EFFECT OF STEM PRUNING ON YIELD AND YIELD CONTRIBUTING CHARACTERS OF CHERRY TOMATO IN SOILLESS CULTURE

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EFFECT OF STEM PRUNING ON YIELD AND YIELD CONTRIBUTING CHARACTERS OF CHERRY TOMATO IN SOILLESS CULTURE

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*This is to certify that thesis entitled **"EFFECT OF STEM PRUNING ON YIELD AND YIELD CONTRIBUTING CHARACTERS OF CHERRY TOMATO IN SOILLESS CULTURE"** submitted to the **Department of Horticulture,** Sher-e-Bangla Agricultural University (SAU), Dhaka in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in HORTICULTURE,** embodies the result of a piece of bona fide research work carried out by **MD. ABDUS SAMAD** Registration No. 14-06120 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged and style of this thesis have been approved and recommended for submission.

Dated: June, 2021
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DEDICATED
TO
MY BELOVED
PARENTS

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The Author

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ABSTRACT

A pot experiment was conducted in the semi-greenhouse at the Horticulture Farm of Sher-e- Bangla Agricultural University, Dhaka 1207, Bangladesh, during October 2019 to March 2020 to investigate the effect of stem pruning on yield and yield contributing characters of cherry tomato in soilless culture. The experiment consisted of three level of pruning viz. P_0= No pruning; P_1 = One stem pruning and P_2 = Two stem pruning and four different cherry tomato varieties viz. V_1= BARI Tomato-11; V_2= BARI Tomato-20; V_3= Red Star and V_4 = SAU Tomato-2. There were 12 treatment combinations and experiment were setup in Completely Randomized Design (CRD) with three replications. In case of pruning, the highest plant height, maximum branch number per plant, maximum chlorophyll content, minimum days required for first flowering and first fruiting, maximum flower cluster per plant, maximum fruit number per plant, highest single fruit weight (9.31 g), highest amount of TSS (9.46 degrees Brix) and yield per plant (2.37 kg) were obtained from P_2 treatment at 60 DAT. Similarly, in case of varieties, the highest plant height, maximum branch number per plant, maximum chlorophyll content, minimum days required for first flowering and first fruiting, maximum flower cluster per plant, maximum fruit number per plant, highest single fruit weight (8.50 g), highest amount of TSS (8.92 degrees Brix) and yield per plant (2.63 kg) were obtained from V_2 treatment at 60 DAT. In combined effect, the highest plant height, maximum branch number per plant, maximum chlorophyll content, minimum days required for first flowering and first fruiting, maximum flower cluster per plant, maximum fruit number per plant, highest single fruit weight (12.42 g), highest amount of TSS (10.53 degrees Brix) and yield per plant (2.98 kg) were obtained from V_2P_2 treatment. Among the treatment combination, V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment seemed to be more promising for obtaining the maximum yield of cherry tomato.

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Full meaning
AEZ	Agro-Ecological Zone
Agric.	Agriculture
Agril.	Agricultural
BBS	Bangladesh Bureau of Statistics
BCPC	British Crop Production Council
Cm	Centi-meter
CV	Coefficient of variation
^{o}C	Degree Celsius
Df	Degrees of freedom
DAT	Days After Transplanting
et al.	And others
FAO	Food and Agriculture Organization of the United Nations
G	Gram
Ha	Hectare
CRSP	Collaborative Research Support Program
J.	Journal
Kg	Kilogram
LSD	Least Significant Difference
Mg	Milligram
MP	Muriate of Potash
CRD	Completely Randomized Design
SAU	Sher-e-Bangla Agricultural University
TSP	Triple Super Phosphate

CHAPTER I

INTRODUCTION

Cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) is a popular type of table tomato with small fruits (1.5-8.5 cm in diameter) on long panicles and the demand for cherry tomato has increased in the market, chiefly due to the recognition of their high quality and good taste (Kobryn and Hallmann, 2005). However, cherry tomato is now very popular in the whole world for its nutritive value, taste and attractive color. Furthermore, it has high content of vitamin A, C and sugar, low calories, lycopene and β- carotene (Rosales *et al.*, 2011). They are a great source of vitamin-C (13 mg/100 g), dietary fibre (2.0 g), vitamin A (25%) and vitamin K and also a good source of vitamin E (Alpha Tocopherol), thiamine, niacin, vitamin B_6, foliate, phosphorus, copper, potassium and manganese (Anon, 2009). This composition explains the high antioxidant capacity in both fresh and processed tomatoes, associating the fruit with lower rates of certain types of cancer and cardiovascular disease (Rao and Aggarwal, 2000). Use of cherry tomatoes is now available for meal decoration of home, hotel and restaurant. Especially, children like to eat cherry tomato.

Fruit set can easily occur in comparatively high temperature which is very significant for tropical climate. Furthermore, Cherry tomatoes are source of germplasm for providing disease resistance and adaptability to cool and hot seasons (Anon, 2009). In Bangladesh, cherry tomato is new type for tomato production and still infancy for farmer field and as well as for consumer market (Uddin *et al.*, 2015). Due to the awareness of food consumption and nutritive status of Bangladeshi people, cherry tomato can supply both of demand. In general, with ever increasing demand, it has become imperative to develop high yielding varieties with resistance to biotic and abiotic stresses and adoption of proper cultural practices.

The growing demand for increased productivity and quality of agricultural products is a catalyst for agricultural development, thus, there is a constant need to adapt products and the means of production. This aspect is particularly relevant to horticulture because most producers have a small growing area in which they seek to obtain the maximum possible income (Rinaldi *et al.*, 2008). Soilless crops allow production in a small area and can maintain product quality at satisfactory levels, as well as serving as a strategy for soil conservation and preservation of water sources (Oliveira *et al.,* 2014, Oliveira *et al.,* 2016). Pruning is the selective removal of side shoots or stem to limit plant growth and to divert nutrients to flower clusters on the remaining shoot or stem. Yield, quality and fruit size of tomatoes is influenced by many factors, including plant population (Ara *et al.*, 2007), fruit pruning as well as stem pruning and cultivar selection (Maboko and Plooy, 2008). Fruit pruning is used to limit the number of fruits per truss/cluster and reduce the competition to increase fruit mass. Reducing fruit number from six to three fruits per truss increased the fruit weight by 42%, while the marketable yield reduced by 15 to 25% (Fanasca *et al.*, 2007).

Pruning in tomatoes has been reported to increase yields and quality of fruits (Srinivasan *et al.,* 2001). In order to maximize the efficiency of photosynthesis and minimize the risk of diseases pruning is necessary when the growth is extremely dense. Franco *et al*. (2009) stated that choosing a proper pruning system was important to keep a balance in the relationship's source/sink and the carbon/nitrogen (C/N) ratio. The pruning of side shoots plays a key role in the efficient use of the planting area in protected cultivation (Mantur and Patil, 2008) and shoot pruning maintains a proper balance between vegetative growth and the fruit load (Utobo *et al.,* 2010). Cockshull *et* *al.* (2001) found a tendency for side shoots to reduce the yield of marketable fruit produced on each cluster in greenhouse production. Guan and Janes (2011) also reported that pruning tomato plants regulate N:CHO ratio within the plant, and enhance fruiting. Literature indicates that productivity per area increases when pruning tomato plants to two stems. Aung (1999) reported that greater marketable yield/area was obtained by pruning indeterminate tomato plants to two stems rather than one stem. Bennewitz *et al.* (2011) reported that yield of pruned tomato plants was significantly lower than unpruned plants, in a determinate variety, but significantly higher in indeterminate and semi-indeterminate varieties. So, the requirements of stem pruning are variable for different variety and growing conditions. Limited information exists on how pruning and varieties affected individual fruit size of hydroponically grown cherry tomatoes. Moreover, in Bangladesh, majority of the growers don not get quality fruit and high yield because of their very little knowledge about suitable varieties and proper pruning practices.

Considering the above facts, the experiment has been undertaken with the following objectives:

1. To find out a suitable pruning practice for the maximum growth and yield of cherry tomato, and
2. To find out the suitable combination of different varieties and level of pruning for ensuring the maximum yield of cherry tomato.

CHAPTER II

REVIEW OF LITERATURE

Cherry tomato is an important vegetable crop and received much attention of the researchers throughout the world to develop its suitable production technique. Among various research works investigations have been made in various parts of the world to determine suitable varieties and pruning practices for its successful cultivation. However, the combined effects of these production practices have not been defined clearly. In Bangladesh, there has not much studies on the technique of improving yield and quality of cherry tomato cultivation through stem pruning in hydroponic culture. Relevant available information in this connection have been described this chapter with the hope that this may contribute useful information to the present study. The information were compiled and presented below:

Methela *et al.* (2019) carried out an experiment at the Horticulture Farm, Bangladesh Agricultural University (BAU), Mymensingh, Bangladesh during the period from 2015 to 2016 to determine the performance of stem pruning on the growth and yield of tomato variety, Ratan. Result showed that the shoots had significant effects on the plant height of two and three stem pruning over no pruning. Number of flowers, fruit length, fruit diameter was significantly higher in double stem pruning over triple stem pruning and no pruning. Number of fruits per cluster, number of ripe fruits per plant, individual fruit weight, fruit weight per plant and fruit yield per plot were higher in double stem pruning followed by triple stem pruning over no pruning. Moreover, double stem pruning had higher yield (57.16 t/ha), afterwards triple stem pruning (54.55 t/ha) over no pruning (49.77 t/ha).

Ali *et al.* (2018) conducted a field experiment to evaluate the effect of different pruning systems on the production of tomato (*Lycopersicon esculentum* Mill.) during winter in Bangladesh. BARI Tomato 2 (V_1) and BARI Tomato 15 (V_2) were pruned differently, such as, one shoot (P_1), two shoot (P_2), three shoot (P_3) with normal pruning (P_0) as a check. There was no significant difference was found in case of 50% flowering, number of fruits/plant, single fruit weight and fruit yield/plant for the pruning treatment irrespective to the varieties. Two shoot pruning (P_2) showed highest seed yield (14.5 g/plant; 49.6 kg/ha) and viability (85.2%). The highest seed yield was found from P_0V_1 (60.2 kg/ha), whereas the lowest (34.7 kg) from P_0V_2. The highest viability was found from P_1V_1 and P_3V_3 (99.0%) and the lowest viability (3.3%) recorded from P_1V_2. Both varieties performed differently to the different stem pruning.

Athulya and Vethamoni (2018) carried out an experiment to study the influence of pruning techniques to improve the yield and quality characters of capsicum (*Capsicum annum* var. grossum) under shade net condition. The study consisted of three stem pruning systems viz., Two main stems, four main stems, Unpruned (control) and three fruit pruning systems one fruit per node, one fruit on alternate nodes, one fruit on every two nodes. Plants pruned to four shoots with one fruit per node recorded the best results for yield hectare^{-1} (64.09 tonnnes). Capsicum plants with two main shoots recorded the highest ascorbic acid (75.61 mg g^{-1}), carotenoid (6.38 mg g^{-1}), TSS content (5.18°brix), except fruit chlorophyll content (0.57 mg g^{-1}), which was found to be highest in unpruned plants. Capsicum plants with one fruit on every two nodes excelled in the qualitative characters viz., carotenoid content (5.52 mg g^{-1}), and TSS content (5.11). The capsaicin content and phenol content was not affected by the pruning treatments.

Alam *et al.* (2016) conducted a field experiment at the Olericulture farm of Bangladesh Agriculture Research Institute, Joydebpur, Gazipur, Bangladesh during summer of

2012 with BARI hybrid tomato 4 in order to find out the response of plants to some staking and pruning treatments on yield, fruit quality and cost of production. Results showed that that summer tomato produced by string staking with four stem pruning exhibited better performance compared to other treatment combinations in relation to net return and BCR (2.10).

Sultana *et al.* (2016) conducted an experiment to determine the effect of pruning on growth and yield of tomato. The experiment consisted of four levels of pruning: No pruning; one stem pruning; two stem pruning and three stem pruning. Three stem pruning produced the maximum fruits per plant (35.33) and highest yield (66.86 t/ha) while the minimum fruits per plant (27.05) and yield (52.32 t/ha) was obtained from one stem pruning.

Muhammad *et al.* (2016) conducted an experiment during rainy seasons on the Teaching and Research Farm of the College of Agriculture, Zuru, to determine the growth and yield response of Tomato (var. UC82B) to stem pruning and weeding frequency. Results showed that plant height and mean fruit weight were significantly ($P<0.05$) higher in two-stem pruned plants; Leaf Area Index (LAI) and fruit number per plant were favored by unpruned treatment while the highest yield was recorded by three-stem pruned plants in both 2007 and 2008 and the combined years

A field experiment was conducted by Razzak *et al.* (2013) to determine the most efficient pruning system and optimum irrigation rate on cherry tomato to achieve the maximum production and high fruit quality in protected agriculture. Two pruning systems, one and two branches and four irrigation system, 100%, 80%, 60% and 40% of crop evapotranspiration were compared. It was observed that the highest productivity in plants pruned to two branches was related to the increase in fruit cluster than that detected in plants pruned to one branch. Whereas, the plants pruned to one branch exhibited improved fruit quality (dry matter, titratable acidity, vitamin C, total soluble solids and total sugars).

