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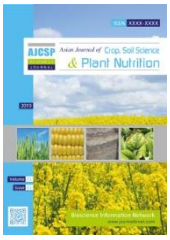

# Effects of growing mediums on the growth and yield of pot grown chilli (*Capsicum frutescens*)

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***ABSTRACT***

*A pot experiment was carried out at Mirpur, Dhaka, from December 2020 to April 2021 to study the growth and yield of chilli as influenced by different growth mediums following Randomized Complete Block Design (RCBD) with three replications. The experiment comprised five levels of growth mediums viz., Soil ($T_1$), Cocopeat ($T_2$), Compost ($T_3$), Vermicompost ($T_4$), Trichocompost ($T_5$) and two chilli varieties viz., $V_1$= Bizlee plus and $V_2$= Green fire. In case of interaction of variety and growth media, the maximum height plant (40 cm) was observed in the treatment combination of $V_2T_4$ (Green fire × vermicompost), the highest stem diameter (2.42 cm) was found in the treatment combination of $V_2T_1$ (Green fire × control), highest leaf length (10 cm) was showed in the interaction of a combination of $V_2T_1$ (Green fire × soil), highest petiole length was showed (2.73 cm) in $V_1T_4$ (Bizlee plus × vermicompost), the higher number of leaves (140.33) produced in the combination of treatment of $V_2T_4$ (Green fire × vermicompost), the higher number of branches (15) was recorded in the treatment interaction of $V_1T_4$ (Bizlee plus × vermicompost), highest fruit length (9.27 cm) was measured in the treatment combination of $V_1T_1$ (Bizlee plus × soil), the highest fruit diameter (3.3 cm) was observed in $V_2T_4$ (Green fire × vermicompost), the highest number of fruit (40) was found from the combination of $V_1T_4$ (Bizlee plus × vermicompost), the highest weight (1.93 g) was recorded on $V_2T_5$ (Green fire × trichocompost), the highest dry weight (0.57 g) found in the treatment combination of $V_2T_1$ (Green fire × soil), the highest yield (64 g) found in the treatment combination of $V_1T_4$ (Bizlee plus × trichocompost), the highest number of seed (54) found in the treatment combination of $V_2T_5$ (Green fire × trichocompost). Results conclude that Bizlee plus chili variety with the growth media of vermicompost is the most effective and efficient among the treatments for successful production because it enriches with high nutrient which is essential for plants growth and yield.*

***Key Words:*** *Chilli, Growth, Vermicompost, Cocopeat, Compost, Trichocompost and Yield.*

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## I. Introduction

Chilli (*Capsicum frutescens*) is a berry fruit of the Capsicum family member of the Solanaceae family (Moscone et al., 2006). It is a valuable spice crop in several countries worldwide for domestic and commercial purposes (Khan et al., 2012). Capsicum is a member of the Solanaceae family, a spice with over 3,000 species classified into 150 genera (Barth and Duarte, 2008). *Capsicum annuum*, *C. frutescens*, *C. chinense*, *C. pubescens*, and *C. baccatum* are the five domesticated species in the genus Capsicum and are now widely cultivated worldwide (Andrews, 1995). Chilli is native to America and West Indies but spreads firstly throughout the tropical countries after the discovery of America and the West Indies (Pruthi, 1993). It grows naturally in temperate, subtropical, and tropical parts of the world (Barboza et al., 2022). *Capsicum frutescens* pepper cultivar which grown as annual or transient perennial plants. The color spectrum of capsicum includes green, yellow, red, orange, purple, and black. Other capsicum includes the yellow and banana-shaped sweet banana pepper, the red, heart-shaped sweet bell pepper, and the light green, thin, and curled bull's horn (Islam, 2015). Chillies are widely used in many dishes as fun to add intense 'heat' to dishes. Capsaicin and related compounds, known as capsaicinoids, intensify when ingesting peppers. It is especially liked for its pungency and spicy taste, besides the appealing colors it adds to the food. Green chilli is used in the dining as table salad. Chemical analysis of chilli has shown that the red chilli pod contains 15.9% protein, 31.6% carbohydrate. 50 mg/100 g vitamin C and small amount of minerals, vitamin A and vitamin B (Pruthi, 1998). Green chilli contains 2.9% protein, 6.1% carbohydrate, 111.0 mg/100 g vitamin C and small amount of vitamins A, B, and E (Bosland and Votava, 1999).

