GROWTH AND YIELD OF CORIANDER LEAF AS INFLUENCED BY ORGANIC NUTRIENT SOURCES

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JUNE, 2017

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Reg. No. 11-04514

A Thesis

Submitted to the Faculty of Agriculture,
Sher-e-Bangla Agricultural University, Dhaka
In partial fulfillment of the requirements
for the degree
of

MASTER OF SCIENCE (MS)
IN
HORTICULTURE
SEMESTER: JANUARY - JUNE, 2017

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CERTIFICATE

This is to certify that thesis entitled, ***"GROWTH AND YIELD OF CORIANDER LEAF AS INFLUENCED BY ORGANIC NUTRIENT SOURCES"*** *submitted to theDepartment of Horticulture, Sher-e-Bangla Agricultural University, Dhaka, inpartial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE IN HORTICULTURE,*** *embodies the result of a piece of bona fide research work carriedout by* ***MD. SHAHANUR ISLAM,*** *Registration:* ***11-04514*** *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.

Dated: *June, 2017*

Dhaka, Bangladesh

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Associate Professor
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Dedicated To

My Beloved Parents

ACKNOWLEDGEMENTS

First of all the author expresses his best gratitude to ***"Almightly Allah"*** *for his never ending benison to complete this work successfully. It is a great pleasure to express immense thankfulness to his respected parents, elder brother whose entiled much hardship inspiring for keep on his studies, thereby receiving proper education.*

The author would like to to express his earnest respect, sincere appreciation and enormous indebtedness to his venerable supervisor, ***Assoc. Prof. Dr. A. H. M. Solaiman****Department of Horticulture, Sher-e-Bangla Agricultural University, Dhaka, for his scholastic supervision, conducive commentary and profound inspiration throughout the research work and preparation of the thesis.*

The author wish to express his gratitude and best regards to his honorable Co-Supervisor, ***Prof. Dr. Tahmina Mostarin****Department of Horticulture, Sher-e-Bangla Agricultural University, Dhaka for his incessant direction, constructive criticism, inspiration and valuable suggestions in carrying out the research work and preparation of this thesis.*

The author is highly grateful to all the teachers of the Department of Horticulture, Sher-e-Bangla Agricultural University, for their valuable teaching, direction and indirect advice, inspiration and co-operation during the whole study period.

The author would like to thanks to his friends Md. Zahidul Islam, Mohammad Jony, Homayun Kabir for their help and inspiration in preparing the thesis.

The Author

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ABSTRACT

The experiment was carried out on coriander leaves production at the Horticulture Farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from March 2017 to July 2017. The experiment consisted of two factors (cultivars and organic nutrient sources). There were three cultivars (V_1-Green aroma,V_2-Green giant and V3-Indian cultivar) and three organic manure level (T_0- no nutrient sources, T_1-cowdung @ 10 t ha^{-1} and T_3-vermicompost @ 3 t ha^{-1}).The experiment was laid out in randomized complete block designwith three replications.It was found that cultivar V_2 showed highest foliage yield among all the cultivars and cultivar V_3 showed the lowest foliage yield. The highest foliage yield was found at treatment T_1 and lowest foliage yield was found at treatment T_0. It was observed that treatment combination of Green giant withCowdunggave better performance in respect of foliage yield among all the combination.

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ABBREVIATIONS AND ACRONYMS

%	=	Percentage
AEZ	=	Agro-Ecological Zone
BBS	=	Bangladesh Bureau of Statistics
BCSRI	=	Bangladesh Council of Scientific Research Institute
Ca	=	Calcium
cm	=	Centimeter
CV %	=	Percent Coefficient of Variation
DAS	=	Days After Sowing
DMRT	=	Duncan's Multiple Range Test
e.g.	=	exempli gratia (L), for example
et al.,	=	And others
etc.	=	Etcetera
FAO	=	Food and Agricultural Organization
g	=	Gram (s)
GM	=	Geometric mean
i.e.	=	id est (L), that is
K	=	Potassium
Kg	=	Kilogram (s)
L	=	Litre
LSD	=	Least Significant Difference
M.S.	=	Master of Science
m^2	=	Meter squares
mg	=	Miligram
ml	=	MiliLitre
NaOH	=	Sodium hydroxide
No.	=	Number
^oC	=	Degree Celceous
P	=	Phosphorus
SAU	=	Sher-e-Bangla Agricultural University
USA	=	United States of America
var.	=	Variety
WHO	=	World Health Organization
Mg	=	Microgram

CHAPTER I

INTRODUCTION

Coriander (*Coriandrumsativum* L.) is, an important spice crop known as 'Dhonia' in Bangla belonging to the family of Apiaceae is normally cultivated in winter season throughout Bangladesh. Coriander is native to South Europe and the Mediterranean region, and is extensively grown in Russia, Bulgaria, Mexico, USA, Argentina, China, Romania, Italy, Japan, Hungary, Poland, Czech, Morocco and India and has been cultivated since human antiquity (Tiwari and Agarwal, 2004). It is also described as a native to southern Europe and Asia Minor. Preciously Italy is presumed as the native place of coriander (Thumburaj and Singh, 2004).It is grown throughout the country for the leaves as well as seeds (Islam *et al*., 2004). Seeds of the crop are used as spice while its tender green leaves are used as culinary herb. It has found to be a remunerative crop. The entire plant of young coriander is used as appetizer in preparing fresh chutneys and sauces. Fresh leaves are used to flavor food, curries, soups, fish sauce, cream sauce for chicken, etc. (Janardhanan and Thoppil, 2004).

The seeds are also used in medicine as a carminative, refrigerant, diuretic and aphrodisiac. Pharmaceutical use of coriander is to mask the taste of other medicinal compounds or to calm the irritating effects on the stomach that some medicines cause (Sharma and Sharma, 2004).Coriander leaves and seeds are valued as food mainly for its high Vit. A and Vit. C. Its leaves contain 88% water, 32 kcal, 6.0 g CHO, 2.7 protein, 0.5 g fat, 1.0 g fiber and 1.7 g ash , 150 mg. C, 0.01 mg B1, 0.01 mg B2, 1.0 mg Niacin, 150 mg Ca, 55 mg P, 540 mg K, 6 mg Fe per 100 g fresh weight of leave and 10, 000 I.U. Vit. A (Rubatzky*et al*., 1999).

At present the cultivation of coriander has been increased for leaf purpose. But there is no recognized commercial variety except BARI Dhonia-1, which is used for seed production. Still there has not been develo1ped any variety suitable for leaf (foliage) production. There are many high yielding

(foliage/leaf) coriander varieties imported from abroad through different seed companies in Bangladesh. Among the various factors responsible for high yield, the variety itself plays a great role. To achieve higher yield, an important component would be to introduce new high yielding varieties that can stealthily replace the existing varietal picture. The high yielding varieties even under low fertility condition yield comparatively more than the traditional varieties. It is now essential that growing of improved varieties has to be worked out, particularly for those farmers having large area under this crop to harness its full yield potential.

One of the important factors responsible for low yield of any crop is improper time of sowing, which exerts a distinct effect on growth, severe competition of weeds and to some extent powdery mildew and aphid infestation. Crop production mainly depends upon the climatic requirement of a particular crop. Temperature is a very important climatic factor which affects plant growth, development and yield. Temperature also plays a key role in determining sowing time (Tiwari and Singh, 1993). Winter crops are vulnerable to high temperature during reproductive stages (Kalra, 2008). Each phenophase of a particular crop has an optimum temperature for its initiation and development and changes in this optimum temperature affects the yield of a crop mainly through changes in phenological processes by influencing plant physiological processes including photosynthesis and respiration (Sharma *et al*., 2003). Coriander is a temperature sensitive crop. Its optimum temperature for germination and early growth is 20-25°C (Singhania*et al*., 2006). Relatively cool weather during vegetative period and warm weather during reproductive stage are ideal for coriander crop (Tiwari*et al*., 2002). The optimum sowing time of coriander in Bangladesh is November 15. The life cycle of the coriander plants become shorter as the sowing is delayed that adversely affects yield of coriander (Ahmed and Haque, 1985). Plants in delayed sowing face adverse climate during vegetative and reproductive stages. In delayed sowing plants do not get optimum temperature during vegetative and reproductive growth in coriander and ultimately seed yield decreases.

For successful crop production, all necessary nutrients must be supplied to the plants judiciously in a sufficient amount.Organic fertilizer plays an important role in nutrient availability without having undesirable effect on the environment (Njoroge*et al*., 1999). Inorganic fertilizer do not retain in the soil for long period of time particularly the nitrogen and provide more nutrient to the weeds so as a result there is great infestation of weeds that compete with the main crop for nutrients, water and other resources require for the growth and development of the plant (Jama*et al*., 1997). Organic fertilizer including farmyard manure, poultry manure and compost are used for several decades ago. And the use of these manure before those inorganic fertilizer, which is the most recent development as compared to those of organic. These are environment friendly compare to inorganic (Akande*et al*., 2004). Organic fertilizers enhance the soil fertility, soil structure, water holding capacity, physical and chemical properties, soil pH, microbial activity and also crop production in term of yield (Clemente *et al*., 2006; Agbede*et al*., 2008 and Muhammad *et al*., 2009). It improves nutrient release at time of decomposition in soil. It also improves the physical properties such as bulk density, aeration and porosity of soil (Frankenberger*et al*., 1985).

Keeping the above facts in view,the present study was undertaken to investigate the growth and yield of coriander leaf as influenced by organic nutrient sources with the following objectives:

1. To observe the feasibility of growing coriander in different sowing dates for foliage production.
2. To determine the suitable treatment combination capable of producing green leaves during different times.
3. To find out the cultivar that produce highest green leaf.

CHAPTER II

REVIEW OF LITERATURE

Coriander (*Coriandrumsativum*L.) is cultivated for both leaf and seed. Generally it is grown in Rabi season in Bangladesh. But it is urgently needed to off-season production for its demand. There has not been much systematic research work on varietal performances, time of cultivation and organic nutrient sources etc. in Bangladesh. Some of the research efforts on related to the present study were done by the researchers in different parts of the world.

2.1. Effect of cultivars

Bajad*et al*. (2017) carried out an investigation entitled "Performance of different coriander varieties for seed yield". The study consisted of eight coriander varieties. The varieties *viz*., HissarSugandh, Pant Haritima, Sadhana, Swati, CO-4, HissarAnand, CO-2 and RajendraSwathi were studied. The results revealed that variety Pant Haritima was found superior in seed yield (13.33 q/ha) but required more number of days for seed harvesting (131d). The yield contributing parameters like days required for seed harvesting, plant height; leaf area (73.9), number of umbels (20.5), number of umbellate (5.7), number of seed (30.4) and test weight (12.23 g) were observed with maximum numerical values in variety Pant Haritima, than rest of the varieties under study. Amongst the eight coriander varieties, Pant Haritima performed better in almost all the characters.

Moniruzzaman*et al*. (2013) conducted a study to find out the suitable coriander genotypes for foliage yield and its attributes. They reported that number of plants m^{-2} varied among the various coriander genotypes. They also reported that the maximum weight of green plants was found in CS003 genotypes which are mainly contributed by maximum days to plant harvest (55.33 days), the highest plant height, leaves/plant and single plant weight. Significant variation of foliage yield of coriander among various genotypes was also observed.

Islam *et al*. (2004) conducted a performance trial with 14 genotypes of coriander (*Coriandrumsativum* L.). The genotype CR0013 took the shortest possible period of 43 days, whereas genotypes CR0008 and CR0013 took the longest period (52.25 and 52.00 days, respectively) for flower stalk emergence. The genotype CR0001 produced the highest seed yield per plant (11.30 g) as well as per hectare (1.73 t). Considering seed germination, the genotype CR0022 exhibited the highest score (78.25%) and CR0013 had the lowest (68.25%).

The experiment taking three promising coriander lines (CR0001, CR0011 and CR0022) and a check (BARI Dhonia-1) was studied in two locations, at Spices Research Sub-Centre, BARI, Gazipur and Spices Research Sub –Centre, Magura and Gazipur. The crop was harvested on March 15, 2001 in both locations. At Magura plant height ranged from 84.00-91.43 cm, number of primary branches plant-1 from 5.70 to 7.90, no. of umbels plant^{-1} from 24.10-33.70, no. of Umbellates umbel^{-1} from 12.22-19.58, wt. of fruits plant^{-1} from 6.36-8.54 g and yield from 1.56-1.95 t/ha. But at Gazipur plant height ranged from 74.07-82.53 cm, number of primary branches plant^{-1} from 5.63 to 6.73, no. of umbels plant^{-1} from 62.13-69.93, no of Umbellates umbel^{-1} from 7.43-7.80, and yield from 0.98-1.24 t/ha. CR0022 gave the highest yield at Magura (1.95 t/ha) while CR0011, at Gazipur (1.24 t/ha). BARI Dhonia-1 produced 1.80 t/ha at Magura and 1.02 t/ha at Gazipur (Anon., 2002).

Rahman (2000) conducted a study to assess the morphological characters and yield potential of different coriander genotypes. He reported that weight of plants varied significantly among coriander genotypes.

Badguzar*et al*. (1987) conducted a study to find out the response of coriander to foliar application of urea and they also found significant variation of weight of coriander plant among various genotypes.

Mohideen*et al*. (1984) in a study reported that the variation in foliage yield of coriander was due to the variation of genetic inheritance.

Kalra*et al*. (2003) evaluated a set of 120 accessions of coriander (*Coriandrumsativum* L.) were screened under late planted conditions for time taken for flowering and fruit maturity, seed yield, seed size, percent content of essential oil in seeds, oil yield and susceptibility to powdery mildew and stem gall diseases. It was concluded that these accessions (CIMAP 2053 and CIMAP 2096) would be suitable for cultivation of coriander under late sown conditions in Indo-Gangetic plains for higher yield of seeds and essential oil, respectively. Days to flowering ranged from 65-80, days to mature, from 100-125, Seed yield per plot (6 m^2), from 0.17-1.39, 1000- seed weight from 8.8-14.6 g.