A field experiment was conducted by Nodi (2012) to study the effect of different levels of pruning and nitrogen on the growth and yield of tomato cv. BAR1 Tomato-14 at the Horticulture Farm of Sher-e-Bangla Agricultural University, Dhaka during the period from October 2011 to March 2012. There were three nitrogen levels, viz., 0, 115, 161 kg N ha^{-1} and three pruning levels, viz., no pruning, single pruning and double pruning. For pruning, maximum yield (45.5 t/ha) was obtained from double pruned plants and the minimum (34.6 t/ha) from no pruned plants.

A study was conducted by Maboko *et al.* (2011) in 2009 to 2010 and 2010 to 2011 to investigate the effect of plant population, and fruit and stem pruning of hydroponically grown tomatoes in a 40% (black and white) shade-net structure at the ARC-Roodeplaat VOPI. Tomato plants were subjected to three plant populations (2, 2.5 or 3 plants/m^2), two stem pruning treatments (one stem and two stems) and three fruit pruning treatments (four fruits, six fruits per truss, and no fruit pruning). They reported that plants pruned to two stems with zero fruit pruning or pruned to six fruits produced significantly higher marketable and total yield, as compared to the other treatments. Results showed that tomato yield and quality can be effectively manipulated by plant population and stem pruning, while fruit pruning had only a limited effect.

Juel (2011) carried out an experiment in the experimental field of Sher-e-Bangla Agricultural University, Dhaka during the period from October 2010 to March 2011 to find out the effect of GA_3 and pruning on the growth and yield of tomato. The experiment consisted of three doses of GA_3 such as 80, 100 and 120 ppm with control; three different pruning levels such as 1, 2 and 3 stem pruning. Both GA_3 and pruning had significant influence on growth and yield contributing characters of tomato. Result revealed that plant height (113.60 cm), leaves per plant (67.00) and yield (28.11 t/ha) were highest in 2 stem pruning.

The effect of pruning on yield and quality of two cherry tomato cultivars (Naomi and Josefina) with an indeterminate growth habit were investigated in an open bag hydroponic system at ARC-VOPI (25° 59' S; 28° 35' E) Pretoria. The plants were subjected to three pruning treatments (one, two and three stems) in a complete randomized block design with three replications. An increase in fruit size was evident in plants pruned to a single stem compared to plants pruned to two or three stems in both cultivars. The yield of plants increased with an increase in the number of stems. Cultivar Josefina had a significantly higher marketable yield compared to cultivar Naomi. Regardless of cultivar, pruning to two or three stems was effective in increasing yield and reducing fruit size to a size which is currently more acceptable to the market (Maboko and Plooy, 2008).

Replicated field trials were carried out by Muhammad and Singh (2007) at the Usmanu Danfodiyo University Fadama Teaching and Research Farm, Sokoto, during 2004/05 and 2005/06 dry seasons, to examine the effects of training and pruning on growth and yield of tomato (*Lycopersicon lycopersicum* Mill.) variety Roma VFN. Treatments consisted of factorial combination of two levels of training (staked and unstaked) and three levels pruning (three-stem, two-stem and unpruned) and three levels of intra-row spacing (20, 40 and 60 cm) laid out in a split-plot design replicated three times, with training allocated to the main plots and pruning intra-row spacing to the sub-plots. Results on pruning showed that mean fruit length, diameter and weight in both trials were significantly higher in three-stem and two-stem pruned plants than unpruned plants. Similarly, three-stem pruned plant produced the highest total fresh fruit yield in both trials.

Hossain (2007) conducted a field experiment at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh during the period from October, 2006 to March, 2007 in order study the effects of nitrogen and stem pruning on the yield of tomato cv. Pusa Ruby. The experiment consisted of four doses of nitrogen, viz., 85, 171, 256 and 342 kg N ha^{-1} and three levels of pruning, viz., single stem, double stem and triple stem. Different pruning methods showed significant effects on most of the characters. Maximum yield (82.21 t ha^{-1}) was obtained from double stem pruned plants and the minimum yield (68.15 t ha^{-1}) was obtained from single stem pruned plants.

The highest fruit yield $plant^{-1}$ (5.1 kg $plant^{-1}$) was obtained from plants with two main stems on each plant adjusted at the widest spacing, the highest fruit with two main stem on each plant adjusted at the widest spacing, the highest fruit yield ha^{-1} (912.0 q ha^{-1}) was obtained when the cherry tomato plants with two main stems were grown at the closest spacing for long duration under semi-controlled greenhouse conditions in Delhi, India (Balraj and Mahesh, 2005).

A field experiment was conducted by Islam (2005) with three mulching treatments eg. Mulching with black polyethylene, mulching with straw and control (no mulch) and three pruning treatments eg. Single stem pruning, pruning up to 1^{st} flower cluster and control (no pruning) at the research farm of Olericulture Division of the Horticulture Research Center (HRC), Bangladesh Agricultural Research Institute, Joydebpur, Gazipur during the period from 20 October 2004 to 20 March 2005 to find out the suitable mulching and pruning practices on growth and yield of tomato (BARI-6). The result of the experiment revealed that pruning up to 1^{st} flower cluster produced highest yield (89.57 t/ha) than no pruning (89.17 t/ha) and the single stem pruning (76.53 t/ha).

Kanyomeka and Shivute (2005) conducted an experiment to evaluate the influence of pruning on tomato production. Experiments were conducted under controlled environments in plastic tunnels in central Namibia. Hydroponics system with gravel as a growing medium was used. Results revealed that pruning does not increase tomato yield. The only benefits obtained from tomato pruning were increased quality and plant health. Pruned tomatoes were less prone to pest attack than those, which were not pruned. These findings suggest that pruning tomatoes under these environments does not help in increasing the yield.

A field experiment was conducted by Basunia (2004) to study the effect of different levels of nitrogen and pruning on the growth and yield of tomato cv. BAR1 Tomato-6 at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh during the period from October 2003 to March 2004. There was four nitrogen levels, viz., 0, 100, 200, 300 kg N ha^{-1} and three pruning levels, viz., no pruning, single stem and double stem pruning. The maximum plant height, length, diameter and weight of individual fruit were observed in single stemmed plant. The total number of leaves, number of green leaves $plant^{-1}$ at final harvest, days to first flowering, number of flower $cluster^{-1}$, flowers $plant^{-1}$, number of fruits $cluster^{-1}$ and fruits $plant^{-1}$ were maximum in unpruned plants. But the highest number of flowers $cluster^{-1}$, fruits $cluster^{-1}$, yield of tomato $plant^{-1}$, $plot^{-1}$ as well as $hectare^{-1}$ was obtained from double stemmed plants.

Islam (2004) carried out an experiment at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh to study the effect of number of plants $hill^{-1}$ and stem pruning on growth and yield of tomato. The two-factor experiment consisted of one, tow and three plants $hill^{-1}$ and five pruning levels, namely, one stemmed, two stemmed, three stemmed, four stemmed and unpruned plant. From the experiment he found that plant height was maximum in one stemmed plants. The number of flower clusters $plant^{-1}$, number of flowers $plant^{-1}$, number of fruit clusters $plant^{-1}$ and number of fruits $plant^{-1}$ were maximum in unpruned plants. Weight, length and diameter of individual fruits were maximum in one stemmed plants. The highest yield of tomato plant^{-1}, plot^{-1} as well as hectare^{-1} (107.66 t ha^{-1}) were obtained from two stem plants.

A field experiment was conducted by Navarrete and Jeannequin (2000) to determine the effect of optimum deshooting frequency on vegetative growth and yield of tomato, in order to help the growers. They worked with four deshooting frequencies and compared these on two cultivars: every 7 (control) 10, 14 and 21 day. When deshooting was performed seldom (every 21 day), a decreasing trend was found in stem diameter and fruit m^2, leading to lower yield. But when the auxiliary buds were eliminated frequently (7 day), even those located near the apex, it reduced only vegetative growth. From a biological point of view, they concluded that the optimum deshooting frequency lies between 7 and 14 day.

CHAPTER III

MATERIALS AND METHODS

The experiment was conducted during the period from October 2019 to March 2020 to study the growth and yield performance of different Cherry tomato varieties through stem pruning in hydroponic culture. The materials and methods that were used for conducting the experiment have been presented in this chapter. It includes a short description of the location of experimental site, soil and climate condition of the experimental area, materials used for the experiment, design of the experiment, data collection and data analysis procedure.

3.1. Experimental site and period

The pot experiment was conducted in the semi-greenhouse at the Horticulture Farm of Sher-e-Bangla Agricultural University, Dhaka 1207 in Bangladesh during October 2019 to March 2020.

3.2. Experimental location

The location of the study site was situated in 23°74′N latitude and 90°35′E longitudes. The altitude of the location was 8m from the sea level as per the Bangladesh Metrological Department, Agargaon, Dhaka-1207, which have been shown in the Appendix I.

3.3. Plant and other materials

The study included four cherry tomato varieties, viz. BARI Tomato-11, BARI Tomato-20, Red Star, and SAU Tomato-2. The seeds of the varieties BARI Tomato-11 and BARI Tomato-20 were collected from Horticulture Research Centre (HRC), Bangladesh Agricultural Research Institute (BARI), Joydebpur. The seeds of SAU Tomato-2 were collected from Sher-e-Bangla Agricultural University (SAU) and the

Red Star seeds were collected from Siddik Bazar, Gulistan, Dhaka. The styrofoam, cocopeat, plastic pot, plastic tray, plastic pipe, polythene sheet, etc. were collected from Town Hall, Mohammadpur, Dhaka. Sawdust was collected from Mazar Road, Gabtoli, Dhaka. Experimental chemicals were bought from Agargaon Nursery, Dhaka. Different types of daily instruments also used from many purposes to complete the experiment.

3.4. Experimental Design and treatments

The experiment was conducted in a Completely Randomized Design (CRD) with three replications. Two factors were considered as treatments denoted as P (Different level of pruning) and V (Different Varieties).

Factor-A: Pruning (3 levels)

P_0= No pruning

P_1= One stem pruning

P_2= Two stem pruning

Factor-B: Tomato varieties

V_1= BARI Tomato-11

V_2= BARI Tomato-20

V_3= Red Star

V_4= SAU Tomato-2

There were 12 (3 × 4) treatments combination such as P_0V_1, P_0V_2, P_0V_3, P_0V_4, P_1V_1, P_1V_2, P_1V_3, P_1V_4, P_2V_1, P_2V_2, P_2V_3 and P_2V_4.

3.5. Preparation of growing media

The mixture of coco peat, sawdust, ash and khoa were used to make the growing media. Sawdust was soaked in a big bowl for three days. Coco peat blocks were also soaked a plastic container for overnight. The soaked coco peat was washed well in water and spread in a polythene sheet for three hours. Then four ingredients sawdust, coco peat, ash & khoa were mixed according to mixer ratio.

3.6. Experimental environment

Round eight-inch 36 plastic pots were prepared for culturing the plants. Polythene sheet was placed in the surface of the soil. Pots were filled with different substrates mixture according to the ratio. For seedling growing, Styrofoam box filled with media mixture of coco peat, brick broken and rice husk at the ratio of 6:2:2 (v/v). Two-week-old seedlings were transferred into the 250 mL plastic pots. The experiment was conducted in a white net house under intensive care. The room was kept clean and tidy during the time of the experiment. Daily supervision was maintained to protect plants. The plants were cultivating and it continued until March 2020.

3.7. Growing media preparation for seedling raising

The mixture of coco peat, broken bricks (khoa) and rice husk at the ratio of 50:30:20 (v/v). Coconut block was soaked in a big bowl for 24 hours. Then they are mixed with khoa and rice husk properly. This mixer was placed in a styrofoam sheet box for using seedbed.

3.8. Seed sowing

The seeds were soaked in water for 24 hours and then wrapped with piece of thin cloth. The socked seed were then spread over polythene sheet for 2 hours to dry out the surface water. After that seeds were sown in styrofoam sheet box and covered with newspaper under room temperature for rising seedling.

3.9. Transplanting of cherry tomato seedling

15 days old cherry tomato seedlings were transferred to 250 ml earthen pot contains the mixture of coco peat, khoa and ash. After four weeks these seedlings were transplanted to the main 12-inch plastic pot. The plants were transplanted carefully so that the roots were not damaged. After transplanting of tomato plant in the earthen pot light watering was done with sprayer so that the plant was got proper moisture.