In Bangladesh, chilli ranks first in area and second in production among the species. The cultivated area and production of chilli in 2019-2020 were 1,68,348 hectares and 1,86,025 metric tons, respectively (BBS, 2020). Chilli is grown in all areas of the country. It covers about 70% of total spice production. The genus *Capsicum* has two commercial species viz., *Capsicum annuum* and *Capsicum fruitescen* commonly cultivated in Bangladesh. Chilli producers in Bangladesh primarily crops in rainy conditions (Hossain, 1990). In our country, it is now cultivated commercially in Cumilla, Noakhali, Mymensingh, Bogura, Panchagarh, Rangpur, Barishal and Madaripur. About 32 local varieties are grown in Bangladesh (BBS, 2019).

Urban food supply systems are under enormous demand as a result of fast urbanization and expansion. In addition, many cities throughout the globe are struggling with issues, including a rapid decline in green areas and an increase in heat island impacts (Mahmud et al., 2020). Urban farming or agriculture is suggested as a potential remedy for these issues (Smit et al., 1996). Urban rooftop farming often involves the use of green roofs, hydroponics, organic, aeroponics and container gardens. (Mahmud et al., 2020). Open and cultivable field has been indiscriminately turning into built-up territory in Dhaka, one of the world's fastest-growing megacities, resulting in an alarming rate of decline of agricultural land. (Islam and Ahmed, 2011). Implementing rooftop farming might be a potential way to ease food supply issues, increase urban self-sufficiency, and improve urban residents' access to fresh produce. According to estimates, rooftop gardening has the potential to cover 10,000 acres of Dhaka city, providing the population with access to fresh veggies and meeting more than 10% of demand. (Wardard, 2014). According to a survey, most of Dhaka's rooftops are ideal for gardening and don't need much work to enhance; occasionally, they need some minor changes (Mahmud et al., 2020).

Applying organic fertilizers and organic amendments has numerous advantages compared to inorganic fertilizers, in crop production time (Ali et al., 2023; Leogrande and Vitti, 2019). The growing media of cocopeat influences production of chilli. Cocopeat increases the porosity of soil. It helps to keep soil loose and helps in better root growth (Uttekar et al., 2021). Cocopeat increases water holding capacity, ensuring the plant does not suffer from overwatering. The use of compost also increases chilli production. It increases microbial activity in soil by increasing chili production (Narkhede et al., 2011). It also enhances plant disease suppression and improves water retention in soil. It is crucial for long-term soil fertility and productivity. Vermicompost is the earthworm excrement that results from the intestinal digestion of organic material. It contains high nutritive value. It is also called biological manure. Numerous micronutrients, including Mn, Fe, Mo, B, Cu, and Zn, as well as certain growth regulators, are present in vermicompost. It enhances the growth and development of crops and increases the yield (Kaur et al., 2015). Trichocompost is a Trichoderma based compost fertilizer. Trichocompost is another important organic manure. It is essential for enhancing the physical,

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chemical, and biological characteristics of soil and raising agricultural yield. (Rahman et al., 2010). The overall improvement in soil ecology and nutrient availability is the main advantage of cycling and recycling organic matter in soils. Therefore, the study was conducted to find suitable growing medium that enhances plant growth and yield. The use of organic and sustainable farming techniques in the manufacture of potted chili is a topic that has received little attention but is becoming more and more crucial because of environmental issues. Despite the potential for better production, disease resistance, and flavor profiles, there is a lack of information on the creation and application of new pot-grown chili varieties suited for pot gardening. Filling up these knowledge gaps will help small-scale farmers and urban farmers produce chili more sustainably and effectively, as well as benefit home gardeners. The objective of the experiment is to estimate the different effects of growing media and effective response of treatment on plant growth and yield of chili and also to observe interaction between variety and treatment.

## II. Materials and Methods

### Location and soil

The experiment was conducted at pot condition on the roof of my residence in Mirpur, Dhaka from December 2020 to April 2021. The experimental locations fall under AEZ 19, i.e., Old Meghna Estuarine flood plain. The experimental area was almost level land sandy loam soil, moderately alkaline, with a pH of 6.5. General fertility is moderate but low in organic matter.

### Experimental treatments and design

The experiment was laid out in the Randomized Complete Block Design (RCBD) with five treatments and three replications. Two factors were included in this experiment.

**Factor A**: Two chilli varieties:
$V_1$- Bizlee plus
$V_2$- Green fire

**Factor B**:
$T_1$: Soil (control)
$T_2$: Cocopeat
$T_3$: Compost
$T_4$: Vermicompost
$T_5$: Trichocompost

### Seedbed preparations and Seedling

Pepper seedlings were grown in a seedbed measuring 3.0 m × 1.0 m. The soil was well prepared, converted to a loose friable, and dried for seedbed. All weeds and stables were removed, well decomposed cowdung was mixed with the soil. Seeds were sown in seedbed in December, 2020. After sowing, the seeds were covered with light soil. Seedlings are raised 6 to 7 days after sowing. The seedbeds were watered when needed for healthy and uniform seedlings and the grown weeds were removed.

