EFFECT OF LEAF PRUNING AND VERMICOMPOST ON GROWTH AND YIELD OF SQUASH (*Cucurbita pepo*)

SANZIDA ISLAM TRIPTI

DEPARTMENT OF HORTICULTURE

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

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BY

SANZIDA ISLAM TRIPTI

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Approved by:

Dr. Jasim Uddain
Associate Professor
Department of Horticulture
SAU, Dhaka
Supervisor

Prof. Dr. Mohammad Humayun Kabir
Department of Horticulture
SAU, Dhaka
Co-Supervisor

Prof. Dr. Mohammad Humayun Kabir
Chairman
Examination Committee

DEPARTMENT OF HORTICULTURE

Sher- e- Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207

Memo no-SAU/HORT/….
Date……

CERTIFICATE

*This is to certify that the thesis entitled, "**EFFECT OF LEAF PRUNING AND VERMICOMPOST ON GROWTH AND YIELD OF SQUASH**" submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M.S.) in HORTICULTURE,** embodies the result of a piece of bona fide research work carried out by **SANZIDA ISLAM TRIPTI,** Registration No.**: 11-04531** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

Dated: JUNE, 17

Place: Dhaka, Bangladesh

Dr. Jasim Uddain
Associate professor
Dept. of Horticulture
SAU, Dhaka
Supervisor

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EFFECT OF LEAF PRUNING AND VERMICOMPOST ON GROWTH AND YIELD OF SQUASH (*Curcurbita pepo*)

BY

SANZIDA ISLAM TRIPTI

ABSTRACT

A field experiment was conducted in the Horticulture Farm of Sher-e Bangla Agricultural University, Dhaka, Bangladesh during the period from November 2015 to February 2016. The experiment was laid out in a Randomized Complete Block Design with three replications. The experiment consisted of two factors viz., three different pruning practices; Control (No pruning, P_0), P_1 (First and second leaf pruning at 20 DAT), P_2 (Third and fourth leaf pruning at 30 DAT) andon the other hand, four different doses of vermicompost viz. Control (No vermicompost, V_0), V_1 (5 t/ha), V_2 (10 t/ha) and V_3 (15 t/ha) were applied in the experiment. Results revealed that pruning, vermicompost and their interaction had significant effect on maximum growth parameters and yield contributing characters. Maximum stem length (64.74 cm at harvest), maximum leaf per plant (20.33), the highest (318.67 gm) individual fruit weight, the highest (21.35 cm) fruit length, the highest yield (21.07 t/ha) was found in P_1 treatment.The maximum stem length (68.26 cm), the maximum leaf per plant (21.56), the maximum female flower (8.11), the maximum total number of fruit (5.11), the maximum individual fruit weight (383.67 gm), the maximum length of fruit (21.61 cm), the maximum diameter of fruit (5.19 cm) and the maximum yield (39.20 t/ha) were found in V_2 treatment. First pruning at 20 DAT and 10 t/ha vermicompost combination gave the highest yield (48.33 t/ha) and the lowest yield was recorded from P_0V_0 treatment combination. So, P_1V_2 is suitable combination for the better growth and yield of squash.

CONTENTS

CONTENTS CONTD.

CONTENTS CONTD.

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATED TERMS

FULL NAME	ABBREVIATION
Agro-Ecological Zone	AEZ
Centimeter	cm
Degree Celsius	^{0}c
Degrees of freedom	df
Duncan’s Multiple Range Test	DMRT
Date After Transplanting	DAT
Gram	gm
Hectare	ha
Kilogram	kg
Mean square	MS
Meter	m
Millimeter	mm
Number	no.
Percent	%
Randomized Complete Block Design	RCBD
Sher-e-Bangla Agricultural University	SAU
Square meter	m^2
Sum of square	SS

CHAPTER-I

INTRODUCTION

Squash is a tender tendril-bearing and vine-like plant belonging to the family Cucurbitaceae. The fruit is large and variable in shape, size, color and markings with a peduncle that is large, soft and corky on the surface at maturity. Squash grows best on fertile, well-drained soil supplied with organic matter. The ideal pH for squash growth is between 21° to 35°C .

Squash is one of the most versatile and delicious foods available throughout the world, and it packs a serious punch in terms of health and medicinal benefits. Squash is rich in carotenoids, beta carotene (a precursor to vitamin A), lutein, zeaxanthin, protein, vitamin C, vitamin B_6, fiber, magnesium, potassium. squash has been used in some cultures as a medicinal plant to treat diabetes, high blood pressure, cancer, high cholesterol, and inflammation (Caili et al. 2006).

Squash is now cultivatin in all over the world.In, 2016 crop was planted on 37,400 acres and 36,300 acres of that was able to be harvested. Squash had an average of 80.75 ton per acre in 2016. California leads the nation in the value of squash production followed by Florida, Georgia, and Michigan. Squash is used primarily for the fresh market. Per capita consumption of squash has grown in recent years and was 5.1 pounds in 2016. The United States imports the most squash in the world. On average, the United States imports 300,000 MT of squash each year. In 2016, squash imports were valued at $384 million. Mexico supplies 90.7 percent of the squash imports to the United States (USDA). Squash is commonly grown in the Philippines throughout the year. In 2009, Philippines ranked 16th in the world production of squash together with pumpkins and gourds with a production value of $43,441 at a volume of 247,759 metric tons (BAS, 2009). It is usually grown in home gardens and commercial scale for its immature fruits, young shoots, flowers and seeds.

Day by day the squash production is increasing in Bangladesh as squash has great demand. According to the statistical data of 2016, Bangladesh ranks 16^{th} position in quantity of squash, pumpkin and gourd production and the quantity was 290,835 tons. In the same year, the area harvested of pumpkins, squash and gourds was 28,625 hectare and it ranked 12 positions. (FAOSTAT).

Organic fertilizers have dual roles, increasing the productivity of soil as well as crop quality and yield. Earthworms are a contributing factor in soil fertility and nutrient cycling via accelerating decomposition of organic matter and, consequently, releasing nutrients in the available form for uptake by plants (Ismail, 1997; Ansari and Sukhraj, 2010). Vermicomposting process is the biological degradation of organic waste by earthworms and microorganisms to form vermicompost (Edwards and Burrows, 1988) which is of importance for organic agriculture, nowadays. The slowly and steadily released nutrients by vermicompost into the rhizosphere provide the suitable conditions for plant uptake (Ansari and Sukhraj, 2010). Vermicompost increases the water and nutrient holding capacity of the soil, which facilitates absorption of nutrients by plants, leads to the proper development of shoot organs, increases efficient use of sunlight, and increases the photosynthetic capacity of the plant (Razzaghifard *et al*. 2017). Vermicompost is a better source of N and a good carrier material for Azotobacter. It is stated that high levels of vermicompost substitutions may adversely affect plant growth, development and yield, especially at germination and seedling stages, (Arancon *et al.,* 2004; Ievinsh, 2011). Therefore, it must be used cautiously for the agricultural and horticultural activities (Ievinsh, 2011). So, the determination of desirable and economical growth inducing concentrations of vermicompost for reducing costs of agriculture is critical (Ladan Moghadam *et al*., 2012). Considering the above factors, the present experiment was undertaken to evaluate the possible effects of different concentrations of vermicompost on the growth of squash.

Pruning is very effective for increased growth of squash. Its large leaves can quickly take up space in the garden and prevent fruits from receiving adequate sunlight.

Although it's not required, pruning squash can help alleviate any overcrowding or shading issues. In addition, pruning can help stimulate additional squash growth. Squash plant leaves grow so large that they can often shade the plant itself and reduce sunlight to itself or surrounding plants. This is why cutting leaves to give squash more sunlight may be required. In addition, pruning squash allows more energy to reach the fruits rather than the majority of squash plant leaves. Pruning zucchini plant leaves can also improve air circulation and help to prevent the powdery mildew that squash is susceptible to. When pruning squash plant leaves, taking care should be needed not to remove all the leaves.

However, very limited research was conducted to improve the growth and yield by pruning and vermicompost in squash.

Therefore considering the above facts, the present experiment has been undertaken with the following objectives:

1. To find out the effect of pruning on growth and yield of squash.
2. To find out the effect of different dose of vermicompost on growth and yield of squash.
3. To find out the combined effect of pruning and different dose of vermicompost on growth and yield of squash.

CHAPTER-II
REVIEW OF LITERATURE

Squash is becoming an important vegetable crop worldwide and receiving 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 the different stage of pruning and different dose of vermicompost application. In maximum case, we observed these techniques for C*ucurbitaceae* family crops as definitely squash is not so much an old crop in the world. However, the combined effects of these production practices have not been defined clearly. In Bangladesh, squash is well known to most of the vegetable lovers though cultivation has not started in wide range. There has not many studies on the influence of different stage of pruning and different dose of vermicompost on growth and yield of squash. Relevant available information in this connection has been described in this chapter.

2.1 Effect of vermicompost on growth and yield of squash

Arancon *et al*. (2006, 2008) said that the application of a range of humic acids, that had been extracted from vermicomposts and then added to MM 360, with all needed nutrients, increased the overall growth of tomatoes and cucumbers significantly in a very similar pattern to the effects of a range of vermicomposts.

Atiyeh *et al*. (2000) reported in their experiment that the growth features of plant (Cucurbita pepo L.) and the dry weight of plants, which have been grown in the medium consisting of vermicompost, are observed much more.

Namayandeh and Shirdareh (2015) conducted an experiment on The Effect of Compost, Vermicompost and Urea fertilizers on Operation and Operation Facture on Pumpkin

Msmayy (*Cucurbita pepo* L.) at Shiraz Branch, Islamic Azad University, Shiraz, Iran. The results of this experiment showed that the effect of vermicompost and compost has been more than urea in making the number of female flower in Pumpkin Msmayy (*Cucurbita pepo* L)**.** The highest number of female flowers was observed in the conditions of using compost which was concluded in an increase in the number and function of the fruit. The results obtained from this experiment express this matter that the diameter of the fruit causes the diameter of squash fruit to be increased in conditions of using three kinds of the studied fertilizers in this experiment; but compost and vermicompost have shown much more effect on the fruit.

Arancon *et al.* (2004) found that the effect of vermicompost on cucumber plant growth could be attributed to presence of plant growth regulators and humic acid in vermicompost, which are produced by increased activity of microbes such as fungi, bacteria, yeasts, actinomycetes and algae.

Azarmi *et al*. (2009) studied an experiment on the effect of sheep-manure vermicompost on quantitative and qualitative properties of cucumber (*Cucumis sativus* L.) grown in the greenhouse at the university of Mohaghegh, Ardabili, Ardabil, Iran. The effect of vermicompost on leaf number and height stem was same at 30, 60 and 90 days after transplanting. Plants in plots treated with vermicompost showed increase in growth parameters like leaf area, chlorophyll content, stem dry weight and leaf dry weight than with plots receiving inorganic fertilizer only. Leaf number, plant height and chlorophyll content were significantly (P 0.05) affected by vermicompost treatments for both varieties (‘Sultan F1’ and ‘Storm F1’) at 30, 60 and 90 days after transplanting. Plots with 20 and 30 t ha -1 vermicompost had greater leaf numbers than plot without vermicompost at 30, 60 and 90 days after transplanting for both varieties. Application of vermicompost increased stem heights in response to different rates of vermicompost for both varieties at 30, 60 and 90 days after transplanting. 30 days after transplanting, the highest chlorophyll content was obtained at 20 and 30 t ha^{-1} vermicompost, while at

60 and 90 days after transplanting the maximum chlorophyll content was obtained at 30 t ha^{-1} vermicompost for both varieties. The results showed that application of vermicompost had significantly (P 0.05) effect on leaf area. The plots treated with vermicompost at 30 t ha^{-1} increased leaf area 18% for cv. 'Sultan F_1' and 22% for cv. 'Storm F1' compared to the control. At 20 and 30 t ha^{-1} of vermicompost, the plants had significantly (P 0.05) greater stem and leaf dry weight than the control. This indicates positive effects of vermicompost on growth of cucumber. The results indicated that 20 t ha -1 vermicompost was adequate to supply the desirable amount of growth promoting substance for higher growth and yield of cucumber.

