

Effect of different types of nutrient media in growth performance of Chilli (*Capsicum annuum* L.) seedlings in Doti district

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Abstract - Chilli (*Capsicum annuum* L.) is a vegetable cum spices crop belonging to the Solanaceae family. The goal of this study was to explore how different forms of nutritional media affected the growth and health of chili seedlings. This research was carried out for 45 days in an open poly-house at "Hariyali Tarkari Tatha Tasupancchi Farm", Silgadhi, Doti. The research study employed an RCBD (Randomized Complete Block Design) with three replications and seven treatments. The nutrients media (treatments) used were, T1 (control), T2 (cocopeat), T3 (vermicompost), T4 (cocopeat + vermicompost), T5 (vermicompost + FYM), T6 (cocopeat + FYM) and T7 (cocopeat + vermicompost + FYM). Seedlings were planted in portrays. The data were analyzed using ANOVA in R-studio software, followed by an LSD test to separate the means. The analysis revealed significant differences among the treatments, with the highest plant height (6.2 cm), number of leaves (5.8), fresh weight (0.498 g), and dry weight (0.225 g) observed in T5 (vermicompost + FYM). Notably, plant height in T1 was 5.82 cm, the number of leaves in T5 was 5.87, and fresh weight in T3 was 0.498 g, all of which differed from the control treatment (T1). Furthermore, the earliest germination was observed 11 days after sowing, with T5 exhibiting the highest germination percentage (97.33%), closely followed by T7 (96.67%). These findings underscore that the combination of vermicompost and FYM in T5 significantly outperforms other treatments in promoting the growth and health of chili seedlings. Consequently, we recommend T5 (vermicompost + FYM) as the optimal nutrient medium for cultivating chili seedlings.

Keywords - FYM, Germination, Treatments, Vermicompost, Cocopeat, Seedlings, Medium

1. Introduction

Chilli (*Capsicum annuum* L., $2n=2x=24$), a member of the Solanaceae family along with tomatoes and potatoes, is both a vegetable and spice crop known for its hot, pungent flavor (Narayan et al., 2019; Mehta, 2017). Commonly referred to as 'Mircha' or 'Marcha,' the term capsicum is derived from the Greek word 'Kapsimo,' meaning 'to burn.' The chilli's pungency is attributed to capsaicin, which binds to pain receptors, while capsanthin, an antioxidant, gives the fruit its red color (Mishra, 2020). Chilli is indispensable in kitchens worldwide, used daily as a condiment, and has been valued for its flavor, spice, and nutritional contributions

to various meals (Rosli et al., 2013). Originating from the northern Amazon basin and native to Central and South America, chillies were used by Indigenous peoples long before Columbus arrived in the Americas (Mishra, 2020; Mehta, 2017).

Chili cultivars spread globally following the Columbian exchange, becoming integral to food and traditional medicine. Historically, chillies existed solely in the Americas until 1492, ranging from the southern USA to Argentina. Today, Peru is the center of chilli diversity, boasting the widest variety of cultivated *Capsicum* spp. Chilli production has expanded to Asia due to its commercial value and similarity to black pepper, a staple in Asian spice trade routes. India leads global production, producing 42% of the world's chillies, followed by China, Ethiopia, Indonesia, Thailand, Pakistan, and Bangladesh (FAOSTAT, 2021). In Nepal, the chilli-producing area spans 9,077 hectares, yielding 87,921 metric tons with a productivity of 9.69 metric tons per hectare, showing an increasing trend in national production despite fluctuations in yield and cultivation area (MoALD, 2021). The diverse agroecology of regions such as the Doti district supports a variety of crops, including chilli, which is cultivated on 205 hectares, yielding 1640 metric tons with a productivity of 8.00 metric tons per hectare.

Seedling production in nurseries has transitioned from traditional raised beds to protected structures, ensuring quality and uniform growth with fewer pests and diseases (Patil et al., 2017; Narayan et al., 2019). Growing media, crucial for root development and nutrient absorption, include soil mixtures, cocopeat, and compost, which enhance water absorption, nutrient availability, and aeration, thereby promoting germination (Rosli et al., 2013). The choice of growing media, such as vermicompost, vermiculite, perlite, and cocopeat, impacts various growth parameters, including plant height, leaf number, and yield (Dayeswari et al., 2017; Bhandari & Khanal, 2019). Studies have demonstrated that soil supplemented with organic matter provides better nutrient availability and less susceptibility to pests and diseases, making it suitable for raising healthy seedlings (Yadav et al., 2020; Roy & Kashem, 2014).

Research indicates that specific media combinations, such as [vermicompost + soil + farmyard manure (1:1:1)] and [tea waste + sand + coir dust (5:5:5)], significantly enhance seed germination and seedling growth (Verma & Singh, 2015; Dahanayake et al., 2012). For chilli cultivation, the recommended growth media include [vermiculite + perlite + vermicompost (1:1:2)], which has shown positive effects on plant growth and reduced pest incidence (Mahala & Sharma, 2022). Additionally, the premium hybrid variety NS1701, known for its high yield and virus tolerance, is recommended for cultivation in Terai and mid-hill regions, maturing in 75-85 days with a yield of 80-90 mt/ha (MoALD, 2022).

