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Effect of different growing media on germination and growth of rhizome buds of turmeric (*Curcuma longa* L.) under shade net condition

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Abstract
The investigation titled "Effect of different growing media on germination and growth of rhizome buds of turmeric (*Curcuma longa* L.) under shade net condition" was carried out in Department of Plantation, Spices, Medicinal and Aromatic Crops, K. D. College of Horticulture and Research Station, Jagdalpur during the Academic year 2024-25. The experiment was conducted under Completely Randomized Design (CRD) with three replications. The experiment was laid out in Completely Rand omized Block Design with nine treatments and three replications. The treatment includes, T_1: Garden soil, T_2: Cocopeat, T_3: Farmyard Manure T_4: Vermi compost, T_5: Garden soil + Cocopeat (1: 1), T_6: Garden soil + Farmyard Manure (1: 1), T_7: Garden soil + Vermi compost (1: 1), T_8: Garden soil +Cocopeat + Vermicompost (1: 1: 1), T_9: Garden soil + Farmyard Manure + Cocopeat (1: 1: 1).
The result indicated that the minimum duration of days taken for germination (10.03 days), 50% germination (4.19 days) recorded under treatment T_8. Significantly maximum data recorded on length of seedling (25.57cm), length of root (13.49 cm), length of shoot (23.32 cm), no. of leaves per seedling (3.85), pseudo stem girth (7.50 cm), was recorded under treatment T_8 whereas, the minimum was recorded under treatment T_1: Garden soil in the virus parameters taken.
Based on the findings of this research work it can be concluded that the performance of turmeric was best when seedlings were grown in T_8 media containing garden soil + coco peat + vermi compost (GS + CC + VC). This media consistently resulted in earlier germination, maximum seedling growth and greater root and shoots length and more number of leave. It also recorded the highest mortality and success percentage, thus proving to be the most effective growing media.

Keywords: Growing media, length, root, rhizome, soil, seedling, stem, turmeric

1. Introduction
Turmeric (*Curcuma longa* L.) is a rhizomatous herbaceous monocot plant belonging to the family Zingiberaceae, under the order scitaminae, is one of the most valuable and important spices of the world. It is widely used as a condiment in culinary preparations, as a colouring agent in textiles, food and confectionary and as a cosmetic in soaps and face creams. It is a natural antiseptic, antibacterial agent and also very strong antioxidant and other medicinal uses. Apart from colouring pigment 'curcumin' and the volatile oil 'turmerol' is also contains appreciable quantity of protein (6.3 %), lipid (5.1 %) and carbohydrate (69.4 %) and is rich in minerals like phosphorous, calcium, iron and vitamin A. India is the largest producer, exporter and consumer of turmeric in the world. Besides India, it is cultivated in Sri Lanka, Indonesia, China, Peru, Jamaica and other tropical and subtropical countries. In India, it is mainly grown in the states of Andhra Pradesh, Orissa, Tamil Nadu, Assam, Kerala, Maharashtra, Karnataka and totally occupying an area of 16 thousand hectares with a production of one lakh metric tons. In Karnataka, Mysore, Belagavi, Kalburgi, Bidar, Vijayapur and Bagalkot.
In India, area under turmeric reported during 2023-24 was 3.50 lakh ha (7.54 lakh acres). Major turmeric cultivating states are Maharashtra 0.89 lakh ha (2.21 lakh acres), Odisha 0.31 lakh ha (0.77 lakh acres), Tamil Nadu 0.25 lakh ha (0.63 lakh acres), Madhya Pradesh 0.24 lakh ha (0.58 lakh acres), Karnataka 0.21 lakh ha (0.51 lakh acres), Telangana 0.18 lakh ha (0.44 lakh acres) and West Bengal 0.18 lakh ha (0.46 lakh acres).

According to Central Government 1" advance estimates, all India turmeric production in 2023-24 is at 10.75 lakh tonnes. Major turmeric producing states are Maharashtra (3.26 lakh tonnes), Karnataka (1.29 lakh tonnes), Telangana (1.17 lakh tonnes), Tamil Nadu (1.14 lakh tonnes), Madhya Pradesh (0.89 lakh tonnes), Odisha (0.69 lakh tonnes) and West Bengal (0.49 lakh tonnes). Till date the National Genotype Repository of Spices at IISR maintains more than 700 accessions of turmeric, including land races, improved varieties, open pollinated progenies (OP), related species and taxa.

Growing media are essential for improving crop productivity in horticulture, as they provide an environment that balances water retention and aeration, supports root development and maintains suitable pH levels for nutrient uptake. Among these, soil remains the most widely used medium because of its low cost and easy availability. However, to enhance its properties, soil is often blended with organic or inert materials such as vermi compost, vermiculite, and coco peat, which improve nutrient supply and seedling growth.