Thriveni *et al.* (2015) studied an experiment on effect of inorganic, organic fertilizers and biofertilizers on growth, flowering, yield and quality attributes of bitter gourd on college of Agriculture Orissa University of Agriculture and Technology, Bhubaneswar 751003 Odisha, India. Even though the crop was affected by 'Philin' the average number of fruits per plant varied significantly between 17.3 in absolute control to 40 in T10. Similarly length of fruit varied between 12 to 17 cm, girth between 11.9 to 13.6 cm and unit fruit between 42.4 and 86.4 g. All these parameters positively increased with incremental uses of inorganic nutrients and further with integrated uses of vermicompost either alone or with biofertilizers. Integration of vermicompost application @ 2.5 tons/ha increased the fruit yield by 6.4, 5.2 and 4.6 per cent compared to respective yields due to 50, 75 and 100 per cent recommended doses of fertilizers respectively.

Zhao *et al*. 2010 (a,b) recorded that the overall quality of cucumbers was improved by applying VP and VP in organic mixed fertilizer under greenhouse conditions.

Nagar *et al*. (2017) studied an experiment on effect of organic manures and different levels of NPK on growth and yield of bottle gourd at SK Rajasthan Agricultural University, Bikaner 334006, Rajasthan, India. The application of vermicompost (5.0 t ha-1). Recorded length of main vine (4.09), number of primary branches per vine

(11.85), length of leaf 65 days after sowing (27.35 cm), per cent fruit set (55.61), number of fruit per vine (9.8), length of fruit (40.48 cm), girth of fruit (24.96 cm), weight of fruit (954.30 g), yield per vine (8.99), yield (242.70 q ha-1). These finding clearly indicated that vermicompost played a significant role on enhancing the growth of bottle gourd.

Kamalakar Reddy (1998) reported increased uptake of N, P and K with the application of vermicompost from 10 to 30 t ha-1 in bitter gourd.

Benitez *et al.* (2013) carried out an experiment in the bitter gourd (*Momordica charantia* L. cv. Makiling) growing in soil amended with organic fertilizers, namely, Bio-N, commercial compost and vermicompost, at the rate of 0.075 g/ seed, 150 g/ plant and 231 g /plant, respectively. Further as a positive control, the plants were fertilized with inorganic fertilizer by adding 32.4 g /plant of complete fertilizer (14-14-14) applied basally and 6.52 g per plant of urea side-dressed at flowering based on the recommended application rate of 100 N – 60 P_2O_5 – 60 K_2O kg ha-1, the application of commercial compost resulted in the greatest improvement in both vegetative and reproductive growth as well as in the total herbage and fruit yield of bitter gourd. He also found the promotive effects of different soil amendments on vegetative growth and herbage yield of bitter gourd are clearly demonstrated in this study. Plants treated with various organic fertilizers showed enhanced growth as exhibited by the noticeable increase in vine length, leaf production and herbage yield over the unfertilized plants. In particular, the total herbage yield was improved by 30%–40% when vermicompost, Bio-N and commercial compost were applied to the plant. Enhancement of bitter gourd growth brought about by the application of organic amendments can be attributed to their relatively high organic matter content. The vermicompost and the commercial compost used in the study contained about 16x and 13x higher organic matter than the soil, respectively. The presence of high amount of nutrients in these fertilizer materials as indicated in the results of chemical analysis further accounted for the enhanced growth of bitter gourds. In these studies, the growth-promoting effects of vermicompost have been attributed to the presence of humic substances that have the ability to retain moisture and improve soil structure as well as to the diverse microbial population, which plays an important role in increasing soil fertility. The positive response of bitter gourd to application of organic fertilizers as shown by improved vegetative growth was also reflected in the reproductive and yield parameters measured in these plants.

K. Sundararasu (2017) studied an experiment on effect of vermicompost and vermiwash on growth and yield of bottle gourd, (*Lagenaria siceraria)* in Tamilnadu, India. In this present study analysis of soil nutrients after cultivation was high in the experimental plots which indicate that the presence of micronutrients in vermicompost and vermiwash. Increase the application of the vermicompost and vermiwash quantity resulted in increased soil copper and iron content due to increased organic inputs which resulted in improved soil aeration and microbial activity. In the present investigation, the yield of bottle gourd in response to vermicompost 50% :vermiwash 50% was highly significant in experimental plot II which may due to increased availability of more exchangeable nutrients in the soil by the application of vermicompost and vermiwash.

2.2 Effect of pruning on growth and yield of squash

Palada and Chang (2003) found that the removal of the lateral shoot had a positive effect on total yield of bitter gourd.

Than Xuan Dao (1995) observed that pruning produced the highest total yield, marketable and non-marketable yield of Cucumber.

Duong (1999) who reported that pruned cucumber had higher weight of fruits than the unpruned ones.

Ekwu *et al*. (2012) conducted that comparing the performance of pruning bushes with no pruning saw that it was not done, that factors such as the number of leaves,The number of flowers, Days to 50% flowering Along the main axis The pruning treatments were performed on them, On the contrary, the treatments did not do any Hersey factors such as the number of fruits, fruit length, fruit diameter, fruit weight, fruit number of non-market-friendly and also more marketable fruits were obtained.

Thang (1995) reported that an experiment was carried out on the effect of six different pruning methods on the yield of cucumber variety Poung and evaluated from December 1995 to February 1996 at AVRDC-ARC experimental field, Kamphaengsaen, Nakhon Pathom, Thailand. The local cucumber variety Poung was chosen for the field experiment. The treatments of the experiment were No pinching (M_0), Pinching branches on main stem at node 10 up to down (Mi), Pinching branches on main stem at node 15 up to down (M_2), No pruning (P_0) and pruning branches at node 4. The highest yield (total yield = 19.72 t/ha, marketable yield = 14.93 t/ha, non-marketable yield = 4.79 t/ha, early stage yield = 3.28 t/ha) was obtained by the treatment M0P|, with no pinching of branches on main stem but pruning braches at node 4. The method of pruning branches had no significant effect on horticultural character such as fruit size and plant height. The pinching treatments had low yield. This was resulted because of the absence of sufficient branches. Nu (1996) stated that the effect of pruning (pinching out the branches on main stem at node 4 up to the bottom and prune when lateral shoots on main stem set fruit on first on second node of lateral shoot) on yield and fruit quality of four cucumber varieties, namely; Lanna-5 (Fi), Nopakao (Fj), Lan-Laem (op) and Poung (op) was evaluated using a 4 x 2 factorial experimental design with no pruning treatment. The experiment was carried out at the ARC-AVRDC experimental field, located at Kasetsart University, Nakhon Pathom, Thailand form November 1996 to February 1997. The no pruning treatment produced the highest total yield 22.18 ton/ha as well as highest nonmarketable yield 7.70 t/ha while the pruning treatment produce low non marketable yield 5.16 t/ha and total yield 17.11. But, the number of branches, nodes and stem length was higher in the pruning treatment.

Than, (1997) conducted that the study effect of pruning on yield and quality of cucumber cultivars, the results showed that the removal of branches and main stem fourth node, Or removal of branches and main stem of the flowers up to 30-40 cm And pruning of branches and leaves left after a fruit, Increase the yield and marketable fruit. By applying this method, the number and weight of fruits per plant at the 1% level showed a significant difference. In this case, the pruning of fruit number and fruit weight was less than average.

Mardhiana *et al*. (2017) studied an experiment on effects of pruning on growth and yield of cucumber (*Cucumis sativus*) Mercy variety in the acid soil of North Kalimantan, Indonesia. Cucumber pruning is able to produce a better fruit weight. It is proven by the fruit weight that is produced by shoot of pruning on the main stem (P_1) which is able to gain a weight fruit in the cucumber Mercy variety is between 350-400 g per fruit. Based on the result of the variance, it is known that the pruning treatment has a very significant effect on the cucumber length of at the age of 50 DAP. The treatment of pruning of two lateral branches that emerged first above the third section (P_3) showed the highest yield compared to other treatments of 272.45 cm, but not significantly different with the treatment of P_0 and P_2. Treatment of shoot pruning on the main stem (P_1) significantly resulted in the shorter plant than other treatments with no shoot pruning, but visually it was seen that the branch was longer than that of without pruning. Treatment of shoot pruning on the main stem (P_1) resulted in the highest number of leaves per plant (59.90 pieces of leaves) compared to other treatments. Treatment of shoot pruning on the main stem could increase the number of leaves by 16.19% compared to that of without pruning (P_0).

Singh and Mangal (1982) said that this is in conformity with the results reported in muskmelon, where it was stated that training and pinching improves the exposure of leaves to sun light which results in an increased trapping of the solar energy for production of carbohydrate content in shoots.

Arora and Malik (1989) reported that pruning of ridge gourd plants to six primary branches with a medium spacing level (45 cm) produced the longest plants, gave maximum number of secondary branches, resulted in early appearance of pistillate flowers, lowered sex ratio and gave higher number and weight of fruits from early and total yield. The result of reduced sex ratio for pruning was due to more production of secondary branches on which pistillate flowers appeared in large number.

CHAPTER III

MATERIALS AND METHODS

3.1 Experimental Site

The research was conducted at the Horticultural Farm of Sher-e-Bangla Agricultural University, Dhaka-1207 during the period from November 2015 to February 2016. The experimental field was located at 90° 22' E longitudes and 23° 41' N latitude at an altitude of 8.2 meters above the sea level. The land was in Agro-Ecological Zone of Madhupur tract (AEZ No. 28). It was deep red brown terrace soil and belonged to "Nodda" cultivated series. The soil was sandy loam in texture having pH 5.47 to 5.63. The physical and chemical characteristics of the soil have been presented in appendix II.

3.2 Climate

The experimental area was under the sub-tropical monsoon climate, which is characterized by scanty rainfall during Rabi season (November to february). The monthly average temperature, humidity, rainfall and sunshine hours prevailed at the experimental area during the study period were collected from the Bangladesh Meteorological Department (climate division) and have been presented in Appendix I.

3.3 Planting materials used for experiment

Seeds of squash (Hybrid Squash: SURMA-F1 variety) were collected from the Siddik bazar, Dhaka and used in the experiment.

3.4 Experimental Treatment

Experiment was consisted of two factors.