Singh *et al*. (2005) evaluated seventy genotypes of coriander (*Coriandrumsativum* L.) of diverse eco-geographical origin. The 70 genotypes were grouped into 9 clusters depending upon the genetic architecture of genotypes and characters uniformity and confirmed by canonical analysis. The maximum inter cluster distance was between I and IV (96.20) followed by III and IV (91.13) and I and VII (87.15). The cluster VI was very unique having genotypes of high mean values for most of the component traits. The cluster VII had highest seed umbel-1 (35.3 ± 2.24), and leaves $plant^{-1}$ (12.93 ± 0.55), earliest flowering (65.05 ± 1.30) and moderately high mean values for other characters.

Bhandari and Gupta (1993) reported 200 genotypes of *Coriandrumsativum* L. exhibited genetic variability for plant height, primary and effective branches, days to flowering and maturity, umbels and umbellets per plant, seeds per umbellets, thousand seed weight, straw and grain yield per plant and harvest index. Plant height ranged from 11.8-86.1 cm, no. of primary branches from 1.4-8.6, days to flowering from 65.0-118.8, days to maturity from 112.0-145.0, umbels per plant from 3.2-39.3, umbellets per plant from 7.1-177.8, seeds per umbellet from 7.1-177.8, seeds per umbellet from 1.7-11.8, 1000-seed weight from 5.0-22.1 g, grain yield per plant from 0.2-7.8g and harvest index from 8.9-84.8.

Sharma and Sharma (1989) studied about 200 genotypes of coriander and they could find significant variability for plant height, branches per plant, days to flowering, days to maturity, umbels per plant, seeds per umbellet, 1000-seed weight, straw and seed yield per plant.

Qureshi*et al*. (2009) evaluated 29 indigenous germplasm of coriander and reported that days to maturity ranged from 190-194, branches per plant from 5-18, umbels per plant from 121-336, days to flowering from 96-152 and 1000-seed weight from 6.0-11.6 g.

Datta and Choudhuri (2006) evaluated and reported that 17 germplasm lines of coriander (*Coriandrumsativum* L.) showed significant variation for most of the character studied. Genotype RCr-41 produced the highest seed yield (1.51 t/ha) followed by DH-246 (1.43 t/ha). RCr-41 and ACR-69 were found free from wilt and stem gall disease incidence. In this experiment plant height ranged from 42.87-98.77 cm, primary branches plant-1 from 5.37-8.23, secondary branches plant-1 from 10.10-16.75, umbels plant-1 from 20.83-34.67, seeds umbel-1 from 33.47-35.57 and 1000-seed weight from 9.33-13.82 g seed yield ranged from 686-1506 g per hectare. Seed colour was classified as yellowish green and light yellowish while seed shape, as oblong, roundish oblong and round. 9 lines infested with stem gall disease.

Sing *et al*. (1995) reported that two-year trials were conducted in Uttar Pradesh with 8 coriander cultivars in 1989 and 1990. Udaipur Dhania 1 and Pant Haritma produced the tallest plants both at flowering and harvesting. Pant Haritma produced the highest seed yield of 1455 and 1238 kg/ha in 1989 and 1990, respectively.

Rao and Reddy (1984) identified the promising varieties for Andhra Pradesh was Lam CS 2, Lam CS 4 and CS 6 (Swathi). The seed yields of those varieties were 1400, 1500, and 850 kg/ha, respectively.

Maurya (1989) worked on 10 characters for 10 genotypes of coriander grown during 1982-83 and 1983-84. From average two years it was observed that

plant height ranged from 68.00-90.33 cm, umbels per plant from 17.0-41.67, umbellets per umbel from 4.40-9.40, fruits per umbel from 28.00-46.00, days to flowering from 46.67-80.67, days to maturity from 91.00-117.61, yield plant-1 from 7.93 to 15.08 g, 1000-fruit weight from 8.82-18.52 g and harvest index from 28.25-46.45.

Rahman (2000) evaluated 14 coriander genotypes reported that days to 50% germination ranged from 8.50-12.00days, leaves plant-1 from 23.13-36.00, days to green leaf harvest from 33.50-42.00 days, green yield ranged from 2.84-5.08 g/plant. The range of primary branches plant-1 and secondary branches plant-1 was 6.50-8.02 and 15.85-25.50, respectively. The green yield ranged from 0.94-1.78 t/ha. Among morphological characters, leaf colour was light to dark green, flower colour off white, whitish pink and pink, fruit colour light brown, deep brown and yellowish brown.

Ayanoglu*et al*. (2002) reported that forty-three coriander lines were under east Mediterranean conditions for two years to determine the best yielding lines in winter season. The seed yields of coriander lines varied between 1138 (K11) and 2297 kg /ha (K46). The highest seed yields were obtained from the lines K67, K28, K69 and K46. The seed Yields of those lines were higher than currently planted cultivars.

Selverajan*et al*. (2002) reported that nine genotypes of coriander (*Coriandrumsativum*L.), i.e. CS 97, CS 102 and CS 123 from Jobner (Rajasthan, India); CS 12 and CS 203 from Coimbatore (Tamil Nadu, India); and CS 8, CS 101, CS 208 from Hissar (Haryana, India), were evaluated to identify the suitable types for cultivation in Tamil Nadu under irrigated conditions. The result of the pooled analysis of the 3-years (1998-2000) data indicated that CS12 was the best with the highest yield of 579.3 kg/ha, followed by CS 102, recording yield of 56.10 kg/ha. The increase in yield for CS 12 was 10% over the control cultivar CO3, which recorded yield of 529.6 kg/ha.

2.2. Effect of sowing time

Moniruzzaman*et al*. (2015) conducted a field experiment on coriander (*Coriandrumsativum* L.) taking five sowing dates *viz*. November 01, November 16, December 01, December 16 and December 31 and four selected genotypes *viz*. CS001, CS007, CS008 and CS011 to study heat efficiency for the crop. The crop sown on November 16 and the genotype CS011 showed the highest heat use efficiency for dry matter, seed and stover yield. Heat use efficiency for dry matter as well as seed yield increased from November 01 to November 16 and then decreased with delayed sowing. November 16 sowing coupled with CS011 gave the maximum heat use efficiency for seed yield.

Sharangi and Roychowdhur, (2014) Effect of 3 irrigations levels along with 6 sowing dates *viz*., 5^{th}, 12^{th}, 19^{th}, 26^{th} November, 3^{rd} and 10^{th} December were studied on coriander. A delay in sowing from November 5 to December 10 decreased growth and influenced phenology. November 5 exhibited significant improvement in yield attributes namely umbel and umbellets plant-1(25.58 and 6.85), seeds umbel^{-1} (30.55), test weight (12.61 g), seed weight plant^{-1} (6.85 g), essential oil (o.25%-0.33%) and yield hectare^{-1} (1098.33 kg ha^{-1}).

Karetha*et al*. (2014) conducted the present investigation on the effect of different date of sowing and growing conditions on coriander (*Coriandrumsativum* L.) cv. Gujarat Coriander-2 as leafy vegetable. Seed germination, growth parameters and yield attributes were influenced by different sowing dates. Among them dry weight of plant (2.11 g), green yield (23.52 tonne/ha) and TSS (5.44OBrix), were found maximum in treatment T_5 (sowing at 22^{nd} June). Whereas, minimum mortality percentage (3.48 %), width of leaf (2.04 cm) and maximum fresh weight of plant (6.85 g) and germination percentage (77.71 %) were found in treatment T_1 (sowing at 25^{th} April). The

number of leaves per branch (4.06) and length of leaf (2.29 cm) were found maximum in treatment T_3 and T_4, respectively (sowing at 08th June).

Chaulagain*et al*. (2011) conducted a field experiment to study the green leaf production potential of coriander (*Coriandrumsativum* L.) cultivars. Ten cultivars of coriander were evaluated. Coriander Local, Marpha Local, Mallika, Surabhi and KalmiChhattedar showed better performance as compared to others on growth, yield and quality parameters. The highest green leaf yield (10.09 mt/ha) was recorded in Coriander Local followed by Mallika (9.54 mt/ha), Surabhi (9.40 mt/ha) and KalmiChhattedar (9.24 mt/ha). Surabhi was found promising cultivar under late sowing condition because if its highest rosette diameter, number of basal leaves and length of basal leaf Hence, there is good scope of coriander cultivation for green leaf production, however, it is more suitable to sow the seeds in usual tome of sowing for the better performance of all the cultivars.

Chaudhari*et al*. (1995) at Rahuri, recorded maximum number of seeds per plant (217.67), yield per plant (2.57 g) and per hectare (9.83 q) by sowing the coriander crop on 1st November.

Jat (1995) at Jobner, observed that the maximum umbels per plant, umbellets per umbel, seeds per umbel, test weight and seed yield recorded on 25th October sowing was found significantly superior to 4th, 14th and 24th November.

Khoja (2004) at Jobner observed that the yield and yield attributes viz., umbels per plant, umbellets per umbel, seeds per umbellet and test weight of coriander remained significantly higher with 30th October sowing.

Bhati*et al*. (1989) reported that umbels per plant, umbellets per umbel, test weight and seed yield of coriander were maximum when crop was sown on 3rd November and decreased as sowing was delayed by every 15 days and recorded minimum with 3rd December sowing at Jobner.

Israel (1988) found that coriander sown on 15th October produced maximum umbels and umbellets per plant and decreased significantly as the sowing was delayed by every 15 days and the minimum being under 15th November sowing. However, seed weight per umbel and seed yield per hectare was maximum under 30th October followed by 15th October sowing and both were at par but superior to 15th November sowing.

Shinde (1977) working on coriander at Parbhani, reported that crop sown on 6th July out yielded 18th and 30th July and 17th August sowing. He further reported that yield attributing characters viz., umbels per plant, seeds per umbel and seed weight per umbel were also affected due to variation in planting dates.

2.3. Effect of organic manure

Ahmad *et al*. (2017) carried out an experiment entitled "Effect of organic fertilizers on growth and yield of Coriander" with a single factor having four treatments of control and organic fertilizer (FYM, Compost and Poultry) was subjected to all plots except control. Data were recorded on different parameters such as days to germination, number of leaves branch^{-1}, leaf area, days to harvest, chlorophyll content, weed flora and total soluble solids. The statistical analysis of the data showed that organic fertilizer significantly affected all the studied attributes. The highest number of leaves branch^{-1} (6.24), highest leaf area (14.95 cm^2) and minimum days taken to harvest(40.75) was recorded in plants received poultry manure. The least days taken by the plant to germination (11) was recorded from plot where compost was applied. It was concluded that poultry manure among the organic fertilizers performed best and hence recommended for the growers in agro-climatic condition of Peshawar.

Dadiga *et al*. (2015) carried out the present investigation to assess the influence of organic and inorganic sources of nutrients on growth, yield attributed traits and yield economic of coriander (*Coriandrumsativum* L.). The experimental material was comprised of twelve treatments. The maximum plant height

recorded with vermicompost @ 5 t ha^{-1} + 100 % RDF, while the minimum with poultry manure @ 2.5 t ha^{-1} + 50 % RDF. Vermicompost @ 5 t ha^{-1} + 100 % RDF recorded the maximum number of primary and secondary branches, while the minimum were observed with FYM @ 10 t ha^{-1} + 50% RDF. Maximum number of umbels $plant^{-1}$ were found with poultry manure @ 5 t ha^{-1} + 100 % RDF, while it was the minimum with the application of FYM @ 10 t ha^{-1} + 50% RDF. The maximum number of seeds $umbel^{-1}$ were found with poultry manure 5 t ha^{-1} + 100 % RDF, while the minimum in vermicompost @ 2.5 t ha-1 +50% RDF. Interaction effect on weight of seeds $umbel^{-1}$ was found to be non-significant, but the maximum weight of seeds $umbel^{-1}$ was found with poultry manure @ 5 t ha^{-1} + 100 % RDF, while the minimum in vermicompost @ 2.5 t ha^{-1} +50% RDF. Significantly maximum number of seeds $plant^{-1}$ were found with poultry manure 5 t ha^{-1} + 100 % RDF, while it was the minimum in FYM @ 10 t ha^{-1} + 50% RDF.

Godara*et al*. (2014) conducted a field experiment on “Influence of organic and inorganic sources of fertilizers on growth, yield and economics of coriander (variety RCr-480) cultivation under semi arid conditions”. The experiment was conducted with eight treatments (absolute control and varying proportion of organic and inorganic sources of nutrients *viz*., 100 % recommended dose of inorganic fertilizers (60:45:0), 100 % RDF through farm yard manure, 100 % RDF through poultry manure, 100 % RDF through vermicompost, 50 % RDF through fertilizers + 50 % RDF through farm yard manure, 50 % RDF through fertilizers + 50 % RDF through poultry manure and 50 % RDF through fertilizers + 50 % RDF through vermicompost) in completely randomized block design with three replications. Results revealed that, RDF through fertilizers and combinations of different organic and inorganic sources produced significantly higher grain yield over absolute control. Recommended dose of nutrients (100%) applied through fertilizers exhibited highest vegetative growth and yield attributes with maximum yield (1024 kg ha^{-1}),closely followed by 50 % RDF through fertilizers + 50 % RDF through vermicompost.

CHAPTER III

MATERIALS AND METHODS

This chapter includes a short description of location of the experimental plot, characteristics of soil, climate and materials used for the experiment. The details of the experiment were described below:

3.1. Location and site of the experiment field

The field experiment was conducted at the Sher-e-Bangla Agricultural University Farm, Dhaka, Bangladesh from March 2017 to July 2017 to evaluate growth and yield of coriander leaf as influenced by organic nutrient sources. It is located at 90°22′ E longitude and 23°41′N latitude at an altitude of 8.6 meters above the sea level. The land belongs to Agro-ecological zone of Modhupur Tract, AEZ-28 which is shown in Appendix I.

3.2. Climatic condition

The experimental site is under the sub-tropical climate that is characterized by high temperature, high relative humidity and heavy rainfall with occasional gusty winds in Kharif season (April-September) and scanty rainfall associated with moderately low temperature during rabi season (October-March). The weather data during the study period at the experimental site are shown in Appendix II.

3.3. Characteristics of the soil

The soil of the experimental field belongs to the General soil type, Shallow Red Brown Terrace Soils under Tejgaon Series. The land was above flood level and sufficient sunshine was available during the experimental period. Soil samples from 0-15 cm depths were collected from the experimental field. The soil analyses were done at Soil Resource and Development Institute (SRDI), Dhaka. The physicochemical properties of the soil are presented in Appendix III.