Our research aims to identify optimal growing conditions that enhance seedling vigor, thereby improving overall crop yield i.e. suitable nutrient media for growth, and enhancing the academic standards of learners. This research is particularly relevant for seedling growers, farmers, technicians, and future researchers, providing insights into effective nursery management practices and contributing to the academic advancement of students and learners. The study's objectives include comparing the morphological characteristics of

seedlings in different media, determining the most. The study is limited by factors such as changing weather conditions, a variety of available growing media, and resource constraints. It provides valuable information on improving chilli seedling health through better nursery practices. This, in turn, has the potential to boost chilli production and productivity, thereby supporting the agricultural development of regions like the Doti district.

2. MATERIALS AND METHODS

2.1 Site selection

Doti district, located in Sudurpaschim Province with the district headquarters at Silgadhi, lies at an elevation of 600-2,430 masl and is situated at 29°12'38.9" North and 81°1'22.19" East. Subsistence agriculture farming, primarily small-scale livestock, is the main source of occupation (DDC, 2019). Doti is especially known for oranges, limes, pulses, and soybeans. The total area of chili production in the Doti district is 205 ha, with production and productivity of 1,640 mt and 8.00 mt/ha, respectively (MoALD, 2021).

The experiment was conducted at Dipayal Silgadhi Municipality-5, "Hariyali Tarkari Tatha Pashupanchhi Farm", Silgadhi, Doti. The experiment was performed under polyhouse conditions. The soil condition of this farm is mostly sandy to sandy to silt and dry.