Factor A: Leaf pruning

There were three treatments. These are-

1. P_0 : Control (No pruning)

2. P_1 : First pruning at 20 DAT (1^{st} and 2^{nd} leaves)

3. P_2 : Second pruning at 30 DAT (3^{rd} and 4^{th} leaves)

Factor B: Vermicompost

Four levels of vermicompost were used in the experiment. The treatments were-

1. V_o: Control (No vermicompost)

2. V_1: 5 t/ha

3. V_2: 10 t/ha

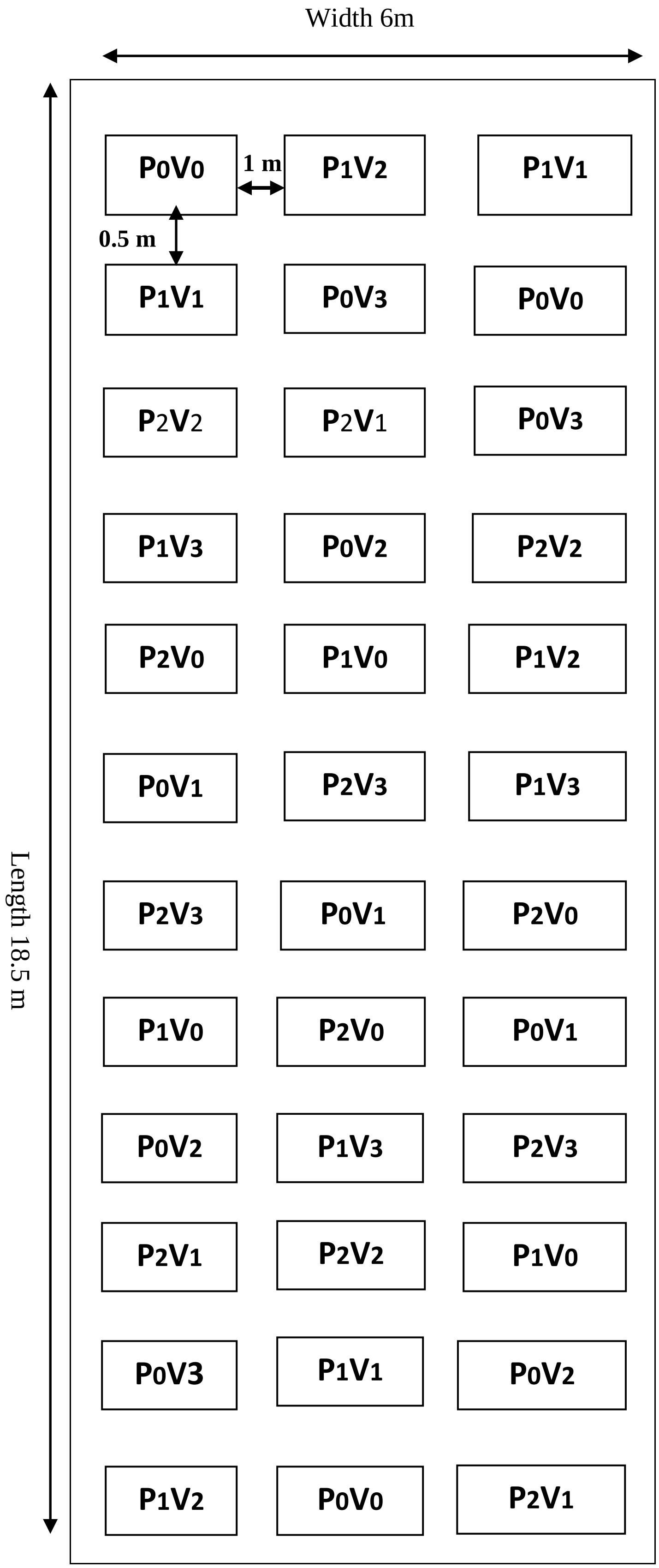
4. V_3 : 15 t/ha

Total 12 treatment combinations were as follows:

P_0V_0	P_1V_0	P_2V_0
P_0V_1	P_1V_1	P_2V_1
P_0V_2	P_1V_2	P_2V_2
P_0V_3	P_1V_3	P_2V_3

3.5 Experimental design and layout

The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The experiment was divided into three blocks and each consisted of 12 plots. Each unit plot was 1 x l m^2 in size. Altogether there were 36 unit plots in experiment and required 111 m^2 land. Both row to row and plot-to-plot distances were 0.5 m. The treatments were randomly assigned to each of the block. Each unit plot had 2 pits and each pit contained 2 plants.



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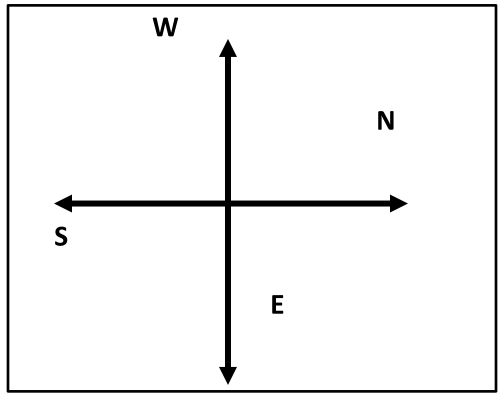

Plot Size: 1m x 1m= 1m²

Block Spacing= 0.5 m

Spacing= 1m x 1m

Area of total plot= (18.5 x 6) m²

Plant per Plot= 2

Factor A

Leaf pruning

P_0 = No pruning

P_1= First pruning at 20 DAT

P_2 =Second pruning at 30 DAT

Factor B

Vermicompost

V_0 = Control

V_1 = 5 t/ha

V_2 = 10 t/ha

V_3 = 15 t/ha

3.6 Land preparation

The land of the experimental plot was first opened on 15 November, 2015 with a power tiller and it was exposed to the sun for few days prior to next ploughing. It was then thoroughly prepared by ploughing and cross ploughing with a power tiller followed by laddering to obtain a good tilth. The subsequent operations were done with harrow, spade, hammer, basket etc. The clods were broken into fine soil particles and the surface was leveled until the desired tilth was obtained. The weeds and stubbles were removed. Irrigation and drainage channels were prepared around the plot. The soil was treated with insecticides (Furadan 5G @ 10 kg ha^{-1}) at the time of final land preparation to protect young plants from the attack of soil insects such as cutworm and mole cricket. Then expected doses of vermicompost were applied on each plot by making pit. And those pits were covered with one lair of soil. Then manual irrigation was done over the plot.

3.7 Sowing of seeds and transplanting of seedling

Seeds were sown in polybags having compost mixed soil on 06 November, 2015 for germination and seedling raising. Two seeds were sown in each polybag. The polybags were kept in shady place. They were watered regularly during the seedling raising period. When the seedlings (18 days old) attained 4 leaves and hard enough, they were transplanted in the main field on 24 November 2015.

3.8 Intercultural operations

Various intercultural operations were done when required.

3.8.1 Weeding and Mulching

Manual weeding was done as and when necessary to keep the plots free from weeds. The soil was mulched by breaking the crust of the soil for easy aeration and to conserve soil moisture as and when needed. Mulching also helped to disturb the emergence of weeds. These two operations were done carefully without hampering the luxurious crop health.

3.8.2 Irrigation

Irrigation was done whenever it was necessary.

3.8.3 Pest control

There was a plan to protect the plant from the attack of insects-pests squash vine borer and squash bugs by spraying of pesticides. For controlling squash bugs, two applications of pyrithroid insecticide were effective. Squash vine borer insect was controlled by applying carbaryl for 2 times.

3.9 Harvesting

Harvesting should be done at the right stage. Squashes are harvested when immature, and used as a fresh vegetable stewed, boiled or fried. They develop very rapidly after their flowers have opened, and must be harvested before the rind begins to harden. When gathering squashes or pumpkins for storage, careful handling is needed to avoid bruising, as damaged fruit soon rots

3.10 Collection of data

Data were recorded on different morphological, yield components and yield from ten randomly selected sample plants. Data on different parameters were recorded as per the following parameters:

3.10.1 Growth related

1. Stem length (cm)
3. Stem diameter (cm)
2. Number of leaves plant^{-1}

3.10.2 Yield and yield related

1. No of male flower plant^{-1}
2. No of female flower plant^{-1}
3. Number of fruit plant^{-1}
4. Total number of fruit
5. Individual fruit weight (kg)
6. Length of fruit (cm)
7. Fruit diameter (cm)
8. Yield ha^{-1}

3.11 Procedure of recording data

3.11.1 Stem length (cm)

Stem length of plant was taken. Average length of stem was determined from each unit plot at 40 DAT, 55 DAT and at harvest was expressed in centimeter.

3.11.2 Stem diameter (cm)

Diameter of the stems from each plant/plot was measured at 40 DAT, 55 DAT and at harvest and the average was calculated.

3.11.3 Number of leaves plant^{-1}

Average number of leaves were counted from plants from of unit plot at 40 DAT, 55 DAT and at harvest.

3.11.4 No of male and female flower plant^{-1}

Total number of male and female flowers was counted from every plant per plot. It was done at 40 DAT, 55 DAT and at harvest.

3.11.5 Number of fruit plant^{-1}

The number of fruits in every plant of squash was counted at every harvest and thus the total number of fruits per plant was recorded and average number of fruits was recorded.

3.11.6 Individual fruit weight (kg)

After each harvest, the weight of fruits per plot was recorded and then the average weight per fruit was calculated.

3.11.7 Length and diameter of fruit (cm)

Length of fruits per plot was measured after each harvest and then the average was taken. Diameter of the same fruits as harvested was measured and the average was calculated.

3.11.8 Yield ha^{-1}

To estimate yield, all the fruits in every harvest were considered. Thus the average yield per plot was measured. The yield per hectare was calculated considering the area covered.

3.12 Statistical analysis

The recorded data on different parameters were statistically analyzed using SPSS software to find out the significance of variation resulting from the experimental treatments. The mean for the treatments was calculated and analysis of variance for each of the characters was performed by F (variance ratio) test. The differences between the treatment means were evaluated by DMRT test at 1% or 5% probability.

CHAPTER- IV
RESULTS AND DISCUSSIONS

The present experiment was conducted to determine the effect of pruning and different doses of vermicompost on growth and yield of squash. The analyses of variance (ANOVA) of the data on different components are given in Appendix III to XXII. The results have been presented, discussed, and possible interpretations have been given under the following headings:

4.1 Stem length (cm)

The maximum stem length (50.24 cm) at 40 DAT was recorded from P_1 treatment and the minimum stem length (45.88 cm) was recorded from P_2 treatment which was closely related to P_0 treatment (46.08 cm). At 55 DAT the maximum stem length (57.59 cm) was recorded in P_1 treatment and the minimum stem length (53.21 cm) was recorded from P_0 treatment which was closely related to P_2 treatment (53.89 cm). At harvest, the maximum stem length (64.75 cm) was recorded from P_1 treatment and the minimum stem length (59.03) was recorded from P_2 treatment which was closely related to P_0 (59.55 cm) treatment (Figure-1). Pruning reduces the competition of plants for nutrient and access enough light to the plant that causes vegetative growth of the plant.

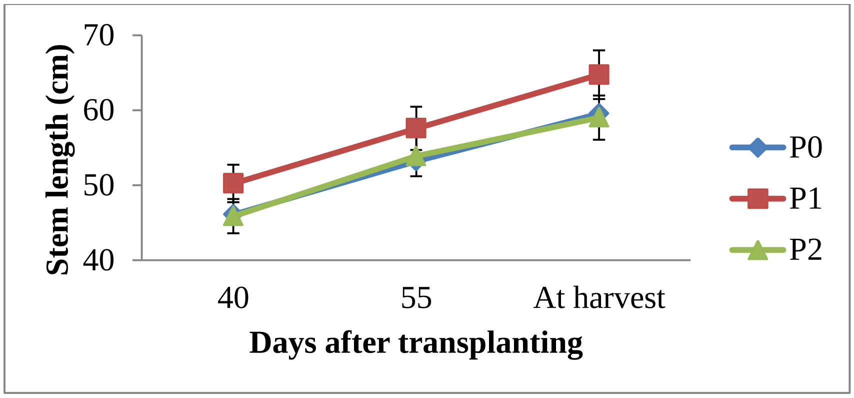

Figure 1. Effect of pruning on stem length at different days after transplanting of squash (P_O: No pruning; P_1: First pruning at 20 DAT and P_2: Second pruning at 30 DAT)

In terms of stem length in relation with different doses of vermicompost at 40 DAT, 55 DAT and at harvest, a statistically highly significant difference was recorded under the trial (Appendix III, IV and V). The maximum stem length (53.07 cm) at 40 DAS was recorded from V_2 treatment comprising of 10 ton/ha vermicompost (Figure-2) and the minimum (43.78 cm) stem length was recorded from V_3 treatment for 15 ton/ha vermicompost which was closely followed by V_0 treatment (44.222 cm). At 55 DAT the maximum stem length (60.29 cm) was recorded from V_2 treatment and the minimum (50.57 cm) length was recorded from the V_0 treatment which was closely followed by V_3 treatment (52.94 cm). At harvest, the maximum stem length (68.26 cm) was recorded from V_2 treatment and the minimum stem length (55.90 cm) was recorded from V_0 treatment which was closely related to V_3 (58.71) treatment. The results indicated that maximum stem length was produced by the V_2 treatment among the different doses of vermicompost in every recorded day. Vermicompost adds various fertilizers such as nitrogen, potassium, calcium and magnesium that play a direct role in plant growth.