3.4. Experimental details

A set of experiment conducted at five sowing timeviz; March, April, May, June and July months and each experiment consisted of two factors of treatment.

3.4.1. Treatments

Factor A: Three coriander cultivarsFactor B: Three levels of organic manure

1. V_1 - Green aroma
2. V_2-Green giant
3. V_3- Indian cultivars

1. T_0 – No nutrient sources
2. T_1 - Cowdung @ 10 t ha^{-1}
3. T_2 - Vermicompost @ 3 t ha^{-1}

3.5. Design and Layout of the experiment

The experiment was laid out in a randomized complete block design (RCBD) having twenty seven treatment combinations (3 varieties × 3 organic manure levels) with three replications. The unit plot size was 2m × 1m (2.0 m^2). The whole experimental area was first divided into three blocks which was considered as replication and each block was further divided into 9 plots which were considered as unit plots. The block to block distance was 1m and the plot to plot distance was 50 cm.

3.6. Planting materials

Three varieties of coriander *viz*. Green aroma, Green giant and Indian cultivars were used as plant materials for each of sowing date.

3.7. Land preparation

The land was prepared thoroughly by ploughing and cross ploughing followed by laddering and harrowing to have good tilth. Weeds and stubbles of the previous crops were collected and removed from the field during land preparation. Soil clods were broken and plots were prepared as 15 cm raised seedbed so that irrigation and rain water easily could drain out and seeds could easily be germinated.

3.8. Seed sowing

Before sowing time, the seeds (fruits) were rubbed for separating the two mericarps (seeds) and were soaked in water for 24 hours to enhance germination. Seeds were also treated with Bavistin at the rate of 2g per kg of seeds before sowing. The seeds were sown in rows 10 cm apart continuously by hand @ 40 kg ha^{-1}. To allow uniform sowing in rows seeds were mixed with some loose soil (about four to five times of weight of seeds). The seeds were covered with good pulverized soil just after sowing and gently pressed by hands.

3.9. Seedling emergence

The apparent, fifty and hundred percent seedling emergence took place within 8, 12 and 15 days after sowing, respectively.

3.10. Weeding

The field was kept free by hand weeding. Weeding was done 20 days after sowing (DAS).

3.11. Crop protection

There was no insect and pathogen attack to the crop. So measurement was not taken for crop protection.

3.12. Irrigation

For good germination water was given to the plots every three days by water can with fine mashed nozzle till good germination. After germination irrigation was done when necessary.

3.13. Harvesting

Harvesting of young plants of the varieties were done before bolting from 1 m^2area of the unit plot just beneath the soil with the help of khurpi for data recording. The young plants of the rest of the plot were harvested for recording the required plant parameters.

3.14. Collection of data

Data were collected from the inner rows of each plot to avoid the border effect. In each unit plot 10 plants were selected randomly for recording data on different yield contributing characters for foliage. The data were recorded on the following parameters:

1. Plant height (cm)
2. Number of leaves $plant^{-1}$
3. Fresh weight $plant^{-1}$ (g)
4. Number of plants m^{-2}
5. Fresh weight of plants m^{-2} (g)
6. Brix index (leaf)

3.14.1. Procedure of recording data

3.14.2. Plant height

Plant height was measured at the time of harvest in centimeter from the base (ground level) of the plant to the tip of the longest leaf with the help of a meter scale from randomly selected 10 plants from each plot. The mean of 10 plants were counted as plant height.

3.14.3. Number of leaves per plant

Number of leaves per plant was counted at the time of harvest from randomly selected 10 plants from each plot. The mean of all plants were counted as number of leaves per plant.

3.14.4. Fresh weight plant^{-1} (g)

Randomly selected 10 fresh plants were harvested for fresh weight from each plot and they were weighed in gram and mean of all plants was recorded as single plant weight. Plants were cut just beneath the soil. Roots were not included.

3.14.5. Number of plants per m^2

The entire seedling of 1 m^2 area of the middle portion of unit plot (2 m × 1 m) were harvested and counted.

3.14.6. Plant weight per m^2

The entire seedling of 1 m^2 area of the middle portion of unit plot (2 m × 1 m) were harvested and weighed by electric balance in gram. Plants were cut just beneath the soil. Roots were not included.

3.14.7. Foliage yield per hectare

Fresh plants of the plot were harvested at by cutting just beneath the soil with the help of Khurpi from each plot. Harvested plants were cleaned, soil particles, dead leaves and other debris were removed and weight of all plants measured with an appropriate spring scale balance and thus plot yield was obtained in kg. Then plot yield was converted to yield per hectare in tons.

3.15. Data analysis

The collected data were compiled and analyzed statistically using the analysis of variance (ANOVA) technique with the help of a computer package program MSTAT-C and mean separation were done by Least Significance Difference (LSD) test.

CHAPTER IV

RESULTS AND DISCUSSION

The experiment was conducted to yield performances of coriander leaf of different cultivars by using organic nutrient sources. Data of the different parameters were analyzed statistically and the results were presented in the Tables and Figures. The results of the present study were presented and discussed in this chapter under the following headings.

4.1. Experiment 1: Growth and yield of coriander leaf as influenced by organic nutrient sources in March, 2017

4.1.1. Plant height

Plant height was not significantly varied by different cultivars of coriander (Table 1 and Appendix V). But it was found that the highest plant height (16.67 cm) was found from V_2 (Green giant) where the lowest plant height (15.50 cm) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on plant height of coriander (Table 1 and Appendix V). Results revealed that the highest plant height (17.44 cm) was found from T_1 (Cowdung) treatment which was statistically identical with T_2 (Vermicompost) treatment where the lowest plant height (14.00 cm) was found from T_0 (Control)

Significant influence was observed on plant height due to combined effect of cultivars and organic manure (Table 1 and Appendix V). Results showed that the highest plant height (19.00 cm) was found from V_2T_1 treatment combination which was significantly different from all other treatment combinations followed by V_1T_1 and V_3T_2. The lowest plant height (13.33 cm) was obtained from V_3T_0 treatment combination which was also significantly different from all other treatment combinations.

4.1.2. Number of leaves plant^{-1}

Number of leaves plant^{-1} was not significantly influenced by different cultivars of coriander (Table 1 and Appendix V). But it was found that the highest number of leaves plant^{-1} (6.22) was found from V_2 (Green giant) where the lowest number of leaves plant^{-1} (5.33) was obtained from V_3 (Indian cultivars).

Different organic manure had non-significant effect on number of leaves plant^{-1} of coriander (Table 1 and Appendix V). But the highest number of leaves plant^{-1}(5.90) was found from T_2 (Vermicompost) treatment where the lowest number of leaves plant^{-1}(5.67) was found from T_0 (Control).

Significant influence was not found on number of leaves plant^{-1} due to combined effect of cultivars and organic manure (Table 1 and Appendix V). But results showed that the highest number of leaves plant^{-1} (6.33) was found from V_2T_1treatment combinationand lowest number of leaves plant^{-1} (5.00) was obtained from V_3T_1treatment combination.

4.1.3. Fresh weight plant^{-1}

Fresh weight plant^{-1} was not significantly influenced by different cultivars of coriander (Table 1 and Appendix V). But it was found that the highest fresh weight plant^{-1} (1.78 g) was found from V_1 (Green aroma) where the lowest fresh weight plant^{-1} (1.60 g) was obtained from V_3 (Indian cultivars).

Different organic manure had non-significant effect on fresh weight plant^{-1} of coriander (Table 1 and Appendix V). But the highest fresh weight plant^{-1} (1.80 g) was found from T_1 (Cowdung) treatment where the fresh weight plant^{-1} (1.53 g) was found from T_0 (Control).

Significant influence was not found on fresh weight plant^{-1} due to combined effect of cultivars and organic manure (Table 1 and Appendix V). But results showed that the highest fresh weight plant^{-1} (2.00) was found from V_2T_1treatment combinationand lowest fresh weight plant^{-1} (1.40 g) was obtained from V_2T_0treatment combination.

4.1.4. Number of plants m^{-2}

Number of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 1 and Appendix V). It was found that the highest number of plants m^{-2} (1016.20) was found from V_1 (Green aroma) which was significantly different from other where the lowest number of plants m^{-2} (824.11) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on number of plants m^{-2} of coriander (Table 1 and Appendix V). Results revealed that the highest number of plants m^{-2} (1015.89) was found from T_1 (Cowdung) treatment which was significantly different from others where asthe lowest number of plants m^{-2}(5.67) was found from T_0 (Control).

Significant influence was found on number of plants m^{-2} due to combined effect of cultivars and organic manure (Table 1 and Appendix V). Results indicated that the highest number of plants m^{-2} (11.39.33) was found from V_1T_1treatment combinationwhich was significantly different from all other treatment combinations followed by V_1T_2 where asthe lowest number of plants m^{-2} (809.00) was obtained from V_1T_0 treatment combinationwhich was statistically identical with V_2T_0treatment combination.

4.1.5. Fresh weight of plants

Fresh weight of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 1 and Appendix V). It was found that the highest fresh weight of plants m^{-2} (1146.67 g) was found from V_2 (Green giant) which was significantly different from others where the lowest fresh weight of plants m^{-2} (997.78 g) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on fresh weight of plants m^{-2} of coriander (Table 1 and Appendix V). Results revealed that the highest fresh weight of plants m^{-2} (1222.56 g) was found from T_1 (Cowdung) treatment followed by T_2 (Vermicompost) whereasthe lowest fresh weight of plants m^{-2} (849.89 g) was found from T_0 (Control).

Significant influence was found on fresh weight of plants m^{-2} due to combined effect of cultivars and organic manure (Table 1 and Appendix V). Results indicated that the highest fresh weight of plants m^{-2} (1359.67 g) was found from V_1T_1 treatment combination which was significantly different from all other treatment combinations followed by V_1T_2 and V_2T_2 where asthe lowest fresh weight of plants m^{-2} (678.67 g) was obtained from V_1T_0 treatment combination which was significantly different from all other treatment combinations.

4.1.6. Brix index

Brix index was significantly influenced by different cultivars of coriander (Table 1 and Appendix V). It was found that the highest brix index (11.41) was found from V_2 (Green giant) where the lowest brix index (10.74) was obtained from V_3 (Indian cultivars) which was statistically identical with V_1 (Green aroma).

Different organic manure had significant effect on brix index of coriander (Table 1 and Appendix V). Results revealed that the highest brix index (12.02) was found from T_0 (Control) where the lowest brix index (10.39) was found from T_1 (Cowdung)treatmentwhich was statistically identical with T_2 (Vermicompost) treatment.

Significant influence was found on brix index due to combined effect of cultivars and organic manure (Table 1 and Appendix V). Results indicated that the highest brix index (12.40) was found from V_2T_0 treatment combination which was significantly different from all other treatment combinations followed by V_1T_0 and V_3T_0 whereasthe lowest brix index (9.77) was obtained from V_1T_1 treatment combinationwhich was significantly different from all other treatment combinations followed by V_3T_2 and V_2T_2.

Table 1.Effect of different growth and leaf yield parameters of coriander affected bycultivars and organic nutrient sourcesin March, 2017

Treat-ments		Growth and leaf yield parameters					
	Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Fresh weight of plants (t/ha)	Brix index (leaf)
Effect of cultivars							
V_1	16.00	5.89	1.78	1016.2 a	1126.11 b	11.26 b	10.98 b
V_2	16.67	6.22	1.63	885.33 b	1146.67 a	11.46a	11.41 a
V_3	15.50	5.33	1.60	824.11 c	997.78 c	9.97c	10.74 b
$LSD_{0.05}$	1.026^{NS}	0.527^{NS}	0.342^{NS}	5.263	8.319	1.52	0.126
CV (%)	4.153	5.029	3.117	10.268	12.314	11.23	6.034
Effect of organic nutrient sources							
T_0	14.00 b	5.89	1.53	840.11 c	849.89 c	8.49c	12.02 a
T_1	17.44 a	5.67	1.80	1015.89 a	1222.56 a	12.22a	10.39 b
T_2	16.72 a	5.90	1.71	869.67 b	1198.11 b	11.98b	10.72 b
$LSD_{0.05}$	1.014	0.526^{NS}	0.312^{NS}	5.289	7.341	3.73	0.236
CV (%)	4.153	5.029	3.117	10.268	12.314	11.23	6.034
Combined effect of cultivars and organic nutrient sources							
V_1T_0	14.33 d	6.00	1.67	809.00 f	678.67 g	9.89 e	11.83 b
V_1T_1	17.00 b	5.67	1.82	1139.33 a	1359.67 a	12.16 c	9.77 f
V_1T_2	16.67 bc	6.00	1.85	1100.33 b	1340.00 b	13.40b	11.33 c
V_2T_0	14.33 d	6.00	1.40	813.33 f	881.67 f	9.12	12.40 a
V_2T_1	19.00 a	6.00	2.00	1008.67 c	1216.67 c	13.59 a	11.33 c
V_2T_2	16.67 bc	6.33	1.45	834.00 e	1341.67 b	13.41b	10.50 d
V_3T_0	13.33 e	5.67	1.47	898.00 d	989.33 e	8.81 f	11.83 b
V_3T_1	16.33 c	5.00	1.58	899.67 d	1091.33 d	10.91 d	10.07 de
V_3T_2	16.83 b	5.33	1.83	674.67	912.67	9.89 e	10.33
$LSD_{0.05}$	0.526	0.526^{NS}	0.214^{NS}	5.289	6.194	4.78	0.468
CV (%)	4.153	5.029	3.117	10.268	12.314	11.23	6.034

V_1 - Green aroma, V_2 -Green giant, V_3 - Indian cultivarsT_0 -Control, T_1 -Cowdung, T_2 -Vermicompost

4.1.7. Foliage yield of treatment combinations during March, 2017

Foliage yield variation was observed among the treatment combinations of cultivars and organic manure (Fig. 1). It was found that the highest foliage yield (13.60 t ha^{-1}) was found from the treatment combination of V_1T_1 which was very close to the treatment combination of V_1T_2 and V_2T_2 where the lowest foliage yield (6.79 t ha^{-1}) was observed in V_1T_0 followed by V_2T_0.