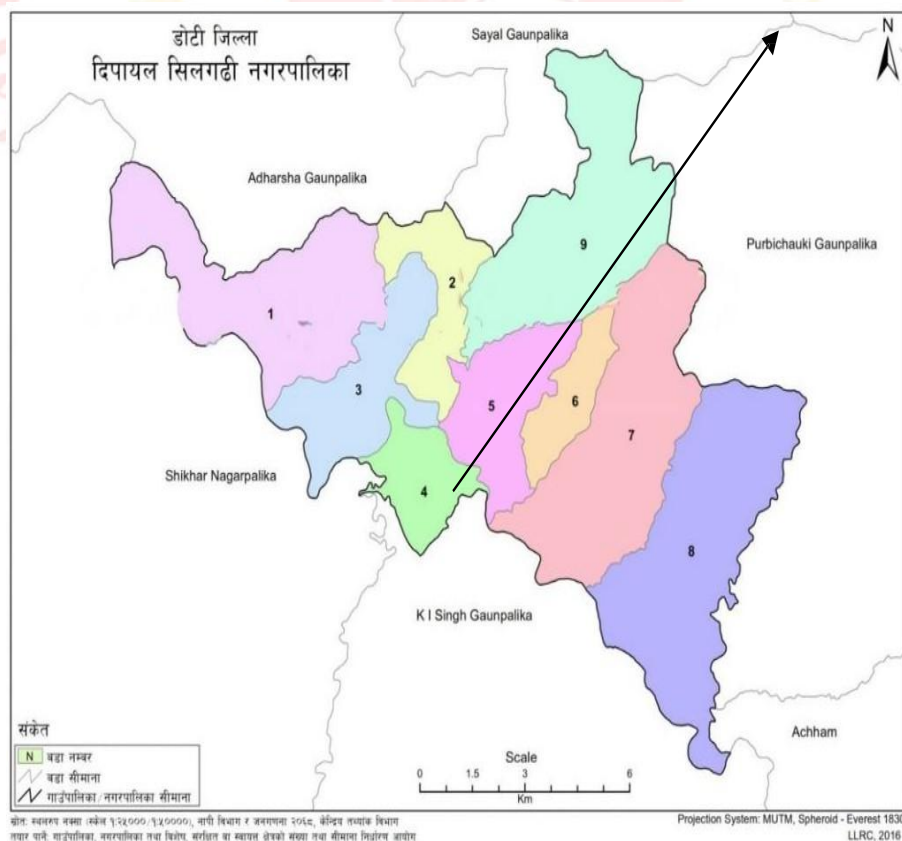


Figure 1. Location of the experimental site

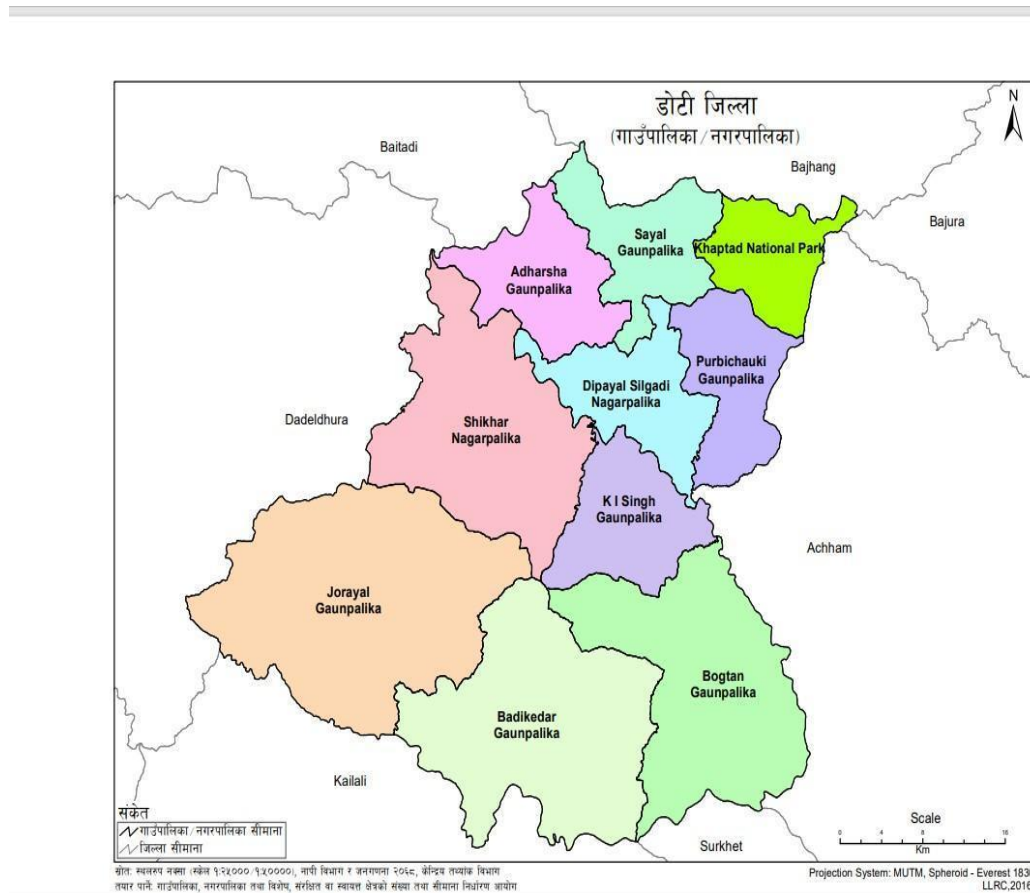


Figure 2. Research area, Doti district

2.2 Soil and climatic conditions

In Doti, most of the soil is sandy and silty with a pH range between 6.5-7.5. The nutrient content in the research field includes Organic Matter 4.02%, nitrogen 0.2%, phosphorus 116.5 kg/ha, and potassium 288 kg/ha (Soil and Fertilizer Testing Laboratory, 2021). Silgadhi, Doti, has a subarctic climate with dry winters and cool summers. The yearly average temperature in the Doti district is 22.61°C, with an annual high of 27.67°C and an annual low of 12.16°C. The warmest month is May, with an average temperature of 34.01°C, and the coolest month is January, with an average temperature of 3.31°C. The average annual precipitation in the Doti district is 170.04 mm (6.69 inches), with an average relative humidity of 54.76%.

2.3 Sample size and sampling techniques

In our experiment, there are 50 plant populations in each individual plot. 5 plant samples were taken by the simple random sampling method from each tray, resulting in a total of 105 (5 x 21) samples from our experiment. Samples were taken in an X-model, leaving the border lines.

2.4 Research design

Our research was conducted under polyhouse conditions at Dipayal Silgadhi Municipality-5, “Hariyali Tarkari Tatha Pashupanchhi Farm,” Silgadhi, Doti. The experiment was carried out in a randomized complete block design (RCBD) with three replications and seven treatments. The research was prepared in plastic seed trays, and each individual tray was considered a treatment. There were seven treatments in total, each replicated three times, resulting in 21 individual plots. The treatment or media for seedlings was prepared using FYM, cocopeat, vermicompost, and their mixtures in appropriate ratios.

Table 1: Treatments details

S.N.	Treatments	Doses	Notation
1.	Control	1.4 kg	T1
2.	Cocopeat	1.2 kg	T2
3.	Vermicompost	1.4 kg	T3
4.	Cocopeat + Vermicompost	0.6 kg + 0.7 kg	T4
5.	Vermicompost + FYM	0.7 kg + 0.7 kg	T5
6.	Cocopeat + FYM	0.6 kg + 0.7 kg	T6
7.	Cocopeat + Vermicompost + FYM	0.3 kg + 0.35 kg + 0.7 kg	T7

2.5 Methodological activities

Procurement of all required materials (Measuring tape, Bucket, plain plastic, Weighing balance, Plastic seed tray, Chilli seed (var. NS 1701), Cocopeat, Farmyard manure, Vermicompost, and others) from the nearby pesticide retailer shop. The experiment was conducted under polyhouse conditions in plastic seedling trays. Each tray was considered a treatment. The tray size was 54 cm x 28 cm (length x breadth). There were three replications and seven treatments. The total experimental area required was 6.0497 m² to install the trays. In the experiment, there was no spacing between trays (plots), but there was a spacing of 10 cm between replications, leaving a border space of 10 cm. Seven treatments were employed in our research, using soil, cocopeat, vermicompost, FYM, and their different compositions. Each treatment was prepared according to the requirements of our research.