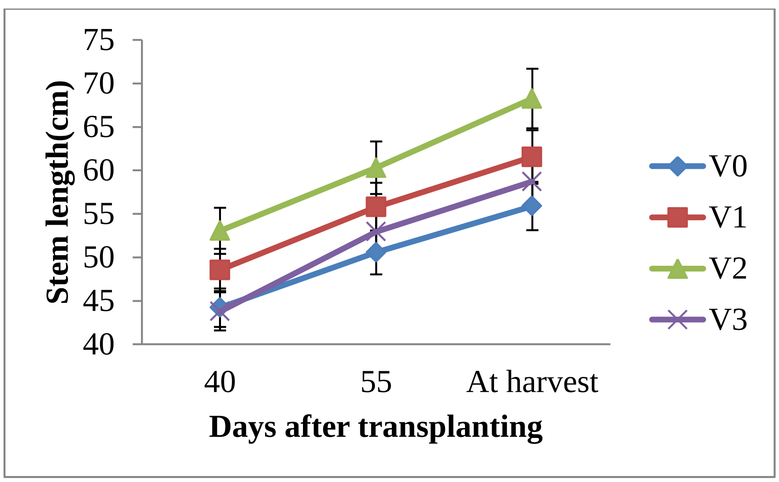

Figure 2. Effect of different doses of vermicompost on stem length at different days after transplanting (V_0: Control; V_1: 5 t/ha; V_2: 10 t/ha and V_3: 15 t/ha)

Interaction effect of pruning and vermicompost showed a statistically significant difference (Appendix III, IV and V) on stem length. The highest stem length (57.00 cm) at 40 DAT was recorded from the treatment combination P_1V_2 and the minimum (41.67 cm) in the treatment combination of P_0V_0. At 55 DAT the highest stem length (66.67 cm) was recorded from the treatment combination P_1V_2 and the minimum stem length (49.00 cm) was recorded from the treatment combination of $P_0V_{0.}$ Similarly at harvest the highest stem length (78.77 cm) was recorded from the treatment combination P_1V_2 and the minimum stem length (55.20 cm) was recorded from the treatment combination of P_0V_0 (Table 1).

4.2 Number of leaf per plant

Number of leaf per plant showed significant differences in relation with different levels of pruning at 40 DAT (Appendix VI). The lowest number of leaf per plant (14.58) was recorded from P_0 treatment, which was closely followed by P_2 treatment (15.75) and the highest number of leaf per plant (16.58) was recorded from P_1 treatment. AT 55 DAT and 70 DAT no significant difference was found (Appendix VII and VIII) At 55 DAT the highest leaf per plant was (17.92) recorded in P_1 treatment which was closely related to P_2 (17.25) treatment and the lowest number of leaf was recorded from P_0 treatment (16.42). At harvest, the highest number of leaf was recorded from P_1 treatment (20.33) which was statistically similar to P_2 (19.67) treatment and the lowest number of leaf was recorded from P_0 treatment (18.25). The results indicated that maximum number of leaves were produced for primary pruning practices (Figure-3). Pruning facilitates sunlight and decreases the competition of nutrients that increases the number of leaves.

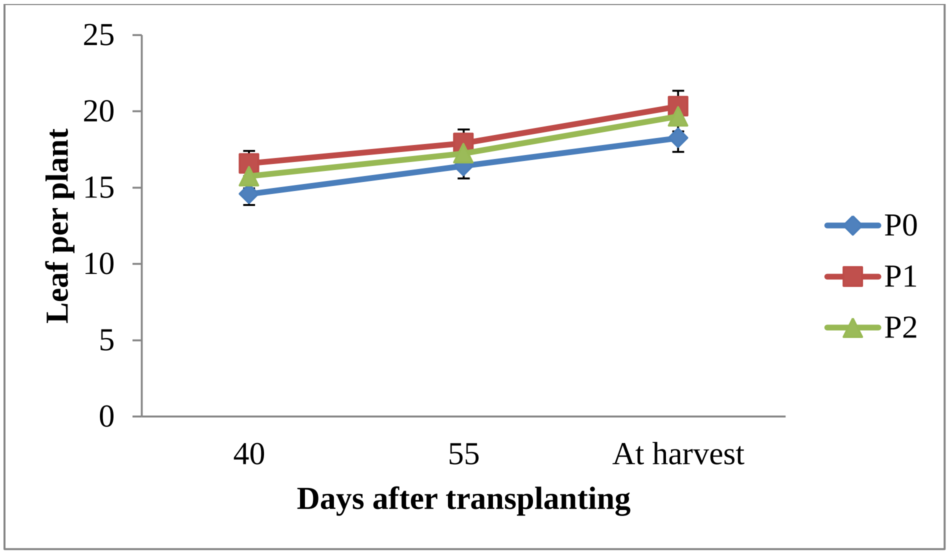

Figure 3. Effect of pruning on leaf per plant at different days after transplanting of squash (P_0: No pruning; P_1: First pruning at 20 DAT and P_2: Second pruning at 30 DAT)

In terms of number of leaf per plant in relation with different doses of vermicompost at 40 DAT, 55 DAT and at harvest a statistically significant difference was recorded under the trial (Appendix VI, VII and VIII) . At 40 DAT, the minimum number of leaf per plant (14.33) was given from V_0 treatment which was closely followed by V_3 treatment (15.11) and the maximum (17.11) was recorded in V_2 treatment. At 55 DAT, the maximum number of leaf per plant (18.56) was recorded from V_2 treatment which was statistically similar with V_1 treatment (17.78) and the minimum number of leaf per plant (16.00) was recorded from V_3 treatment which was statistically similar to V_0 treatment (16.44). At harvest, the maximum number of leaf per plant (21.56) was recorded from V_2 treatment and the lowest number of leaf per plant (17.89) was recorded from V_3 treatment which was closely related to V_0 (18.56) treatment (Figure-4). The results showed that maximum number of leaves was produced by the V_2 treatment among the different doses of vermicompost. Azarmi et al. (2009) reported the similar results from their experiments. Vermicompost adds different macro and micro nutrients that increases the number of leaves.

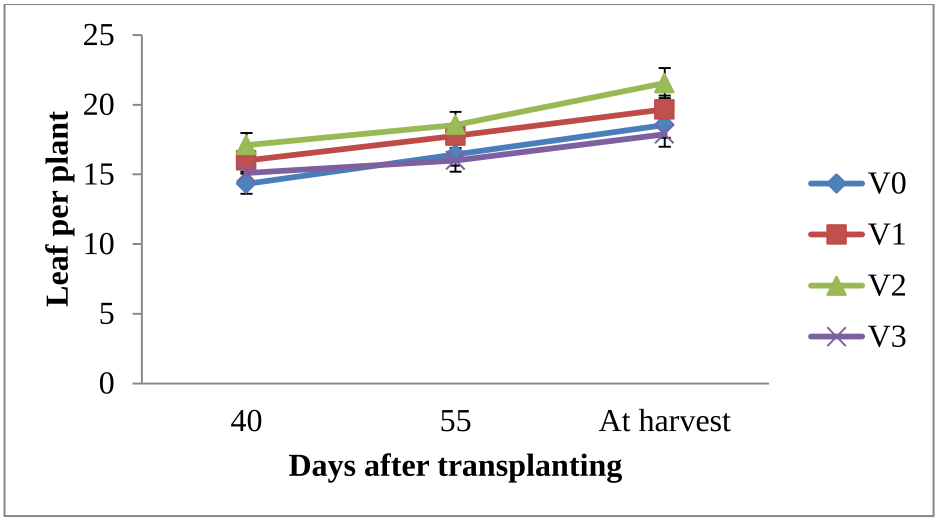

Figure 4. Effect of vermicompost on leaf per plant at different days after transplanting of squash (V_0: Control; V_1: 5 t/ha; V_2: 10 t/ha and V_3: 15 t/ha)

Interaction effect of pruning and vermicompost showed a statistically significant difference in consideration of number of leaf per plant at 40 DAT, 55 DAT and at harvest in the present study (Appendix VI, VII and VIII). At 40 DAT, the lowest (13.67) number of leaf per plant was recorded from the treatment combination P_0V_0 and the highest (19.00) was recorded from the treatment combination of P_1V_2. At 55 DAT, the lowest (15.33) number of leaf per plant was recorded from the treatment combination P_0V_0 and P_2V_3 and the highest (20.33) was recorded from the treatment combination of P_1V_2. At harvest, the highest (24.67) was recorded from the treatment combination of P_1V_2 and the lowest (17.67) number of leaf per plant was recorded from the treatment combination P_0V_0 and P_1V_3 (Table 2).

Table 1: Interaction effect of leaf pruning and vermicompost on stem length (cm)

Treatment	Stem length(cm)		
	40 DAT	55 DAT	At harvest
P_0V_0	41.67 c	49.00 c	55.20 e
P_0V_1	48.33 bc	55.67 bc	62.99 bcd
P_0V_2	51.00 ab	55.33 bc	61.00 bcde
P_0V_3	43.33 c	52.83 bc	59.00 bcde
P_1V_0	47.67 bc	51.70 bc	56.33 de
P_1V_1	51.96 ab	58.67 b	64.00 bc
P_1V_2	57.00 a	66.67 a	78.77 a
P_1V_3	44.33c	53.33 bc	59.85 bcde
P_2V_0	43.33 c	51.00 c	56.17 de
P_2V_1	45.33 bc	53.00 bc	57.66 bcde
P_2V_2	51.19 ab	58.87 b	65.00 b
P_2V_3	43.67 c	52.67 bc	57.29 cde
Standard error	2.034	2.207	2.29
Significance level	0.000	0.001	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 =First pruning at 20 DAT

P_2=Second pruning at 30 DAT

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

Table 2: Interaction effect of pruning and different doses of vermicompost on leaf per plant

Treatment	Leaf per plant		
	40 DAT	**55 DAT**	**At harvest**
P_0V_0	13.67 e	15.33c	17.67 c
P_0V_1	15.00 cde	17.33 bc	18.33 bc
P_0V_2	15.00 cde	16.67 bc	19.00 bc
P_0V_3	14.67 de	16.33 bc	18.00 c
P_1V_0	14.67 de	17.00 bc	19.33 bc
P_1V_1	16.67 bc	18.00 b	19.67 bc
P_1V_2	19.00 a	20.33 a	24.67 a
P_1V_3	16.00 bcd	16.33 bc	17.67 c
P_2V_0	14.67 de	17.00 bc	18.67 bc
P_2V_1	16.33 bcd	18.00 b	21.00 b
P_2V_2	17.33 ab	18.67 ab	21.00 b
P_2V_3	14.67 de	15.33c	18.00 c
Standard error	1.42	1.42	1.75
Significance level	0.00	0.00	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 = First pruning at 20 DAT

P_2=Second pruning at 30 DAT

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

4.3 Stem diameter

Stem diameter showed statistically non significant dissimilarity in relation with different levels of pruning at 40 DAT, 55 DAT and at harvest (Appendix IX, X and XI). At 40 DAT, the minimum stem diameter was recorded from P_1 (1.25 cm) treatment and the maximum stem diameter was recorded from P_2 (1.30) treatment. At 55 DAT, the minimum stem diameter was recorded from P_0 (1.48 cm) treatment and the maximum stem diameter was recorded from P_2 (1.62 cm) treatment. At harvest, the minimum stem diameter was observed on P_1 (2.05 cm) treatment and the maximum stem diameter was observed on P_2 (2.28 cm) treatment.