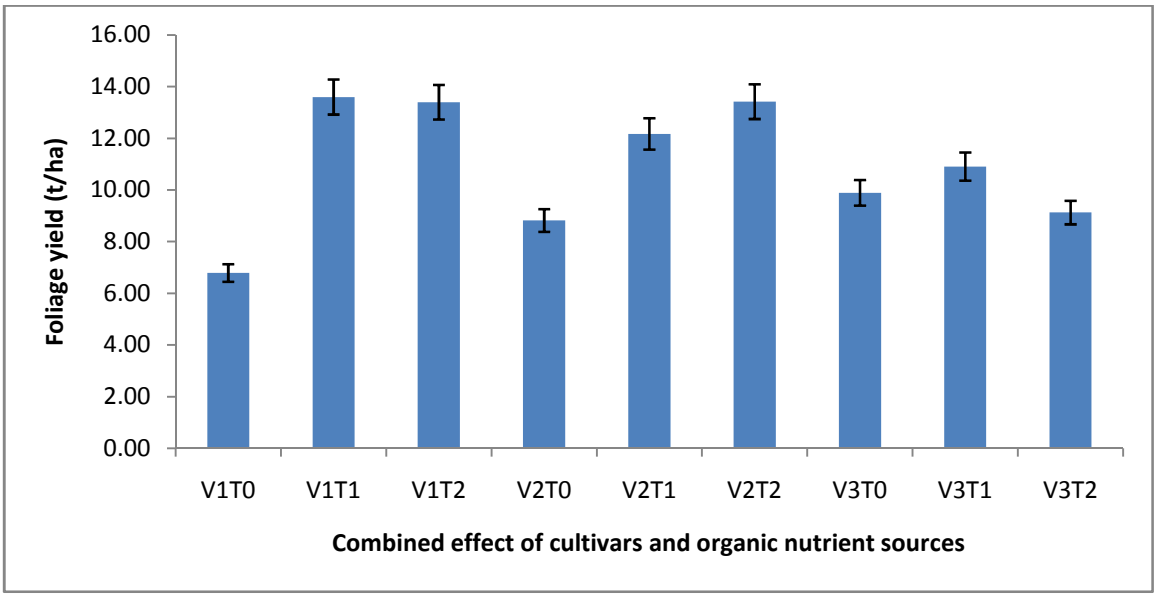

Fig. 1. Combined effect of cultivars and organic manure on foliage yield during March 2017

V_1 - Green aroma, V_2 -Green giant, V_3 - Indian cultivars and T_0 -Control, T_1 -Cowdung, T_2 -vermicompost

4.2. Experiment 2: Growth and yield of coriander leaf as influenced byorganic nutrient sources in April, 2017

4.2.1. Plant height

Plant height was not significantly varied by different cultivars of coriander (Table 2 and Appendix VI). But it was found that the highest plant height (11.67 cm) was found from V_1 (Green aroma) where the lowest plant height (10.89 cm) was obtained from V_2 (Green giant).

Different organic manure had no significant effect on plant height of coriander (Table 2 and Appendix VI). It was found that the highest plant height (11.89 cm) was found from T_1 (Cowdung) treatmentwhere asthe lowest plant height (10.67 cm) was found from T_0 (Control)

Non-significant influence was found on plant height due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). But it was found that the highest plant height (12.33 cm) was found from V_2T_1 treatment combinationwhere asthe lowest plant height (10.00 cm) was obtained from V_2T_2treatment combination.

4.2.2. Number of leaves plant^{-1}

Number of leaves plant^{-1} was not significantly influenced by different cultivars of coriander (Table 2 and Appendix VI). But it was found that the highest number of leaves plant^{-1} (7.34) was found from V_3 (Indian cultivars) where the lowest number of leaves plant^{-1} (6.22) was obtained from V_2 (Green giant).

Different organic manure had non-significant effect on number of leaves plant^{-1} of coriander (Table 2 and Appendix VI). But the highest number of leaves plant^{-1} (7.00) was found from T_1 (Cowdung) treatmentwhere asthe lowest number of leaves plant^{-1} (6.45) was found from T_0 (Control).

Significant influence was not found on number of leaves plant^{-1} due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). But results showed that the highest number of leaves plant^{-1} (7.67) was found from V_2T_1 treatment combinati0nand lowest number of leaves plant^{-1} (5.67) was obtained from V_3T_1treatment combination.

4.2.3. Fresh weight plant^{-1}

Fresh weight plant^{-1}was not significantly influenced by different cultivars of coriander (Table 2 and Appendix VI). But it was found that the highest fresh weight plant^{-1}(1.42 g) was found from V_1 (Green aroma) where the lowest fresh weight plant^{-1}(1.23 g) was obtained from V_3 (Indian cultivars).

Different organic manure had non-significant effect on fresh weight plant^{-1} of coriander (Table 2 and Appendix VI). But the highest fresh weight plant^{-1} (1.48 g) was found from T_2 (Vermicompost) treatment where asthe lowest fresh weight plant^{-1} (1.22 g) was found from T_0 (Control).

Significant influence was not found on fresh weight plant^{-1} due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). But results showed that the highest fresh weight plant^{-1} (1.50) was found from V_2T_1 treatment combination and lowest fresh weight plant^{-1} (1.13 g) was obtained from V_3T_1treatment combination.

4.2.4. Number of plants

Number of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 2 and Appendix VI). It was found that the highest number of plants m^{-2} (371.33) was found from V_1 (Green aroma) which was significantly different from other followed V_2 (Green giant) where the lowest number of plants m^{-2} (220.89) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on number of plants m^{-2} of coriander (Table 2 and Appendix VI). Results revealed that the highest number of plants m^{-2} (331.55) was found from T_1 (Cowdung) treatment which was significantly different from others whereas the lowest number of plants m^{-2} (290.89) was found from T_0 (Control).

Significant influence was found on number of plants m^{-2} due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). Results indicated that the highest number of plants m^{-2} (414.33) was found from V_1T_2 treatment combination which was statistically identical with V_1T_0 treatment combination whereas the lowest number of plants m^{-2} (210.33) was obtained from V_3T_2 treatment combination followed by V_3T_0treatment combination.

4.2.5. Fresh weight of plants m^{-2}

Fresh weight of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 2 and Appendix VI). It was found that the highest fresh weight of plants m^{-2} (417.55 g) was found from V_1 (Green aroma) followed by V_2 (Green giant) where the lowest fresh weight of plants m^{-2} (293.56 g) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on fresh weight of plants m^{-2} of coriander (Table 1 and Appendix V). Results revealed that the highest fresh weight of plants m^{-2} (379.11 g) was found from T_2 (Vermicompost)treatment which was statistically identical with T_1 (Cowdung) treatment whereas the lowest fresh weight of plants m^{-2} (340.56 g) was found from T_0 (Control).

Significant influence was found on fresh weight of plants m^{-2} due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). Results indicated that the highest fresh weight of plants m^{-2} (514.00 g) was found from V_2T_1 treatment combination which was significantly different from all other treatment combinations followed by V_1T_2 whereas the lowest fresh weight of plants m^{-2} (281.00 g) was obtained from V_3T_0 treatment combination which was statistically identical with V_2T_0 and V_3T_1treatment combinations.

4.2.6. Brix index

Brix index was not significantly influenced by different cultivars of coriander (Table 2 and Appendix VI). But it was found that the highest brix index (11.42) was found from V_1 (Green aroma) where the lowest brix index (11.28) was obtained from V_2 (Green giant).

Different organic manure had non-significant effect on brix index of coriander (Table 2 and Appendix VI). But it was found that the highest brix index (11.87) was found from T_0 (Control) where the lowest brix index (10.81) was found from T_2 (Vermicompost) treatment.

Non-significant influence was found on brix index due to combined effect of cultivars and organic manure (Table 2 and Appendix VI). But it was observed the highest brix index (12.17) was found from V_2T_0 treatment combination whereas the lowest brix index (10.17) was obtained from V_2T_2treatment combination.

Table 2. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in April, 2017

Treatments		Growth and leaf yield parameters					
	Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Fresh weight of plants (t/ha)	Brix index (leaf)
Effect of cultivars							
V_1	11.67	6.78	1.42	371.33 a	417.55 a	3.81 b	11.42
V_2	10.89	6.22	1.40	332.11 b	381.89 b	4.17 a	11.28
V_3	11.45	7.34	1.23	220.89 c	293.56 c	2.93c	11.41
$LSD_{0.05}$	1.104^{NS}	1.026^{NS}	0.512^{NS}	3.147	5.289	1.26	1.204^{NS}
CV (%)	4.864	4.389	3.122	10.677	12.084	3.14	4.056
Effect of organic manure							
T_0	10.67	6.45	1.22	301.89 b	340.56 b	3.40b	11.87
T_1	11.89	7.00	1.35	290.89 c	373.33 a	3.79a	11.43
T_2	11.45	6.89	1.48	331.55 a	379.11 a	3.73a	10.81
$LSD_{0.05}$	1.036^{NS}	1.149^{NS}	0.329^{NS}	5.812	7.389	0.39	1.044^{NS}
CV (%)	4.864	4.389	3.122	10.677	12.084	3.14	4.056
Combined effect of cultivars and organic manure							
V_1T_0	11.00	6.00	1.17	413.33 a	453.00 c	3.19 e	11.93
V_1T_1	11.33	6.67	1.60	286.33 d	319.33 e	4.53 c	10.90
V_1T_2	12.67	7.33	1.50	414.33 a	480.33 b	4.80b	11.43
V_2T_0	10.33	5.67	1.33	263.67 c	287.67 g	2.87g	12.17
V_2T_1	12.33	6.67	1.33	362.67 c	514.00 a	5.14a	11.50
V_2T_2	10.00	6.33	1.53	370.00 b	344.00 d	3.44d	10.17
V_3T_0	10.67	7.33	1.17	228.67 f	281.00 g	2.81g	11.50
V_3T_1	12.00	7.67	1.13	223.67 e	286.67 g	2.86g	11.90
V_3T_2	11.67	6.67	1.40	210.33 g	313.00 f	3.13f	10.83
$LSD_{0.05}$	2.806^{NS}	1.349^{NS}	0.566^{NS}	3.564	5.217	5.12	1.078^{NS}
CV (%)	4.864	4.389	3.122	10.677	12.084	3.14	4.056

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2.Vermicompost

4.2.7. Foliage yield of treatment combinations during April 2017

Significant variation on foliage yield was observed among the treatment combinations of cultivars and organic manure (Fig. 2). It was found that the highest foliage yield (5.14 t ha^{-1}) was found from the treatment combination of V_2T_1 followed by the treatment combination of V_1T_0 and V_1T_2 whereas the lowest foliage yield (2.81 t ha^{-1}) was observed in V_3T_0 treatment combinationwhich was closely followed by V_3T_1treatment combination.

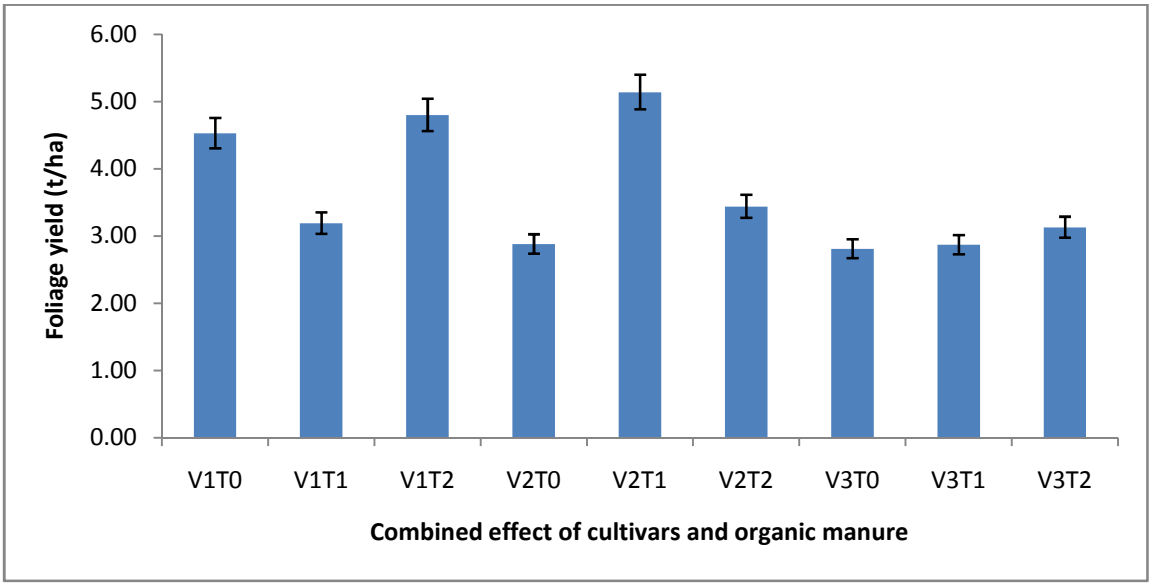

Fig. 2. Combined effect of cultivars and organic manure on foliage yield during April, 2017

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2 - Vermicompost

4.3. Experiment 3: Growth and yield of coriander leaf as influenced by organic nutrient sources sowing at May, 2017

4.3.1. Plant height

Plant height was not significantly varied by different cultivars of coriander (Table 3 and Appendix VII). But it was found that the highest plant height (9.33 cm) was found from V_3 (Indian cultivars) where the lowest plant height (8.66 cm) was obtained from V_2 (Green giant).

Different organic manure had no significant effect on plant height of coriander (Table 3 and Appendix VII). It was found that the highest plant height (9.89 cm) was found from T_2 (Vermicompost) treatment whereas the lowest plant height (8.22 cm) was found from T_0 (Control) treatment.

Significant influence was found on plant height due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). It was found that the highest plant height (10.33 cm) was found from V_1T_2 treatment combinationwhich was statistically identical with V_3T_2 treatment combinationand statistically similar with V_3T_1 treatment combinationwhereas the lowest plant height (8.00 cm) was obtained from V_1T_0 treatment combination which was significantly different from all other treatment combinations.

4.3.2. Number of leaves plant^{-1}

Number of leaves plant^{-1} was not significantly influenced by different cultivars of coriander (Table 3 and Appendix VII). But it was found that the highest number of leaves plant^{-1} (6.22) was found from V_3 (Indian cultivars) where the lowest number of leaves plant^{-1} (6.10) was obtained from V_2 (Green giant).