3.10. Intercultural operations

3.10.1. Staking and pruning

When the plants were well established, staking was done using Dhaincha (*Sesbania* sp.) sticks to keep the plants erect. Within a few days of staking, as the plants grew up, the plants were pruned as per the treatments. In case of single stem pruning, all the side shoots were removed and only the main stem was allowed to grow. In case of double stem pruning, the main and the axillary stem just after first truss were kept. Pruning was started 35 days after transplanting and continued throughout the whole period of plant growth leaving the required number of stem as treatments.

3.10.2 Application of Rahman and Inden solution

Rahman and Inden (2012) nutrient solution was applied to the plants for all the treatments until 2 weeks after transplanting until harvest. The constituents of the nutrient solution (meq L^{-1}) were NO_3-N (17.05), P (7.86), K (8.94), Ca (9.95), Mg (6.0), and S (6.0), along with the micronutrients (mg L^{-1}) Fe (3.0), B (0.5), Zn (0.1), Cu (0.03), Mo (0.025), and Mn (1.0). The pH and EC of the solution were ~6.0 and 3 mS cm^{-1}, respectively.

3.10.3. Irrigation

Immediately after transplanting, light irrigation to the individual pot was provided to overcome water deficit. After establishment of seedlings, each pot was watered in alternate days to keep the soil moist for normal growth and development of the plants. During pre-flowering stage, irrigation was done sincerely.

3.10.4. Weeding

No weeding was done in the experiment.

3.10.5. Stalking

Firstly, a bamboo stick was used for support cherry tomato plant. Secondly, a small plastic pipe was cut roundly different pieces. Then it used as a hook in plant base and plastic rope used for support the plant.

3.10.6. Insect management

Cherry tomato plants were grown in controlled environment. So, no insecticides were applied in the experiment.

3.10.7. Diseases management

Cherry tomato plants were grown in controlled environment in hydroponic system and all nutrients required for plant were supplied artificially to the plants. The growing environment was clean and no disease attacked to the plant.

3.11. Harvesting

The crop was harvested after 120 and 150 DAT. Harvesting of the crop was done according to treatment.

3.12. Data collection

Data on physicochemical properties of growing media mixtures were collected before transplanting cherry tomato seedling described below. Different data on the growth and physiological traits were recorded during the experiment. Data were collected from each plant described below.

Data on the following parameters were recorded

1. Plant height
2. Number of branches per plant
3. Number of leaves per plant
4. Length of leaflet
5. Breadth of leaflet
6. Leaf chlorophyll content

7. Days of first flowering
8. No. of flower cluster per plant
9. No. of flower per plant
10. Days of first fruit initiation
11. No. of fruit per plant
12. Fruit length
13. Fruit diameter
14. Individual fruit weight
15. Total soluble solids
16. Yield per plant

3.13. Data recording

3.13.1. Plant height

Plant height was measured in centimeter (cm) by a meter scale at 20, 40 and 60 DAT (days after transplanting) from the point of attachment of growing media up to the top of the trunk.

3.13.2. Number of branch per plant

Total number of branches per plant was counted from the plant of each of unit pot. Data recorded at 20 days interval started from the 20 days of planting up to 60 days.

3.13.3. Number of leaves per plant

Total number of leaves per plant was counted from the plant of each of unit pot. Data was recorded at 20 days interval started from the 20 days of planting up to 60 days.

3.13.4. Length of leaflet

The length of leaflet was measured with a scale from the neck of the leaf to the bottom of 10 selected leaves from each plant and their average was taken in centimeter (cm).

3.13.5. Breadth of leaflet

The breadth of leaflet was measured with a scale from 10 selected leaves from each plant and their average was taken in centimeter (cm).

3.13.6. Chlorophyll contents (SPAD value)

Leaf chlorophyll content as SPAD values were measured from the youngest fully expanded leaf in the third position from the tip by a portable chlorophyll meter (SPAD-502, Konica Minolta Sensing, Inc., Japan). The SPAD-502 chlorophyll meter can estimate total chlorophyll amounts in the leaves of a variety of species with a high degree of accuracy and is a nondestructive method. Data was recorded at 25 days interval started from the 25 days of planting up to 75 days.

3.13.7. Days to first flowering

The date of flower blooming was recorded from the number of days of 1st the date of flower blooming after transplanting.

3.13.8. Number of flower cluster per plant

Total number of flower cluster of individual plant was recorded.

3.13.9. Number of flower per plant

Total number of flower cluster of individual plant was recorded.

3.13.10. Days of first fruit initiation

The date of fruiting was recorded from the number of days of 1st the date of fruiting after transplanting of cherry tomato.

3.13.11. Number of fruit per plant

Number of fruits per plant were counted at 75 (First harvesting), 120 (Second harvesting) and 150 (Third harvesting) DAT. All the fruits of each plant were counted separately. Only the smallest young fruits at the growing point of the plant were excluded from the counting and the average number was recorded.

3.13.12. Fruit length

The length of fruit was measured with a slide caliper from the neck of the fruit to the bottom of 5 individual fruits from individual plant three times and their average was taken and expressed in centimeter (cm).

3.12.13. Fruit diameter

Diameter of fruit was measured at middle portion of 5 individual fruits from individual plant three times with a slide caliper. Their average was taken and expressed in centimeter (cm).

3.12.14. Individual fruit weight

The fresh weight of 5 individual fruits from individual plant was recorded by an electric balance three times and the mean value was calculated by the following formula:

$$Individual\ fruit\ weight = \frac{\text{Total weight of fruits per plants}}{\text{Total number of fruits per plant}}$$

3.13.15. Total soluble solids

Total soluble solid (TSS) content of pineapple pulp was estimated by using Abbe refractometer. A drop of pulp solution squinted from the fruit pulp was placed on the prism of refractometer. Percent TSS was obtained from direct reading of the instrument.

3.13.16. Yield per plant

Yield of cherry tomato per plant was recorded as the whole fruit per plant harvested in different times and was expressed in kilogram (kg).

3.14. Statistical analysis

The data obtained from the experiment were analyzed statistically using MSTAT computer package program to find out the significance of the difference among the treatments. The mean values of all the treatment were calculated and analysis of variances for all the characters was performed by the Ft (variance ratio) test. The significance of the differences among the pairs of treatment means was estimated by the Duncan Multiple Range Test (DMRT) at 5% level of probability (Gomez and Gomez. 1984) for the interpretation of results.

CHAPTER IV

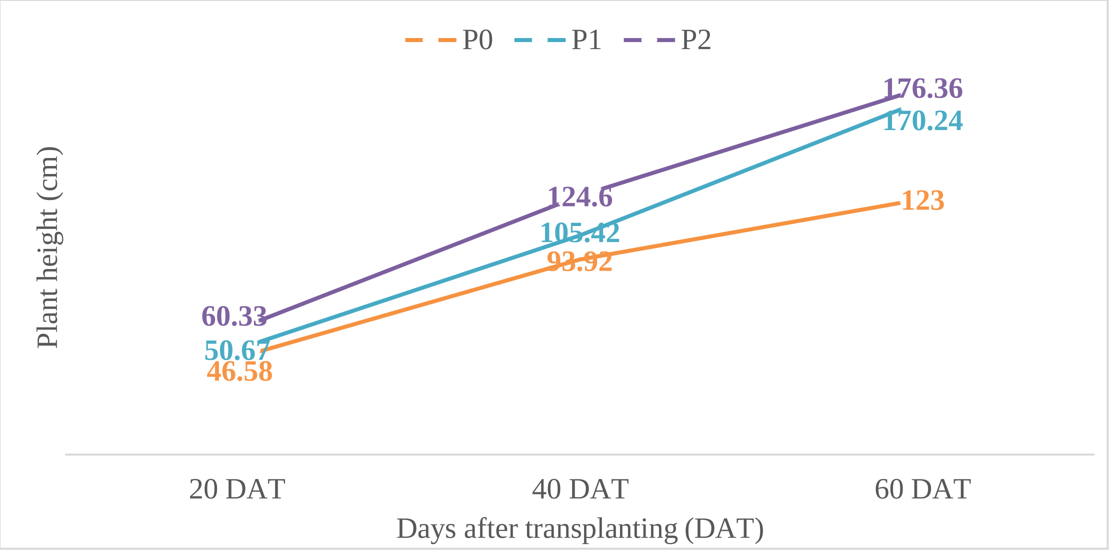
RESULTS AND DISCUSSION

The present study was conducted to evaluate the effect of pruning on the growth and yield of different cherry tomato varieties. Data on different growth, yield contributing characters and yield of cherry tomatoes were recorded. The results have been presented and discussed in this chapter. A summary of the analyses of variances (ANOVA) of the data in respect of all the parameters have been shown in Appendices II to VII. The results have been presented, discussed and possible interpretations have been given under the following headings:

4.1. Plant height

Plant height is one of the most important parameters, which is positively correlated with the yield of cherry tomato. The tomato plants responded significantly to different level of pruning and varieties. For better understanding the trends of plant height at different days after transplanting (DAT) have been presented graphically.

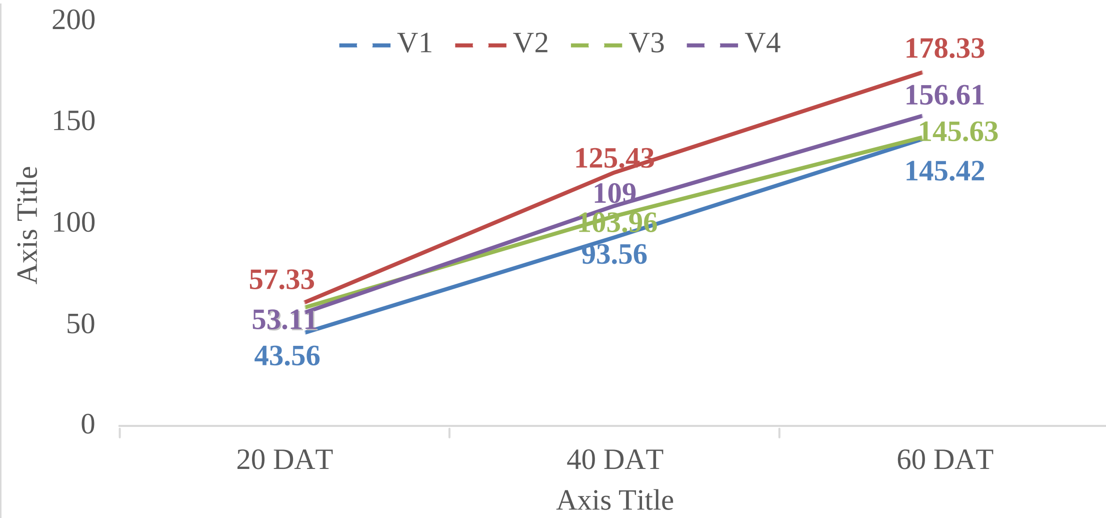
A marked variation in plant height was observed due to influence of different pruning levels of cherry tomato. This variation in plant height was highly significant at different DAT (Appendix-II). In all the cases, the highest plant height was observed from two stemmed plants and the lowest plant height was observed from unpruned plants (Figure 1). At 20 DAT, the tallest (60.33 cm) plant was recorded from P_2 (Double stem pruning) and the shortest plant (46.58 cm) was recorded from P_0 (No pruning). Similarly, at 40 DAT, the highest plant height (124.60 cm) was recorded from P_2 and the lowest plant height (93.92 cm) was recorded from P_0. At 60 DAT, the maximum plant highest (176.36 cm) was obtained from P_2 which was statistically similar to P_1 (170.24 cm), while the minimum plant height was obtained from P_0 (123.00 cm). Results revealed that two stems' plants significantly increased plant height followed by one pruning treatment of one stem, while the non-pruned plants were the poorest. The increase in plant height of tomato might be due to removal of branches that leads to supply nutrients in the remaining branches. These results are in harmony with the findings of Razzak *et al.* (2013) on cherry tomato and Alam *et al.* (2016) on summer tomato. Razzak *et al.* (2013) reported that two-branch pruning produced the tallest (195.3 cm) cherry tomato plants. Alam *et al.* (2016) found that two stems plant significantly increased plant height followed by pruning treatment of three stems per plant and four stems pe plant, while the non-pruned plants were the poorest in summer tomato.



[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Figure 1. Effect of different level of pruning on plant height of cherry tomato at different days after transplanting (DAT).

The variation in plant height at different days after transplanting (DAT) among the studied varieties was statistically significant (Figure 2). At 20 DAT, the maximum (57.33 cm) plant height was recorded from V_2 (BARI Tomato-20) and the minimum plant height (43.56 cm) was obtained from V_1 (BARI Tomato-11). On the other hand, at 40 DAT, the tallest plant (125.43 cm) was recorded from V_2, while the minimum plant height (93.56 cm) was obtained from V_1. Similarly, at 60 DAT, the maximum plant height (178.33 cm) was recorded from V_2 which, while the minimum plant height (145.42 cm) was found from V_1 treatment which was statistically similar with V_3 and V_4. Variation of plant height might be due to the genetic variation among the varieties. Rina (2015) reported that plant height varied significantly due to use of different groundnut varieties. Parvin (2012) also found same type of result in tomato. She found that BARI Tomato 15 gives the tallest plant at different days after transplanting.