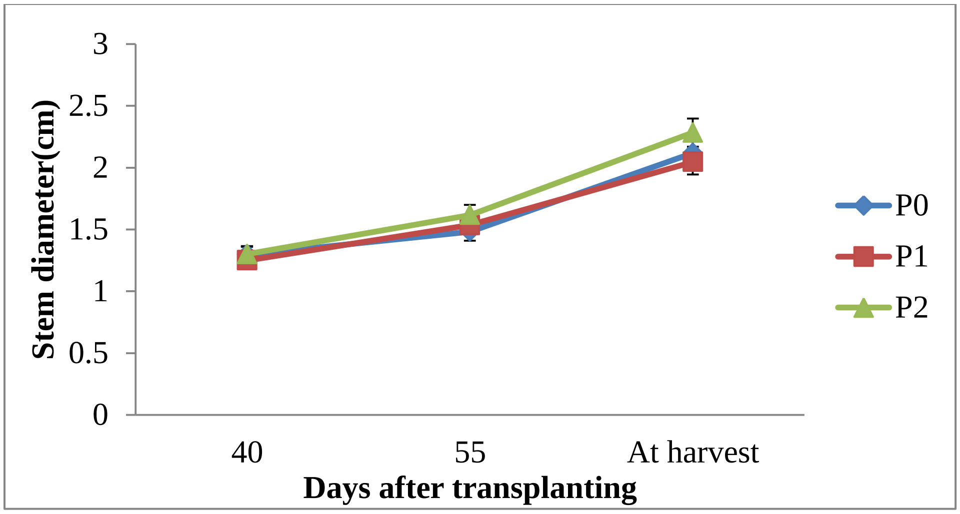

Figure 5. Effect of pruning on stem diameter (cm) at different days after transplanting of squash (P_0: No pruning; P_1: First pruning at 20 DAT and P_2: Second pruning at 30 DAT)

In terms of stem diameter in relation with different doses of vermicompost at 40 DAT, 55 DAT and at harvest a statistically significant difference was recorded under the trial (Appendix IX, X and XI). At 40 DAT, the minimum stem diameter observed at V_0 treatment (1.16 cm) and he maximum stem diameter was recorded on V_3 (1.46 cm) treatment. At 55 DAT, the highest stem diameter was observed on V_3 treatment (1.74 cm) and the lowest stem diameter was recorded from V_1 (1.39 cm) treatment. At harvest, the highest stem diameter was observed on V_3 (2.46 cm) treatment and the lowest was observed on V_1 (1.91) treatment (Figure-6). Vermicompost is rich in nitrogen ant nutrient content. This favorable condition creates better nutrient absorption and favors for vegetative growth. Consequently highest stem diameter was found by increased dose of vermicompost.

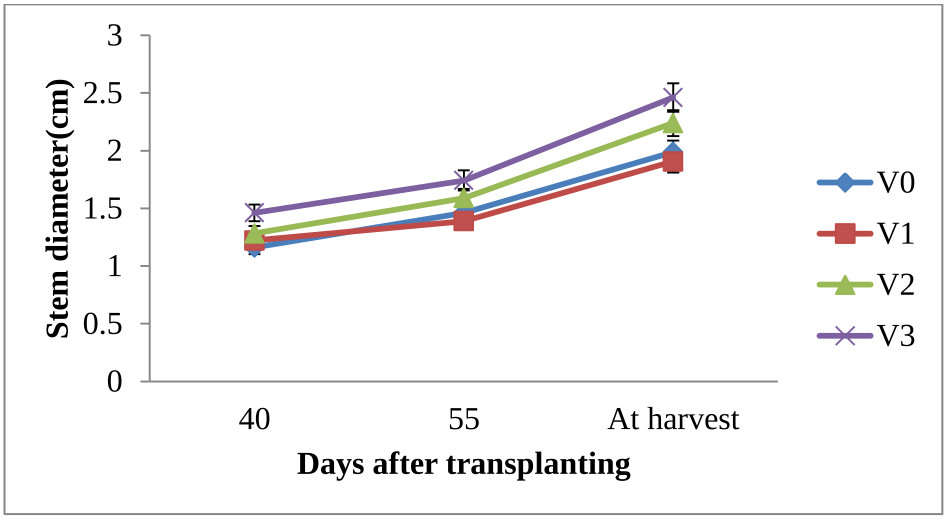

Figure 6. Effect of different doses of vermicompost on stem diameter (cm) at different days after transplanting of squash (V_0: Control; V_1: 5 t/ha; V_2: 10 t/ha and V_3: 15 t/ha)

Interaction effect of pruning and vermicompost showed a statistically significant difference in consideration of stem diameter 40 and at harvest in the present study (Appendix IX, XI). At 40 DAT the lowest (1.12 cm) stem diameter was recorded from the treatment combination P_1V_0 which was statistically similar to P_2V_1 (1.13cm) combination and the highest (1.53 cm) was recorded from the treatment combination of P_0V_3. At 55 DAT the lowest (1.38 cm) stem diameter was recorded from the treatment combination P_0V_1 and P_1V_1 and the highest (1.95 cm) was recorded from the treatment combination of P_2V_3. At harvest, the highest (2.65 cm) was recorded from the treatment combination of P_2V_3 and the lowest (1.83 cm) stem diameter was recorded from the treatment combination P_2V_1 (Table 3).

Table 3: Interaction effect of pruning and different doses of vermicompost on stem diameter (cm)

Treatment	Stem diameter (cm)		
	40 DAT	55 DAT	At harvest
P_0V_0	1.17 bc	1.40 b	1.88 c
P_0V_1	1.25 abc	1.38 b	1.90 c
P_0V_2	1.23 bc	1.50 b	2.17 abc
P_0V_3	1.53 a	1.65 ab	2.52 ab
P_1V_0	1.12 c	1.57 ab	1.95 bc
P_1V_1	1.28 abc	1.38 b	1.98 bc
P_1V_2	1.20 bc	1.57 ab	2.03 bc
P_1V_3	1.40 abc	1.63 ab	2.22 abc
P_2V_0	1.20 bc	1.42 b	2.13 abc
P_2V_1	1.13 c	1.40 b	1.83 c
P_2V_2	1.42 abc	1.70 ab	2.52 a
P_2V_3	1.45 ab	1.95 a	2.65 a
Standard error	0.09	0.13	0.18
Significance level	0.04	0.15	0.04

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning V_0= Control

P_1 = First pruning at 20 DAT V_1= 5 t/ha

P_2=Second pruning at 30 DAT V_2= 10 t/ha

$V_{3=}$ 15 t/ha

4.4 Number of male flower

Number of male flower did not show any significant variation in relation with different levels of pruning (Appendix XII, XIII, XIV). At 40 DAT, the highest number of male flower was observed in P_0 treatment (9.00) which was statistically similar to P_2 treatment (8.67). The lowest number of male flower was observed on P_1 treatment (8.08). At 55 DAT, the highest number of male flower was observed on P_2 treatment (5.75) and the lowest number of male flower was observed on P_1 treatment (5.17). At harvest, the highest number of male flower was observed on P_2 treatment (4.75) and the lowest number of male flower was observed on P_1 (3.92) treatment (Table 4).

In terms of number of male flower per plant in relation with different doses of vermicompost there had no significant variation (Appendix XII, XIII, XIV). At 40 DAT, the maximum (8.89) number of male flower was recorded from V_2 treatment (Table 5) and the minimum (8.111) was recorded from V_3 treatment. At 55 DAT, the highest number of male flower was recorded from V_3 treatment (5.67) and the lowest number of male flower was recorded from V_1 treatment (5.22). At harvest, the highest number of male flower was recorded from V_2 treatment (4.56) and the lowest number of male flower was recorded from V_3 treatment (2.33). It was observed that using vermicompost fertilizer has had much more and better effect than the other fertilizers on the production of male flowers. Vermicompost has a higher bacterial activity due to the existence of fungus, bacterium and yeast. These small creatures can have positive effect on the growth and function of plants in addition to improving the absorption of nutritious elements via producing the regulators of herbal growth.

In terms of number of male flower per plant in relation with interaction of pruning and different doses of vermicompost there had significant variation for 40 DAT and there had no significant variation on 55 DAT and at harvest(Appendix XII, XIII, XIV). At 40 DAT the maximum (10.00) number of male flower was recorded from P_2V_0 combination which was statistically similar to P_0V_2 (9.67) combination (Table 6) and the minimum (7.33) number of male flower was recorded from the P_2V_3 combination which was statistically similar to P_1V_3 (7.67) combination. At 55 DAT, the maximum number of male flower was recorded from P_0V_1 (4.00) treatment combination and the minimum number of male flower was recorded from P_1V_2 (4.33) combination. At 70 DAT, the maximum (6.00) number of male flower was recorded from P_0V_2 and P_2V_1 combination and the minimum (3.33) number of male flower was recorded from P_0V_0 and P_1V_1 combination.

4.5 Number of female flower

Number of female flower did not show any significant variation in relation with different levels of pruning (Appendix XV, XVI, XVII). At 40 DAT, the highest number of female flower was observed in P_1 treatment (2.67) and the lowest number of female flower was observed on P_0 treatment (2.25). At 55 DAT, the highest number of female flower was observed on P_2 treatment (5.25) and the lowest number of female flower was observed on P_1 treatment (4.17). At harvest, the highest number of female flower was observed on P_2 treatment (4.25) and the lowest number of female flower was observed on P_1 (3.92) treatment (Table 4).

In terms of number of female flower per plant in relation with different doses of vermicompost showed significant variation (Appendix XV, XVI, XVII). At 40 DAT, The maximum (2.29) number of female flower was recorded from V_2 treatment which was significantly similar to V_1 (2.33) and V_3 (2.333) treatment (Table 5) and the minimum (2.11) was recorded from V_0 treatment. At 55 DAT, the highest number of female flower was recorded from V_2 (8.11) treatment and the lowest number of female flower was recorded from V_0 (2.11) treatment which was significantly similar to V_3 (2.56) treatment. At harvest, the highest number of female flower was recorded from V_2 treatment (7.56) and the lowest number of female flower was recorded from V_0 treatment (2.00) which was significantly similar to V_3 (3.11) treatment. The results of this experiment showed that the effect of vermicompost has been more in making the number of female flower. The highest number of female flowers was observed in the conditions of using vermicompost which was concluded in an increase in the number and function of the fruit.

In terms of number of female flower per plant in relation with interaction of pruning and different doses of vermicompost there had significant variation (Appendix XV, XVI, XVII). At 40 DAT, the maximum (3.67) number of female flower was recorded from P_1V_2 combination which was statistically similar to P_0V_0, P_1V_1, P_2V_2, P_2V_3 combination and the minimum (1.67) number of female flower was recorded from the P_2V_0 combination. At 55 DAT, the maximum (8.67) number of female flower was recorded from P_0V_2 combination and the minimum (2.00) number of female flower was recorded from P_1V_0, P_1V_3, P_2V_0 combinations. At harvest, the highest (8.67) number of female flower was recorded from P_2V_2 combination and the lowest (1.67) number of female flower was recorded from P_0V_0 combination (Table 6).