Different organic manure had non-significant effect on number of leaves plant^{-1} of coriander (Table 3 and Appendix VII). But the highest number of leaves plant^{-1} (6.55) was found from T_1 (Cowdung) treatment whereas the lowest number of leaves plant^{-1} (5.56) was found from T_0 (Control) treatment.

Non-significant influence was not found on number of leaves plant^{-1} due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). But results showed that the highest number of leaves plant^{-1} (7.00) was found from V3T1 treatment combination and lowest number of leaves plant^{-1} (5.33) was obtained from V_3T_0treatment combination.

4.3.3. Fresh weight plant^{-1}

Fresh weight plant^{-1} was not significantly influenced by different cultivars of coriander (Table 3 and Appendix VII). But it was found that the highest fresh weight plant^{-1} (1.59 g) was found from V_1 (Green aroma) where the lowest fresh weight plant^{-1} (1.19 g) was obtained from V_3 (Indian cultivars).

Different organic manure had non-significant effect on fresh weight plant^{-1} of coriander (Table 3 and Appendix VII). But the highest fresh weight plant^{-1} (1.44 g) was found from T_0 (Control) treatment whereas the fresh weight plant^{-1} (1.37 g) was found from T_1 (Cowdung) treatment.

Significant influence was not found on fresh weight plant^{-1} due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). But results showed that the highest fresh weight plant^{-1} (1.83) was found from V_1T_1treatment combination and lowest fresh weight plant^{-1} (1.00 g) was obtained from V_3T_1treatment combination.

4.3.4. Number of plants

Number of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 3 and Appendix VII). It was found that the highest number of plants m^{-2} (272.45) was found from V_1 (Green aroma) which was significantly different from other followed byV_2 (Green giant) whereas the lowest number of plants m^{-2} (224.00) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on number of plants m^{-2} of coriander (Table 3 and Appendix VII). Results revealed that the highest number of plants m^{-2} (269.56) was found from T_1 (Cowdung) treatment

followed by T_2 (Vermicompost) treatment where asthe lowest number of plants m^{-2} (239.67) was found from T_0 (Control) treatment.

Significant influence was found on number of plants m^{-2} due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). Results indicated that the highest number of plants m^{-2} (306.67) was found from V_2T_1 treatment combination which was significantly different from all other treatment combinations followed by V_1T_1 and V_1T_2 whereas the lowest number of plants m^{-2} (213.00) was obtained from V_3T_1 treatment combination followed by V_3T_2treatment combination.

4.3.5. Fresh weight of plants

Fresh weight of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 3 and Appendix VII). It was found that the highest fresh weight of plants m^{-2} (346.44 g) was found from V_2 (Green giant) followed by V_1 (Green aroma) where the lowest fresh weight of plants m^{-2} (281.44 g) was obtained from V_3 (Indian cultivars).

Different organic manure had significant effect on fresh weight of plants m^{-2} of coriander (Table 3 and Appendix VII). Results revealed that the highest fresh weight of plants m^{-2} (338.33 g) was found from T_1 (Cowdung) treatment followed by T_2 (Vermicompost) treatment whereas the lowest fresh weight of plants m^{-2} (294.66 g) was found from T_0 (Control) treatment.

Significant influence was found on fresh weight of plants m^{-2} due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). Results indicated that the highest fresh weight of plants m^{-2} (391.67 g) was found from V_2T_1 treatment combination which was significantly different from all other treatment combinations followed by V_1T_2 followed by V_1T_2 and V_3T_0 whereasthe lowest fresh weight of plants m^{-2} (257.00 g) was obtained from V_3T_2treatment combination followed by V_1T_0 treatment combination.

4.3.6. Brix index

Brix index was not significantly influenced by different cultivars of coriander (Table 3 and Appendix VII). But it was found that the highest brix index(11.08) was found from V_2 (Green giant) where the lowest brix index (10.72) was obtained from V_3 (Indian cultivars)

Different organic manure had non-significant effect on brix index of coriander (Table 3 and Appendix VII). But it was found that the highest brix index (11.39) was found from T_0 (Control) treatment whereas the lowest brix index (10.54) was found from T_1 (Cowdung) treatment.

Significant influence was found on brix index due to combined effect of cultivars and organic manure (Table 3 and Appendix VII). It was observed the highest brix index (12.17) was found from V_2T_1treatment combination which was statistically identical with V_1T_0treatment combinationwhere the as lowest brix index (9.83) was obtained from V_1T_1treatment combination followed by V_2T_0treatment combination.

Table 3. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in May, 2017

Treatments		Growth and leaf yield parameters					
	Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Fresh weight of plants (t/ha)	Brix index (leaf)
Effect of cultivars							
V_1	9.00	6.11	1.59	272.45 a	317.11 b	3.17b	11.02
V_2	8.66	6.10	1.42	263.78 b	346.44 a	3.46a	11.08
V_3	9.33	6.22	1.19	224.00 c	281.44 c	2.81c	10.72
$LSD_{0.05}$	1.147^{NS}	0.367^{NS}	0.142^{NS}	4.289	5.364	0.29	1.056^{NS}
CV (%)	6.527	4.732	3.856	11.389	10.524	4.81	5.706
Effect of organic manure							
T_0	8.22	5.56	1.44	239.67 c	294.66 c	2.94c	11.39
T_1	8.89	6.55	1.37	269.56 a	338.33 a	3.38a	10.54
T_2	9.89	6.33	1.39	251.00 b	312.00 b	3.12b	10.89
$LSD_{0.05}$	1.322^{NS}	0.589^{NS}	0.107^{NS}	4.506	4.036	0.44	1.056^{NS}
CV (%)	6.527	4.732	3.856	11.389	10.524	4.81	5.706
Combined effect of cultivars and organic manure							
V_1T_0	8.00 f	5.67	1.50	237.67 c	287.33 f	2.87f	12.13 a
V_1T_1	8.67 d	6.33	1.43	289.00 b	302.33 e	3.02e	9.83 e
V_1T_2	10.33 a	6.33	1.83	290.67 b	361.67 b	3.61b	11.10 c
V_2T_0	8.33 de	5.67	1.33	242.00 c	330.33 c	3.17 d	10.27 d
V_2T_1	8.33 de	6.33	1.67	306.67 a	391.67 a	3.91a	12.17 a
V_2T_2	9.33 bc	6.33	1.27	242.67 c	317.33 d	3.30 c	10.80 cd
V_3T_0	8.33 de	5.33	1.50	239.33 c	266.33 b	2.57 g	11.77 b
V_3T_1	9.67 ab	7.00	1.00	213.00 e	321.00 d	2.66 b	9.63 e
V_3T_2	10.00 a	6.33	1.07	219.67 d	257.00 g	2.57g	10.77 cd
$LSD_{0.05}$	0.361	1.034^{NS}	0.552^{NS}	4.318	3.947	1.64	0.648
CV (%)	6.527	4.732	3.856	11.389	10.524	4.81	5.706

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2 - Vermicompost

4.3.7. Foliage yield of treatment combinations during May 2017

Significant variation on foliage yield was observed among the treatment combinations of cultivars and organic manure (Fig. 3). It was found that the highest foliage yield (3.92 t ha^{-1}) was found from the treatment combination of V_2T_1 followed by the treatment combination of V_2T_0whereas the lowest foliage yield (2.57 t ha^{-1}) was observed in V_3T_2treatment combinationwhich was statistically identical V_3T_0treatment combination.

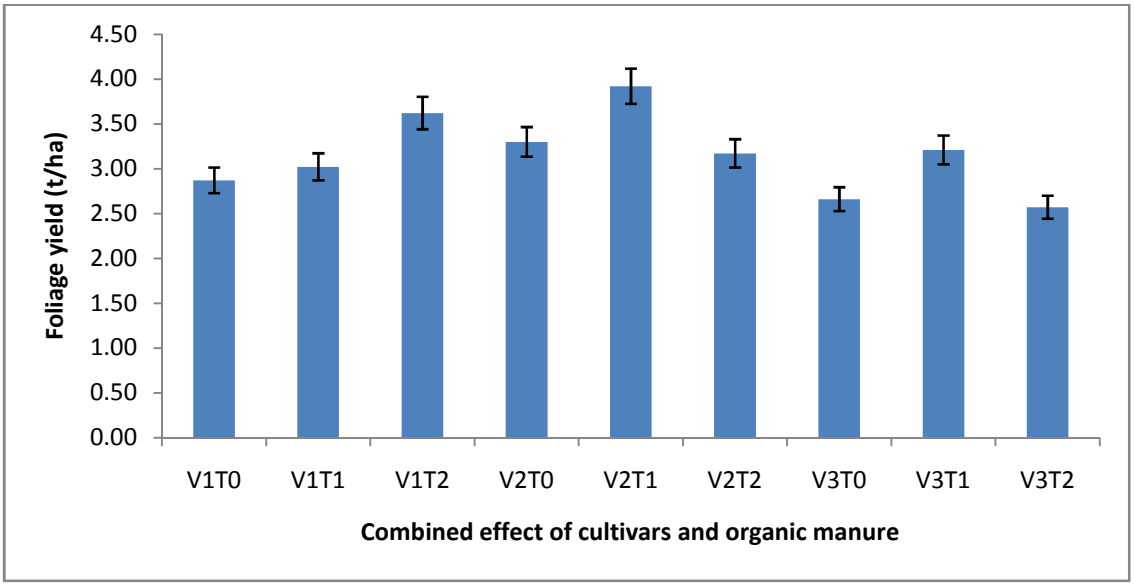

Fig. 3. Combined effect of cultivars and organic manure on foliage yield during March 2017

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2 - Vermicompost

4.4. Experiment 4: Growth and yield of coriander leaf as influenced by organic nutrient sourcesin June, 2017

4.4.1. Plant height

Plant height was not significantly varied by different cultivars of coriander (Table 4 and Appendix VIII). But it was found that the highest plant height (8.22 cm) was found from V_3 (Indian cultivars) where the lowest plant height (7.89 cm) was obtained from V_1 (Green aroma).

Different organic manure had no significant effect on plant height of coriander (Table 4 and Appendix VIII). It was found that the highest plant height (8.56 cm) was found from T_2 (Vermicompost) treatment whereas the lowest plant height (7.78 cm) was found from T_0 (Control) treatment.

Significant influence was found on plant height due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). It was found that the highest plant height (9.33 cm) was found from V_1T_2 treatment combinationwhich was statistically identical withV_2T_1 andV_2T_2treatment combinations and statistically similar with V_1T_1treatment combination whereas the lowest plant height (7.33 cm) was obtained from V_1T_0 treatmentwhich was significantly similar with V_1T_2, $V_2T_0$and V_3T_1treatment combinations.

4.4.2. Number of leaves plant^{-1}

Number of leaves plant^{-1} was not significantly influenced by different cultivars of coriander (Table 4 and Appendix VIII). But it was found that the highest number of leaves plant^{-1} (6.89) was found from V_2 (Green giant) where the lowest number of leaves plant^{-1} (6.33) was obtained from V_1 (Green aroma).

Different organic manure had significant effect on number of leaves plant^{-1} of coriander (Table 4 and Appendix VIII). Results revealed that the highest number of leaves plant^{-1} (7.04) was found from T_2 (Vermicompost) combination which was statistically identical with T_1 (Cowdung) combination whereas the lowest number of leaves plant^{-1} (5.78) was found from T_0 (Control) combination.

Significant influence was found on number of leaves plant^{-1} due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). Results showed that the highest number of leaves plant^{-1} (7.67) was found from V_3T_1 treatment combination which was statistically identical with V_1T_1, V_2T_1 and V_2T_2treatment combinationsand significantly similar with V_1T_2 and V_3T_1treatment combinationsand lowest number of leaves plant^{-1} (5.33) was obtained from V_1T_0treatment combinationwhich was significantly similar withV_3T_0treatment combination.

4.4.3. Fresh weight plant^{-1}

Fresh weight plant^{-1} was not significantly influenced by different cultivars of coriander (Table 4 and Appendix VIII). But it was found that the highest fresh weight plant^{-1} (1.57 g) was found from V_1 (Green aroma) where the lowest fresh weight plant^{-1} (1.40 g) was obtained from V_2 (Green giant).

Different organic manure had non-significant effect on fresh weight plant^{-1} of coriander (Table 4 and Appendix VIII). But the highest fresh weight plant^{-1} (1.72 g) was found from T_1 (Cowdung) treatment whereas the lowest fresh weight plant^{-1} (1.37 g) was found from T_0 (Control) treatment.

Significant influence was not found on fresh weight plant^{-1} due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). But results showed that the highest fresh weight plant^{-1} (1.80g) was found from V_1T_1treatmentcombinationand the lowest fresh weight plant^{-1} (1.27 g) was obtained from V_1T_0treatment combination.

4.4.4. Number of plants

Number of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 4 and Appendix VIII). It was found that the highest number of plants m^{-2} (271.78) was found from V_2 (Green giant) which was significantly different from other followed by V_3 (Indian cultivars) where the lowest number of plants m^{-2} (244.78) was obtained from V_1 (Green aroma).

Different organic manure had significant effect on number of plants of coriander (Table 4 and Appendix VIII). Results revealed that the highest number of plants m^{-2} (282.56) was found from T_2 (Vermicompost) treatment which was statistically identical withT_1 (Cowdung) treatment whereas the lowest number of plants m^{-2} (206.78) was found from T_0 (Control) treatment.

Significant influence was found on number of plants m^{-2} due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). Results indicated that the highest number of plants m^{-2} (315.67) was found from V_3T_2treatment combination which was statistically identical withV_2T_1treatment combination whereas the lowest number of plants m^{-2} (174.00) was obtained from V_1T_0treatment combination which was significantly similar with V_3T_0treatment combination.

4.4. 5. Fresh weight of plants

Fresh weight of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 4 and Appendix VIII). It was found that the highest fresh weight of plants m^{-2} (296.67 g) was found from V_2 (Green giant) which was statistically identical with V_3 (Indian cultivars) where the lowest fresh weight of plants m^{-2} (276.78 g) was obtained from V_1 (Green aroma).