[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Figure 2. Effect of different varieties on plant height of cherry tomato at different DAT.

Due to combination of variety and level of pruning showed significant variation for plant height throughout the growing season (Table 1 and Appendix II). At 20 DAT, the longest plant (63.33 cm) was recorded from the V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment which was statistically similar with V_3P_2 (62.00 cm); V_1P_2 (60.67 cm) and V_4P_2 (60.00 cm) while, the shortest plant (32.33 cm) from V_1P_0 (BARI Tomato-11 variety with no pruning). Similarly, at 40 DAT, the longest plant (136.00 cm) was recorded from the V_2P_2 treatment combination which was statistically similar with the V_3P_2 (131.36 cm) and V_1P_2 (131.72 cm) treatment while, the shortest plant height (71.33 cm) was recorded from V_1P_0 treatment combination. At 60 DAT, the tallest plant (189.03 cm) was recorded from V_2P_2 treatment combination and the shortest plant (93.33 cm) was obtained from V_1P_0 treatment combination which was statistically similar with V_1P_1 (100.33 cm).

Table 1: Combined effect of different level of pruning and varieties on plant height of cherry tomato at different days after transplanting (DAT)

Interactions	Plant height (cm) at different days after transplanting (DAT)		
	20 DAT	**40 DAT**	**60 DAT**
V_1P_0	32.33 g	71.33 d	93.33 d
V_1P_1	53.00 d	89.67 c	100.33 d
V_1P_2	60.67 ab	131.72 a	170.76 ab
V_2P_0	55.33 cd	83.00 c	127.73 c
V_2P_1	57.33 bc	115.74 b	171.36 ab
V_2P_2	63.33 a	136.00 a	189.03 a
V_3P_0	43.33 f	93.67 c	167.72 b
V_3P_1	55.33 cd	115.33 b	171.73 ab
V_3P_2	62.00 a	131.36 a	177.00 ab
V_4P_0	41.00 f	106.74 b	165.00 b
V_4P_1	46.67 e	108.00 b	168.72 ab
V_4P_2	60.00 ab	113.33 b	175.33 ab
CV (%)	3.77	5.85	6.87
LSD (0.05)	3.28	10.46	17.82

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.2 Branch number per plant

Different pruning levels showed significant variation on number of branches per plant at different days after transplanting of Cherry tomato (Appendix III and Table 2). The maximum number of branches per plant (3.25, 3.50 and 5.50) was recorded from P_0 (No pruning) while, the minimum number of branches per plant (2.18, 2.80 and 3.90) was recorded from P_2 (Double stem pruning). Juel (2011) also found similar type result in case of tomato. He found lowest number of branches per plant in case of double stem pruning and highest number of branches in non-pruning tomato plant.

Table 2. Effect of different level of pruning on branch number per plant of cherry tomato at different DAT

Level of pruning	Branch number per plant at different days after transplanting (DAT)		
	20 DAT	40 DAT	60 DAT
P_0	3.25 a	3.50 a	5.50 a
P_1	2.92 a	3.67 a	5.25 a
P_2	2.18 b	2.80 b	3.90 a
CV (%)	21.66	14.73	18.53
LSD $_{(0.05)}$	1.06	0.86	1.59

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Statistically non-significant variation was recorded for branch number per plant due to use of different cherry tomato varieties at 20, 40 and 60 DAT (Appendix III and Table 3). Numerically, at different days after transplanting (DAT) the maximum number of branches per plant (3.33, 3.67 and 5.67) was recorded from V_2 (BARI Tomato-20) at 20, 40 and 60 DAT, respectively. On the other hand, at the same DAT the minimum number of branches per plant (2.56, 3.33 and 4.78) was recorded from V_1 (BARI Tomato-11).

Table 3. Effect of different variety on branch number per plant of cherry tomato at different DAT

Variety	Branch number per plant at different days after transplanting (DAT)		
	20 DAT	40 DAT	60 DAT
V_1	2.56 a	3.33 a	4.78 a
V_2	3.33 a	3.67 a	5.67 a
V_3	3.11 a	3.56 a	5.22 a
V_4	2.78 a	3.56 a	5.00 a
CV (%)	21.66	14.73	18.53
LSD $_{(0.05)}$	1.06	0.86	1.59

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Due to combined effect of variety and different level of pruning also showed significant differences of the branch number per plant of cherry tomato at 20, 40 and 60 DAT (Table 4 and appendix III). Numerically, at different days after transplanting (DAT) the maximum number of branches per plant (4.33, 4.67 and 6.33) was recorded from V_2P_0 (BARI Tomato-20 variety with no pruning) treatment combination at 20, 40 and 60 DAT respectively. On the other hand, at the same DAT the minimum number of branches per plant (2.33, 3.00 and 4.33) was recorded from V_1P_2 (BARI Tomato-11 variety with two pruning) treatment combination, respectively.

Table 4: Interaction effect of varieties and different level of pruning on branch number per plant of cherry tomato at different days after transplanting

Interactions	Branch number per plant at different days after transplanting (DAT)		
	20 DAT	40 DAT	60 DAT
V_1P_0	3.33 abc	3.67 a	5.67 ab
V_1P_1	2.67 bc	3.67 a	5.33 ab
V_1P_2	2.33 c	3.00 a	4.33 b
V_2P_0	4.33 a	4.67 a	6.33 a
V_2P_1	2.67 bc	3.67 a	5.67 ab
V_2P_2	2.67 bc	3.33 a	5.33 ab
V_3P_0	3.33 abc	3.67 a	5.33 ab
V_3P_1	3.00 bc	3.67 a	4.67 ab
V_3P_2	2.33 c	3.33 a	5.00 ab
V_4P_0	3.67 ab	3.67 a	5.33 ab
V_4P_1	2.67 bc	3.33 a	4.33 b
V_4P_2	2.33 c	3.33 a	4.67 ab
CV (%)	21.66	14.73	18.53
LSD (0.05)	1.06	0.86	1.59

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.3 Number of leaves per plant

The effect of different pruning practices in respect of total number of leaves per plant was found to be significant (Table 5 and appendix IV). The maximum number of leaves (51.42) was observed in no pruning and the minimum (38.42) number of leaves was obtained from two stem pruning plant. Similar trend of results was found by Juel (2011) and Basunia (2004). Basunia (2004) reported that the maximum number of leaves (33.91) was observed from no stem pruning and minimum number obtained from double stem pruning tomato plant. Juel (2011) also found maximum number of leaves from double stem pruning at different days after transplanting.

Different varieties had significant influences on number of leaves per plant of cherry tomato (Table 6 and appendix IV). The maximum number of leaves (51.22) per plant was recorded from V_2 (BARI Tomato-20) treatment. On the other hand, the minimum number of leaves (42.78) per plant was recorded from V_1 (BARI Tomato-11) treatment which was statistically identical with V_3 (Red Star). Similar trend of results was found by Parvin (2012). She found that BARI Tomato 15 gives the maximum number of leaves per plant at different days after transplanting.

Due to combine effect of varieties and different level of pruning showed statistically significant differences on number of leaves per plant in cherry tomato (Table 7 and appendix IV). The maximum number of leaves per plant (58.33) of cherry tomato was recorded from V_2P_0 (BARI Tomato-20 variety with no pruning) treatment combination while, the minimum number of leaves per plant (34.67) was recorded from V_1P_2 (BARI Tomato-11 variety with two stem pruning) treatment combination which was statistically similar with V_4P_2 (35.00) treatment combination.

4.4 Length of leaflet

Different levels of pruning significantly affected the length of leaflet of cherry tomato (Table 5 and appendix IV). The longest leaflet (28.08 cm) was recorded from P_2 (Double stem pruning) which was statistically similar to P_1 (27.42 cm). On the other hand, the shortest leaflet (21.92 cm) was recorded from P_0 (No pruning).

Leaflet length of cherry tomato varied significantly due to use of different varieties (Table 6 and appendix IV). The longest leaflet length (29.22 cm) was recorded from V_2

(BARI Tomato-20) which was statistically similar with the V_3 (25.44 cm) and V_4 (25.67 cm), while the shortest leaflet length (22.89 cm) was recorded from V_1 (BARI Tomato-11).

Combine effect of varieties and different level of pruning showed statistically significant differences on leaflet length of cherry tomato (Table 7 and appendix IV). The highest leaflet length (30.33 cm) of cherry tomato was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination while, the lowest leaflet length (19.33 cm) was recorded from V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination.

4.5 Breadth of leaflet

Different levels of pruning significantly affected the breadth of leaflet of cherry tomato (Table 5 and appendix IV). The highest leaflet breadth (19.25 cm) was recorded from P_2 (Double stem pruning) which was statistically similar with P_1 (27.42 cm). On the other hand, the lowest leaflet breadth (13.67 cm) was recorded from P_0 (No pruning).

Different varieties had significant influences on breadth of the leaflet of cherry tomato (Table 6 and appendix IV). The highest leaflet breadth (19.00 cm) was recorded from V_2 (BARI Tomato-20) treatment, while the shortest leaflet breadth (14.33 cm) was recorded from V_1 (BARI Tomato-11) treatment.

Combine effect of varieties and different level of pruning showed statistically significant differences on leaflet breadth of cherry tomato (Table 7 and appendix IV). The highest leaflet breadth (20.33 cm) of cherry tomato was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination while, the lowest leaflet breadth (9.33 cm) was recorded from V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination.

Table 5: Effect of different level of pruning on leaves number/plant, length of leaflet and breadth of leaflet of cherry tomato

Level of pruning	Leaves/plant	Length of leaflet	Breadth of leaflet
P_0	51.42 a	21.92 b	13.67 b
P_1	49.00 a	27.42 a	16.58 ab
P_2	38.42 b	28.08 a	19.25 a
CV (%)	7.84	11.88	12.70
LSD $_{(0.05)}$	6.02	5.08	3.48

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Table 6: Effect of different varieties on leaves number/plant, length of leaflet and breadth of leaflet of cherry tomato

Variety	Leaves/plant	Length of leaflet	Breadth of leaflet
V_1	42.78 b	22.89 b	14.33 b
V_2	51.22 a	29.22 a	19.00 a
V_3	45.00 b	25.44 ab	16.22 ab
V_4	46.11 ab	25.67 ab	16.44 ab
CV (%)	7.84	11.88	12.70
LSD $_{(0.05)}$	6.02	5.08	3.48

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Table 7: Interaction effect of different varieties and pruning on leaves number/plant, length of leaflet and breadth of leaflet of cherry tomato

Interactions	Leaves/plant	Length of leaflet	Breadth of leaflet
V_1P_0	51.00 b	19.33 f	9.33 g
V_1P_1	49.00 bc	21.67 def	13.33 f
V_1P_2	34.67 e	25.67 bcde	18.00 abcd
V_2P_0	58.33 a	23.33 cdef	14.00 ef
V_2P_1	48.00 bc	26.00 abcde	20.00 ab
V_2P_2	40.33 de	30.33 ab	20.33 a
V_3P_0	45.67 bcd	27.00 abcd	17.33 abcde
V_3P_1	48.33 bc	29.00 abc	19.33 abc
V_3P_2	43.67 cd	27.67 abc	16.33 bcdef
V_4P_0	51.67 b	21.00 ef	15.33 def
V_4P_1	49.67 bc	27.00 abcd	16.00 cdef
V_4P_2	35.00 e	31.67 abc	18.67 abcd
CV (%)	7.84	11.88	12.70
LSD $_{(0.05)}$	6.02	5.08	3.48

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.6 Chlorophyll percentage

The chlorophyll content (%) was also significantly influenced by pruning practices at different days after transplanting (DAT) in cherry tomato (Appendix V and Table 8). At 25 DAT, the maximum chlorophyll content (54.75 %) was recorded from P_2 treatment and the minimum chlorophyll content (43.85 %) was obtained from P_0 treatment. The maximum chlorophyll content (74.57 %) was recorded from P_2 (Double stem pruning) treatment and the minimum chlorophyll content (64.03 %) was obtained from P_0 (No pruning) at 50 DAT. Similarly, at 75 DAT, the maximum chlorophyll content (84.91 %) was recorded from P_2 treatment while, the minimum chlorophyll content (63.07 %) was found from P_0.