2.6 Preparation of treatments

2.6.1 Treatment T1 (Control)

For control treatments, the field was dug 15 to 20 cm. The soil was cleaned and made fine, then, used to fill the trays.

2.6.2 Treatment T2 (Cocopeat)

Cocopeat blocks were soaked in water for several minutes to hours. After soaking, the dry block retained water and broke down into fine pieces, which hydrated the media and made it easy to work with. The soaked cocopeat was taken out of the water, excess moisture was

removed, and it was ready to use.

2.6.3 Treatment T3 (vermicompost)

Good-grade vermicompost was brought for use. Clods were broken and made fine by sieving, then used to fill the tray.

2.6.4 Treatment T4 (cocopeat + vermicompost)

For this treatment, 0.6 kg cocopeat and 0.7 kg vermicompost were mixed properly, and the trays were filled with the mixture.

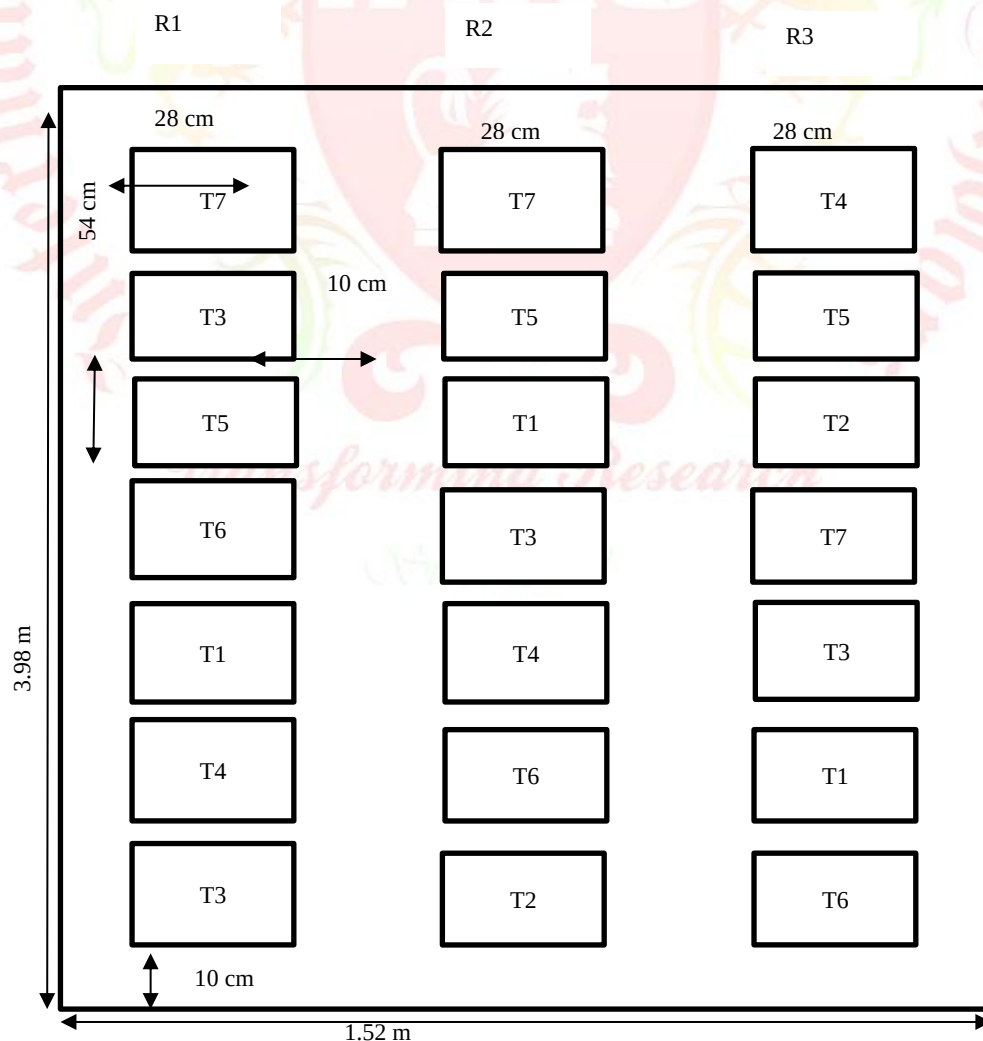
2.6.5 Treatment T5 (vermicompost + FYM)

Well-decomposed FYM was brought, and unwanted materials like stones and plastic were filtered out. FYM was made fine, then 0.7 kg FYM and 0.7 kg vermicompost were mixed and used to fill the tray.