Different organic manure had significant effect on fresh weight of plants m^{-2} of coriander (Table 4 and Appendix VIII). Results revealed that the highest fresh weight of plants m^{-2} (314.33 g) was found from T_2 (Vermicompost) treatment followed by T_1 (Cowdung) treatment whereas the lowest fresh weight of plants m^{-2} (252.78 g) was found from T_0 (Control) treatment.

Significant influence was found on fresh weight of plants m^{-2} due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). Results indicated that the highest fresh weight of plants m^{-2} (320.33 g) was found from V_2T_1treatment combinationwhich was statistically identical with V_1T_2 treatment combination whereas the lowest fresh weight of plants m^{-2} (222.00 g) was obtained from V_1T_0 treatment combination followed by V_2T_0 and V_3T_0treatment combinations.

4.4.6. Brix index

Brix index was not significantly influenced by different cultivars of coriander (Table 4 and Appendix VIII). But it was found that the highest brix index (10.91) was found from V_3 (Indian cultivars) where the lowest brix index (10.28) was obtained from V_1 (Green aroma).

Different organic manure had non-significant effect on brix index of coriander (Table 4 and Appendix VIII). But it was found that the highest brix index (10.90) was found from T_2 (Vermicompost) treatment where the lowest brix index (9.99) was found from T_1 (Cowdung) treatment.

Significant influence was found on brix index due to combined effect of cultivars and organic manure (Table 4 and Appendix VIII). It was observed the highest brix index (11.50) was found from V_3T_0treatment combinationwhich was statistically similar with V_3T_2 treatment combination whereas the lowest brix index (9.90) was obtained from V_3T_1 treatment combination which was statistically identical with V_2T_1treatment combination.

Table 4. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sourcesin June, 2017

Treatments		Growth and leaf yield parameters					
	Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Fresh weight of plants (t/ha)	Brix index (leaf)
Effect of cultivars							
V_1	7.89	6.33	1.57	244.78 c	276.78 b	2.90a	10.28
V_2	8.45	6.89	1.40	271.78 a	296.67 a	2.96a	10.36
V_3	8.22	6.56	1.51	253.56 b	290.78 a	2.76b	10.91
$LSD_{0.05}$	1.153^{NS}	0.126^{NS}	0.104^{NS}	3.529	6.754	0.20	1.056^{NS}
CV (%)	5.289	6.376	3.871	10.244	12.389	2.70	4.375
Effect of organic manure							
T_0	7.78	5.78 b	1.37	206.78 b	252.78 c	2.52c	10.66
T_1	8.22	7.00 a	1.72	280.78 a	297.11 b	3.14 a	9.99
T_2	8.56	7.04 a	1.39	282.56 a	314.33 a	2.97 b	10.90
$LSD_{0.05}$	1.147^{NS}	1.376	0.381^{NS}	5.637	6.281	0.62	1.322^{NS}
CV (%)	5.289	6.376	3.871	10.244	12.389	2.70	4.375
Combined effect of cultivars and organic manure							
V_1T_0	7.33 c	5.33 d	1.27	174.00 g	222.00 e	2.69 d	10.40 c
V_1T_1	8.33 ab	7.00 a	1.80	273.33 c	287.67 c	2.87c	10.23 de
V_1T_2	7.67 bc	6.67 ab	1.63	287.00 b	319.33 a	3.19a	10.20 de
V_2T_0	7.67 bc	6.33 bc	1.37	256.67 d	266.67 d	2.66d	10.07 e
V_2T_1	8.67 a	7.33 a	1.67	313.67 a	320.33 a	3.20a	9.83 f
V_2T_2	9.00 a	7.00 a	1.17	245.00 e	303.00 b	3.03b	11.17 b
V_3T_0	8.00 b	5.67 cd	1.47	189.67 f	269.67 d	2.22 e	11.50 a
V_3T_1	7.67 bc	6.67 ab	1.70	255.33 d	283.33 c	2.83c	9.90 f
V_3T_2	9.33 a	7.67 a	1.37	315.67 a	320.67 a	3.20a	11.33 ab
$LSD_{0.05}$	1.102	1.011	0.526^{NS}	3.671	5.687	0.98	0.236
CV (%)	5.289	6.376	3.871	10.244	12.389	2.70	4.375

V_1 - Green aroma, V_2-Green giant, V_3- Indian cultivarsT_0-Control, T_1-Cowdung, T_2-Vermicompost

4.4.7. Foliage yield of treatment combinations during June 2017

Significant variation on foliage yield was observed among the treatment combinations of cultivars and organic manure (Fig. 4). It was observed that the highest foliage yield (3.21 t ha^{-1}) was found from the treatment combination of V_3T_2 which was statistically identical with the treatment combination of V_1T_2 and $V_2T_1$where asthe lowest foliage yield (2.22 t ha^{-1}) was observed in V_1T_0 treatment combination which was statistically similar with V_2T_0treatment combination.

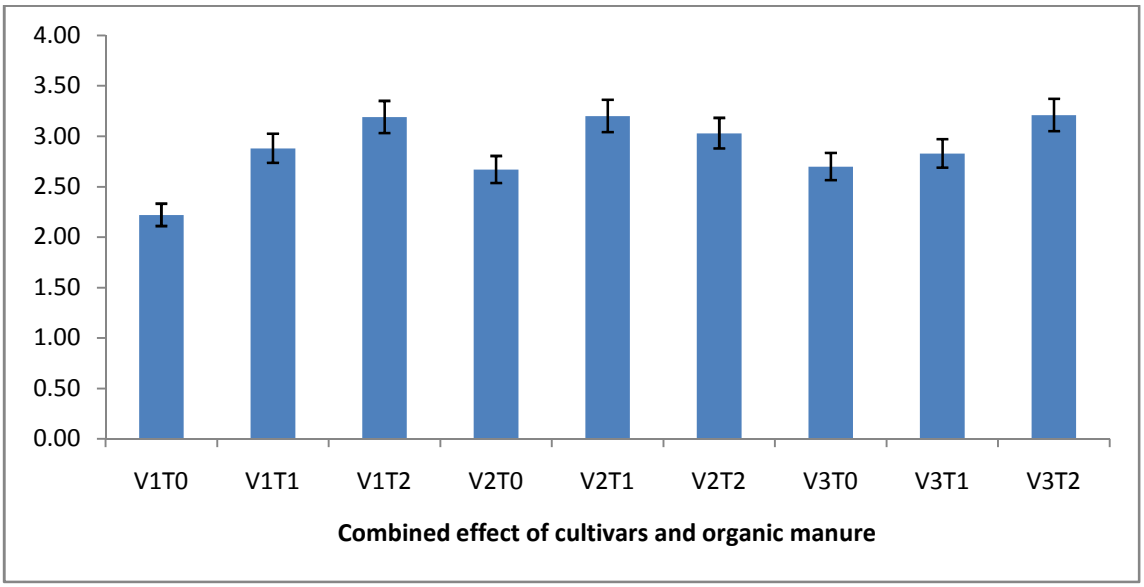

Fig. 4. Combined effect of cultivars and organic nutrient sources on foliage yield during June 2017

4.5. Experiment 5:Growth and yield of coriander leaf as influenced by organic nutrient sources sowing in July, 2017

4.5.1. Plant height

Plant height was not significantly varied by different cultivars of coriander (Table 5 and Appendix IX). But it was found that the highest plant height (9.11 cm) was found from V_3 (Indian cultivars) where the lowest plant height (8.55 cm) was obtained from V_1 (Green aroma).

Different organic manure had no significant effect on plant height of coriander (Table 5 and Appendix IX). It was found that the highest plant height (8.89 cm) was found from T_1 (Cowdung) treatment whereas the lowest plant height (8.67 cm) was found from T_0 (Control) treatment.

Significant influence was found on plant height due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). It was found that the highest plant height (10.33 cm) was found from V_3T_2 treatment combination which was significantly different from all other treatment combinations followed by V_2T_1 whereas the lowest plant height (7.67 cm) was obtained from V_2T_2 treatment combination which was also significantly different from all other treatment combinations followed by V_1T_0, V_1T_2 and V_3T_1.

4.5.2. Number of leaves plant^{-1}

Number of leaves plant^{-1} was not significantly influenced by different cultivars of coriander (Table 5 and Appendix IX). But it was found that the highest number of leaves plant^{-1} (6.22) was found from V_3 (Indian cultivars) where the lowest number of leaves plant^{-1} (5.89) was obtained from V_1 (Green aroma).

Different organic manure had non-significant effect on number of leaves plant^{-1} of coriander (Table 5 and Appendix IX). But the highest number of leaves plant^{-1} (6.22) was found from T_2 (Vermicompost)treatment whereasthe lowest number of leaves plant^{-1} (5.11) was found from T_0 (Control) treatment.

Significant influence was found on number of leaves plant^{-1} due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). Results

revealed that the highest number of leaves plant^{-1} (7.33) was found from V_3T_2treatment combination which was statistically identical with V_2T_0treatment combinationand significantly similar with V_1T_1treatment combination. The lowest number of leaves plant^{-1} (4.67) was obtained from V_1T_0treatment combination followed by V_2T_0, V_2T_2 and V_3T_0treatment combinations.

4.5.3. Fresh weight plant^{-1}

Fresh weight plant^{-1} was not significantly influenced by different cultivars of coriander (Table 5 and Appendix IX). But it was found that the highest fresh weight plant^{-1} (1.38 g) was found from V_3 (Indian cultivars) where the lowest fresh weight plant^{-1} (1.29 g) was obtained from V_1 (Green aroma).

Different organic manure had non-significant effect on fresh weight plant^{-1} of coriander (Table 5 and Appendix IX). But the highest fresh weight plant^{-1} (1.43 g) was found from T_2 (Vermicompost) treatment whereas the lowest fresh weight plant^{-1} (1.24 g) was found from T_0 (Control) treatment.

Significant influence was not found on fresh weight plant^{-1} due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). But results showed that the highest fresh weight plant^{-1} (1.73) was found from V_3T_0treatment combination and lowest fresh weight plant^{-1} (1.00 g) was obtained from V_1T_0treatment combination.

4.5.4. Number of plants

Number of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 5 and Appendix IX). It was found that the highest number of plants m^{-2} (161.44) was found from V_1 (Green aroma) where the lowest number of plants m^{-2} (201.22) was obtained from V_2 (Green giant) which was statistically identical with V_3 (Indian cultivars).

Different organic manure had significant effect on number of plants m^{-2} of coriander (Table 5 and Appendix IX). Results revealed that the highest number of plants m^{-2} (236.22) was found from T_1 (Cowdung) treatment followed by

T_2(Vermicompost) where the lowest number of plants m^{-2} (232.00) was found from T_0 (Control) treatment.

Significant influence was found on number of plants m^{-2} due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). Results indicated that the highest number of plants m^{-2} (284.33) was found from V_2T_1treatment combination which was statistically identical with V_3T_2 treatment combination where the lowest number of plants m^{-2} (104.00) was obtained from V_3T_0 treatment combination followed by V_1T_2 and V_2T_0treatment combinations.

4.5.5. Fresh weight of plants

Fresh weight of plants m^{-2} was significantly influenced by different cultivars of coriander (Table 5 and Appendix IX). It was found that the highest fresh weight of plants m^{-2} (234.11 g) was found from V_2 (Green giant) which was statistically identical with V_3 (Indian cultivars) where the lowest fresh weight of plants m^{-2} (210.45 g) was obtained from V_1 (Green aroma).

Different organic manure had significant effect on fresh weight of plants m^{-2} of coriander (Table 5 and Appendix IX). Results revealed that the highest fresh weight of plants m^{-2} (260.55 g) was found from T_1 (Cowdung) treatment followed by T_2 (Vermicompost) treatment where the lowest fresh weight of plants m^{-2} (172.00 g) was found from T_0 (Control) treatment.

Significant influence was found on fresh weight of plants m^{-2} due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). Results indicated that the highest fresh weight of plants m^{-2} (316.33 g) was found from V_2T_1 treatment combination which was significantly different from all other treatment combinations followed by V_2T_1 followed by V_3T_2 whereas the lowest fresh weight of plants m^{-2} (140.67 g) was obtained from V_1T_0treatment combination followedby V_2T_0 and V_3T_0treatment combinations.

4.5.6. Brix index

Brix index was significantly influenced by different cultivars of coriander (Table 5 and Appendix IX). It was found that the highest brix index (10.72)

was found from V_2 (Green giant) which was statistically identical with V_1 (Green aroma) where the lowest brix index (10.72) was obtained from V_3 (Indian cultivars)

Different organic manure had significant effect on brix index of coriander (Table 5 and Appendix IX). But it was found that the highest brix index (10.93) was found from T_2 (Vermicompost) treatment followed by T_1 (Cowdung) treatment where the lowest brix index (10.54) was found from T_0 (Control) treatment.

Significant influence was found on brix index due to combined effect of cultivars and organic manure (Table 5 and Appendix IX). It was observed that the highest brix index (11.73) was found from V_2T_2 treatment combination followed by V_1T_1 and V_1T_2 treatment combinations where the lowest brix index (8.10) was obtained from V_1T_1 treatment combination which was statistically identical with V_1T_0treatment combination.