Table 4: Effect of pruning on male and female flower

Treatment	Number of male flower			Number of female flower		
	40 DAT	55 DAT	At harvest	40 DAT	55 DAT	At harvest
P_0	9.00 a	5.50 a	4.42 a	2.25 a	4.7 a	4.08 a
P_1	8.08 b	5.17 a	3.92 a	2.67 a	4.17 a	3.92 a
P_2	8.67 ab	5.75 a	4.75 a	2.33 a	5.25 a	4.25 a
Standard Error	0.27	0.34	0.51	0.17	0.52	0.40
Significance Level	0.12	0.59	0.49	0.30	0.69	0.95

In a column, means with similar letter (s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1= First pruning at 20 DAT

P_2= Second pruning at 30 DAT

Table 5: Effect of different doses of vermicompost on male and female flower

Treatment	Number of male flower			Number of female flower		
	40 DAT	55 DAT	At harvest	40 DAT	55 DAT	At harvest
V_0	8.78 a	5.44 a	4.33 a	2.11 b	2.11 c	2.00 c
V_1	8.56 a	5.22 a	4.33 a	2.33 ab	6.00 b	3.67 b
V_2	8.89 a	5.56 a	4.56 a	2.89 a	8.11 a	7.56 a
V_3	8.11 a	5.67 a	4.22 a	2.33 ab	2.56 c	3.11 bc
Standard Error	0 .31	0.39	0 .58	0.19	0.60	0 .47
Significance Level	0.47	0.92	0.98	0.09	0.00	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

Table 6: Interaction effect of pruning and vermicompost on male and female flower

Treatment	Number of male flower			Number of female flower		
	40 DAT	55 DAT	At harvest	40 DAT	55 DAT	At harvest
P_0V_0	8.33 abcd	5.33 abc	3.33 a	2.67 ab	2.33 c	1.67 d
P_0V_1	8.67 abcd	4.00 c	3.67 a	2.00b	4.67 bc	5.00 c
P_0V_2	9.67 ab	7.33 a	6.00 a	2.33 b	8.67 a	6.67 ab
P_0V_3	9.33 abc	5.33 abc	4.67 a	2.00 b	3.00 c	3.00 cd
P_1V_0	8.00 bcd	6.00 abc	4.67 a	2.00 b	2.00 c	2.00 d
P_1V_1	8.67 abcd	4.67 c	3.33 a	2.67 ab	5.33abc	3.33 cd
P_1V_2	8.00 bcd	4.33 c	3.67 a	3.67a	7.33 ab	7.33 ab
P_1V_3	7.67 cd	5.67 abc	4.00 a	2.33 b	2.00 c	3.00 cd
P_2V_0	10.00 a	5.00 bc	5.00 a	1.67 b	2.00 c	2.33 cd
P_2V_1	8.33 abcd	7.00 ab	6.00 a	2.33 b	8.00 a	2.67cd
P_2V_2	9.00 abcd	5.00 bc	4.00 a	2.67 ab	8.33 a	8.67a
P_2V_3	7.33 d	6.00 abc	4.00 a	2.67 ab	2.67 c	3.33 cd
Standard Error	0.54	0.69	1.01	0.33	1.05	0.81
Significance level	0.05	0.06	0.61	0.04	0.00	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 = First pruning at 20 DAT

P_2= Second pruning at 30 DAT

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

V_3= 15 t/ha

4.6 Total number of fruit

The lowest (4.08) total number of fruit per plant was recorded from P_0 treatment and the highest (4.75) total number of fruit per plant was recorded from P_2 treatment (Table 8). Pruning improves light and air flow around the plant and thus can increases the number of fruit.

In terms of total number of fruit per plant in relation with different doses of vermicompost, a statistically significant difference was recorded under the present trial (Appendix XVIII). The maximum (5.11) total number of fruit/plant was recorded from V_2 treatment and the minimum (4.00) was recorded from V_0 treatment which was closely related to V_1 treatment (Table 7). Vermicompost adds high amount of nitrogen, phosphorus and potash that is the increasing factor of total number of fruit.

Table 7: Effect of different doses of vermicompost on total number of fruit

Treatment	Total number of fruit
V_0	4.00 a
V_1	4.11 a
V_2	5.11 a
V_3	4.44 a
Standard Error	0 .23
Significance level	0.01

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

V_0= Control V_2= 10 t/ha

V_1= 5 t/ha $V_{3=}$ 15 t/ha

It was observed that pruning and different doses of vermicompost exhibited interaction effect in terms of total number of fruit per plant under the present trial (Appendix XVIII). The highest (5.33) number of total of fruit per plant was recorded from the treatment combination P_1V_2 and the lowest (3.33) was recorded from the both treatment combination of P_0V_0 and P_0V_1 (Table 9).

4.7 Individual fruit weight (gm)

Individual fruit weight had no significant variation in relation with different levels of pruning (Appendix XIX). The lowest (253.33 g) individual fruit weight was recorded from P_o treatment and the highest (318.67g) was recorded from P_1 treatment (Table 8). Pruning facilitates air flow, sun light that can increase the individual fruit weight.

Different doses of vermicompost significantly influenced weight of individual fruit (Appendix XIX). The minimum (198.56 g) individual fruit weight was recorded from V_0 treatment and the maximum (383.67g) was recorded in V_2 treatment (Figure 6). This might be caused that vermicompost contains high amount of nitrogen and potassium which enhance photosynthesis, cell division and cell enlargement.

Table 8: Effect of pruning on total number of fruit and individual fruit weight

Treatment	Total number of fruit	Individual fruit weight(gm)
P_0	4.08 a	253.33 b
P_1	4.42 a	318.67 a
P_2	4.75 a	288.08 ab
Standard error	0.19	12.55
Significance level	0.15	0.20

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 = First pruning at 20 DAT

P_2=Second pruning at 30 DAT

Results revealed that pruning and vermicompost exhibited interaction effect in terms of individual fruit weight (g). The lowest individual fruit weight (175 gm) was recorded in the treatment combination P_0V_0 and the highest (453.33 gm) was recorded in the treatment combination of P_1V_2 (Table 9).

Table 9: Interaction effect of pruning and different doses of vermicompost on total number of fruit and individual fruit weight (gm)

Treatment	Total number of fruit	Individual fruit weight (gm)
P_0V_0	3.33 b	175.33 g
P_0V_1	3.33 b	258.33 def
P_0V_2	5.00 a	293.33 cde
P_0V_3	4.67 ab	286.33 de
P_1V_0	4.00 ab	199.00 fg
P_1V_1	4.33 ab	254.33 defg
P_1V_2	5.33 a	453.33 a
P_1V_3	4.00 ab	368.00 bc
P_2V_0	4.67 ab	221.33 efg
P_2V_1	4.67 ab	219.67 efg
P_2V_2	5.00 a	404.33 ab
P_2V_3	4.67 ab	307.00 cd
Standard Error	0.39	25.09
Significance level	0.03	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 = First pruning at 20 DAT

P_2= Second pruning at30 DAT

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

4.8 Length of fruit (cm)

Length of fruit did not show any significant variation in terms of different level of pruning (Appendix XXII). The lowest (19.97cm) average length of individual fruit was recorded from P_0 treatment that was followed by P_2 treatment (20.91 cm) and the highest (21.35 cm) average length of individual fruit was recorded from P_1 treatment (Table 10). Pruning improves quality and size of harvest.

Table 10. Main effect of pruning on length of fruit

Treatment	Length of fruit (cm)
P_0	19.97 b
P_1	21.35 a
P_2	20.91 ab
Standard error	0.40
Significance level	0.14

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

(P_0= No pruning, P_1= First pruning at 20 DAT, P_2= Second pruning at 30 DAT)

In terms of average length of individual fruit in relation with different doses of vermicompost there had no statistically significant variance (Appendix XXII). The minimum (20.25 m) average length of individual fruit was recorded from V_3 treatment and the maximum (21.61 cm) was recorded from V_2 treatment (Table 11). Vermicompost contain different macro and micro nutrients in higher amount that increases the length of fruit.

It was observed that pruning and different doses of vermicompost exhibited interaction effect in terms of average length of individual fruit under the present trial (Appendix XXII). The highest average length (23.00 cm) of individual fruit was recorded from the treatment combination P_1V_2 and the lowest (18.34 cm) was recorded from the treatment combination of P_2V_3 (Table 12).

4.9 Diameter of individual fruit (cm)

Average diameter (cm) of individual fruit did not show any significant variation in relation with different levels of pruning (Appendix XXI). The lowest (4.54 cm) average diameter of individual fruit was recorded in P_0 treatment and the highest (4.90 cm) average diameter of individual fruit was recorded in P_1 treatment (Figure 8). Pruning improves air and light flow that improves the size and quality of harvested fruit.

Different doses of vermicompost significantly influence the average diameter of individual fruit (Appendix XXI). The minimum (4.36 cm) girth of individual fruit was recorded in V_1 treatment which was closely followed by treatment (4.51 cm) and the maximum (5.19 cm) was recorded from V_2 which was closely followed by V_3 (13.46 cm) treatment (Table 11). Vermicompost has higher amount of important nutrients that has the high capacity to improve the diameter of fruit.

Table 11. Main effect of different doses of vermicompost on length of fruit, fruit diameter (cm)

Treatment	Length of fruit (cm)	Fruit diameter (cm)
V_0	20.82 a	4.51 b
V_1	20.29 a	4.36 b
V_2	21.61 a	5.194 a
V_3	20.25 a	4.82 ab
Standard error	0 .46	0.15
Significance level	0.33	0.01

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

Results revealed that pruning and different doses of vermicompost showed significant influence in terms of average diameter of individual fruit (Appendix XXI). The highest (5.78 cm) average diameter of individual fruit was recorded from the treatment combination P_1V_2 and the lowest (4.21 cm) was recorded from the treatment combination of P_2V_1 (Table 12).

Table 12. Interaction effect of pruning and vermicompost on length of fruit, fruit diameter and yield (t/ha)

Treatment	Length of fruit (cm)	Fruit diameter (cm)	Yield (ton/ha)
P_0V_0	19.63 cd	4.39 c	11.52 f
P_0V_1	20.05 bcd	4.46 bc	16.83 ef
P_0V_2	19.30 cd	4.53 bc	29.33 cd
P_0V_3	20.90 abcd	4.76 bc	26.57 cd
P_1V_0	21.07 abcd	4.45 bc	15.92 ef
P_1V_1	19.83 cd	4.41 bc	22.35 cde
P_1V_2	23.00 a	5.78 a	48.33 a
P_1V_3	21.51 abc	4.97 abc	29.03 cd
P_2V_0	21.77 abc	4.69 bc	20.93 cde
P_2V_1	21.00 abcd	4.21 c	20.32 cde
P_2V_2	22.53 ab	5.27 ab	39.93 b
P_2V_3	18.34 d	4.73 bc	28.42 cd
Standard error	0.26	0.27	2.71
Significance level	0.01	0.02	0.00

In a column, means with similar letter(s) are not significantly different by DMRT at 5% level of significance.