The pH of the growing media greatly influences the successful establishment of seedlings. Generally the coarse textured media provide better drainage and aeration therefore promote better root development. It is reported that compost amended growing media offered clear advantages for improved plant nutrition better vegetative growth and increases in both the quantitative and qualitative characteristics of the production. The physical and physiochemical properties of compost as growing media offer higher production.

Soil is the fundamental component of most growing media, usually forming the bulk of the mixture. It is inexpensive, easily available and convenient to use. On average, soil contains about 46-49% mineral matter, 1-6% organic matter and the remaining volume is filled with air and water. Its mineral portion is made up of sand, silt and clay.

Coco peat also known as coir pith is obtained from the fibrous husk of coconuts. The husk, which has 20-30% fiber, is processed to produce coco peat, a widely used growing medium. It is often regarded as a waste product in tropical countries but has great value in horticulture due to its high moisture retention, aeration and porosity. Coco peat can hold water 8-9 times its weight, suppresses bacterial and fungal growth and can be reused for up to four years. These properties make it excellent for root aeration and overall healthy plant growth.

Vermi compost, commonly called worm castings or worm humus, is the organic product formed when earthworms decompose organic matter. The process, known as vermi composting, produces a clean, odor-free, nutrient-rich material containing nitrogen, phosphorus, potassium and important micronutrients essential for plant development.

2. Materials and Methods

2.1 Experimental site

The experiment was carried out, in 2024-2025 at instructional cum research laboratory of K.D. College of Horticulture and Research Station, Jagdalpur, (C.G.).

2.2 Methodology adapted for observation

2.2.1 Days taken for germination

The number of days taken for germination was recorded from date of sowing to the first germination. The average time required for germination in each replication was calculated.

2.2.2 Days to 50% germination

The time required for 50% of the final number of germinated rhizome to germinate.

2.2.3 Length of seedling

Five seedlings were randomly selected from each of the treatments and their shoot length was measured with the help of scale and mean length was calculated.

2.2.4 Root length (cm)

Root length was measured by destructive method of uprooting the plants and taking measurement by using centimeter scale. Average data was worked out for each replication after 30 days of sowing.

2.2.5 Shoot length (cm)

Shoot length was measured with the help of cm scale.

2.2.6 Number of leaves perplant

The numbers of leaves were counted at the end of experiment (30 days after sowing) when the true leaves have emerged. Average data is calculated for each replication.

2.2.7 Plant height (cm)

Plant height was measured in each treatment and average data was worked out for each replication after 30 days of sowing with the help of centimeter scale from base of seedling to the highest tip of plant and expressed in cm.

2.2.8 Pseudo stem girth (mm)

The stem girth was measured 1cm above from the base of the stem with the help of digital vernier caliper at the end of experiment and expressed in mm. Average data is calculated for each replication.

3. Result and Discussion

3.1 Days taken for first germination

The data on days taken for first germination are presented in Table 1.

The observation revealed that the minimum days taken for first germination of turmeric was found in treatment T_8 (GS + CC + VC) 10.03 days whereas, the maximum days taken for germination was recorded under treatment T_1 (GS) 13.44 days. Rhizomes sprouted quickly and in higher percentage in this medium. Coco peat has a porous structure which prevents rotting and allows oxygen near the rhizome. Vermi compost contains growth-promoting hormones like auxin and cytokinin that speed up sprouting.

Table 1: Effect of different growing median on days taken for first germination of turmeric.

Treatment		Days taken for first germination
T_1	Garden Soil	13.44
T_2	Coco Peat	12.61
T_3	Fym	11.77
T_4	Vermi Compost	11.41
T_5	Garden Soil + Coco Peat	10.65
T_6	Garden Soil + FYM	11.06
T_7	Garden Soil + Vermi Compost	10.34
T_8	Garden Soil + Coco Peat+ Vermi Compost	10.03
T_9	Garden Soil + FYM+ Coco Peat	10.21
	SEm ±	0.29
	CD (5%)	0.86

3.2 Days taken to 50% seed germination

The data on days taken for 50% germination are presented in Table 2.

The current study revealed that the days taken to 50% germination of the seedlings was significantly impacted by the different growing media. The minimum days taken to 50% germination was observed in treatment T_8 (GS + CC + VC) 22.67 whereas, the maximum days taken for germination was recorded under treatment T_1 (GS) 30.46 days. Garden soil provides natural microbes and minerals that support germination. Due to this combination, the rhizomes sprouted early and half of the total germination (50%) was achieved faster. Ancy and John (2015) [7] also reported that turmeric ministers grown in coco peat + vermi compost reached 50% germination in fewer days compared to soil media.

Table 2: Effect of different growing media on days taken for 50% germination of turmeric.