Table 5. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in July, 2017

Treatments		Growth and leaf yield parameters					
	Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Fresh weight of plants (t/ha)	Brix index (leaf)
Effect of cultivars							
V_1	8.55	5.89	1.29	161.44 a	210.45 b	2.31 a	10.10 a
V_2	8.67	5.90	1.34	201.22 b	234.11 a	2.34a	10.72 a
V_3	9.11	6.22	1.38	206.44 b	231.22 a	2.10 b	9.02 b
$LSD_{0.05}$	1.117^{NS}	1.086^{NS}	0.214^{NS}	4.287	5.264	0.24	0.861
CV (%)	5.217	5.388	3.129	8.376	1.578	2.25	6.514
Effect of organic manure							
T_0	8.67	5.11	1.24	132.00 c	172.00 c	1.72c	8.99 c
T_1	8.89	6.67	1.33	236.22 a	260.55 a	2.60a	9.92 b
T_2	8.78	6.22	1.43	200.89 b	243.22 b	2.43b	10.93 a
$LSD_{0.05}$	1.033^{NS}	1.012^{NS}	0.214^{NS}	5.385	6.124	2.24	0.614
CV (%)	5.217	5.388	3.129	8.376	1.578	2.25	6.514
Combined effect of cultivars and organic manure							
V_1T_0	8.33 d	4.67 d	1.00	104.00 g	140.67 h	1.85 g	8.30 f
V_1T_1	9.00 bc	6.67 ab	1.17	236.33 b	250.00 c	2.50c	10.93 b
V_1T_2	8.33 d	6.33 b	1.70	144.00 f	240.67 d	2.40d	11.07 b
V_2T_0	9.00 bc	5.33 c	1.00	142.67 f	189.67 g	1.89g	10.57 bc
V_2T_1	9.33 b	7.00 a	1.83	284.33 a	316.33 a	3.16a	9.87 d
V_2T_2	7.67 e	5.33 c	1.20	176.67 d	196.33 f	1.96 f	11.73 a
V_3T_0	8.67 cd	5.33 c	1.73	149.33 e	185.67 g	1.40 h	8.10 f
V_3T_1	8.33 d	6.33 b	1.04	188.00 c	215.33 e	2.15e	8.97 e
V_3T_2	10.33 a	7.33 a	1.40	282.00 a	292.67 b	2.92b	10.00 cd
$LSD_{0.05}$	0.326	0.328	0.104^{NS}	3.589	5.056	1.31	0.487
CV (%)	5.217	5.388	3.129	8.376	1.578	2.25	6.514

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2 - Vermicompost

4.5.7. Foliage yield of treatment combinations during July 2017

Foliage yield was significantly varied due to the treatment combinations of cultivars and organic manure (Fig. 5). It was found that the highest foliage yield (3.16 t ha^{-1}) was found from the treatment combination of V_2T_1 followed by the treatment combination of V_3T_2 where the lowest foliage yield (1.41 t ha^{-1}) was observed in V_1T_0 treatment combination which was closely followed by V_3T_0treatment combination.

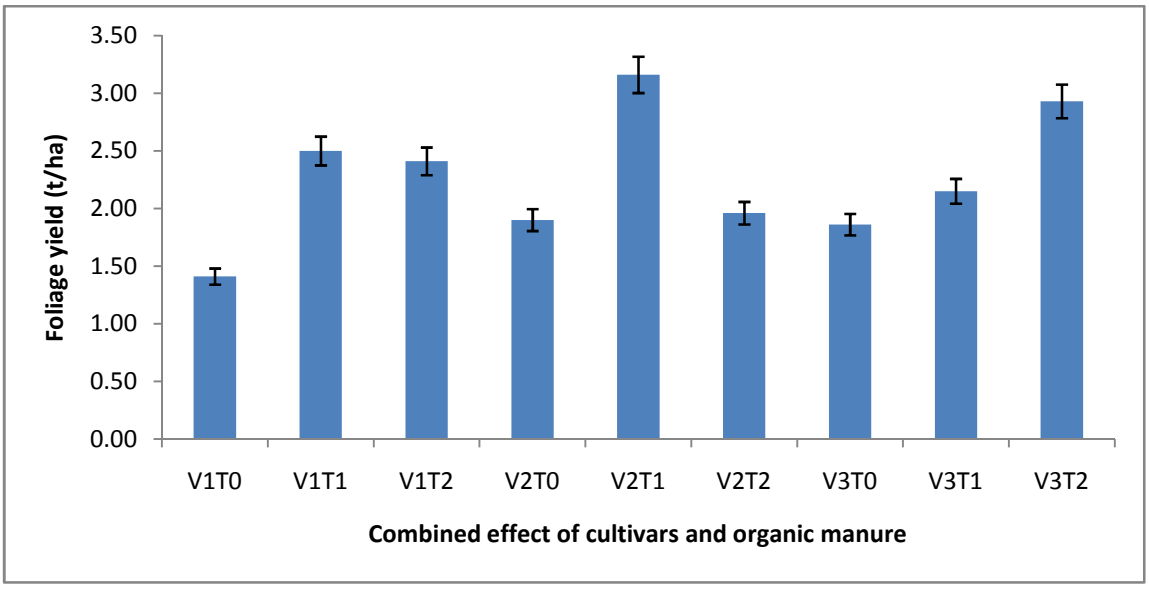

Fig. 5. Combined effect of cultivars and organic nutrient sources on foliage yield during July 2017

V_1 - Green aroma, V_2 - Green giant, V_3 - Indian cultivars T_0 - Control, T_1 - Cowdung, T_2 - Vermicompost

4.6 Comparative foliage yield (weight basis) study under different sowing date

Different treat combinations showed foliage yield variation in different treatment combinations (Fig. 6). It was found that foliage yield m^{-2} at March, 2017 showed higher foliage yield performance compared to other sowing time. It was also observed that in advancement of time yield was decreased gradually (Fig. 6). Different treatment combinations showed different foliage yield.

Varied sowing date showed better treatment combination according to foliage yield. No one treatment combination was superior for all the sowing time.

It was also found that treatment combination of V_2T_1 gave better performance in respect of foliage yield at all sowing time and this treatment combination of V_2T_1 found as best for the sowing time of April 2017 (5.14 t ha^{-1}), May 2017 (3.92 t ha^{-1}) and July 2017 (3.16 t ha^{-1}) in respective of foliage yield. Sowing time of March 2017 showed the highest foliage yield (13.59 t ha^{-1}) from the treatment combination of V_1T_1. In June 2017 the highest foliage yield (3.20 t ha^{-1}) was obtained from V_3T_2 treatment combination which was statistically same with V_2T_1treatment combination. The lowest foliage yield in March 2017 (8.81 t ha^{-1}) was found from V_2T_0treatment combination, in April 2017 (2.81 t ha^{-1}) was found from V_3T_0treatment combination, in May 2017 (2.57 t ha^{-1}) was found from V_3T_2treatment combination, in June 2017 (2.22 t ha^{-1}) was found from V_1T_0treatment combination and in July 2017 (1.40 t ha^{-1}) was found from V_1T_0treatment combination.

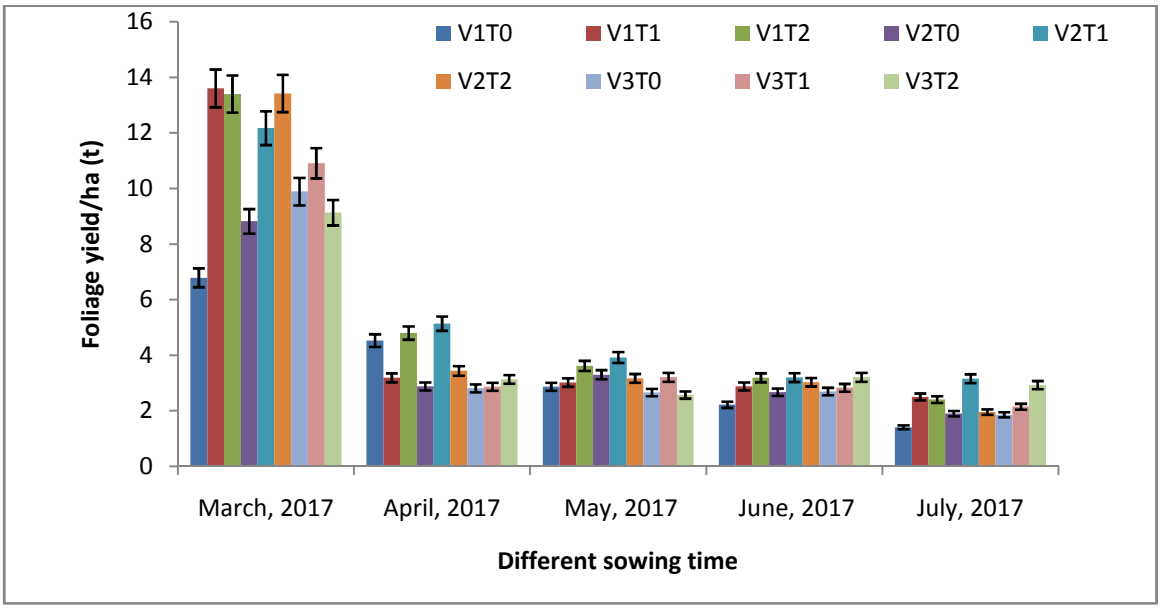

Fig. 6. Foliage yield comparison of different treatment combinations at different sowing date

Table 6: Cost and return of coriander leaf ,sowing time March, 2017

Treatments combinations	Total cost of production (Tk)	Yield (ton/ha)	Gross return (Tk/ha)	Net return (Tk /ha)	Benefit cost ratio
V_1T_0	79,800	6.79	2,71600	1,91800	2.40
V_1T_1	1,03500	13.6	4,44000	3,40500	3.28
V_1T_2	2,12800	13.4	5,36000	3,23200	1.52
V_2T_0	79,800	8.82	3,52800	2,73000	3.42
V_2T_1	1,03500	12.17	4,00000	3,83300	3.40
V_2T_2	2,12800	13.42	5,36800	3,24000	1.52
V_3T_0	77,896	9.89	3,95600	3,17704	3.00
V_3T_1	1,01696	10.91	4,36400	3,34704	3.29
V_3T_2	2,11000	9.13	4,50000	2,39000	1.13

According to thesis data month wise cost of production of coriander leaf are given below-

April Month:

Total cost of production: 1,31,421

Gross income: 1,82,000

Net income: 50,579

Benefit Cost Ratio (BCR): 1.39

May Month:

Total cost of production: 1,31,421

Gross income: 2,20,500

Net income: 89,079

Benefit Cost Ratio (BCR): 1.68

June Month:

Total cost of production: 1,31,421

Gross income: 2,30,400

Net income: 98,979

Benefit Cost Ratio (BCR): 1.75

July Month:

Total cost of production: 1,31,421

Gross income: 2,25,000

Net income: 93579

Benefit Cost Ratio (BCR): 1.71

CHAPTER V

SUMMARY AND CONCLUSION

The experiment was conducted on coriander (*Coriandrumsativum* L.) at the Horticulture Farm of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka, Bangladesh during the period from March 2017 to July 2017. The main objective of this study was to find out off-season yield performances of coriander leaf of different cultivars by using organic fertilizer and time of sowing. The experiment consisted of two factors (cultivars and organic manure). There were three varieties (Green aroma, Rosina, Green giant and Indian cultivars) and three organic manure level (0; control, cowdung @ 10 t ha^{-1} and vermicompost @ 3 t ha^{-1}). Five experiments were conducted at different sowing time to observe foliage yield performance according to sowing time using treatment combination of cultivars and organic manure. Different growth and yield parameters were significantly influenced by cultivars and organic manure and also their combination at different sowing date.

First experiment (March 2017)

Considering varietal performance, the highest number of plants m^{-2} (1016.20) was found from V_1 (Green aroma) and highest fresh weight of plants m^{-2} (1146.67 g) was found from V_2 (Green giant) where the lowest number of plants m^{-2} (824.11) and lowest fresh weight of plants m^{-2} (997.78 g) was obtained from V_3(Indian cultivars). Considering organic manure application, the highest number of plants m^{-2} (1015.89), and highest fresh weight of plants m^{-2} (1222.56 g) was found from T_1 (Cowdung) treatment where lowest number of plants m^{-2} (567) and lowest fresh weight of plants m^{-2} (849.89 g) was found from T_0 (Control) treatment. Considering treatment combinations, the highest number of plants m^{-2} (1139.33), highest fresh weight of plants m^{-2} (1359.67 g) and highest foliage yield (13.60 t ha^{-1}) was found from V_1T_1treatment combination where the lowest number of plants m^{-2} (809.00) and lowest fresh

weight of plants m^{-2} (678.67 g) and lowest foliage yield (6.79 t ha^{-1}) was obtained from V_1T_0treatment combination.

Second experiment (April 2017)

Considering varietal performance, the highest number of plants m^{-2} (371.33) and highest fresh weight of plants m^{-2} (417.55 g) was found from V_1 (Green aroma) where the lowest number of plants m^{-2} (220.89) and lowest fresh weight of plants m^{-2} (293.56 g) was obtained from V_3(Indian cultivars). Considering organic manure application, the highest number of plants m^{-2} (331.55) was found from T_1 (Cowdung) treatment and highest fresh weight of plants m^{-2} (379.11 g) was found from T_2 (Vermicompost) treatment where the lowest number of plants m^{-2} (290.89) and lowest fresh weight of plants m^{-2} (340.56 g) was found from T_0 (Control) treatment. Considering treatment combinations, the highest number of plants m^{-2} (414.33) was found from V_1T_2 treatment combination but the highest fresh weight of plants m^{-2} (514.00 g) and highest foliage yield (5.14 t ha^{-1}) was found from V_2T_1treatment combinationwhere the lowest number of plants m^{-2} (210.33) was obtained from V_3T_2 treatment combination and lowest fresh weight of plants m^{-2} (281.00 g) and lowest foliage yield (2.81 t ha^{-1}) was obtained from V_3T_0treatment combination.

Third experiment (May 2017)

Considering varietal performance, the highest number of plants m^{-2} (272.45) was found from V_1 (Green aroma) but the highest fresh weight of plants m^{-2} (346.44 g) was found from V_2 (Green giant) where the lowest number of plants m^{-2} (224.00) and lowest fresh weight of plants m^{-2} (281.44 g) was obtained from V_3(Indian cultivars). Considering organic manure application, the highest number of plants m^{-2} (269.56) and highest fresh weight of plants m^{-2} (338.33 g) was found from T_1 (Cowdung) treatment where the lowest number of plants m^{-2} (239.67) and lowest fresh weight of plants m^{-2} (294.66 g) was found from T_0 (Control)treatment.Considering treatment combinations, the highest number of plants m^{-2} (306.67) and highest fresh weight of plants m^{-2} (391.67 g) and highest foliage yield (3.92 t ha^{-1}) was found from V_2T_1 treatment combination

where the lowest number of plants m^{-2} (213.00) was obtained from V_3T_1 treatment combination but the lowest fresh weight of plants m^{-2} (257.00 g) and lowest foliage yield (2.57 t ha^{-1}) was obtained from V_3T_2treatment combination.

