisting of three stalking methods and three level of pruning were laid out in randomized complete block design having three replication. Plants stalked in inverted V shape stalking, net and strings were assigned to the main-plot whereas plants pruned to 2 stem, 3 stem and one stem were allotted to the sub-plot. Results showed that significantly higher number of fruit per plant (62.22), marketable fruits per plant (55.44) and total yield (48.66 t/ha) were produced by plants having treatments string stalking with three stem. The highest fruit set (48.53 %) was found in plants stalked with string having three stem. Plants grown with string stalking allowing single stem gave maximum length (5.05cm), diameter (4.88cm) and weight (104.22 g) of a single fruit. The result of the above study concluded that tomato produced by string stalking with three stem pruning gave better production as compared to other treatment combination so it is recommended that tomato should stalked with string for better production of tomato.

* **Corresponding Author:** Abdul Waheed ✉ horticulturiest126@yahoo.com

Introduction

In Pakistan, Production of tomato is low as compared as compared to advanced countries. Inadequate management might be the reason for low yield of tomato. Better cultural practices such as stalking and pruning could increase the yield of tomato. Stalking means support to plants with robust material to keep the leaves of the plant above the ground. Stalking enhances fruit yield, decreases incidence of soil borne diseases and exposure of plant to sunlight and photosynthetic activities. Amina *et al.* (2012) reported that stalking of tomato plant enhances fruit yield and quality by exposure of foliage to sunlight. In most areas V shape and platform system of stalking are commonly used in the world. Nylon strings are also used for stalking of tomato which is less expansive as compared to other system of stalking

Pruning is the choosy amputation of side branches to control plant growth and dissuade nutrients to the remaining branches. It has been observed that tomato pruning enhances yield and quality of tomato (srinivasan *et al.,* 2001). In order to minimize the incidence of diseases and increases the photosynthetic activities; pruning is one of the most important cultural practice in Tomato. Franco *et al.* (2009) reported that selection of proper pruning system is very important to keep a balance between nitrogen/carbon ratios. Cock shull *et al.* (2001) observed that there is general inclination of side branches, reduces yield of marketable fruits. Gua and Janes (1991) also observed that tomato pruning standardizes N: CHO ratio which resulted in increased of fruiting. When pruning a plant to two stem the productivity of tomato plant per acre increases. Aung (1999) recorded that when we prune indeterminate tomato to two stem, higher marketable fruits per fruit are produced.

Raghoo and Govinden (1999) described that yield of pruned and staked tomato is much higher as compared as unpruned and staked tomatos in indeterminate varieties? So keeping in view the importance of proper staking system and pruning levels, the present trial was initiated to find out the impact of stalking and level of pruning on the yield of fruit quality of tomato.

Material & methods

Location

An experiment entitle "Effect of different training methods and stem pruning on the growth and yield of Tomato" was conducted at National Tea and high value crops research institute Shinkiari, Mansehra during Kharif, 2019.

Design and Treatments

The experiment was laid out in RCBD design with split plot arrangement having three replications. The treatment comprises of different training methods i.e inverted V shape stalking, net stalking and string stalking which were assigned to the main-plot and different level of pruning i.e no pruning, single stem pruning, two stem pruning and three stem pruning which were allotted to the sub-plot.

Cultural practices

The nitrogen were applied in the form of Ammoumium sulphate in three split doses i.e. at planting stage, 2nd at leaf expansion stage and third at fruit formation stage whereas phosphorous and potassium are applied at the time of planting in the form of super phosphate and potassium sulphate. During the course of the experiment, weeds were removed by hand hoeing and irrigation was applied as and when required. At the end of the trial, yield component (Plant height, no of marketable fruit per plant, fruit weight (cm), fruit length (cm), fruit diameter (cm) and fruit yield (t/ha)) were determined.

Results and discussion

Plant Height (cm)

Statistical analysis of the data shows that different stalking methods and pruning levels had significant effect on Plant Height (Table 1). In case of training method, Maximum plant height (148.69cm) was recorded from plants which were trained with strings whereas minimum plant height (126.98cm) was obtained from plants which were trained with nets. In level of pruning, taller plants (141.50cm) were produced by plants which were pruned to single stem whereas smaller plants (134.97cm) were obtained from plants which were pruned to three stem These results are in line with those of Malash and Gawish (1989)

which reported that taller plants were produced in plots where branches were removed as result of pruning and so the nutrient were diverted to the remaining branches so taller plants were produced. In case of interaction between staking methods and level of pruning, highest plant height (153.22cm) were recorded from plants which were trained with string and pruned to single stem whereas lowest plant height of 124.31cm was obtained from plants which were trained with net and pruned three stem.