### Pot preparations, planting and intercultural operations

The soil used to make the main bed was dried in the sun for a week. Five mediums were then created. The mediums are- Only the soil was dried and a small amount of organic manure was added. The second medium was made by mixing cocopeat and soil in a ratio of 4: 1. The third medium was made by mixing compost and soil in a ratio of 4: 1. A fourth medium in a ratio of 4: 1 has been made by mixing earthworm manure and soil. The fifth medium was made by mixing trichocompost and soil in the ratio of 4: 1. The pot filled with the mixture was placed in a place where the mixed media filled the specified pots. The fill pots have at least six hours of sunshine. Healthy and uniform chilli seedlings were uprooted separately from the seedbed. To prevent damage to the roots, the seedbed was irrigated prior to the removal of the seedlings. The transplanting was made in the experimental pot on the afternoon of January 2021. Weeding was done two times in pots to keep pots free from weeds. Irrigations were supplied by hand sprayer when needed. The harvest was done in the morning when the fruits were mature. The fruits were collected when it contained the desired size and color.

### Data collection and statistical analysis

Data on Plant height (cm), Stem diameter (cm), Leaf length (cm), Petiole length (cm), Number of leaves per plant, Number of branches per plant, Fruit length (cm), Fruit diameter (cm), Number of fruits per plant, Single fruit weight per plant (g), Single dry fruit weight (g), Yield per plant (g) and Number of

seed per fruit (g). The recorded data on the different parameters of the study were analyzed statistically using an Excel data sheet and Minitab software. Various descriptive statistical measures such as mean, Coefficient of variation (CV) and ANOVA test, PCA, Correlation were used for categorization and description of the variables.

## III. Results

### Plant height (cm)

The plant height was influenced significantly by variety and medium interaction (Table 01 and Figure 01). The maximum height of plant (40 cm) was observed in the treatment combination of $V_2T_4$ (Green fire × vermicompost) followed by $V_2T_1$ (Green fire × control) and $V_1T_4$ (Bizlee plus × vermicompost). The lowest height (14.33 cm) was found on the treatment combination of $V_1T_5$ (Bizlee plus × trichocompost).

### Stem diameter (cm)

The interaction between variety and medium exhibited non-significant influence on stem diameter (Table 01). In this experiment, the highest stem diameter (2.42 cm) was found in the treatment combination of $V_2T_1$ (Green fire × control) followed by $V_2T_4$ (Green fire × vermicompost) and $V_1T_4$ (Bizlee plus × vermicompost). Besides, the lowest stem diameter (0.97 cm) was observed in $V_1T_5$ (Bizlee plus × trichocompost). Green fire showed good performance over other varieties concerning stem diameter.

### Leaf length (cm)

Interaction of variety and medium showed non-significant on leaf length (Table 01). The highest leaf length (10 cm) was shown in the interaction of a combination of $V_2T_1$ (green fire × soil) followed by $V_2T_4$ (Green fire × vermicompost), where the lowest leaf length (2.67 cm) in combination $V_1T_5$ (Bizlee plus × trichocompost).

### Petiole length (cm)

The interaction of variety and medium showed highly significant on petiole length. The combination of treatments showed highest length of petiole (3.07 cm) in $V_1T_4$ (Bizlee plus × vermicompost) followed by $V_2T_1$ (Green fire × control), where the low length (0.7 cm) was found in $V_1T_5$ (Bizlee plus × trichocompost) (Table 01).

**Figure 01. Effects of Growing Mediums on the Growth and Yield of Pot Grown Chilli.**

### Number of leaves per plant

Variety and medium interaction exhibited significant impact on the number of leaves. The higher number of leaves (140.33) produced in the combination of treatment of $V_2T_4$ (Green fire × vermicompost) followed by $V_1T_4$ (Bizlee plus × vermicompost) and $V_2T_1$ (Green fire × control) where the smaller number of leave (37.33) produced in $V_1T_5$ (Bizlee plus × trichocompost) (Table 01).

**Number of branches per plant**

There was no significant difference in the number of branches due to the combination of variety and medium (Table 01). The higher number of branches (15) was recorded in the treatment interaction of $V_1T_4$ (Bizlee plus × vermicompost) followed by $V_2T_4$ (Green fire × vermicompost) where the smaller number of branches (2) was recorded in $V_1T_5$ (Bizlee plus × trichocompost).

**Fruit length (cm)**

The interaction of variety and medium was significant in case of fruit length. The maximum fruit length (9.27 cm) was measured in the treatment combination of $V_1T_1$ (Bizlee plus × control) followed by $V_2T_4$ (Green fire × vermicompost) and the minimum length of fruit (5.43 cm) was measured in $V_1T_5$ (Bizlee plus × trichocompost).