2.6.6 Treatment T6 (cocopeat + FYM)

For this treatment, 0.6 kg cocopeat and 0.7 kg FYM were mixed properly, and the mixture was poured into a tray.

2.6.7 Treatment T7 (cocopeat + vermicompost + FYM) In this treatment, 0.3 kg cocopeat, 0.35 kg vermicompost, and 0.7 kg FYM were combined and used to fill the tray.



2.7 Observations and Observation Methods

Collecting detailed and precise data is essential for every research endeavor. Observation is the process of acquiring data by watching behavior, events, or physical features in their natural environment. Observation can be overt, in which participants acknowledge they are being watched, or covert in which the observer is concealed and the participants are oblivious. Observation has the benefit of encouraging people to act naturally while they are unaware they are being watched to assess. For the evaluation of the performance of different nutrient media, germination data, and physical data were collected from tagged plants at various intervals according to the experiment design. Several parameters were painstakingly documented as follows.

2.7.1 Germination percentage (%)

To determine the germination percentage, the numbers of plants were counted at 15 DAS, 20 DAS, and 30 DAS. The number of plants germinated in each tray was counted, and the germination percentage for each treatment was calculated. Additionally, the number of plants observed was recorded to determine the time of first germination in the field.

2.7.2 Height of seedlings (cm)

The height of seedlings was measured three times at 20 DAS, 30 DAS, and 40 DAS. The measurements were taken using a measuring scale.

2.7.3 Number of leaves

Data on the number of leaves were collected through direct observation in the research field. The leaves of the sampled plants were counted at 20 DAS and 40 DAS.

2.7.4 Fresh weight (g)

The fresh weight of the plants was measured using a digital weighing balance at the time of transplanting, i.e., 40 DAS. Sampled seedlings were pulled out along with their full root system and cleaned to remove the growing media. The fresh weight was then measured and recorded.

2.7.5 Dry weight (g)

After measuring the fresh weight, the seedlings were shade-dried for 72 hours (3 days). The dry weight was then measured using a pocket scale (digital weighing balance).

2.8 Data analysis and techniques

2.9

After experimenting, various data were collected according to the research requirements. These data were noted in notebooks and later organized using MS Excel. The data were systematically arranged based on the observed parameters. At the end of the research, the data were analyzed using the R-program (R-STUDIO). The ANOVA table for the RCBD design with seven treatments and three replications is presented in Table 5.

Table 2. ANOVA table

Source of Variance	Degree of Freedom (df)	The sum of Square (SS)	Mean Sum of Square (MSS)	Calculated 'F' Value	Tabulated 'F' value	
					0.05	0.01
Replication (r)	r-1	SSr	MSr	MSr/MSe		
Treatment (t)	t-1	SSt	MSt	MSt/MSe		
Error (e)	(r-1)(t-1)	SSe	MSe			
Total (T)	rt-1	SST	MST			

3 RESULTS AND DISCUSSION

3.1 Germination percentage (%)

The findings of the current investigation, as shown in Table 3, show considerable differences in seed germination across different growth conditions. The initial germination count was performed 15 days after sowing (DAS). The greatest germination percentage (74%) was seen in treatment T5 (vermicompost + FYM), followed by T2 (73.33%) and T6 (65.33%). The lowest germination percentage (45.33%) was found in treatment T4 (cocopeat + vermicompost).

At 20 DAS, the highest germination percentage (86%) was observed in T5 (vermicompost + FYM), which was statistically equivalent to T2 (86%). In contrast, the lowest germination rate (72%) was obtained in T3 (vermicompost), which was statistically comparable to T4 and T6.

The greatest germination rate (97.33%) at 30 DAS was observed in T5 (vermicompost + FYM), which was statistically equivalent to T7 (96.67%). At this stage, T3 (vermicompost) had the lowest germination rate (78%). Regular field inspections revealed that the first germination occurred 11 days after sowing.

Bhandari and Khanal (2019) found that cocopeat had the maximum seed germination percentage (95%). Verma and Singh (2015) discovered that the maximum germination percentage (64%) of pyrethrum was achieved in vermicompost + soil + FYM (1:1:1). Similarly, Dayeswari et al. (2017) reported a maximum germination percentage (97.78%) in cocopeat + vermicompost + azospirillum + phosphobacteria + *Pseudomonas fluorescens*. Contrary to these findings, our study observed the maximum germination percentage (97.33%) in vermicompost + FYM.