Treatment		Days taken for 50% germination
T_1	Garden Soil	30.46
T_2	Coco Peat	28.88
T_3	Fym	29.95
T_4	Vermi Compost	28.25
T_5	Garden Soil + Coco Peat	27.01
T_6	Garden Soil + FYM	27.32
T_7	Garden Soil + Vermi Compost	24.58
T_8	Garden Soil + Coco Peat+ Vermi Compost	22.67
T_9	Garden Soil + FYM+ Coco Peat	23.90
	SEm ±	0.58
	CD (5%)	1.73

3.3 Length of seedling (cm)

Length of seedling of turmeric showed significant variation under different growing media and the results are presented in Table 3.

Significantly the maximum length of seedling was recorded under treatment T_8: GS + CC + VC (25.57cm.) the minimum was recorded under treatment T_1: GS (13.06 cm.). The length of seedlings was greater in the medium of garden soil + vermi compost + coco peat. As a result, seedlings in this medium became taller and healthier compared to those grown in only soil or poor media. Similar findings were reported by Singh *et al.* (2018) [6], who observed longer turmeric seedlings in coco peat + vermi compost compared to traditional soil media.

Table 3: Effect of different growing media on Length (cm) of seedling of turmeric.

Treatment		Length of seedling (cm)
T_1	Garden Soil	13.06
T_2	Coco Peat	14.32
T_3	Fym	19.85
T_4	Vermi Compost	20.62
T_5	Garden Soil + Coco Peat	20.79
T_6	Garden Soil + FYM	21.53
T_7	Garden Soil + Vermi Compost	23.01
T_8	Garden Soil + Coco Peat+ Vermi Compost	25.57
T_9	Garden Soil + FYM+ Coco Peat	24.69
	SEm ±	0.40
	CD (5%)	1.21

3.4 Length of root (cm)

Length of root of turmeric showed significant variation under different growing media and the results are presented in Table 4.

Significantly the maximum length of root was recorded under treatment T_8: GS + CC + VC (13.20 cm.) whereas, the minimum length of root was recorded under treatment T_1: GS (10.25cm.). Similar results were obtained by Bhardwaj (2014) [1], Kumawat *et al.* (2014) [2], Ramteke *et al.* (2015) [3] and Ritesh *et al.* (2016) [9] for papaya. Manh and Wang (2014) [5] observed the effect of vermi compost and coco peat in muskmelon, Panchal *et al.* (2014) [4] in arecanut.

Table 4: Effect of different growing media on length of root (cm) of turmeric.

Treatment		Length of root (cm.)
T_1	Garden Soil	10.25
T_2	Coco Peat	10.62
T_3	Fym	10.88
T_4	Vermi Compost	10.79
T_5	Garden Soil + Coco Peat	11.88
T_6	Garden Soil + FYM	13.49
T_7	Garden Soil + Vermi Compost	11.85
T_8	Garden Soil + Coco Peat+ Vermi Compost	13.20
T_9	Garden Soil + FYM+ Coco Peat	12.63
	SEm ±	0.31
	CD (5%)	0.94

3.5 Length of shoot (cm)

Length of shoot of turmeric showed significant variation under different growing media and the results are presented in Table 5.

The maximum length of shoot was recorded under treatment T_8: GS + CC +VC (23.32 cm.) whereas, the minimum length of shoot was recorded under treatment T_1: GS (10.81 cm.). The shoot length of turmeric plants was found maximum in the medium of garden soil + vermi compost + coco peat. Similar observations were also made by Singh *et al.* (2018) [6], who reported that turmeric grown in vermi compost + coco peat recorded significantly higher shoot length compared to normal soil. Similar results were obtained by Bhardwaj (2014) [1], Kumawat *et al.* (2014) [2], Ramteke *et al.* (2015) [3] and Ritesh *et al.* (2016) [9] for papaya.

Table 5: Effect of different growing media on length of shoot (cm)of turmeric.

Treatment		Length of shoot (cm)
		30 day
T_1	Garden Soil	10.81
T_2	Coco Peat	12.07
T_3	Fym	17.60
T_4	Vermi Compost	18.63
T_5	Garden Soil + Coco Peat	18.54
T_6	Garden Soil + FYM	19.28
T_7	Garden Soil + Vermi Compost	20.76
T_8	Garden Soil + Coco Peat+ Vermi Compost	23.32
T_9	Garden Soil + FYM+ Coco Peat	21.07
	SEm ±	0.40
	CD (5%)	1.21

3.6 Number of leaves

Number of leaves turmeric plants showed significant variation under different growing media and the results are presented in Table 6.