**Fruit diameter (cm)**

There was no significance observed in the interaction of variety and medium. In the combination of variety and treatment, the highest fruit diameter (3.3 cm) was observed in $V_2T_4$ (Green fire × vermicompost) followed by $V_1T_1$ (Bizlee plus × control) and $V_2T_1$ (Green fire × control). On the other hand, the lowest fruit diameter (1.57 cm) was observed in $V_1T_3$ (Bizlee plus × compost) (Table 01).

**Table 01. Effect of variety and treatment interaction on Chilli production**

| Interaction | Pant height | Stem diameter (cm) | Leaf length (cm) | Petiole length (cm) | Number of leaves/plant | Number of branches/plant | Fruit length (cm) | Fruit diameter (cm) | Number of fruits/plant | Single fruit weight/plant (g) | Single dry fruit weight (g) | Yield/plant (g) | Number of seeds/fruit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $V_1T_1$ | $32.3^{abc}$ | $1.6^{abc}$ | $9.4^{a}$ | $2.7^{ab}$ | $114.3^{a}$ | $12.0^{a}$ | $9.3^{a}$ | $3.2^{a}$ | $17.0^{bc}$ | $1.4^{a}$ | $0.5^{a}$ | $29.0^{bc}$ | $32.0^{ab}$ |
| $V_1T_2$ | $21.0^{cd}$ | $1.4^{bc}$ | $4.0^{bc}$ | 1.3cd | $60.3^{b}$ | $3.7^{bc}$ | $6.5^{a}$ | $2.5^{a}$ | $4.0^{c}$ | $1.2^{a}$ | $0.4^{a}$ | $3.7^{d}$ | $21.0^{b}$ |
| $V_1T_3$ | $20.3^{cd}$ | $1.2^{c}$ | $6.8^{ab}$ | $1.0^{cd}$ | $57.0^{b}$ | $4.3^{bc}$ | $7.1^{a}$ | $1.6^{a}$ | $4.0^{c}$ | $1.0^{a}$ | $0.4^{a}$ | $5.0^{d}$ | $23.0^{b}$ |
| $V_1T_4$ | $36.7^{ab}$ | $2.3^{ab}$ | $9.7^{a}$ | $3.1^{a}$ | $131.0^{a}$ | $15.0^{a}$ | $8.3^{a}$ | $2.7^{a}$ | $40.0^{a}$ | $1.6^{a}$ | $0.5^{a}$ | $64.0^{a}$ | $28.0^{b}$ |
| $V_1T_5$ | $14.3^{d}$ | $1.0^{c}$ | $2.7^{c}$ | $0.7^{d}$ | $37.3^{b}$ | $2.0^{bc}$ | $5.4^{a}$ | $2.0^{a}$ | $8.0^{c}$ | $1.1^{a}$ | $0.3^{a}$ | $12.7^{d}$ | $20.0^{b}$ |
| $V_2T_1$ | $37.0^{ab}$ | $2.4^{a}$ | $10.0^{a}$ | $2.7^{ab}$ | $116.3^{a}$ | $12.7^{a}$ | $9.1^{a}$ | $3.1^{a}$ | $16.0^{bc}$ | $1.8^{a}$ | $0.6^{a}$ | $35.3^{b}$ | $54.0^{a}$ |
| $V_2T_2$ | $21.0^{cd}$ | $1.4^{c}$ | $4.5^{bc}$ | $1.9^{bcd}$ | $65.7^{b}$ | $4.0^{bc}$ | $5.5^{a}$ | $2.2^{a}$ | $5.0^{c}$ | $0.8^{a}$ | $0.4^{a}$ | $4.0^{d}$ | $31.0^{ab}$ |
| $V_2T_3$ | $21.3^{cd}$ | $1.4^{bc}$ | $7.0^{ab}$ | $1.6^{bcd}$ | $68.3^{b}$ | $6.0^{b}$ | $7.0^{a}$ | $2.5^{a}$ | $5.0^{c}$ | $1.1^{a}$ | $0.5^{a}$ | $6.7^{d}$ | $34.0^{ab}$ |
| $V_2T_4$ | $40.0^{a}$ | $2.4^{a}$ | $9.9^{a}$ | $2.0^{abc}$ | $140.3^{a}$ | $13.0^{a}$ | $9.2^{a}$ | $3.3^{a}$ | $31.0^{ab}$ | $1.7^{a}$ | $0.6^{a}$ | $62.7^{a}$ | $40.0^{ab}$ |
| $V_2T_5$ | $24.0^{bcd}$ | $1.1^{c}$ | $5.2^{bc}$ | $1.0^{cd}$ | $61.0^{b}$ | $5.0^{bc}$ | $8.0^{a}$ | $3.0^{a}$ | $40.0^{a}$ | $1.9^{a}$ | $0.5^{a}$ | $16.3^{cd}$ | $29.0^{b}$ |
| Level of sig. | ** | NS | NS | ** | ** | NS | ** | ** | ** | NS | NS | ** | NS |

Legends: ** = 1% significance level, * = 5% significance level, NS = non-significance level.