Table 8. Effect of different pruning on chlorophyll content (%) at different DAT

Level of pruning	Chlorophyll percentage at different days after transplanting		
	25 DAT	50 DAT	75 DAT
P_0	43.85 c	64.03 c	63.07 c
P_1	51.41 b	67.22 b	73.82 b
P_2	54.75 a	74.57 a	84.91 a
CV (%)	0.35	0.60	0.31
LSD $_{(0.05)}$	0.40	0.50	0.38

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

The chlorophyll content (%) at different days after transplanting (DAT) was also significantly influenced by different varieties of cherry tomato (Appendix V and Table 9). The maximum (52.11%) chlorophyll content was recorded from V_2 (BARI Tomato-20) and V_3 (Red Star) while, the minimum chlorophyll content (47.42 %) was obtained from V_1 (BARI Tomato-11) at 25 DAT. Similarly, at 50 DAT, the maximum chlorophyll content (84.79 %) was recorded from V_2 treatment and the minimum chlorophyll content (55.99 %) was obtained from V_1 treatment. Similarly, at 75 DAT, the maximum chlorophyll content (83.94%) was recorded from V_2 treatment while, the minimum chlorophyll content (66.84%) was found from V_1.

Table 9. Effect of different varieties on chlorophyll content (%) at different DAT

Variety	Chlorophyll percentage at different days after transplanting		
	25 DAT	50 DAT	75 DAT
V_1	47.42 c	55.99 d	66.84 c
V_2	52.11 a	84.79 a	83.94 a
V_3	52.11 a	75.89 b	72.52 b
V_4	48.37 b	57.74 c	72.41 b
CV (%)	0.35	0.60	0.31
LSD $_{(0.05)}$	0.40	0.50	0.38

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Combine effect of varieties and pruning also showed significant differences of the chlorophyll content (%) of cherry tomato at 25, 50 and 75 DAT (Table 10). At 25 DAT, the highest chlorophyll content (101.42 %) was recorded from the V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination while, the lowest chlorophyll content (48.63%) from V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination, which was statistically similar with V_3P_0 (48.67%). Similarly, at 50 DAT, the highest chlorophyll content (101.53%) was recorded from the V_2P_2 treatment combination while, the lowest chlorophyll content (61.33%) was recorded from V_1P_0 treatment combination which was statistically similar with V_4P_0 (61.53%). Similarly, at 75 DAT, the highest chlorophyll content (75.71%) was recorded from V_2P_2 treatment combination and the lowest chlorophyll content (61.17 %) was obtained from V_1P_0 treatment combination.

Table 10: Interaction effect of different varieties and pruning on chlorophyll percentage of cherry tomato at different days after transplanting

Interactions	Chlorophyll percentage at different days after transplanting		
	25 DAT	50 DAT	75 DAT
V_1P_0	48.63 i	61.33 i	61.17 g
V_1P_1	61.43 g	82.77 d	69.97 c
V_1P_2	97.27 b	71.27 f	71.78 b
V_2P_0	61.53 g	75.27 e	55.89 j
V_2P_1	82.83 d	91.63 b	58.39 h
V_2P_2	101.42 a	101.53 a	75.71 a
V_3P_0	48.67 i	67.73 g	63.57 f
V_3P_1	65.33 f	83.43 c	67.34 d
V_3P_2	70.67 e	64.60 h	71.90 b
V_4P_0	46.37 j	61.53 i	52.79 k
V_4P_1	55.67 h	67.60 g	57.19 i
V_4P_2	83.40 c	58.53 j	64.45 e
CV (%)	0.35	0.60	0.31
LSD $_{(0.05)}$	0.40	0.50	0.38

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.7. Days to first flowering from transplanting

The days to first flowering for different pruning levels showed significant variation under the present trail (Appendix VI and Table 11). From the findings, it was found that the double stem pruning produced early flowering (19.58 DAT). This was delayed in unpruned plants (29.33 DAT) followed by single stem pruned plants (28.75 DAT). Similar findings also reported by Alam *et al.* (2016) earlier from their experiment. They reported that double stem pruning plant produced early flowering.

Days from transplanting to 1^{st} flowering of cherry tomato varied significantly due to use of different varieties under the present trial (Appendix VI and Table 12). It varied 34.00 to 21.00 days after transplanting. The minimum days from transplanting to 1^{st} flowering (21.00 DAT) was found from V_2 (BARI Tomato-20) treatment and the maximum days (34.00 DAT) required to first flowering in V_1 (BARI Tomato-11) treatment, which was statistically similar with V_3 (24.00 DAT) and V_4 (24.00 DAT) treatment.

Statistically significant differences recorded on days to first flowering from transplanting due to the combined effect of varieties and different levels of pruning in cherry tomato (Table 13 and Appendix VI). The minimum days (18.00 DAT) required to first flowering in V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination which was statistically similar with V_1P_2 (18.67 DAT) and V_2P_1 (18.67 DAT) treatment. On the other hand, the maximum days (43.00 DAT) required to first flowering in V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination which was statistically similar with V_4P_0 (41.00 DAT) treatment combination.

4.8. Days to first fruiting from transplanting

The days to first fruiting for different pruning levels showed significant variation under the present trail (Appendix VI and Table 11). From the findings, it was found that the double stem pruning produced early fruiting (30.50 DAT). This was delayed in unpruned plants (46.00 DAT) followed by single stem pruned plants (35.50 DAT). Similar findings also reported by Alam *et al.* (2016) earlier from their experiment. They reported that double stem pruning plant produced early fruiting among all the other pruning technique.

Days from transplanting to first fruiting of cherry tomato varied significantly due to use of different varieties under the present trial (Appendix VI and Table 12). It varied from 30.00 to 47.22 days after transplanting. The minimum days (30.00 DAT) required to first fruiting in V_2 (BARI Tomato-20) treatment and the maximum days (47.22 DAT) required to first flowering in V_1 (BARI Tomato-11) treatment.

Statistically significant differences were observed on days to first fruiting from transplanting due to the combined effect of varieties and different levels of pruning (Table 13 and Appendix VI). The minimum days (28.33 DAT) required to first fruiting in V_2P_2 (BARI Tomato-20 variety with two stem pruning) and V_4P_2 (SAU Tomato-2 with two stem pruning) treatment combination and the maximum days (70.67 DAT) required to first fruiting in V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination.

Table 11: Effects of pruning on days to first flowering and days to first fruiting from transplanting

Level of pruning	Days to first flowering	Days to first fruiting
P_0	29.33 a	46.00 a
P_1	28.75 a	30.50 c
P_2	19.58 b	35.50 b
CV (%)	7.84	11.88
LSD $_{(0.05)}$	6.02	5.08

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Table 12: Effects of varieties on days to first flowering and days to first fruiting from transplanting

Variety	Days to first flowering	Days to first fruiting
V_1	34.00 a	47.22 a
V_2	21.00 b	30.00 c
V_3	24.00 b	39.00 b
V_4	24.00 b	33.11 c
CV (%)	7.84	11.88
LSD $_{(0.05)}$	6.02	5.08

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Table 13: Combined effects of different varieties and pruning on days to first flowering and days to first fruiting from transplanting

Interactions	Days to first flowering	Days to first fruiting
V_1P_0	43.00 a	70.67 a
V_1P_1	27.33 bc	38.67 c
V_1P_2	18.67 c	31.00 ef
V_2P_0	28.33 b	46.33 b
V_2P_1	18.67 c	29.67 ef
V_2P_2	18.00 c	28.33 f
V_3P_0	20.00 bc	41.33 c
V_3P_1	21.67 bc	32.33 ef
V_3P_2	26.00 bc	30.67 ef
V_4P_0	41.00 a	37.33 cd
V_4P_1	24.33 bc	33.33 de
V_4P_2	23.67 bc	28.33 f
CV (%)	19.11	7.01
LSD $_{(0.05)}$	8.20	4.34

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.9. Number of flower cluster per plant

A significant variation was recorded due to effect of different pruning on number of flower clusters per plant under the present investigation (Appendix VI and Table 14). The maximum number of flower cluster per plant (39.67) was recorded in P_2 (Double stemmed plants) treatment and the minimum number of flower cluster per plant (20.67) was recorded from P_0 (unpruned plants). The results show that the higher the branching, the higher the number of flower cluster per plant. Hossain (2007) found highest number of flower clusters per plant (14.26) from double stemmed plants which was similar to the present study.

A significant variation was recorded due to effect of different varieties on number of flower clusters per plant under the present investigation (Appendix VI and Table 15). The maximum number of flower cluster per plant (35.56) was recorded in V_2 (BARI Tomato-20) treatment and the minimum number of flower cluster per plant (26.67) was recorded from V_1 (BARI Tomato-11) treatment which was statistically identical with V_4 (28.78). Parvin (2012) found BARI Tomato 15 variety gave the highest number of flower cluster per plant (10.61) which was similar to the present study.

A significant variation was found due to combined effect of varieties and different level of pruning in terms of number of flower cluster per plant (Table 16 and Appendix VI). The maximum number of flower cluster per plant (43.33) was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, while V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination gave the minimum number of cluster (13.67) per plant.

4.10. Number of flowers per plant

A significant variation was recorded due to effect of different pruning on number of flowers per plant under the present investigation (Appendix VI and Table 14). The maximum number of flowers per plant (370.61) was recorded in P_2 (Double stemmed plants) treatment, which was statistically identical with P_1 (339.33) and the minimum number of flowers per plant (215.00) was recorded from P_0 (unpruned plants). The results show that the higher the branching, the higher the number of flowers per plant.

Different varieties showed significant variation on number of flowers per plant under the present trial (Appendix VI and Table 15). The maximum (393.33) number of flowers per plant was recorded from V_2 (BARI Tomato-20) treatment and the minimum (264.92) was found from V_1 (BARI Tomato-11) treatment, which was statistically identical with V_3 (304.93) and V_4 (270.00). Parvin (2012) found BARI Tomato 15 variety gave the highest number of flowers per plant (324.61) which was similar to the present study.

A significant variation was found due to combined effect of varieties and different pruning practices on number of flowers per plant under the present trial (Table 16 and Appendix VI). The maximum number of flowers per plant (442.33) was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, while V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination gave the minimum number of flower (148.72) per plant which was statistically identical with V_2P_0 (183.06).

4.11. Number of fruits per plant

A significant variation was recorded due to effect of different pruning on number of fruits per plant under the present investigation (Appendix VI and Table 14). The maximum number of fruits per plant (263.33) was recorded in P_2 (Double stemmed plants) treatment and the minimum number of fruits per plant (123.52) was recorded from P_0 (unpruned plants). The results show that the higher the branching, the higher the number of fruits per plant.

Different varieties showed significant variation on number of fruits per plant under the present investigation (Appendix VI and Table 15). The maximum (257.82) number of fruits per plant was recorded from V_2 (BARI Tomato-20) treatment and the minimum (146.33) was observed in V_1 (BARI Tomato-11) treatment. Parvin (2012) found BARI Tomato 15 variety gave the highest number of fruits per plant (148.05) which was similar to the present study.

A significant variation was found due to combined effect of varieties and different pruning on number of fruits per plant in cherry tomato (Table 16 and Appendix VI). The maximum number of fruits per plant (302.77) was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, while V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination gave the minimum number of fruit (62.67) per plant.

Table 14: Effects of pruning on number of flower cluster per plant, number of flower/plant and number of fruit/plants

Level of pruning	No. of Flower cluster per plant	No. of Flower/plant	No. of Fruit/plant
P_0	20.67 c	215.00 b	123.52 c
P_1	31.92 b	339.33 a	187.00 b
P_2	39.67 a	370.61 a	263.33 a
CV (%)	4.99	10.91	1.70
LSD (0.05)	2.54	55.75	5.39

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Table 15: Effects of varieties on number of flower cluster per plant, number of flower/plant and number of fruit/plant

Variety	No. of Flower cluster per plant	No. of Flower/plant	No. of Fruit/plant
V_1	26.67 c	264.92 b	146.33 d
V_2	35.56 a	393.33 a	257.82 a
V_3	32.00 b	304.93 b	200.76 b
V_4	28.78 c	270.00 b	160.27 c
CV (%)	4.99	10.91	1.70
LSD (0.05)	2.54	55.75	5.39

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Table 16: Interaction effects of different varieties and pruning on number of flower cluster per plant, number of flower/plant and number of fruit/plant

Interactions	No. of Flower cluster per plant	No. of Flower/plant	No. of Fruit/plant
V_1P_0	13.67 g	148.72 e	62.67 i
V_1P_1	20.00 f	194.00 de	94.00 h
V_1P_2	30.33 d	356.76 bc	244.73 c
V_2P_0	18.67 f	183.06 e	92.67 h
V_2P_1	39.67 b	399.00 ab	242.36 c
V_2P_2	43.33 a	442.33 a	302.77 a
V_3P_0	26.67 e	334.33 c	134.00 g
V_3P_1	35.67 c	316.00 c	234.00 d
V_3P_2	40.00 b	403.33 ab	274.00 b
V_4P_0	32.67 d	247.00 d	154.00 f
V_4P_1	32.00 d	364.00 bc	226.00 e
V_4P_2	36.33 c	311.00 c	234.00 d
CV (%)	4.99	10.91	1.70
LSD $_{(0.05)}$	2.54	55.75	5.39

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.12. Length of individual fruit

Pruning practices exhibited wide variation in respect of mean length of individual fruit of cherry tomato (Appendix VII and Table 17). The maximum fruit length (2.45 cm) was obtained from double stem plants whereas the minimum (1.93 cm) was obtained from unpruned plants. The results were in agreement with those of Alam *et al.* (2016); Muhammad and Singh (2007) and lslam (2004). Muhammad and Singh (2007) reported that mean fruit length was significantly higher in two stem pruned plants than unpruned plants.