P_0= No pruning

P_1 = First pruning at 20 DAT

P_2=Second pruning at 30 DAT

V_0= Control

V_1= 5 t/ha

V_2= 10 t/ha

$V_{3=}$ 15 t/ha

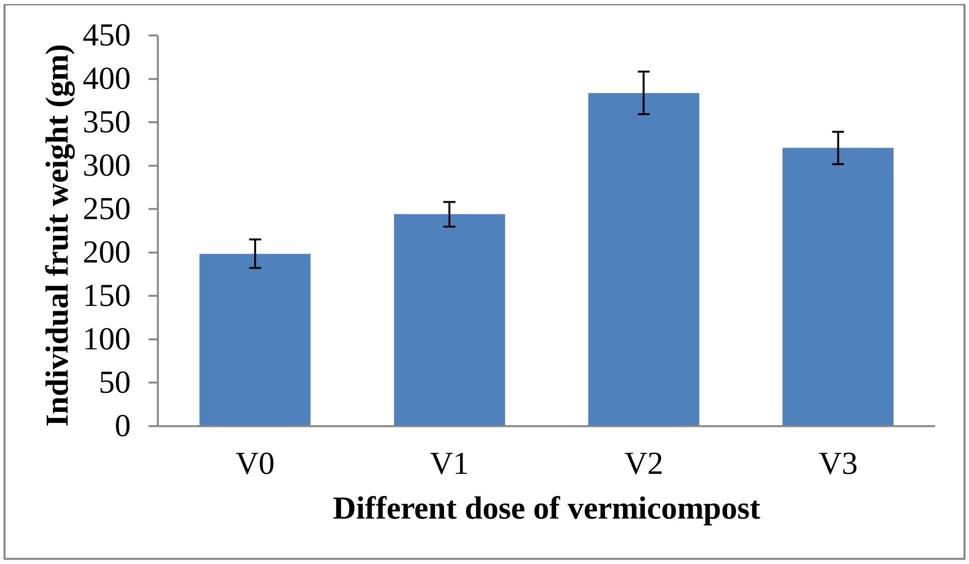

Figure 7. Effect of different doses of vermicompost on individual fruit weight (gm) at different days after transplanting (V$_0$: Control; V$_1$: 5 t/ha; V2: 10 t/ha and V$_3$: 15 t/ha)

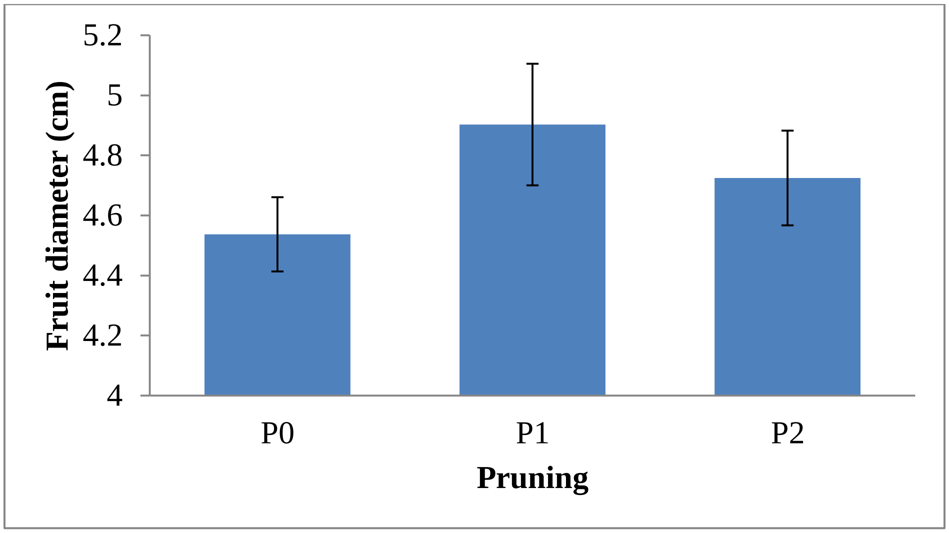

Figure 8. Effect of pruning on fruit diameter (cm) at different days after transplanting (P$_0$: Control; P$_1$: First pruning at 20 DAT; P$_2$: Second pruning at 30 DAT)

4.10 Yield (t/ha)

The lowest (21.07 t/ha) yield was recorded from P_0 treatment comprising of no pruning and the highest (28.91 t/ha) yield was recorded from P_1 treatment (Figure 9). The results indicated that pruned plant produced maximum yield under the present trial. Nu (1996) stated that the effect of pruning on yield and fruit quality of four cucumber varieties and reported that pruning had significant influence on yield of cucumber and gave lowest non-marketable yield over the control. Growth regulators significantly influence the yield of cucumber.

Different doses of vermicompost had significant effect on yield of squash plant (Appendix XX). The maximum (39.20 t/ha) yield was recorded from V_2 treatment and the minimum (16.12 t/ha) was recorded in V_0 which was closely followed by V_1 treatment (19.83 t/ha). The results indicated that maximum yield was attained by the V_2 treatment among the different doses of vermicompost (Figure 10). Nitrogen, Phosphorus, potash contents are in high amount in vermicompost that is favorable for highest yield of squash.

The significant difference was observed on pruning and different doses of vermicompost combination in terms of yield of individual fruit under the present trial (Appendix XX). The highest yield was observed on P_1V_2 treatment (48.33 t/ha) and the lowest yield was observed on P_0V_0 (11.52 t/ha) treatment (Table 12).

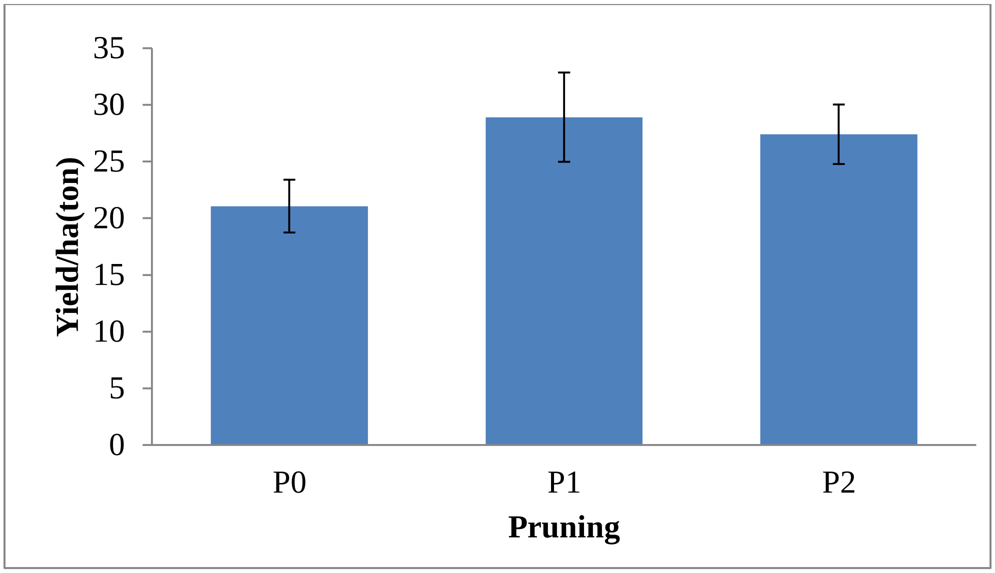

Figure 9. Effect of pruning on fruit yield (t/ha)

(P_0: Control; P_1: First pruning at 20 DAT ; P_2: Second pruning at 30 DAT)

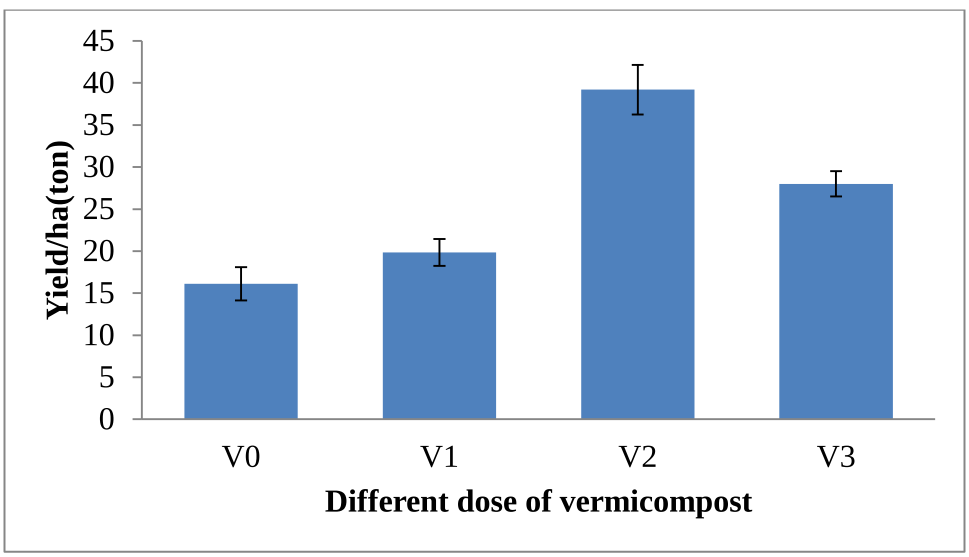

Figure 10. Effect of different doses of vermicompost on yield (t/ha)

(V_0: Control; V_1: 5 t/ha; V_2: 10 t/ha and V_3: 15 t/ha)

CHAPTER- V

SUMMARY AND CONCLUSION

A field experiment was conducted in the Horticulture Farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from November'15 to February'16 to study the effect of pruning and different doses of vermicompost on growth and yield. The experiment considered of two factors. Factor A: pruning (3 levels) i.e.P_0: No pruning,P_1: First pruning at 20 DAT and P_2: Second pruning at 30 DAT; Factor B: Different doses of vermicompost (4 levels) i.e: No vermicompost (control), 1st dose of vermicompost (V_1:5 t/ha), 2nd dose of vermicompost (V_2: 10 t/ha) and 3rd dose of vermicompost (V_3: 15 t/ha). There were on the whole 12 (3 x 4) treatments combinations. The experiment was laid out in the two factors Randomized Complete Block Design with three replications. After transplanting of seedlings, various intercultural operations were accomplished for better growth and development of the plant.

Data were collected in respect of the snake gourd growth characters and yield and yield contributing characters. The data obtained for different characters were statistically analyzed to find out the significance of the pruning and different rate of vermicompost.

In consideration of pruning in terms of stem length at 40 DAT, 55 DAT and at harvest the maximum stem length were recorded in P_1 treatment and those were 50.24 cm, 57.59 cm and 64.74 cm respectively comprises Primary pruning. Different doses of vermicompost showed statistically significant difference on stem length. The results indicated that maximum stem length was produced by the V_2 treatment (53.07 cm, 60.29 cm, 68.26 cm) in every recorded day which comprises 10 ton/ha vermicompost application. Interaction effect of pruning and plant vermicompost showed a statistically significant difference. The highest stem length was observed in P_1V_2 (57.00 cm, 66.67

cm , 78.77 cm) interaction at 40 DAT, 55 DAT and at harvest. The minimum stem length was observed on P_0V_0 (41.67cm, 49.00 cm, 55.20 cm) treatment in every recorded day.

Primary pruning (P_1) showed maximum leaf per plant (16.58, 17.92 and 20.33) at 40 DAT, 55 DAT and at harvest respectively. The minimum leaf per plant was recorded from P_0 treatment (14.58, 16.42 and 18.25) comprises of no pruning at 40 DAT, 55 DAT and at harvest respectively. The maximum (17.11, 18.56, 21.56) leaf per plant was recorded from V_1 treatment comprises of 10 ton/ha vermicompost dose in every recorded day. The minimum (14.33, 16.00 and 17.89) leaf per plant was recorded from V_0 treatment comprises of control in every recorded day. In consideration of interaction effect, Primary pruning and 10 ton/ha vermicompost combination showed maximum (19.00, 20.33 and 24.67) leaf per plant in every recorded day. The minimum (13.67, 15.33 and 17.67) leaf per plant was recorded in control (P_0V_0) in every recorded day.