Table 3. Germination percentage in different treatments at different days after sowing

Treatments	Germination percentage (%)		
	15 DAS	20 DAS	30 DAS
T1 (Control)	60.00 ^{cd}	80.67 ^b	83.33 ^d
T2 (Cocopeat)	73.33 ^{ab}	86.00 ^a	93.33 ^b
T3 (Vermicompost)	52.00 ^{de}	72.00 ^c	78.00 ^e
T4 (Cocopeat + Vermicompost)	45.33 ^e	74.67 ^c	88.67 ^c
T5 (Vermicompost + FYM)	74.00 ^a	86.00 ^a	97.33 ^a
T6 (Cocopeat + FYM)	65.33 ^{abc}	74.67 ^c	94.00 ^b
T7 (Cocopeat + Vermicompost + FYM)	64.00 ^{bc}	82.00 ^b	96.67 ^a
SEm(±)	3.177	0.872	0.842
LSD	9.790	2.689	2.594
C.V. %	8.876	1.903	1.617
p-value	***	**	**

Means followed by common letter (s) within column are non-significantly different based on LSD test at P=0.05: LSD, Least Significant Difference; SEm, Standard Error of Mean; CV, Coefficient of Variation; DAS, Days After Sowing; NS, Non-Significant, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance

3.2 Height of seedlings (cm)

The results of the present study, as displayed in Table 4, indicate the height of the seedlings measured with a measuring scale at 20 DAS, 30 DAS, and 40 DAS.

At 20 DAS, the recorded data on seedling height showed no significant difference among different treatments. The average mean height of seedlings at 20 DAS was 1.604 cm. At 30 DAS, the maximum height of seedlings (4.20 cm) was recorded in T5 (vermicompost + FYM), followed by T7 (4.03 cm) and T2 (3.91 cm). The minimum height of seedlings (3.17 cm) was observed in the control treatment. At 40 DAS, the maximum height of seedlings (6.22 cm) was recorded in T5 (vermicompost + FYM), followed by T2 (5.82 cm), which was statistically at par with T3 (5.81 cm). The minimum height of seedlings (4.18 cm) was recorded in the control treatment.

Rosli et al. (2013) reported a maximum height (48.20 cm) of chilli seedlings in soil mixture. Similarly, Singh and Verma (2015) found the tallest seedlings (13.90 cm) in soil + vermicompost + FYM. Dayeswari et al. (2017) observed the maximum height (29.00 cm) of papaya seedlings in cocopeat + vermicompost + *Pseudomonas fluorescens*.

Table 4. Height of seedlings in different treatments on different days after sowing

Treatments	Height of seedlings (cm)		
	20 DAS	30 DAS	40 DAS
T1 (Control)	1.54	3.17 ^e	4.18 ^d
T2 (Cocopeat)	1.77	3.91 ^{abc}	5.82 ^{ab}
T3 (Vermicompost)	1.52	3.83 ^{bcd}	5.81 ^{ab}
T4 (Cocopeat + Vermicompost)	1.38	3.53 ^d	5.16 ^c
T5 (Vermicompost + FYM)	1.52	4.20 ^a	6.22 ^a
T6 (Cocopeat + FYM)	1.52	3.68 ^{cd}	5.46 ^{bc}
T7 (Cocopeat + Vermicompost + FYM)	1.75	4.03 ^{ab}	5.71 ^{abc}
SEm(±)	0.1076	0.1119	0.1886
LSD	0.3317	0.344	0.581
C.V. %	11.618	5.143	5.958
p-value	NS	**	***

Means followed by common letter (s) within column are non-significantly different based on LSD test at P=0.05: LSD, Least Significant Difference; SEm, Standard Error of Mean; CV, Coefficient of Variation; DAS, Days After Sowing; NS, Non-Significant, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance.

3.3 Number of leaves

The results of the present study, as shown in Table 5, indicate the number of leaves counted at 20 DAS and 40 DAS. At 20 DAS, the data showed no significant differences in the number of leaves among different treatments. The average mean number of leaves at 20 DAS was 1.99.

At 40 DAS, the maximum number of leaves (5.87) was recorded in T5 (vermicompost + FYM), followed by T7 (5.67), which was statistically at par with T2, T3, T4, and T6. The minimum number of leaves (4.27) was recorded in the control treatment.

Dayeswari et al. (2017) reported a maximum number of leaves (8.20) in cocopeat + vermicompost + *Pseudomonas fluorescens*. Khatiwada and Adhikari (2020) found the maximum number of leaves (3.90) in rich compost.

Table 5. Number of leaves in different treatments on different days after sowing

Treatments	Number of leaves	
	20 DAS	40 DAS
T1 (Control)	2.00	4.27 ^c
T2 (Cocopeat)	2.00	5.33 ^{ab}
T3 (Vermicompost)	1.93	5.47 ^{ab}
T4 (Cocopeat + Vermicompost)	2.00	4.87 ^{ab}
T5 (Vermicompost + FYM)	2.00	5.87 ^a
T6 (Cocopeat + FYM)	2.00	5.33 ^{ab}
T7 (Cocopeat + Vermicompost + FYM)	2.00	5.67 ^{ab}
SEm(±)	0.0252	0.266
LSD	0.0776	0.82 [*]
C.V. %	2.1926	8.72
p-value	NS	*

Means followed by common letter(s) within column are non-significantly different based on LSD test at P=0.05: LSD, Least Significant Difference; SEm, Standard Error of Mean; CV, Coefficient of Variation; DAS, Days After Sowing; NS, Non-Significant, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance.