**Number of fruits per plant**

Interaction of variety and medium significantly impact the number of fruits. The higher number of fruit (40.33) was collected from the combination of $V_1T_4$ (Bizlee plus × vermicompost) followed by V2T5 (Green fire × trichocompost) and the lowest number of fruit (3.67) was collected from $V_1T_3$ (Bizlee plus × cocopeat) followed by V1T2 (Bizlee plus × cocopeat) (Table 01 and Figure 01).

**Single fruit weight per plant (g)**

The interaction of variety and medium had non-significant influence on the weight of single fruit. The highest weight (1.93 g) was recorded on $V_2T_5$ (Green fire × trichocompost), followed by $V_2T_1$ (Green fire × control) and the lowest weight (0.8 g) was measured on $V_2T_2$ (Green fire × cocopeat) followed by $V_1T_3$ (Bizlee plus × compost) (Table 01).

**Single dry fruit weight (g)**

The interaction between variety and medium had no significant effect on dry weight. The highest dry weight (0.57 g) was found in the treatment combination of $V_2T_1$ (Green fire × control), followed by dry weight (0.55 g) from $V_2T_4$ (Green fire × vermicompost) and the lowest dry weight (0.34 g) found in the combination of treatment of $V_1T_5$ (Bizlee plus × trichocompost) (Table 01).

**Yield per plant (g)**

The interaction between variety and medium had significant effect on yield. The highest yield (64 g) found in the treatment combination of $V_1T_4$ (Bizlee plus × vermicompost), followed by yield (62.67 g)


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from the combination of $V_2T_4$ (Green fire × vermicompost) and the lowest yield (3.67 g) found in the combination of treatment of $V_1T_2$ (Bizlee plus × cocopeat) (Table 01 and Figure 01).

**Number of seeds per fruit**

The interaction between variety and medium had non-significant effect on seed number per fruit. The highest number of seeds (54) was found in the treatment combination of $V_2T_1$ (Green fire × control) followed by $V_2T_4$ (Green fire × vermicompost) and the lowest seeds (20) was found in the combination of treatment of $V_1T_5$ (Bizlee plus × trichocompost) (Table 01).

**Traits association**

**Principle Component Analysis (PCA)**

Principle component analysis (PCA) is computing the principal components. It is commonly used for dimensional reduction by projecting each data point onto only the first principal components to obtain lower dimensional data while preserving as much of its variation as possible. In PCA, the eigenvalues and variances among the components were estimated in Table 02. Among the total variances in PCA, 86.17% were recorded in 1st component 13.82% in 2nd component. In the 1st component, all traits are positively identified viz. plant height, stem diameter, leaf length, petiole length, number of leaves per plant, number of branches per plant, fruit length, fruit diameter, number of fruits per plant, single fruit weight, single dry fruit weight, yield per plant and number of seed per fruit. In the 2nd component, number of leaves per plant, fruit length, fruit diameter, number of fruits per plant, single fruit weight, single dry fruit weight, and number of seeds per fruit were positively contributed. Plant height, stem diameter, leaf length, and petiole length were negatively correlated. Two chilli varieties with five growing mediums were categorized into four groups in the score (Figure 02) and loading plots of PCA (Figure 03). These were categorized based on how similar they were to one another and where they were located throughout the several quadrants.

**Table 02. Component loadings for thirteen phenotypic expressions based on eigen value, factor scores, and contribution of the first two principal component axes by PCA.**

| Variables | Eigenvectors | |
|---|---|---|
| | PC1 | PC2 |
| Plant height | 0.325 | -0.097 |
| Stem diameter | 0.303 | -0.142 |
| Leaf length | 0.298 | -0.202 |
| Petiole length | 0.255 | -0.380 |
| Number of leaves per plant | 0.316 | 0.220 |
| Number of branches per plant | 0.308 | -0.274 |
| Fruit length | 0.282 | 0.208 |
| Fruit diameter | 0.262 | 0.307 |
| Number of fruits per Plant | 0.210 | 0.149 |
| Single fruit weight per Plant (g) | 0.246 | 0.471 |
| Single dry fruit weight (g) | 0.246 | 0.436 |
| Yield per plant | 0.288 | -0.194 |
| Number of seed per fruit | 0.240 | 0.210 |
| Eigen value | 8.917 | 1.431 |
| % Variation explained | 86.17 | 13.82 |

PC1: First principal component; PC2: Second principal component.