Different varieties showed significant variation on length of individual fruit under the present trial (Appendix VII and Table 18). The maximum (2.44 cm) length of individual fruit was recorded from V_2 (BARI Tomato-20) treatment which was statistically identical with V_3 (2.31) and V_4 (2.22) and the minimum (1.92 cm) was obtained from V_1 (BARI Tomato-11) treatment.

The variation was found due to interaction effect of varieties and pruning on length of individual fruit under the trial (Table 19 and Appendix VII). The maximum (2.60 cm) length of individual fruit was recorded from treatment combination V_2P_2 (BARI Tomato-20 variety with two stem pruning) which was statistically identical with V_3P_2 (2.63 cm), while the V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination had minimum (1.27 cm) length of individual fruit.

4.13. Diameter of individual fruit

Pruning practices exhibited wide variation in respect of mean diameter of individual fruit of cherry tomato (Appendix VII and Table 17). The maximum fruit diameter (1.96 cm) was obtained from double stem plants whereas the minimum (1.46 cm) was obtained from unpruned plants. The results were in agreement with those of Alam *et al.* (2016); Muhammad and Singh (2007) and Juel (2011). Muhammad and Singh (2007) reported that mean fruit diameter was significantly higher in two stem pruned plants than unpruned plants.

Different varieties showed significant variation on diameter of individual fruit under the present trial (Appendix VII and Table 18). The maximum (2.01 cm) diameter of individual fruit was recorded from V_2 (BARI Tomato-20) treatment and the minimum (1.56 cm) was obtained from V_1 (BARI Tomato-11) treatment.

Interaction effect varied significantly due to different varieties and pruning for diameter of individual fruit of cherry tomato (Table 19 and Appendix VII). The maximum (2.20 cm) diameter of individual fruit was recorded from treatment combination of V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, which was statistically identical with V_4P_2 (2.17 cm) while the treatment combination V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination had minimum (1.10 cm) diameter of individual fruit.

4.14. Weight of individual fruit

Different levels of pruning showed significant influence on the weight of individual fruit of cherry tomato (Appendix VII and Table 17). The maximum weight (9.31 g) of individual fruit was recorded from P_2 (Double stemmed plants) treatment which was statistically identical with P_1 (8.98 g) and the minimum (6.00 g) was recorded from P_0 (unpruned plants) treatment.

A significant variation was recorded for varieties on weight of individual fruit of cherry tomato under the present trial (Appendix VII and Table 18). The weight of individual fruit ranged from 6.53 g to 8.50 g. The maximum weight (8.50 g) weight of individual fruit was recorded from V_2 (BARI Tomato-20) treatment and the minimum (6.53 g) was recorded from V_1 (BARI Tomato-11) treatment.

A significant variation was found due to interaction effect of varieties and pruning practices for weight of individual fruit of cherry tomato under the trial (Table 19 and Appendix VII). The maximum (12.42 g) weight of individual fruit was recorded from treatment combination of V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, while the treatment combination V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination had minimum (5.03 g) weight of individual fruit.

Table 17: Effect of pruning on yield attributing characteristics of cherry tomato

Level of pruning	Individual fruit length (cm)	Fruit diameter (cm)	Individual fruit weight (g)
P_0	1.93 b	1.46 b	6.00 b
P_1	2.29 a	1.91 a	8.98 a
P_2	2.45 a	1.96 a	9.31 a
CV (%)	6.30	6.67	3.13
LSD (0.05)	0.23	0.20	0.42

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Table 18: Effect of different varieties on yield attributing characteristics of cherry tomato

Variety	Individual fruit length (cm)	Fruit diameter (cm)	Individual fruit weight (g)
V_1	1.92 b	1.56 c	6.53 c
V_2	2.44 a	2.01 a	8.50 a
V_3	2.31 a	1.86 ab	7.06 b
V_4	2.22 a	1.68 bc	6.53 c
CV (%)	6.30	6.67	3.13
LSD (0.05)	0.23	0.20	0.42

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Table 19: Interaction effect of different varieties and calcium on yield attributing characteristics of cherry tomato

Interactions	Individual fruit length (cm)	Fruit diameter (cm)	Individual fruit weight (g)
V_1P_0	1.27 d	1.10 e	5.03 f
V_1P_1	2.07 c	1.53 d	10.17 c
V_1P_2	2.27 bc	1.67 cd	7.33 d
V_2P_0	2.13 c	1.53 d	6.42 e
V_2P_1	2.27 bc	1.83 bc	7.33 d
V_2P_2	2.60 a	2.20 a	12.42 a
V_3P_0	2.23 bc	1.77 c	5.17 f
V_3P_1	2.30 bc	2.00 ab	7.33 d
V_3P_2	2.63 a	2.03 ab	7.33 d
V_4P_0	2.23 bc	1.73 cd	7.17 d
V_4P_1	2.27 bc	1.73 cd	7.42 d
V_4P_2	2.43 ab	2.17 a	11.17 b
CV (%)	6.30	6.67	3.13
LSD $_{(0.05)}$	0.23	0.20	0.42

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.15. Total soluble solids (°Brix) content

TSS is one of the most important quality factors for most of the fruits and for TSS, a TSS of 8.0 to 17.0% indicates the highest quality of fruits to attain the optimum harvesting stage (Morton, 1987).

A significant variation was recorded for pruning on total soluble solids of cherry tomato under the present trial (Appendix VII and Table 20). In the study, highest Total soluble solids (9.46 ^{o}B) was recorded from P_2 (Double stemmed plants) treatment. Lowest TSS (7.36 ^{o}B) was recorded from P_0 (unpruned plants).

Table 20. Effect of pruning on total soluble solids content of cherry tomato

Level of pruning	Total soluble solids (°B)
P_0	7.36 c
P_1	8.50 b
P_2	9.46 a
CV (%)	7.47
LSD $_{(0.05)}$	0.96

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

A significant variation was recorded for varieties on total soluble solids of cherry tomato under the present trial (Appendix VII and Table 21). In the study, highest Total soluble solids (8.92 °B) was recorded from V_2 (BARI Tomato-20) treatment, which was statistically identical with V_3 (8.81 °B) and V_4 (8.56 °B). Lowest TSS (7.47 °B) was recorded from V_1 (BARI Tomato-11) treatment.

Table 21. Effect of different varieties on total soluble solids content of cherry tomato

Variety	Total soluble solids (°B)
V_1	7.47 b
V_2	8.92 a
V_3	8.81 a
V_4	8.56 a
CV (%)	7.47
LSD $_{(0.05)}$	0.96

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

The variation was found due to interaction effect of varieties and pruning for the total soluble solids (TSS) of cherry tomato under the trial (Table 22 and Appendix VII). The maximum (10.53 ^{o}B) total soluble solid of individual fruit was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination, while the treatment combination V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination had minimum (6.37 ^{o}B) weight of individual fruit which was statistically identical with V_2P_0 (6.73 ^{o}B).

Table 22. Combined effect of varieties and calcium on total soluble solids content of cherry tomato

Interactions	Total soluble solids (^{o}B)
$\mathbf{V_1P_0}$	6.37 e
$\mathbf{V_1P_1}$	7.77 d
$\mathbf{V_1P_2}$	8.57 c
$\mathbf{V_2P_0}$	6.73 e
$\mathbf{V_2P_1}$	9.50 b
$\mathbf{V_2P_2}$	10.53 a
$\mathbf{V_3P_0}$	7.67 d
$\mathbf{V_3P_1}$	8.37 c
$\mathbf{V_3P_2}$	9.43 b
$\mathbf{V_4P_0}$	7.33 d
$\mathbf{V_4P_1}$	7.67 d
$\mathbf{V_4P_2}$	9.50 b
CV (%)	3.54
LSD (0.05)	0.50

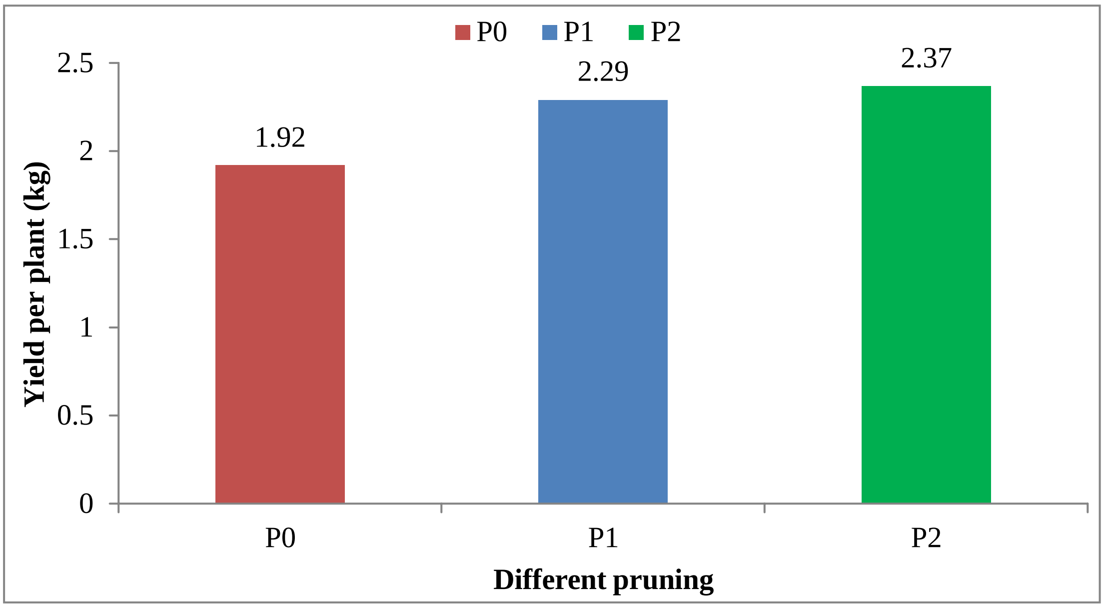
In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

4.16. Yield per plant

Due to pruning yield per plant showed significant variation (Figure 3 and Appendix VII). The highest yield per plant (2.37 kg) was observed in P_2 (double stem pruning), which was statistically identical with P_1 (2.29 kg) and the lowest (1.92 kg) was found

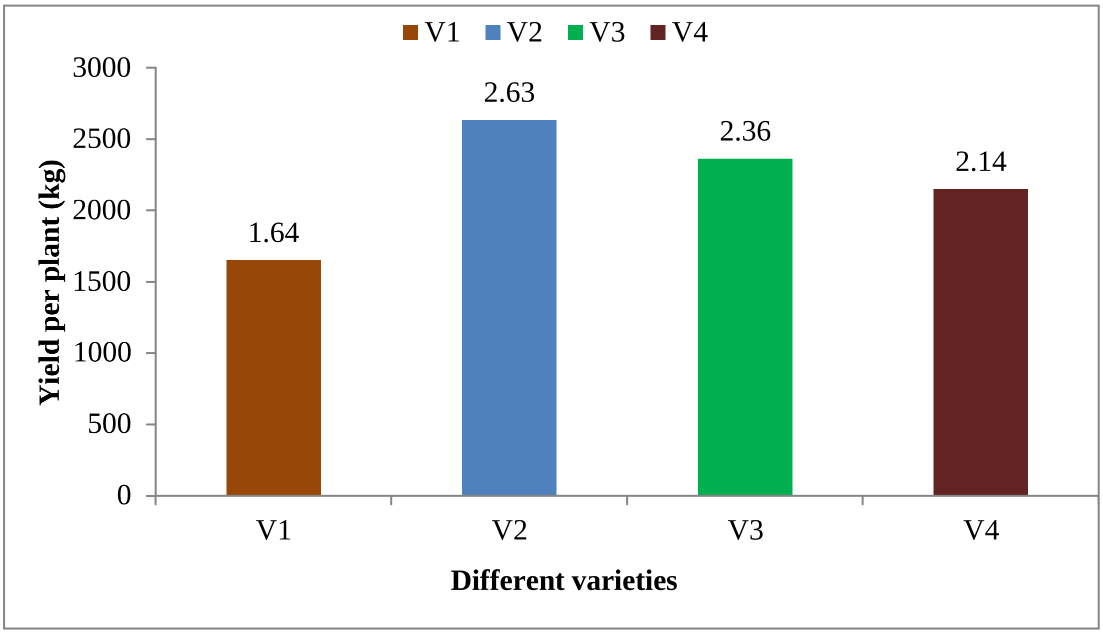
P_0 (unpruned plants) (Table 4). Ece and Darakci (2007) reported that double stem application should be implemented for higher yield in tomato. Thakur *et al*. (2005) reported yield per plant was greatest in double leader pruning. Balraj and Mahesh (2005) reported that highest yield/plant were recorded under condition of two main stems on each plant.