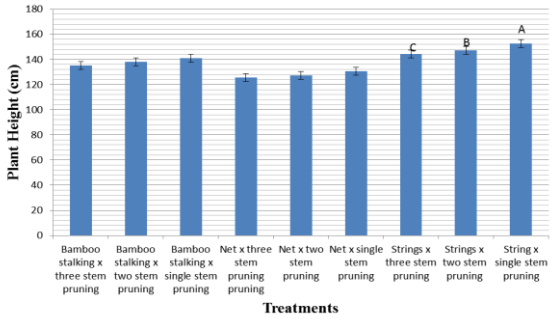

Fig. 1. Interactive effect of different staking methods and pruning levels on Plant Height (cm).

Marketable fruit per plant

Significant difference was observed among different treatments to Marketable fruits per plant (Table 1). In case of stalking methods, maximum marketable fruit (54.22) was obtained from plants which were trained with strings whereas minimum marketable fruit (40.42) was obtained from plants which were trained with nets. In pruning levels, more marketable fruit per plant (49.43) were obtained from plants which were pruned to three stem whereas less marketable fruits per plant (45.11) were noted from plants which were pruned to single stem. In case of interaction between stalking method and level of pruning, highest marketable fruits per plant (56.06) was recorded from plants which trained with strings and pruned to three stem whereas lowest marketable fruits per plant (37.81) were obtained from plants which were trained with net and pruned to single stem These results are in harmony with those of Akoroda *et al.* (1990) and Amina *et al.* (2012) which reported that tomato should be stalked for highest marketable fruits per plant. Singh (1994) also reported that maximum marketable fruits per plant when plants were planted on raised beds and are staked.

Fruit weight (g)

Different staking methods, level on pruning and its interaction had significant effect on fruit weight (Table 1). In case of stalking methods, highest fruit weight (102.17g) was recorded from plants which were trained with strings whereas lowest fruit weight of (81.21g) was obtained from plants which were trained with the help of nets. Better exposure of foliage of tomato plants might results enhancing photosynthetic activities which might be responsible for maximum fruit weight of the plant which were stalked with string. These results are in line with those of Kumar *et al.* (2001) who obtained maximum fruit weight from plants which were stalked. In level of pruning, more fruit weight (93.89g) was recorded from plants which were pruned to single stem whereas less fruit weight (88.87g) was obtained from plants which pruned to three stem. In case of interaction between stalking methods and pruning levels, maximum fruit weight (105.07g) was noted from plants which were trained with string and pruned to single stem whereas minimum.

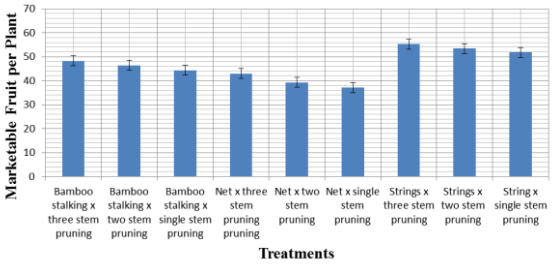

Fig. 2. Interactive effect of different staking methods and pruning levels on marketable fruit per plant.

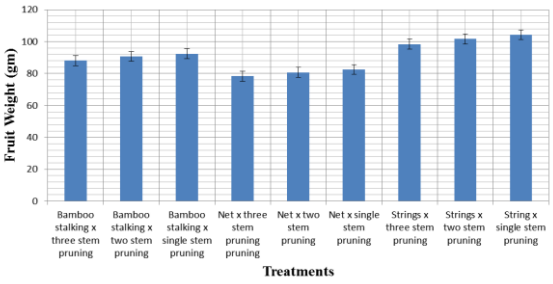

Fig. 3. Interactive effect of different staking methods and pruning levels on Fruit weight (gm).