The maximum number of leaves was recorded under treatment T_8: GS + CC + VC (3.85) whereas, the minimum number of leaves was recorded under treatment T_1: GS (1.05). Similar finding in reported that the maximum number of leaves per plant observe in ground soil + vermi compost + coco peat (4.02), mixture of soil, coco peat and vermi compost was the ideal medium registering the good water holding capacity coupled with optimal porosity could have the plants to establish better in this media. Singh *et al.* (2018) [6] also reported that turmeric plants grown in coco peat + vermi compost had more leaves compared to only soil. Similar results of coco peat and vermi compost were obtained by Bhardwaj (2014) [1], Kumawat *et al.* (2014) [2], Ramteke *et al.* (2015) [3] and Ritesh *et al.* (2016) [9] in papaya.

Table 6: Effect of different growing media on number of leaves per seedling of turmeric.

Treatment		No. of leaves per seedling
		30 day
T_1	Garden Soil	1.05
T_2	Coco Peat	1.35
T_3	Fym	1.89
T_4	Vermi Compost	2.45
T_5	Garden Soil + Coco Peat	2.67
T_6	Garden Soil + FYM	2.98
T_7	Garden Soil + Vermi Compost	3.16
T_8	Garden Soil + Coco Peat+ Vermi Compost	3.85
T_9	Garden Soil + FYM+ Coco Peat	3.47
	SEm ±	0.56
	CD (5%)	0.16

3.7 Pseudo stem girth

The data on pseudo stem girth of turmeric seedlings significant effects of the different growing media are presented in Table 7.

The maximum pseudo stem girth was recorded under treatment T_8: GS + CC + VC (7.50 mm.) whereas, the minimum pseudo stem girth was recorded under treatment T_1: GS (3.05 mm.). The pseudo stem became thicker in the mixed medium. Similar finding in reported that the highest girth of pseudo stem found in garden soil, vermi compost and coco peat mixture (6.31). Singh *et al.* (2018) [6] also reported that turmeric plants grown in coco peat + vermi compost had more leaves compared to only soil. Joseph *et al.* (2016) observed stronger pseudo stems in turmeric when organic manure and coco peat were used.

Table 7: Effect of different growing media on pseudo stem girth of (mm) turmeric.

Treatment		Pseudo stem girth (mm)
		30 day
T_1	Garden Soil	3.05
T_2	Coco Peat	3.12
T_3	Fym	3.67
T_4	Vermi Compost	3.56
T_5	Garden Soil + Coco Peat	5.11
T_6	Garden Soil + FYM	4.19
T_7	Garden Soil + Vermi Compost	5.49
T_8	Garden Soil + Coco Peat+ Vermi Compost	7.50
T_9	Garden Soil + FYM+ Coco Peat	5.67
	SEm ±	0.11
	CD (5%)	0.33

Conclusion

Based on the findings of this research work it can be concluded that the performance of turmeric was best when seedlings were grown in T_8 media containing Garden Soil + Coco peat + Vermi compost (GS + CC + VC). This medium consistently resulted in earlier germination, maximum seedling growth, and greater root and shoots length, higher plant height, more number and width of leaves, as well as higher fresh and dry weight. It also recorded the highest

motility and success percentage, thus proving to be the most effective growing medium.

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References

1. Bhardwaj RL. Effect of growing media on seed germination and seedling growth of papaya (*Carica papaya* L.) cv. 'Red Lady'. Afr J Plant Sci. 2014;8(4):178-184.
2. Kumawat R, Maji S, Govind, Meena DC. Studies on seed germination and seedling growth of papaya (*Carica papaya* L.) cv. Coorg Honey Dew as influenced by media and chemicals. J Crop Weed. 2014;10(2):281-286.
3. Ramteke V, Paithankar DH, Kamatyanatti M, Baghel MM, Chauhan J, Kurrey V. Seed germination and seedling growth of papaya as influenced by GA3 and propagation media. Int J Farm Sci. 2015;5(3):74-81.
4. Panchal GP, Parasana JS, Patel SR, Patel MV. Effect of different growing media and levels IBA on growth and development of khirni (*Manilkara hexandra* roxb) seedlings cv. Local. Global J Bio-Sci Biotechnol. 2014;3(4):379-383.
5. Manh VH, Wang CH. Vermicompost as an important component in substrate, effects on seedling quality and growth of muskmelon (*Cucumis melo* L.). APCBEE Procedia. 2014;8:32-40.
6. Singh RK, Meena RK, Yadav SK. Effect of different potting media on growth of turmeric (*Curcuma longa* L.). Int J Curr Microbiol Appl Sci. 2018;7(6):1448-1455.
7. Ancy J, John J. Influence of rooting media on sprouting and establishment of turmeric minisetts. Indian J Hortic. 2015;72(3):422-426.
8. Babu R, Rao M, Reddy P. Response of turmeric rhizomes to different nursery media and organic manures. Int J Agric Sci. 2017;9(2):560-565.
9. Ritesh K, Patel KM, Upadhyay NV. Effect of different growing media and containers on germination and establishment of seedlings of papaya (*Carica papaya* L.) cv. Madhubindu. Trends Biosci. 2016;8(1):227-230.