3.4 Weight of seedlings

3.4.1 Fresh weight (g)

The data for fresh weight, presented in Table 6, revealed significant differences among the various treatments. The maximum fresh weight (0.498 g) was observed in treatment T5 (vermicompost + FYM), which was statistically comparable to treatment T3 (0.467 g). In contrast, the minimum fresh weight (0.228 g) was recorded in the control treatment.

In the context of fresh weight, Khatiwada and Adhikari (2020) found a non-significant difference among treatments, with a mean weight of 19.67 g. Conversely, research conducted by Dayeswari et al. (2017) reported a maximum fresh weight of 5.22 g in a treatment combining cocopeat, vermicompost, and *Pseudomonas fluorescens*.

3.4.2 Dry weight (g)

The dry weight data, also shown in Table 6, revealed substantial variations across the

treatments. Treatment T5 (vermicompost + FYM) had the highest dry weight (0.225 g), which was statistically comparable to treatment T2 (0.221 g). The control treatment had the lowest dry weight (0.081 g).

A similar study by Verma and Singh (2015) discovered that a blend of soil, vermicompost, and farm yard manure produced the highest dry weight. Furthermore, Bhandari and Khanal (2019) found the maximum dry weight (0.08667 g) in tomato seedlings treated with bio-bacterial compost.

Table 6. Fresh weight and dry weight of seedlings

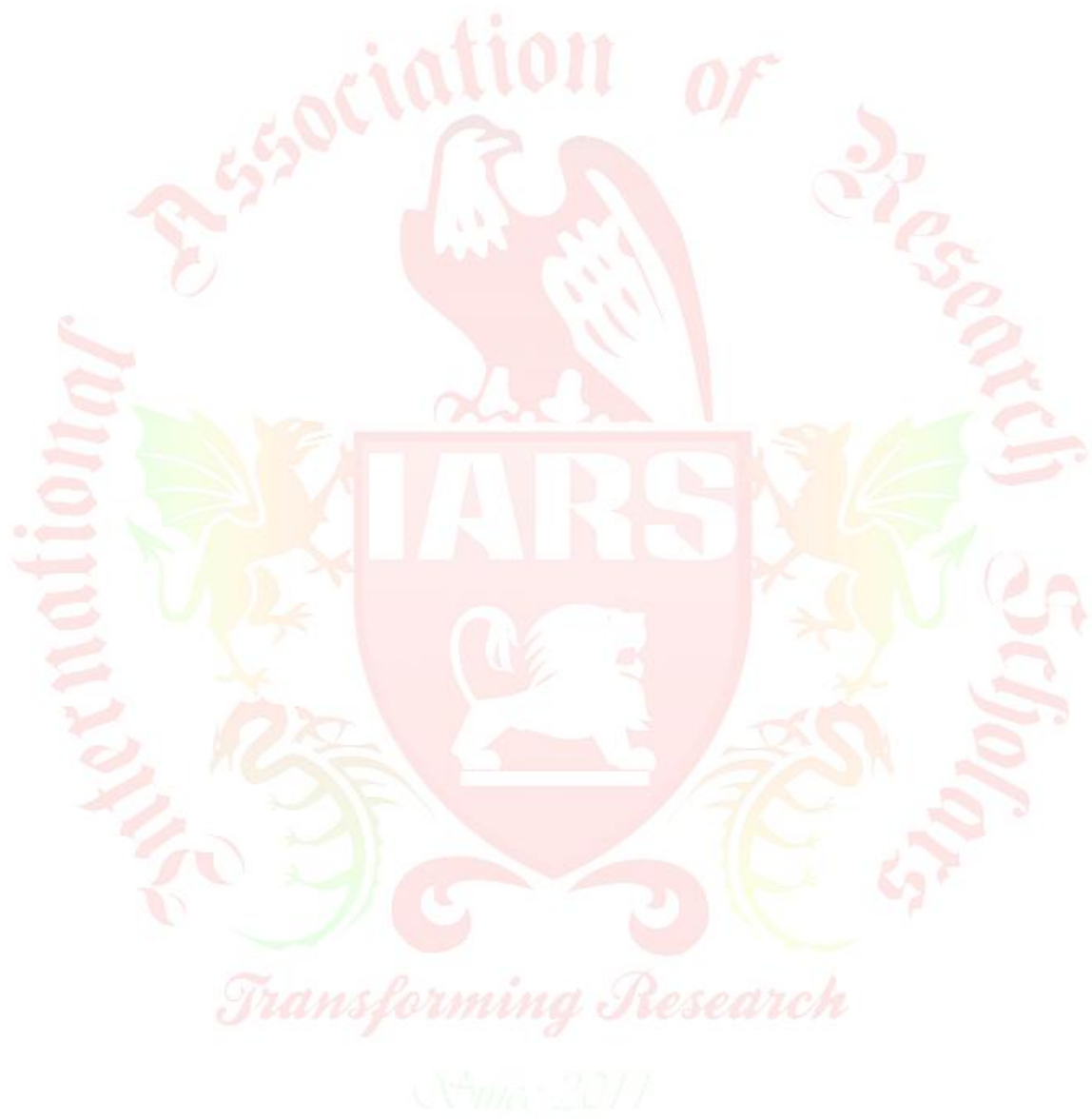
Treatments	Weight of seedlings (g)	
	Fresh weight (g)	Dry weight (g)
T1 (Control)	0.228 ^c	0.081 ^c
T2 (Cocopeat)	0.429 ^{ab}	0.221 ^a
T3 (Vermicompost)	0.467 ^a	0.188 ^{ab}
T4 (Cocopeat + Vermicompost)	0.352 ^b	0.135 ^{bc}
T5 (Vermicompost + FYM)	0.498 ^a	0.225 ^a
T6 (Cocopeat + FYM)	0.421 ^{ab}	0.180 ^{ab}
T7 (Cocopeat + Vermicompost + FYM)	0.467 ^{ab}	0.193 ^{ab}
SEm(±)	0.328	0.027
LSD	0.101	0.084 [*]
C.V. %	13.97	27.09
p- value	**	*
P-value	0.6134	0.8504