**Correlation analysis**

The correlation among different plant parameters is presented in Table 03. These results indicated that growth and yield of chilli depend on plant height, stem diameter, leaf length, petiole length, number of leaves per plant, number of branches per plant, fruit length, fruit diameter, number of fruits per plant, single fruit weight, single dry fruit weight, yield per plant and number of seed per fruit. At 1% level of significance (r = 0.95 to 0.46), the correlation showed that growth and yield of chilli had significant and positive correlation with stem diameter (r = 0.906), leaf length (r = 0.895), number of leaves per plant (r = 0.955), number of branches per plant (r = 0.917), fruit length (r =0.795), total number of fruit (r = 0.560), fresh fruit weight (r = 0.651), dry fruit weight (r = 0.636), number of seed/ fruit (r = 0.655) and Yield (r= 0.855). At 5% significance level (r = 0.45 to 0.31), 6 expressions were positively correlated and only one expression indicated non-significance level.

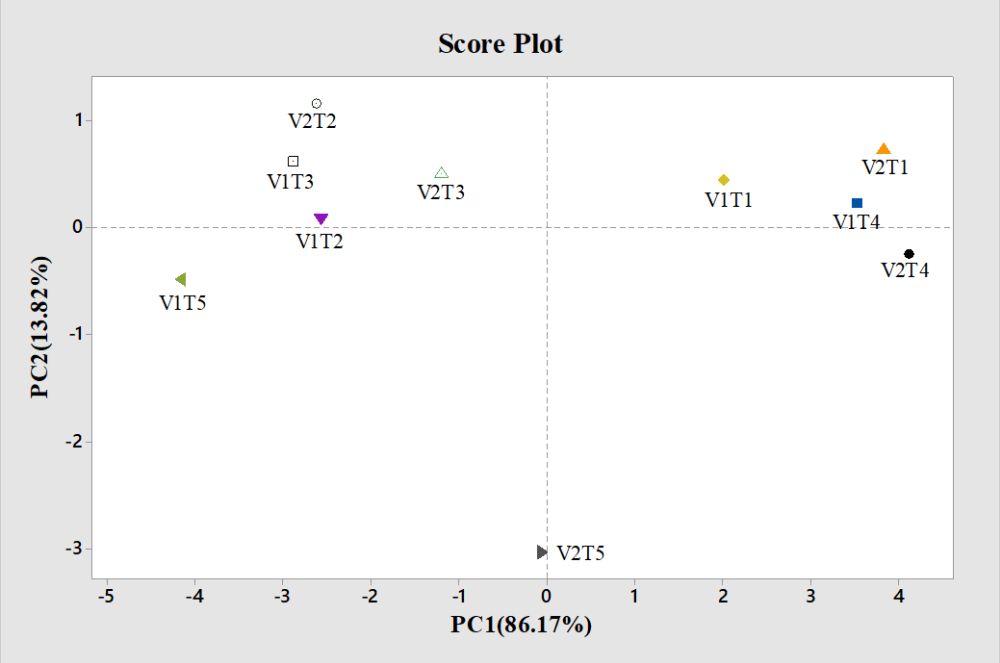


**Figure 02. Score plot from PCA distributes the combination of variety & treatment based on vegetative and reproductive traits.**

Legends, $V_1$- Bizlee plus, $V_2$- Green fire; $T_1$- Control (soil), $T_2$- Cocopeat, $T_3$-Compost, $T_4$- Vermicompost, $T_5$-Trichocompost

**Table 03. Correlation of thirteen vegetative and reproductive traits.**

| Traits | PH | SD | LL | PL | NFLP | NFBP | FL | FD | NFFP | SFW | SDFW | YPP | NFSF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 1 | | | | | | | | | | | | |
| SD | 0.906 | 1 | | | | | | | | | | | |
| LL | 0.895 | 0.799 | 1 | | | | | | | | | | |
| PL | 0.767 | 0.767 | 0.751 | 1 | | | | | | | | | |
| NFLP | 0.955 | 0.887 | 0.884 | 0.819 | 1 | | | | | | | | |
| NFBP | 0.917 | 0.851 | 0.909 | 0.829 | 0.953 | 1 | | | | | | | |
| FL | 0.795 | 0.668 | 0.781 | 0.511 | 0.720 | 0.664 | 1 | | | | | | |
| FD | 0.732 | 0.641 | 0.592 | 0.462 | 0.631 | 0.561 | 0.845 | 1 | | | | | |
| NFFP | 0.560 | 0.427 | 0.405 | 0.343 | 0.553 | 0.571 | 0.469 | 0.499 | 1 | | | | |
| SFW | 0.651 | 0.567 | 0.472 | 0.311 | 0.553 | 0.521 | 0.663 | 0.692 | 0.657 | 1 | | | |
| SDFW | 0.636 | 0.587 | 0.544 | 0.375 | 0.567 | 0.510 | 0.687 | 0.627 | 0.472 | 0.856 | 1 | | |
| YPP | 0.855 | 0.798 | 0.746 | 0.646 | 0.890 | 0.895 | 0.593 | 0.517 | 0.706 | 0.561 | 0.497 | 1 | |
| NFSF | 0.655 | 0.706 | 0.619 | 0.437 | 0.587 | 0.569 | 0.636 | 0.654 | 0.211 | 0.549 | 0.673 | 0.421 | 1 |