[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning]

Figure 3. Effect of pruning on yield per plant (kg) in cherry tomato.

Yield per plant varied significantly due to the use of different varieties of cherry tomato (Figure 4 and Appendix VII). The maximum yield per plant (2.63 kg) was recorded from V_2 (BARI Tomato-20) treatment, which was statistically similar with V_3 (2.36 kg) and the minimum yield per plant (1.64 kg) was obtained from V_1 (BARI Tomato-11) treatment.



[V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

Figure 4. Effect of different varieties on yield per plant (kg) in cherry tomato.

Combine effect of varieties and pruning had a significant variation in terms of yield of fruit (Table 23 and Appendix VII). The maximum yield per plant (2.98 kg) was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination while the V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination gave the minimum (1.27 kg).

Table 23. Combine effect of varieties and pruning on yield per plant in cherry tomato

Interactions	Yield per plant (kg)
V_1P_0	1.27 g
V_1P_1	1.87 def
V_1P_2	2.22 cde
V_2P_0	1.64 efg
V_2P_1	2.35 bcd
V_2P_2	2.98 a
V_3P_0	1.43 fg
V_3P_1	1.95 def
V_3P_2	2.74 abc
V_4P_0	2.14 cde
V_4P_1	2.83 ab
V_4P_2	2.93 ab
CV (%)	15.00
$LSD_{(0.05)}$	0.55

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

[P_0 = No pruning; P_1 = One stem pruning and P_2 = Two stem pruning; V_1 = BARI Tomato-11; V_2 = BARI Tomato-20; V_3 = Red Star and V_4 = SAU Tomato-2]

CHAPTER V

SUMMARY AND CONCLUSION

The experiment was carried out in the semi-greenhouse at the Horticulture Farm of Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh, during October 2019 to March 2020. The objectives of the present study were to study the growth and yield performance of different varieties of cherry tomato; to find out a suitable pruning practice for maximum growth and yield of cherry tomato, yield contributing characters and yield response of cherry tomato and to find out the suitable combination of different varieties and level of pruning for ensuring the maximum yield of cherry tomato. The experiment consisted of three level of pruning viz. P_0= No pruning; P_1 = One stem pruning and P_2 = Two stem pruning and four different cherry tomato varieties viz. V_1= BARI Tomato-11; V_2= BARI Tomato-20; V_3= Red Star and V_4 = SAU Tomato-2. The experiment was setup in Completely Randomized Design (CRD) with three replications. Statistically significant variations were found in terms of all the characters related to growth and yield of cherry tomato. Data of different growth and yield parameters such as plant height, number of branch per plant, number of leaves per plant, length of leaflet, breadth of leaflet, leaf chlorophyll content, days of first flowering, number of flower cluster per plant, number of flower per plant, number of fruit per plant, fruit length, fruit diameter, fruit weight, TSS and yield were recorded and analyzed statistically. The results obtained in the study have been summarized below.

Different growth and yield parameters of cherry tomato were significantly influenced by the different pruning. At 20, 40 and 60 DAT, the tallest plant (60.33 cm, 124.60 cm, and 176.36 cm) was recorded from P_2 (Double stem pruning) and the shortest plant (46.58 cm, 93.92 cm and 123.00 cm) was found in P_0 (No pruning). Numerically, at different days after transplanting (DAT) the maximum number of branches per plant (3.25, 3.50 and 5.50) was recorded from P_0 at 20, 40 and 60 DAT, respectively and the minimum number of branches per plant (2.67, 3.42 and 4.75) was recorded from two stem pruning (P_2) condition. The maximum and minimum number of leaves per plant (51.42 and 38.42) was recorded in P_0 and P_2 treatment, respectively. The highest and lowest leaflet length (28.08 cm and 21.92 cm), highest and lowest leaflet breadth (19.25 cm and 13.67 cm) was recorded in P_2 and P_0 treatment, respectively. At 20, 40 and 60 DAT the maximum chlorophyll content (54.75 %, 74.57 % and 84.91 %) was recorded from P_2 and the minimum chlorophyll content (43.85 %, 64.03 % and 63.07 %) was found in P_0. The minimum and maximum days required to first flowering (19.58 DAT and 29.33 DAT) and minimum and maximum days required to first fruiting (35.50 DAT and 46.00 DAT) was recorded in P_2 and P_0 treatment, respectively. The maximum and minimum number of flower cluster per plant (39.67 and 20.67); maximum and minimum number of fruits per plant (263.33 and 123.52); maximum and minimum weight of individual fruit (9.31 g and 6.00 g); highest and lowest amount of TSS (9.46 ^oB and 7.36 ^oB) and maximum and minimum yield of cherry tomato per plant (2.37 kg and 1.93 kg) was found in P_2 and P_0 treatment, respectively.

Different growth and yield parameters of cherry tomato were significantly influenced by the using different varieties. At 20, 40 and 60 DAT, the tallest plant (53.11 cm, 109.00 cm and 156.61 cm) was recorded from V_2 (BARI Tomato-20) and the shortest plant (43.56 cm, 93.56 cm and 145.42 cm) was found in V_1 (BARI Tomato-11). Similarly, at different days after transplanting (DAT) the maximum number of branches per plant (3.33, 3.67 and 5.67) was recorded from V_2 at 20, 40 and 60 DAT, respectively and the minimum number of branches per plant (2.56, 3.33 and 4.78) was recorded from

V_1 treatment. The maximum and minimum number of leaves per plant (51.22 and 42.78), highest and lowest leaflet length (29.22 and 22.89 cm), highest and lowest leaflet breadth (19.00 cm and 14.33 cm) was recorded in V_2 and V_1 treatment, respectively. At 20, 40 and 60 DAT, the maximum chlorophyll content (52.11 %, 84.79 %, and 83.94 %) was recorded from V_2 (BARI Tomato-20) and the minimum chlorophyll content (47.42 %, 55.99 % and 66.84 %) was found in V_1 treatment. The minimum and maximum days required to first flowering (21.00 DAT and 34.00 DAT) and minimum and maximum days required to first fruiting (30.00 DAT and 47.22 DAT) was recorded in V_2 and V_1 treatment, respectively. The maximum and minimum number of flower cluster per plant (35.56 and 26.67); maximum and minimum number of fruits per plant (257.82 and 146.33); maximum and minimum weight of individual fruit (8.50 g and 6.53 g); highest and lowest amount of TSS (8.92 ^oB and 7.47 ^oB) and maximum and minimum yield of cherry tomato per plant (2.63 kg and 1.64 kg) was found in V_2 and V_1 treatment, respectively.

Different growth and yield parameters of cherry tomato were significantly influenced by combined effect of varieties and pruning. At 20, 40 and 60 DAT, the tallest plant (63.33 cm, 136.00 cm and 189.03 cm) was recorded from V_2P_2 (BARI Tomato-20 variety with two stem pruning) treatment combination and the shortest plant (32.33 cm, 71.33 cm and 93.33 cm) was found in V_1P_0 (BARI Tomato-11 variety with no pruning) treatment combination. At different days after transplanting (DAT) the maximum number of branches per plant (4.33, 4.67 and 6.33) was recorded from V_2P_0 treatment combination at 20, 40 and 60 DAT, respectively and the minimum number of branch per plant (2.33, 3.00 and 4.33) was recorded from V_1P_2 treatment combination, respectively. The maximum and minimum number of leaves per plant (58.33 and 34.67) was recorded from V_2P_0 and V_1P_2, respectively. The highest and lowest leaflet length

(30.33 cm and 19.33 cm), highest and lowest leaflet breadth (20.33 cm and 9.33 cm) was recorded in V_2P_2 and V_1P_0 treatment combination, respectively. At 20, 40 and 60 DAT, the maximum chlorophyll content (101.42 %, 101.53 % and 75.71 %) was recorded from V_2P_2 treatment combination and the minimum chlorophyll content (48.63 %, 61.33 %, and 61.17 %) was found in V_1P_0. The minimum and maximum days required to first flowering (18.00 DAT and 43.00 DAT) and minimum and maximum days required to first fruiting (28.33 DAT and 70.67 DAT) was recorded in V_2P_2 and V_1P_0 treatment, respectively. The maximum and minimum number of flower cluster per plant (43.33 and 13.67); maximum and minimum number of fruits per plant (302.77 and 62.67); maximum and minimum weight of individual fruit (12.42 g and 5.03 g); highest and lowest amount of TSS (10.53 ^{o}B and 6.37 ^{o}B) and maximum and minimum yield of cherry tomato per plant (2.98 kg and 1.27 kg) was found in V_2P_2 and V_1P_0 treatment, respectively.

Conclusion:

i. Morphological characters, yield contributing characters and yield of cherry tomato varied significantly in different varieties. Among the varieties, BARI Tomato-20 seemed to be more promising for getting higher yield.

ii. Pruning had a positive effect on morphological characters, yield contributing characters and yield of cherry tomato. Considering the levels of pruning, when two stems were pruned the plants performed the highest yield. and

iii. The combined effect of varieties and different pruning had a positive effect on morphological characters, yield contributing characters and yield of cherry tomato. BARI Tomato-20 variety with two stem pruning of cherry tomato seemed to be more suitable for getting higher yield.

REFERENCES

Alam, M. S., Islam, N., Ahmed, S., Hossen, M. I. and Islam, M. R. (2016). Effect of different staking methods and stem pruning on yield and quality of summer tomato. *Bangladesh J. Aril. Res.,* **41**(3): 419-432.

Ali, M. R., Goffar, A., Hasan, M. and Mehraj, H. (2018). Shoot pruning on fruit and seed production of two winter tomato varieties. *EC Nutri.* **13**(5): 265-271.

Anonymous, (2009). Cherry tomato nutritional information; USDA National Nutritional Database for Standard Reference. (www. Lose- weightwithus. com/cherry tomato- nutrition. Html).

Ara, N., Bashar, M. K., Begum, S. and Kakon, S. S. (2007). Effect of spacing and stem pruning on the growth and yield of tomato. *Int. J. Sustain. Crop Prod.,* **2**: 35-39.

Aung, M. (1999). Effect of pruning and spacing on performance of fresh market tomato. Report of AVRDC, The World Vegetable Center. Pp.1-7.

Athulya, M. P. and Vethamoni, P. I. (2018). Influence of pruning techniques on yield and quality characters of capsicum variety Indra under shade net conditions. *Madras Agric. J.,* **105**(7-9): 324-328.

Balraj, S. and Mahesh, K. (2005). Effect of plant spacing and stem pruning on growth and yield of cherry tomato in greenhouse. *Haryana J. Hort. Sci.,* **34**(1/2): 179-180.

Basunia, D. N. (2004). Effects of different levels of nitrogen and pruning on growth and yield of tomato. M.S. Thesis. Dept. of Horticulture. BAU. Mymensingh. pp. 25-55.

Bennewitz E., Fredes, C., Losak, T. Martínez, C. and Hlusek, J. (2011). Effects on fruit production and quality of different dormant pruning intensities in sweet cherries in Central Chile, *Cien. Inv. Agr.*, **38**(3):339-344.

Cockshull, K. E., Ho, L.C. and Fenlon, J.S. (2001). The effect of the time of taking shoots on the regulation of fruit size in glasshouse-grown tomato crops. *J. Hortic. Sci. Biotech.,* **76**: 474–483.

Ece, A. and Darakci, N. (2007). Determination of relationships between number of stem and yield of tomato (*Lycopersicon lycopersicum* L.). *Asian J. Plant Sci.,* **6**(5): 802-808.

Fanasca. S., Martino, A., Heuvelink, E. and Stangellini, C. (2007). Effect of electrical conductivity, ruit pruning, and truss position on quality in greenhouse tomato fruit. *J. Hort. Sci. Biotech.,* **3**: 488-494.

Franco, J. L., Rodriguez, N., Diaz, M. and Camacho, F. (2009). Influence of different pruning methods in cherry tomato grown hydroponically in a cropping spring cycle: effects on the production and quality. *Acta Hort*., **843**: 165-169.

Gomez, K. A. and Gomez, A. A. (1984). Statistical procedures for agricultural research (2nd Edn.). Jhon Willey and Sons, Singapore. pp 28-92

Guan, H. P. and Janes, H. W. (2011). Light regulation of sink metabolism in tomato fruit. *J. Plant Physiol.,* **96**: 916-921.

Hossain M. M. (2007). Effect of nitrogen and stem pruning on growth and yield of tomato. M.S. Thesis. Dept. of Horticulture. BAU. Mymensingh. pp. 37-51.

Islam, A. (2005). Effects of mulching and pruning on growth and yield of tomato (*Lycopersicon esculentum* Mill.). M.S. Thesis. Dept. of Horticulture. SAU. Dhaka. pp. 37-51.