Means followed by common letter (s) within column are non-significantly different based on LSD test at P=0.05: LSD, Least Significant Difference; SEm, Standard Error of Mean; CV, Coefficient of Variation; DAS, Days After Sowing; NS, Non-Significant, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance.

3.5 B:C ratio

The B:C ratio is a financial or quantitative indication of a planned project's relative cost and benefits. If a treatment has a B:C ratio greater than 1.0, it is predicted to provide a net present value that is favorable for a company and its inventors. The greater the ratio, the more appealing the project's risk-reward profile. Poor cash flow forecasting or an inappropriate discount price would result in a faulty B:C ratio. The benefit-cost analysis of various therapies was performed using a predetermined formula.

B:C ratio = Gross return/Variable cost



B: C ratio for different treatments is presented in Table 17. From the table, we, the maximum B: C ratio (1.72) was recorded in control followed by T5 (1.33) & T7 (1.14). The minimum B: C ratio (0.707) was recorded in treatment T2 (cocopeat).

Table 7. B: C ratio of different treatments

Treatments	Cost of cultivation (Rs)	Gross income (Rs)	Net income (Rs)	B:C ratio
T1 (Control)	399.96	690	290.04	1.72
T2 (Cocopeat)	939.96	665	-274.96	0.707
T3 (Vermicompost)	609.96	725	115.04	1.118
T4 (Cocopeat + Vermicompost)	774.96	715	-59.96	0.922
T5 (Vermicompost + FYM)	546.96	730	183.04	1.33
T6 (Cocopeat + FYM)	711.96	715	3.04	1.004
T7 (Cocopeat + Vermicompost + FYM)	629.96	720	90.04	1.14

4 . SUMMARY AND CONCLUSION

Nepal, predominantly an agricultural country, derives 23.95% of its national GDP from agriculture, engaging more than two-thirds of its population in this sector. Field research was conducted under polyhouse conditions at "Hariyali Tarkari Tatha Pashupanchhi Farm" in Dipayal Silgadhi Municipality-05, Silgadhi, Doti. The aim was to assess the effect of various nutrient media on the growth performance of chili seedlings. Utilizing plastic seed trays, the experiment followed a randomized complete block design (RCBD) with three replications and seven treatments (T1: control, T2: cocopeat, T3: vermicompost, T4: cocopeat + vermicompost, T5: vermicompost + FYM, T6: cocopeat + FYM, and T7: cocopeat + vermicompost + FYM).

Five parameters were measured: germination percentage, seedling height, number of leaves, fresh weight, and dry weight. Data collection employed simple random sampling using the X-method, excluding border lines, with five seedlings sampled from each treatment. The study revealed significant variations among treatments across all parameters.

The earliest germination was observed 11 days post-sowing. Treatment T5 (vermicompost + FYM) exhibited the highest germination percentage (97.33%), statistically comparable to T7 (96.67%), while the lowest (78%) was seen in T3 (vermicompost). Seedling height peaked in T5 (6.22 cm), followed by T2 (5.82 cm) and T3 (5.81 cm), with the minimum height (4.18 cm)

in the control. Leaf count also varied significantly, with T5 showing the highest number (5.87) and the control the lowest (4.18).

Regarding fresh weight, T5 achieved the maximum (4.98 g), statistically at par with T3 (0.467g), whereas the control had the minimum (0.228 g). Similarly, the highest dry weight (0.225 g) was recorded in T5, and the lowest (0.081 g) in the control. The Benefit-Cost (B-C) ratio was highest in the control (1.72), followed by T5 (1.33) and T7 (1.14), with the lowest in T2 (0.707).

Although the control treatment had the highest BC ratio, the risk of soil-borne diseases was significant. Consequently, treatment T5 (vermicompost + FYM) is recommended due to its superior germination percentage, seedling height, leaf count, fresh and dry weights, and a favorable BC ratio exceeding 1. Thus, T5 is advocated as the optimal nutrient medium for growing chili seedlings.

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