Primary pruning (P_1) showed maximum (2.67) number of female flower at 40 DAT and no pruning (P_0) showed minimum number of female flower at the same DAT. Secondary pruning (P_2) showed maximum (5.25, 4.25) number of female flower at 55 DAT an harvest and Primary pruning (P_1) showed minimum (4.17, 3.92) result at the same recorded days. The maximum (2.89, 8.11 and 7.56) number of female flower was recorded from V_2 treatment comprises of 10 ton/ha in every recorded day and minimum (2.11 and 2.00) number of female flower was recorded from control. In terms of number of female flower per plant in relation with interaction of pruning and different doses of vermicompost , the maximum (3.67) number of female flower was recorded from P_1V_2 combination and the minimum (1.67) number of female flower was recorded from the P_2V_0 combination at 40 DAT. At 55 DAT, the maximum (8.67) number of female flower was recorded from P_0V_2 combination and the minimum (2.00) number of female flower was recorded from $P_1V_{0,}$ $P_1V_{3,}$ P_2V_0 combinations. At harvest, the highest

(8.67) number of female flower was recorded from P_2V_2 combination and the lowest (1.67) number of female flower was recorded from P_0V_0 combination.

The lowest (4.08) total number of fruit per plant was recorded from P_0 treatment and the highest (4.75) total number of fruit per plant was recorded from P_2 treatment. In terms of total number of fruit per plant in relation with different doses of vermicompost the maximum (5.11) total number of fruit/plant was recorded from V_2 treatment comprises of 10 ton/ha and the minimum (4.00) was recorded from V_0 treatment. The highest (5.33) number of total of fruit per plant was recorded from the treatment combination P_1V_2 and the lowest (3.33) was recorded from the both treatment combination of P_0V_0 and P_0V_1.

The highest (318.67 gm) individual fruit weight (gm) was recorded from P_1 treatment comprises of primary pruning and the lowest (253.33 gm) was observed from P_0 treatment. V_1 treatment showed highest (383.67 gm) individual fruit weight and the lowest (198.56 gm) was recorded from V0 treatment. Primary pruning and 10 ton/ha combination treatment (P_1V_2) showed the highest (453.33 gm)individual fruit weight and the lowest (175.33 gm) individual fruit weight was recorded from P_0V_0 treatment combination.

The highest (21.35 cm) fruit length was observed on primary pruning (P_1) and the lowest fruit length was recorded from P_0 treatment. V_2 treatment comprises of 10 ton/ha vermicompost showed highest (21.61 cm) fruit length and the lowest (20.25 cm)fruit length was observed on V_3 treatment comprises of 15 ton/ha. In consideration of treatment combination, the highest (23.00 cm) fruit length was recorded from $P1V_2$ combination and the lowest (18.34 cm) was observed on P_2V_3 treatment combination.

Primary pruning (P_1) showed highest (4.90 cm) fruit diameter and the lowest (4.54 cm) stem diameter was observed on P_0 treatment. The highest (5.19 cm) fruit diameter was observed on V_2 treatment and the lowest (4.36 cm) was observed on V_1 treatment. In consideration of treatment combination, the highest (5.78 cm) fruit diameter was recorded from P_1V_2 combination and the lowest (4.21 cm) was recorded from P_2V_1 treatment combination.

The lowest (21.07 t/ha) yield was recorded from P_0 treatment comprising of no pruning and the highest (28.91 t/ha) yield was recorded from P_1 treatment. The results indicated that primary pruning plant produced maximum yield under the present trial. The maximum (39.20 t/ha) yield was recorded from V_2 treatment and the minimum (16.12 t/ha) was recorded in V_0 treatment. The results indicated that maximum yield was attained by the V_2 treatment among the different doses of vermicompost. Pruning and different doses of vermicompost exhibited interaction effect in terms of yield of individual fruit under the present trial. The highest yield was observed on P_1V_2 treatment (48.33 t/ha) and the lowest yield was observed on P_0V_0 treatment (11.52 t/ha).

From the above discussion it can be concluded that, P_1 (primary pruning) showed the best performance in respect of yield and yield contributing characters. In terms of vermicompost application, among the 4 rates, V_2 (Vermicompost: 10 t ha^{-1}) gave the best result. Again, Interaction effect of pruning and vermicompost, P_1V_2 (First and second leaves pruning at 20 DAT x Vermicompost: 10 t ha^{-1}) provided the higher return in terms of yield compared to other combination.

CHAPTER- VI

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Appendix-I Monthly recorded of air temperature, rainfall, and relative humidity and sunshine hours during the period from November 2015 to February 2016

Month of the Year	Air temperature (°C)		Total rainfall (mm)	Relative humidity (%)
	Maximum	Minimum		
November'15	30	23	0.5	68.92
December'15	26	16	0.0	70.05
January'16	26	15	0.0	74.52
February'16	29	17	0.0	79.09

Source: Bangladesh Meterological Department (Climate & Weather division) Agargaon, Dhaka, Bangladesh

Appendix-II Characteristics of Horticulture Farm soil analyzed by Soil during the period from November 2015 to February 2016

A.Morphological Characteristics

Morphological features	Characteristics
Location	Horticulture Garden ,SAU, Dhaka
AEZ	Madhupur Tract (28)
General Soil Type	Shallow red brown terrace soil
Land type	High land
Soil series	Tejgaon
Topography	Fairly leveled
Flood level	Above flood level
Drainage	Well drained

B. Mechanical analysis

Constituents	Percent
Sand	27
Silt	43
Clay	30

C. Chemical analysis

Soil properties	Amount
Soil pH	5.8
Organic nitrogen (%)	0.45
Total nitrogen (%)	0.03
Available P (ppm)	20
Exchangeable K (%)	0.1
Available S (ppm)	45

Source: Soil Resources Development Institute (SRDI)

Appendix-III. Analysis of Variance on stem length (cm) of 40 DAT

Source of Variation	df	SS	MS	F-value	Significance level
Factor A (Pruning)	2	145.28	72.64	2.79	0.08
Factor B (Vermicompost)	3	509.62	169.87	11.03	0.00
Interaction(AXB)	11	704.58	64.05	5.16	0.00

Appendix-IV. Analysis of Variance on stem length (cm) of 55 DAT

Source of Variation	df	SS	MS	F-value	Significance Level
Factor A(Pruning)	2	133.56	66.78	2.32	0.12
Factor B (Vermicompost)	3	472.36	157.45	8.22	0.00
Interaction(AXB)	11	734.68	66.79	4.57	0.00

Appendix-V. Analysis of Variance on stem length (cm) at harvest

Source of Variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	239.01	119.51	2.63	0.09
Factor B (Vermicompost)	3	757.16	252.39	8.24	0.00
Interaction(AXB)	11	1360.34	123.67	7.86	0.00

Appendix-VI. Analysis of Variance on leaf per plant (LPP) of 40 DAT

Source of Variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	24.22	12.11	5.39	0.01
Factor B (Vermicompost)	3	38.53	12.84	6.88	0.00
Interaction(AXB)	11	72.97	6.63	6.29	0.00

Appendix-VII. Analysis of Variance on leaf per plant (LPP) of 55 DAT

Source of Variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	13.56	6.78	2.54	0.09
Factor B (Vermicompost)	3	12.55	6.27	0.00	0.00
Interaction(AXB)	11	66.31	6.03	4.09	0.00

Appendix-VIII. Analysis of Variance on leaf per plant (LPP) at harvest

Source of Variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	27.17	13.58	2.74	0.08
Factor B (Vermicompost)	3	69.42	23.14	6.10	0.00
Interaction(AXB)	11	134.08	12.19	5.16	0.00

Appendix-IX. Analysis of Variance of stem diameter (SD) at 40 DAT

Source of Variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	0.02	0.01	0.26	0.77
Factor B (Vermicompost)	3	0.45	0.15	6.54	0.00
Interaction (AXB)	11	0.61	0.06	2.29	0.04

Appendix-X. Analysis of Variance of stem diameter (SD) at 55 DAT

Source of Variation	df	SS	MS	F-value	Significance Level
Factor A (Pruning)	**2**	0.11	0.05	0.84	0.44
Factor B (Vermicompost)	**3**	0.65	0.22	4.37	0.01
Interaction (AXB)	**11**	0.96	0.09	1.64	0.15

Appendix-XI. Analysis of Variance of stem diameter (SD) at harvest

Source of Variation	df	SS	Means	F-Value	Significance Level
Factor A (Pruning)	**2**	0.36	0.18	1.32	0.28
Factor B (Vermicompost)	**3**	1.71	0.57	5.88	0.00
Interaction (AXB)	**11**	2.52	0.23	2.38	0.04

Appendix-XII. Analysis of Variance of number of male flower (NMF) at 40 DAT

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	5.17	2.58	2.27	0 .12
Factor B (Vermicompost)	3	3.19	1.07	0.86	0.47
Interaction (AXB)	11	21.42	1.95	2.19	0.05

Appendix-XIII. Analysis of Variance of number of male flower (NMF) at 55 DAT

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	2.06	1.03	0.52	0.59
Factor B(Vermicompost)	**3**	0.97	0.32	0.16	0.92
Interaction (AXB)	11	21.42	2.99	2.12	0.06

Appendix-XIV. Analysis of Variance of number of male flower (NMF) at harvest

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A(Pruning)	2	4.22	2.11	0.71	0.49
Factor B (Vermicompost)	3	0.53	0.18	0.06	0.98
Interaction(AXB)	11	28.31	2.57	0.84	0.61

Appendix-XV. Analysis of Variance of number of female flower (NFF) at 40 DAT

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	1.17	0.58	1.24	0.30
Factor B (Vermicompost)	3	2.97	0.99	2.30	0.09
Interaction (AXB)	11	8.75	0.79	2.39	0.04

Appendix-XVI. Analysis of Variance of number of female flower (NFF) at 55 DAT

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	7.06	3.53	0.37	0.69
Factor B (Vermicompost)	3	221.64	73.88	23.18	0.00
Interaction (AXB)	11	244.97	22.27	6.79	0.00

Appendix-XVII. Analysis of Variance of number of female flower (NFF) at harvest

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	0.67	0.33	0.05	0.95
Factor B (Vermicompost)	3	157.64	52.55	26.64	0.00
Interaction (AXB)	11	173.42	15.77	7.99	0.00

Appendix-XVIII. Analysis of Variance of total number of fruit (TNF)

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	2.67	1.33	1.99	0.15
Factor B (Vermicompost)	3	6.75	2.25	4.00	0.02
Interaction (AXB)	11	13.42	1.22	2.58	0.03

Appendix-XIX. Analysis of Variance of individual fruit weight (IFW)

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	25645.39	12822.69	1.64	0.21
Factor B (Vermicompost)	3	181120.31	60373.44	18.87	0.00
Interaction (AXB)	11	238147.64	21649.79	11.46	0.00

Appendix-XX. Analysis of Variance on fruit length (cm)

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A(Pruning)	2	11.95	5.98	2.06	0.14
Factor B (Vermicompost)	3	10.83	3.61	1.19	0.33
Interaction (AXB)	11	61.53	5.59	2.90	0.01

Appendix-XXI. Analysis of Variance on Fruit Diameter (cm)

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	0.80	0.40	1.24	0.30
Factor B (Vermicompost)	3	3.68	1.22	5.01	0.01
Interaction (AXB)	11	6.41	0.58	2.75	0.02

Appendix-XXII. Analysis of Variance on Yield (ton/ha)

Source of variation	df	SS	MS	F-Value	Significance Level
Factor A (Pruning)	2	415.64	207.82	1.87	0.17
Factor B (Vermicompost)	3	2822.82	940.94	23.87	0.00
Interaction (AXB)	11	3556.30	323.30	14.70	0.00