Legends, Black color showed 1% level of significance; Green color showed a 5% level of significance; Blue color showed non-significance. PH- Plant height; SD- Stem diameter; LL- Leaf length; PL- Petiole length; NFLP- Number of leaves per plant; NFBP- Number of branches per plant; FL- Fruit length; FD- Fruit diameter; NFFP-Number of fruits per plant; SFW- Single fruit weight; SDFW- Single dry fruit weight; YPP- Yield per plant; NFSF- Number of seed per fruit.

## IV. Discussion

The best effect of different growth media on growth parameters of chilli was recorded, like plant height, stem diameter, leaf length, petiole length, number of leaves per plant, number of branches per plant and yield contributing characters. Treatment $T_4$ (vermicompost) was best in most cases and it was also observed that there was a fewer difference between $T_3$ (compost) and $T_5$ (trichocompost) but wide difference was recorded in $T_2$ (cocopeat) compared to the $T_1$ (control). Plant height was affected by different growth media in chilli. Highest plant height was recorded in $T_4$ (vermicompost). Vermicompost has been scientifically demonstrated to be a miraculous plant growth promoter. (Rao et al., 2015; Kumar et al., 2016). There is a notable difference in stem length and diameter between vermicompost treated plants and other treated plants. A considerable increase in stem length and diameter was recorded in vermicompost treated plants. When compared to control and other treated plants length and diameter of the stem of plants treated with vermicompost was significantly higher (Ansari and Kumar, 2010). The present study reflects that the leaf length, petiole length, number of leaves, number of branches per plant gradually onward in $T_4$ (Vermicompost). The petiole length with

the leaf length was recorded in vermicompost-treated plant compared to control. During the experimental period, the maximum number of branches were grown in vermicompost treated plants compared to the control and other treated plants (Rekha et al., 2018). The maximum number of leaves observed in vermicompost treated plants (Kaur et al., 2015)

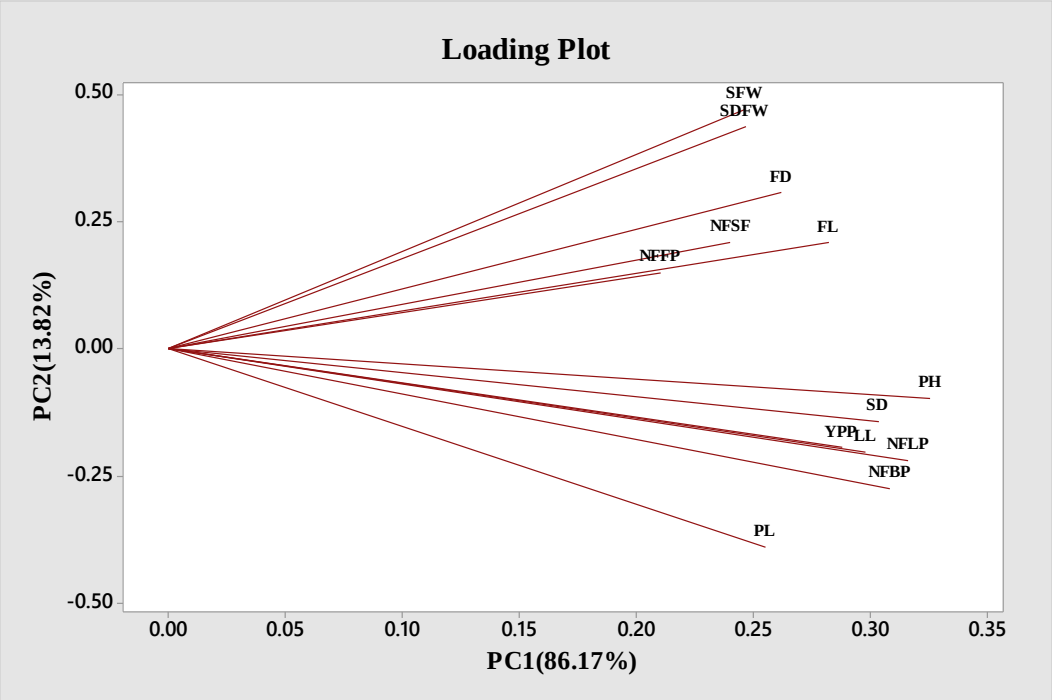


**Figure 03. Loading plot from PCA, distribute the combination of variety & treatment based on vegetative and reproductive traits.**