Fruit Length (cm)

Significant different was observed among different stalking method, pruning levels and its interaction

had significant effect on Fruit length (Table 1). In case of stalking method, Lengthy fruits (4.98cm) were recorded from plants which were trained with strings whereas smaller fruit weight of 4.62cm was obtained from plants which were trained with nets. In pruning levels, maximum fruit length (4.86cm) was recorded from plants which were pruned to single stem whereas minimum fruit length (4.73cm) was obtained from plants which were pruned to three stem. In case of interaction, highest fruit length (5.06cm) was noted from plants which were trained with strings and pruned to single stem whereas lowest fruit length (4.55cm) was recorded from plants which were trained with nets an d pruned to stem stems These finding are in agreements with those of Hesamil *et al.* (2012) who reported that removal of lateral branches resulted in highest fruit size of tomato due to diversion of nutrients to the remaining branches.

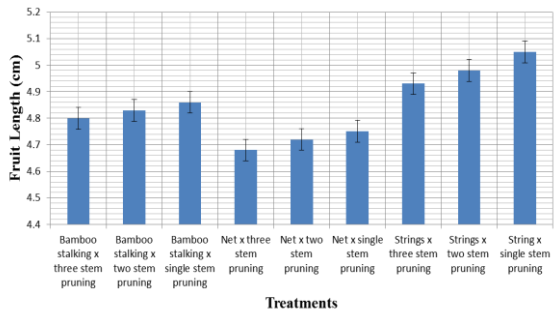

Fig. 4. Interactive effect of different staking methods and pruning levels on Fruit Length (cm).

Table 1. Plant height (cm), number of fruit-1, fruit weight (g) and fruit length (cm) as effected by training method and level of pruning.

Treatments	Plant height (cm)	Number of fruit plant^{-1}	Fruit weight (g)	Fruit length (cm)
Training method				
Trained with string	148.69 A	61.29 A	102.17 A	4.98 A
Trained with bamboos	138.56 B	56.10 B	091.09 B	4.79 B
Trained with net	126.98 C	48.82 C	081.21 C	4.62 C
LSD	2.9702	0.0772	0.3031	0.0385
Level of pruning				
Pruned to single stem	141.50 A	53.51 C	93.89 A	4.86 A
Pruned to two stem	137.80 B	55.34 B	91.70 B	4.80 B
Pruned to three stem	134.94 C	57.36 A	88.87 C	4.73 C
LSD	0.3344	0.2739	0.1785	2.4803
Interaction				
TxP	Fig-1	Fig-2	Fig-3	Fig-4

Fruit Diameter (cm)

Different staking methods, level on pruning and its interaction had significant effect on fruit diameter (Table 2). In case of stalking methods, highest fruit diameter (4.81cm) was recorded from plants which were trained with string whereas lowest fruit diameter of 4.42cm was recorded from plants trained with nets. In level of pruning, maximum fruit diameter (4.69cm) was recorded from plants which were pruned to single stem whereas minimum fruit diameter (4.55cm) was recorded from plants which were pruned to three stem. In case of interaction between stalking method x level of pruning, maximum fruit diameter (4.89cm) was recorded from plants which were trained with string x pruned to single stem whereas minimum fruit diameter (4.35cm) was recorded from plants which were trained with nets x pruned to three stem. These results are in line with those of Hernanden *et al.* (1992) who reported maximum diameter when the plants are pruned and staked with string.

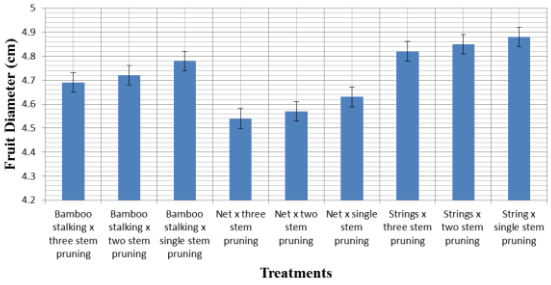

Fig. 5. Interactive effect of different staking methods and pruning levels on Fruit Diameter (cm).