Fourth experiment (June 2017)

Considering varietal performance, the highest number of plants m^{-2} (271.78) and highest fresh weight of plants m^{-2} (296.67 g) was found from V_2 (Green giant) where the lowest number of plants m^{-2} (244.78) and lowest fresh weight of plants m^{-2} (276.78 g) was obtained from V_1 (Green aroma). Considering organic manure application, the highest number of plants m^{-2} (282.56) and highest fresh weight of plants m^{-2} (314.33 g) was found from T_2 (Vermicompost) treatment where the lowest number of plants m^{-2} (206.78) and lowest fresh weight of plants m^{-2} (252.78 g) was found from T_0 (Control) treatment. Considering treatment combinations, the highest number of plants m^{-2} (315.67) was found from V_3T_2treatment combinationbut the highest fresh weight of plants m^{-2} (320.33 g) and highest foliage yield (3.21 t ha^{-1}) was found from V_2T_1 treatment combination whereas the lowest number of plants m^{-2} (174.00) and lowest fresh weight of plants m^{-2} (222.00 g) and lowest foliage yield (2.22 t ha^{-1}) was obtained from V_1T_0treatment combination.

Fifth experiment (July 2017)

Considering varietal performance, the highest number of plants m^{-2} (161.44) was found from V_1 (Green aroma) but the highest fresh weight of plants m^{-2} (234.11 g) was found from V_2 (Green giant) where the lowest number of plants m^{-2} (201.22) was obtained from V_2 (Green giant) but the lowest fresh weight of plants m^{-2} (210.45 g) was obtained from V_1 (Green aroma). Considering organic manure application, the highest number of plants m^{-2} (236.22) and highest fresh weight of plants m^{-2} (260.55 g) was found from T_1 (Cowdung) treatment whereas the lowest number of plants m^{-2} (232.00) and lowest fresh weight of plants m^{-2} (172.00 g) and highest foliage yield (3.16 t ha^{-1}) was found from T_0 (Control) treatment. Considering treatment combinations, the highest

number of plants m^{-2} (284.33) and highest fresh weight of plants m^{-2} (316.33 g) was found from V_2T_1treatment combinationwhereas the lowest number of plants m^{-2} (104.00) was obtained from V_3T_0 treatment combination and lowest fresh weight of plants m^{-2} (140.67 g) and lowest foliage yield (1.41 t ha^{-1}) was obtained from V_1T_0treatment combination.

Conclusion

From the above findings it can be concluded that yield parameters varied significantly due to different sowing time. Same treatment combinations showed significantly varied yield performance with the variation of sowing date.It was found that cultivar V_2 (Green giant) showed highest foliage yield among all the cultivars and cultivar V_3(Indian cultivar) showed the lowest foliage yield. The highest foliage yield was found at treatment T_1 (Cowdung) and lowest foliage yield was found at treatment T_0 (No nutrient sources). It was observed that treatment combination of V_2T_1 (Green giant x Cowdung) gave better performance in respect of foliage yield among all the combination and V_3T_0 (Indian cultivar x control) showed the lowest foliage yield. Considering yield performance on sowing time, cultivars of coriander and organic manure, treatment combination of V_2T_1 (Green giant× Cowdung) was the best for foliage yield coriander during all the seasons.

Recommendation:

1. Further research works can be carried out at different AEZ using different coriander cultivars.
2.More research works should be conducted at different AEZ using some other organic nutrient sources.
3. Further study might be conducted at different AEZ using the combination of different cultivars and organic nutrients sources for coriander production

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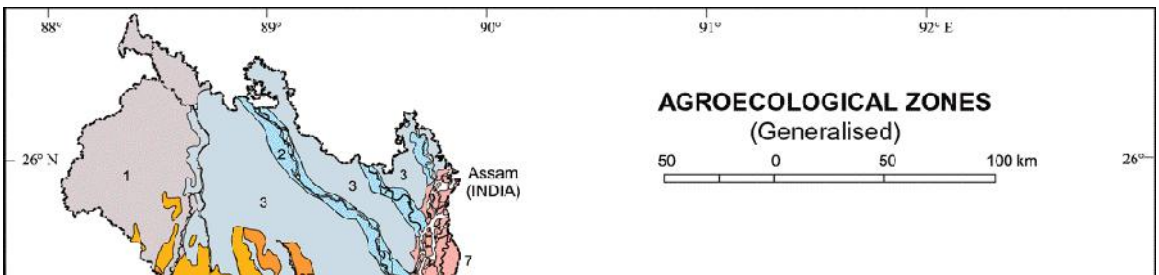
APPENDICES

Appendix I. Agro-Ecological Zone of Bangladesh showing the experimental location



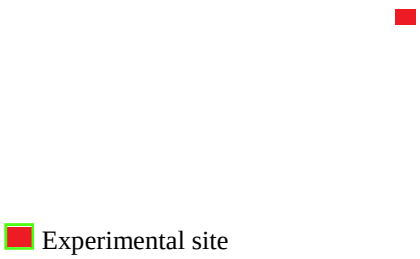


Fig. 9. Experimental site

Appendix II.Monthly records of air temperature, relative humidity, rainfall and sunshine hours during the period from March to June, 2017

Month	RH (%)	Air temperature (C)			Rainfall (mm)
		Max.	*Min.*	*Mean*	
March	52.44	35.20	21.00	28.10	20.4
April	65.40	34.70	24.60	29.65	165.0
May	68.30	32.64	23.85	28.25	182.2
June	71.30	27.40	23.44	25.42	190.0
July	79.60	33.20	25.74	29.47	304.0

Source: Bangladesh Meteorological Department (Climate division), Agargaon, Dhaka-1212.

Appendix III. Characteristics of experimental soil analyzed at Soil Resources Development Institute (SRDI), Farmgate, Dhaka.

A. Morphological characteristics of the experimental field

Morphological features	**Characteristics**
Location	Horticulture Farm, SAU, Dhaka
AEZ	Modhupur 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
Cropping pattern	Not Applicable

Source: Soil Resource Development Institute (SRDI)

B. Physical and chemical properties of the initial soil

Characteristics	**Value**
Partical size analysis % Sand	27
%Silt	43
% Clay	30
Textural class	Silty Clay Loam (ISSS)
pH	5.6
Organic carbon (%)	0.45
Organic matter (%)	0.78
Total N (%)	0.03
Available P (ppm)	20
Exchangeable K (me/100 g soil)	0.1
Available S (ppm)	45

Source: Soil Resource Development Institute (SRDI)

Appendix IV.Layout of the experiment field

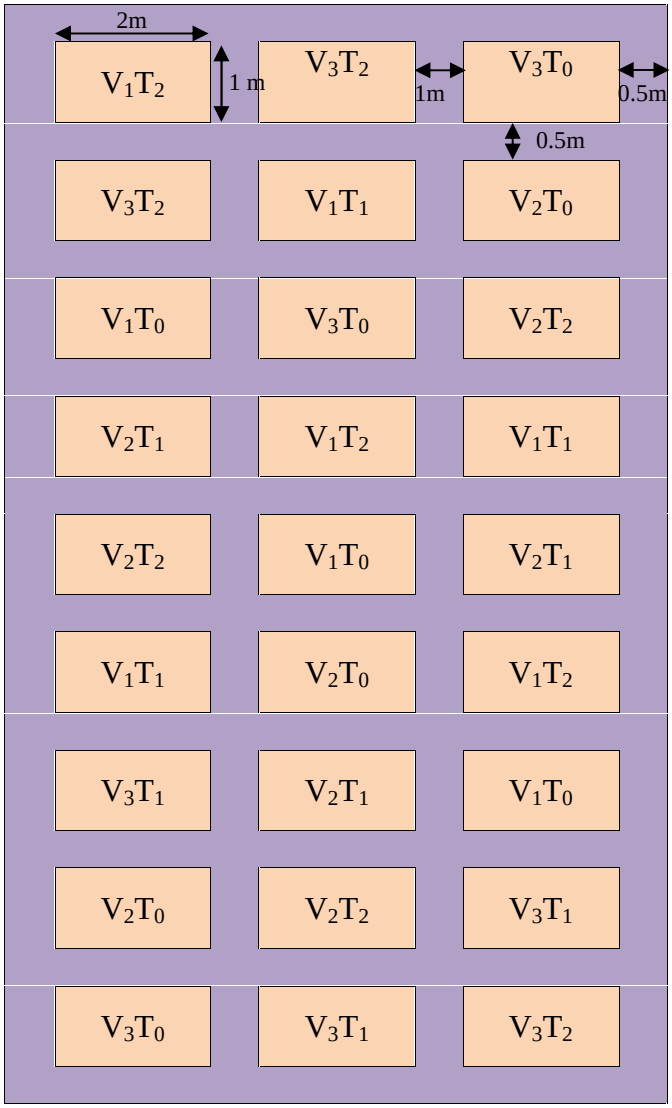


Fig. 7. Layout of the experimental plot

Appendix V. Analysis of variance on the effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in March, 2017

Sources of variation	Degrees of freedom	Mean square of growth and leaf yield parameters					
		Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Brix index (leaf)
Replication	2	0.306	0.014	0.004	1.512	2.316	0.324
Factor A	2	2.012^{NS}	1.016^{NS}	1.527^{NS}	58.124*	48.36*	10.35*
Factor B	2	12.04**	3.141^{NS}	2.016^{NS}	71.514*	82.31*	18.71*
AB	4	7.234*	2.212^{NS}	0.512^{NS}	32.316*	42.64*	6.329**
Error	18	1.012	0.007	0.018	5.614	6.075	0.726

Appendix VI.Analysis of variance on the effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in April, 2017

Sources of variation	Degrees of freedom	Growth and leaf yield parameters					
		Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Brix index (leaf)
Replication	2	0.006	0.012	0.001	3.058	3.317	0.007
Factor A	2	0.614^{NS}	1.216^{NS}	0.371^{NS}	38.714*	48.014*	1.512^{NS}
Factor B	2	1.318^{NS}	2.052^{NS}	1.526^{NS}	56.301*	76.315*	4.316^{NS}
AB	4	0.784^{NS}	0.388^{NS}	0.227^{NS}	16.026*	18.311*	2.052^{NS}
Error	18	0.004	0.006	0.003	4.331	5.210	0.024

Appendix VII. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in May, 2017

Sources of variation	Degrees of freedom	Growth and leaf yield parameters					
		Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1}(g)	Number of plants m^{-2}	Fresh weight of plants m(g)	Brix index (leaf)
Replication	2	0.011	0.016	0.015	3.319	4.078	0.032
Factor A	2	1.226^{NS}	2.589^{NS}	2.366^{NS}	46.057*	34.159*	2.169^{NS}
Factor B	2	4.804^{NS}	5.063^{NS}	1.587^{NS}	76.318*	86.056*	5.078^{NS}
AB	4	3.146**	1.289^{NS}	1.614^{NS}	42.831*	16.879*	6.240**
Error	18	0.024	0.027	0.018	6.236	6.075	0.103

Appendix VIII. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources in June, 2017

Sources of variation	Degrees of freedom	Growth and leaf yield parameters					
		Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Brix index (leaf)
Replication	2	0.045	0.101	0.008	2.312	3.109	0.214
Factor A	2	2.367^{NS}	1.058^{NS}	3.19^{NS}	78.634*	58.632*	3.568*
Factor B	2	5.217^{NS}	3.127**	2.09^{NS}	64.278*	112.529*	5.724*
AB	4	4.117*	6.329*	2.47^{NS}	48.714*	42.644*	1.586**
Error	18	0.128	0.316	0.032	5.291	6.075	0.237

Experiment 5: July, 2017

Appendix IX. Effect of different growth and leaf yield parameters of coriander affected by different cultivars and organic nutrient sources July, 2017

Sources of variation	Degrees of freedom	Growth and leaf yield parameters					
		Plant height (cm)	Number of leaves plant^{-1}	Fresh weight plant^{-1} (g)	Number of plants m^{-2}	Fresh weight of plants m^{-2} (g)	Brix index (leaf)
Replication	2	0.036	0.014	0.022	1.527	4.312	0.256
Factor A	2	0.687^{NS}	1.389^{NS}	1.529^{NS}	36.302*	32.632*	6.529*
Factor B	2	3.522^{NS}	3.077^{NS}	1.366^{NS}	42.517*	71.386*	10.31**
AB	4	7.053**	6.112**	2.087^{NS}	18.316*	28.17*	5.319*
Error	18	0.042	0.048	0.004	4.716	5.819	0.341

AppendixX: Per hectare production cost of coriander leaf as influencedby organic nutrient sources and time of sowing

A . Input cost

Treatments combination	Labor cost (Tk)	Ploughing cost (Tk)	Seed cost (Tk)	Insecticide cost (Tk)	Irriga-tion cost (Tk)	Cow dung cost (TK)	Vermi-compost cost (TK)	Sub Total (Tk) (A)
V_1T_0	5,000	3,000	8,000	1,000	3,000	0	0	20,000
V_1T_1	5,000	3,000	8,000	1,000	3,000	20,000	0	40,000
V_1T_2	5,000	3,000	8,000	1,000	3,000	0	120000	1,40,000
V_2T_0	5,000	3,000	8,000	1,000	3,000	0	0	20,000
V_2T_1	5,000	3,000	8,000	1,000	3,000	20000	0	40,000
V_2T_2	5,000	3,000	8,000	1,000	3,000	0	120000	1,40,000
V_3T_0	5,000	3,000	6,400	1,000	3,000	0	0	18,400
V_3T_1	5,000	3,000	6,400	1,000	3,000	20,000	0	38,400
V_3T_2	5,000	3,000	6,400	1,000	3,000	0	120000	1,38,400

B. Overhead cost

Treatment Combination	Cost of lease of land for 6 months	Miscellaneous cost (Tk. 5% of the input cost	Interest on running capital for 6 months (Tk. 14.0% of cost/year	Subtotal (Tk) (B)	Total cost of production (Tk./ha) [Input cost (A)+ overhead cost (B)]
V_1T_0	56,000	1,000	2,800	59,800	79,800
V_1T_1	56,000	2,000	5,600	63,500	1,03500
V_1T_2	56,000	7,000	9,800	72,800	2,12800
V_2T_0	56,000	1,000	2,800	59,800	79,800
V_2T_1	56,000	2,000	5,600	63,500	1,03500
V_2T_2	56,000	7,000	9,800	72,800	2,12800
V_3T_0	56,000	920	2,576	59,496	77,896
V_3T_1	56,000	1,920	5,376	63,296	1,01696
V_3T_2	56,000	6,920	9,688	72,600	2,11000