Legends, PH- Plant height; SD- Stem diameter; LL- Leaf length; PL- Petiole length; NFLP- Number of leaves per plant; NFBP- Number of branches per plant; FL- Fruit length; FD- Fruit diameter; NFFP-Number of fruits per plant; SFW- Single fruit weight; SDFW- Single dry fruit weight; YPP- Yield per plant; NFSF- Number of seeds per fruit.

In this study, plant height, stem diameter, leaf length, petiole length, number of leaves per plant, number of branches per plant also affected between $T_3$ (compost) and $T_5$ (trichocompost). Here, most plant height was observed in $T_5$ (trichocompost), but less stem diameter was measured. But the highest plant height was measured by applying trichocompost followed by compost (Rahman et al., 2010). Trichocompost alone treatment showed an adverse effect on vegetative and reproductive growth of chilli (Rapar, 2019). The maximum number of leaves per plant was recorded in trichocompost treatment and the lowest was recorded in control (Rahman et al., 2010) and other parameters showed a good response in $T_3$ (compost).

the efficacy of different growth media on growth & yield of chilli was conducted by degree of reproductive traits such as fruit length, fruit diameter, number of fruits per plant, single fruit weight per plant, single dry fruit weight per plant, yield per plant etc. among these five treatments. The highest yield was produced in $T_4$ among T1 T5, T3 and T2 in reproductive traits. It can be mentioned that vermicompost is suitable for better production of chilli or any crops. Because of, it may increase the fertility and productivity of soil. Mention that the significant increase in fruit length of chilli plants was measured in plots treated with vermicompost (Kaur et al., 2015).

The maximum fruit diameter recorded in vermicompost treated plant compared to control (Bahrampour, 2013). It also noted the maximum weight of fruit per plant in vermicompost treatment compared to soil (Reddy et al., 2017). It also added that by Reddy, the maximum dry weight of fruit per plant was similarly observed in vermicompost treated plant compared to soil. By using vermicompost, an increase in the yield of certain vegetable crops such as brinjal, okra and tomato has been conducted by kaur et al. (2015).

Growth enhancing activity of trichocompost in this experiment, the report of Rahman et al. (2010) showed that trichocompost treatment plants produce higher percentages of chilli and ripe pepper

based on the results than compost. On the other hand, Rini et al. (2006) conducted an experiment wherthey reported that adding trichocompost to the soil could enhance the production of the pepper crop. Besides, Hossain et al. (2022) conducted another experiment and they observed compost has a citable effect on fruit length and fresh root weight.

Growth and yield of chilli was highly affected by $T_2$ where used cocopeat in this experiment. Uttekar et al. (2021) who showed that cocopeat treatment plants produce higher percentages of chilli. They also reported that the single weight of fruit was most against soil. Another study examined by Valiki, S.R.H. and Ghanbari, S. (2015) observed that fruit weight was maximum by adding manure to cocopeat to improve physical and biological conditions and create a helpful environment for growth. At a significance level of 5%, the production of eggplant discovered a negative relationship between fruit output per plant and average fruit weight (Sabatino, 2013). The results indicated that growth and yield of chilli depend on plant height, number of leaves per plant, number of flowers, number of fruits, fresh fruit weight, dry fruit weight and hundred seed weight. The results fully agreed with the findings of Rahman et al. (2010). Geneticists use correlation analyses to determine the links between similar outcomes (Oboh and Fakorede, 1990).

## V. Conclusion

The different growth mediums were affected by growth parameters and yield attributes of chilli. High water holding capacity causes poor air-water relationship, leading to reduced aeration within the medium, thus affecting the oxygen diffusion to the roots. These attributes could have driven retarded growth. It can also be concluded that compost produced by bacteria and kitchen waste has high nutrient values, reducing chemical fertilizer application. Trichocompost is eco-friendly, but chilli production in this medium is not significant. The growth and yield of chilli were significantly increased in vermicompost medium, which significantly positively correlated with growth parameters and yield. However, in the present study, the best variety was $V_2$ (Green fire) and the best treatment was $T_4$ (vermicompost). The combination of treatments $V_1T_4$ (Bizlee plus × vermicompost) produced the best higher growth and yield than other treatments.

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