Islam, M. S. (2004). Effects of number of plants per hill and stem pruning on growth and yield of tomato. M.S. Thesis. Dept. of Horticulture. BAU. Mymensingh. pp. 23-47.

Juel, A. A. (2011). Growth and yield of tomato as influenced by GA_3 and pruning. M.S. Thesis. Dept. of Horticulture. SAU. Dhaka. pp. 21-43.

Kanyomeka, L. and Shivute, B. (2005) Influence of pruning of tomato production under controlled enviroments. *Agri. Tro. Sub.*, **38**(2): 79-81.

Kobryn, J. and Hallmann, E. (2005). The effect of nitrogen fertilization on the quality of three tomato types cultivated and Rockwool. *Acta. Hort.,* **691**: 341-348.

Maboko, M. M. and Du Plooy, C. P. (2008). Effect of pruning on yield and quality of hydroponically grown cherry tomato (*Lycopersicon esculentum*). *South African. J. Plant Soil.,* **25**: 178-181.

Maboko, M. M., Plooy, C. P. and Chiloane, S. (2011). Effect of plant population, fruit and stem pruning on yield and quality of hydroponically grown tomato. *J. Agri. Res.,* **6**(22): 5144-5148.

Mantur, S. M. and Patil, S. R. (2008). Influence of spacing and pruning on yield of tomato grown under shade house. *Karnataka J. Agric. Sci,.* **21**: 97-98.

Methela, N. J., Islam, M. S., Munsur, M. and Rahman, M. H. (2019). Growth and yield performance of tomato by stem pruning. *Inter. J. Nat. Soci. Sci.,* **6**(1): 13-18.

Muhammad, A., Gambo, B. A., Aliye, U. and Yakudu, A. A. (2016). Effects of stem pruning and weeding frequency on tomato (*Lycopersicon lycopersicum* Mill.) in Zuru, Northern Guinea Savanna, Nigeria. *Int. J. Life. Sci. Scienti. Res.,* **2**(2): 212-218.

Muhammad, A. and Singh, A. (2007). Yield of tomato as influenced by training and pruning in the Sudan Savanna of Nigeria. *J. Plant Sci.,* **2**(3): 310-317.

Navarrete, M. and Jeannequin, B. (2000). Effect of frequency of axillary bud pruning on vegetative growth and fruit yields in greenhouse tomato crops. *Scientia. Hort.,* **86**(3): 197-210.

Nodi, J. F. (2012) Effect of pruning and nitrogen on growth and yield on tomato. M.S. Thesis. Dept. of Horticulture. SAU. Dhaka. pp. 33-47.

Oliveira, F. A., Oliveira, M. K. T., Medeiros, J. F., Prazeres, O. M., Paiva, E. P. and Maia, P. M. E. (2014). Produtividade do maxixeiro cultivado em substrato e fertirrigado com soluções nutritivas. *Hort. Bras.,* **32**(4): 464-467. http://dx.doi.org/10.1590/S0102-053620140000400015.

Oliveira, F. A., Sá, F. V. S., Pereira, F. H. F., Araujo, F. N., Paiva, E. P. and Almeida, J. P. N. (2016). Comportamento fisiológico e crescimento de plantas de melancieira sob diferentes concentrações de solução nutritiva. *Revista. Bras. Agri.,* **10**(3) 439-448. http://dx.doi.org/10.7127/RBAI.V10N100365.

Parvin, S. (2012) Effect of calcium on growth and yield of tomato varieties and assessment of shelf life. M.S. Thesis. Dept. of Horticulture. SAU. Dhaka. pp. 61-69.

Rao, A. V. and Agarwal, S. (2000). Role of antioxidant lycopene in cancer and heart disease. *J Am Coll. Nutr.,* **19**:563-569.

Razzak, H. A., Ibrahim, A., Wahb-Allah, M. and Alsadon, A. (2013). Response of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) to pruning systems and irrigation rates under greenhouse conditions. *Asian J. Crop Sci.,* **5**(3): 275-285.

Rina, T. A. (2015). Growth and yield of groundnut varieties as affected by different levels of calcium and application time. M.S. Thesis. Dept. of Agronomy. SAU. Dhaka. pp. 47-52.

Rinaldi, M. M., Sandri, D., Ribeiro, M. O. and Amaral, A. G. (2008). Características físico-químicas e nutricionais de pimentão produzido em campo e hidroponia. *Ciên. Tecnol.,* **28**(3): 558-563. http://dx.doi.org/10.1590/S0101-20612008000300009.

Rosales M. A., L. Cervilla, E. Sanchez-Rodriguez, M. Rubio-Wilhelmi and B. Blasco. (2011). The effect of environmental conditions on nutritional quality under semi-arid Medierranean climte of two experimental Mediterranean greenhouse. *J. Sci. Food Agric.,* 91:152-162.

Srinivasan, S., Veeraghavathathan, D., Kanthaswamy, V. and Thiruvudainambi, S. (2001). The effect of spacing, training and pruning in hybrid tomato. Ed. CAB international.

Sultana, R., Dilruba, S., Parveen, K. Kulsum, U. and Parvin, N. (2016). Effect of pruning on growth and yield of tomato (*Lycopersicon esculentum* Mill.). *European Inter. J. Sci. Techno.,* **5**(9): 127-132.

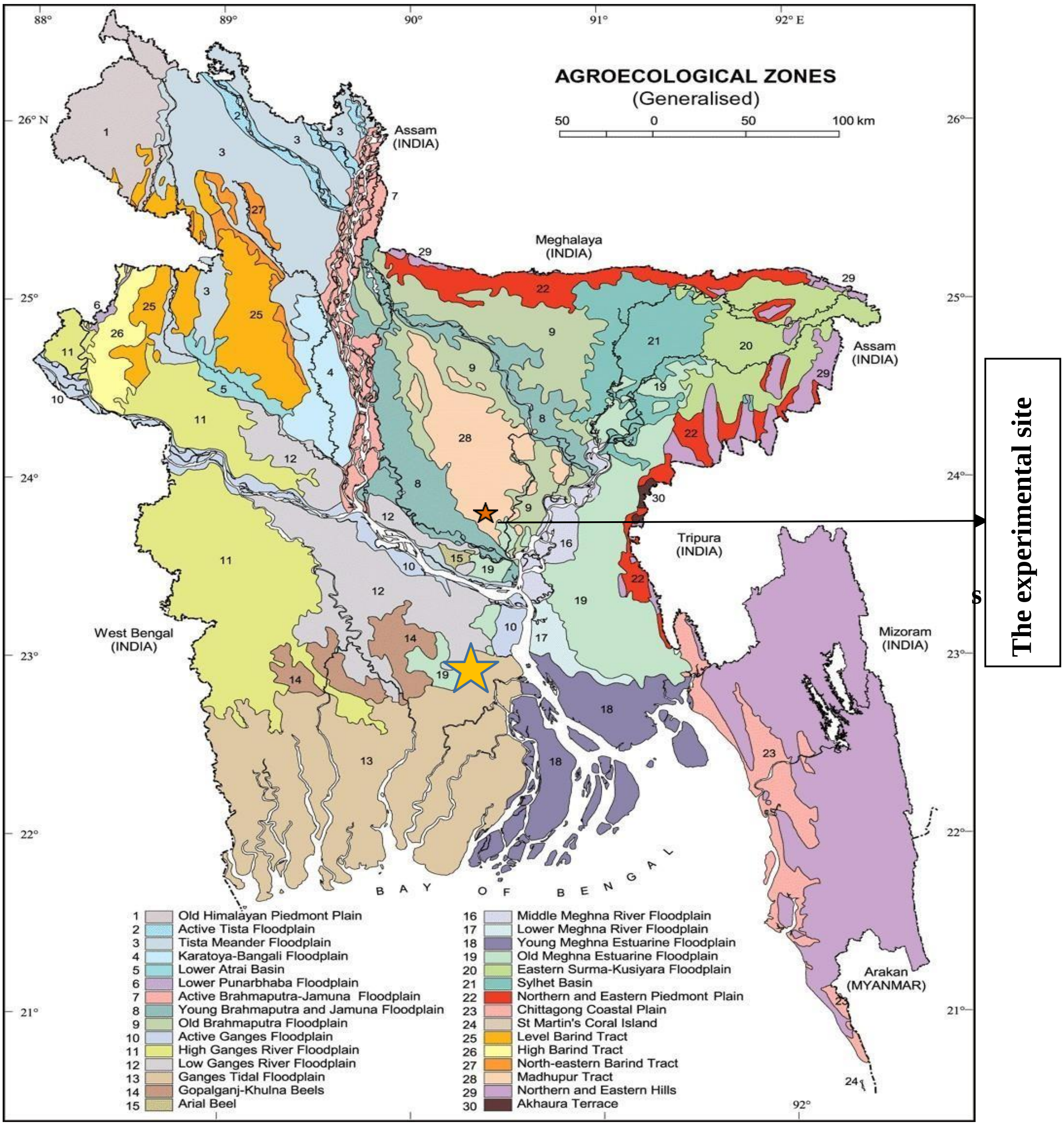
Thakur, M. C., Shyam, L. and Arun, J. (2005). Effect of different training systems and spacing on yield and quality characters and its impact on economics of tomato production. *Hort. J.,* **18**(1): 64-68.

Uddin, A. F. M. J., Roni, M. Z. K., Rahman, S., Momena, K. and Nahiyan, A. S. M. (2015). Study on growth and yield characteristics of seven exotic cherry tomato varieties. *Int. J. Bus. Soc. Sci. Res.,* **3**(2): 125-130.

Utobo, E. B., Ekwu, L. W., Ogah and Nwokwu, G. N. (2010). Growth and yield of cucumber varieties as influenced by pruning at Abakaliki Agricultural area Southeastern Nigeria. *Cont. J. Agron.,* **4**: 23-27.

APPENDICES

Appendix I: Map showing the experimental site



Appendix-II. Analysis of variance of data on plant height of cherry tomato at different days after transplanting

Source of variation	Degrees of freedom (df)	Mean Square of plant height (cm)		
		20 DAT	40 DAT	60 DAT
Factor A	2	669.194**	2910.861**	10040.361**
Factor B	3	367.361**	1583.481**	2141.704**
AB	6	137.083**	538.898**	909.065**
Error	24	3.167	46.778	146.667

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Appendix-III. Analysis of variance of data on branch per plant of cherry tomato at different days after transplanting

Source of variation	Degrees of freedom (df)	Mean Square of branch per plant		
		20 DAT	40 DAT	60 DAT
Factor A	2	0.194**	0.000*	0.861**
Factor B	3	0.25NS	0.028NS	2.556NS
AB	6	0.194**	0.111NS	1.417**
Error	24	0.333	0.333	0.333

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Appendix-IV. Analysis of variance of data on leaves/plant, length of leaflet and breadth of leaflet of cherry tomato

Source of variation	Degrees of freedom (df)	Mean Square		
		Leaves/Plant	Length of Leaflet	Breadth of Leaflet
Factor A	2	618.861**	156.194**	106.194**
Factor B	3	130.852**	53.259**	41.657**
AB	6	14.157**	2.454**	5.713**
Error	24	12.444	5.972	2.528

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Appendix-V. Analysis of variance of data on chlorophyll percentage of cherry tomato at different days after transplanting

Source of variation	Degrees of freedom (df)	Mean Square of chlorophyll percentage (%)		
		25 DAT	50 DAT	75 DAT
Factor A	2	371.893**	296.931**	1183.205**
Factor B	3	119.573**	1690.257**	356.997**
AB	6	103.785**	890.341**	290.679**
Error	24	0.226	0.054	0.099

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Appendix-VI. Analysis of variance of data on days of first flowering, days of first fruiting, flower cluster per plant, flower/plant and fruit/plant of cherry tomato

Source of variation	Degrees of freedom (df)	Mean Square				
		Days of first flowering	Days of first fruiting	Flower cluster per plant	Flower/plant	Fruit/plant
Factor A	2	368.694**	620.861**	1037.861**	100622.25**	43833.00**
Factor B	3	321.657**	466.917**	185.667**	28868.917**	34509.333**
AB	6	108.213**	252.306**	19.083**	4602.917**	3442.333**
Error	24	22.361	26.417	14.167	1410.25	911.00

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Appendix-VII. Analysis of variance of data on yield attributing characteristics of cherry tomato

Source of variation	Degrees of freedom (df)	Mean Square				
		Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	BRIX (%)	Yield/plant (kg)
Factor A	2	0.823**	0.698**	46.528**	8.572**	827.669**
Factor B	3	0.586**	0.408**	33.377**	2.808**	178.973**
AB	6	0.084**	0.037**	1.389**	2.296**	107.56**
Error	24	0.031	0.021	2.344	0.49	14.444

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability and NS Non-significant

Plate

Plate 1. Ist harvested cluster of cherry tomato

Plate 2. Growing media and growing plant after transplanting

Plate 3: Interculture operation

Plate 4. Immature and mature fruit cluster

Plate 5. Data collection