Fruit yield (t/ha)

Different staking method, level on pruning and its interaction had significant effect on fruit yield (Table 2). In case of stalking method, more fruit yield (46.21 t/ha) was noted from plants which were trained with strings whereas less fruit yield of 30.09 t/ha was recorded from plants which were trained with nets. In level of pruning, maximum fruit yield (40.35 t/ha) was obtained from plants which were pruned to three stem whereas minimum fruit yield of 35.58 t/ha was obtained from plants which were pruned to single stem. In case of interaction between stalking methods x pruning levels, highest fruit yield (49.19 t/ha) was

obtained from plants which were trained with string x pruned to three stem whereas lowest fruit yield (28.42t/ha) was recorded from plants which were trained with net x pruned to single stem. Amina *et al.* (2012) recorded that stalked tomato gave 20 % more yield than un-staked tomato.

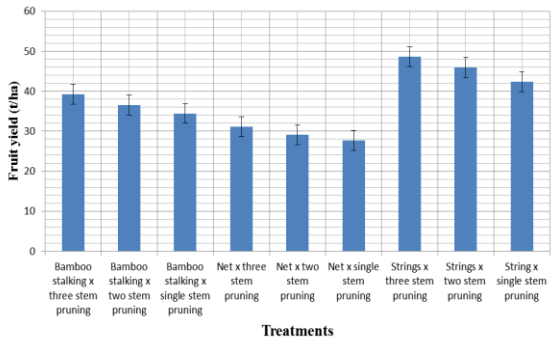

Fig. 6. Interactive effect of different staking methods and pruning levels on Fruit Yield (t/ha).

Table 2. Fruit diameter (cm) and Fruit yield (t ha-1) as effected by training methods and level of pruning.

Treatments	Fruit diameter (cm)	Fruit yield (t ha^{-1})
Training method		
Trained with string	4.81 A	46.21 A
Trained with bamboos	4.63 B	37.49 B
Trained with net	4.42 C	30.09 C
LSD	0.0240	0.3666
Level of pruning		
Pruned to single stem	4.69 A	35.58 C
Pruned to two stem	4.62 B	37.86 B
Pruned to three stem	4.55 C	40.35 A
LSD	0.0123	0.1820
Interaction		
TxP	Fig-5	Fig-6

Conclusion

It concluded that growth and yield of tomato was significantly effected by different stalking methods and level of pruning. The plant managed by string staking having three stem produces highest no of fruit per plant and yield per acre so it is recommended that indeterminate tomato cultivars should be trained with the help of strings for better production of tomato.

Reference

Akoroda MO, Ogbechei-odinak NI, Adebaya MI, Ugwu OE, Fuwa B. 1990. Flowering, pollination and fruiting in fluted pumkin. Scientia Hort **43,** 197-206.

Amina JG, Derbew B, Ali M. 2012. Yield and quality of interminate tomato varirties with staking methods in Jimma. Singapore J. Sci. Res **12,** 01-14.

Aung M. 1999. Effect of pruning and spacing on performance of fresh market tomatos. Report of AVRDC, the World vegetable Centre Pp 1-17.

Cockshull KE, Ho LC, Fenlon JS. 2001. Effect of time of stalking shoot on the regulation of fruit size in green house grown tomato crop. J. Hort. Sci. Biotech **76,** 474-483.

Franco JL, Rodriguz N, Diaz M, Canacho F. 2009. Influence of different pruning methods in cherry tomato grown hydroponically in cropping spring cycle. Acta Hort **843,** 165-169

Guan KA, Janes HW. 1991. Light regulation of sink metabolism in tomato fruit. J. Pl. Physio **96,** 916-921

Hesamil S, Khorami S, Hosseini SS. 2012. Effect of shoot pruning and flowering thinning on quality and quantity of tomato. Print ISSN 2067-3205.

Kumar AR, Singh RK, Chhilar M, Pal A. 2001. Influence of fertility levels and support management of tomato under planting method. Crop Res Hisar **22(3),** 437-441.

Malash NM, Gawish RA. 1989. A comparative study between interminate and determinate tomato varieties as influenced by pruning. Menufiya J. Agric. Res **14(2),** 1001-1024

Rughoo M, Govinden N. 1999. Response of three salad tomato varieties to staking and pruning. Revue Agricole et Sucriere de I lle Mauice **78,** 26-34.

Singh RV. 1994. Performance of kharif tomato as influenced by cultural practices. Ind J. Hort **51(2),** 192-196.

Srinivasan S, Veeraghavathathan D, Kanthaswamy V, Thiruvudainambi. 2001. Effect of spacing, training and pruning in hybrid tomatos. Ed. CAB International.