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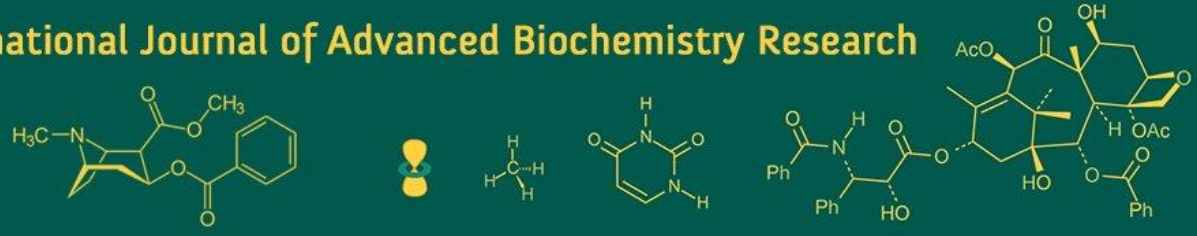

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Studies on plant growth parameters of dragon fruit (*Hylocereus polyrhizus* L.) as responded different growing media under shade net condition

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Abstract
An experiment was carried out to study the response of different growing media on growth performance of dragon fruit under shade net condition during the year 2024-25 at Pt. Kishori Lal Shukla, College of Horticulture and Research Station, Rajnandgaon (C.G.). The investigation was laid out in Completely Randomized Design, with 12 different media combination as treatment. Growing media used as treatment included soil, sand, cocopeat and vermicompost, as sincerely as in combination in different ratios (1:1: and 1:1:1). Results of the investigation revealed that the combination of Soil + Vermicompost (1:1) recorded maximum shoot growth parameters *i.e.* number of sprouts per cutting (6.31), shoot length (37.70 cm), fresh and dry weight of shoot (123.98 and 12.67 g), shortest time to sprout initiation (35.77) and survival percentage of cutting (96.45 %) exhibited a significant improvement under the treatment combination of Soil + Vermicompost (1:1) while the minimum values were recorded under the (T_0-Soil).

Keywords: Dragon fruit, media, vermicompost, cocopeat, sand, soil etc.

Introduction
The tropical climbing vine known as dragon fruit (*Hylocereus undatus* Britton and Rose) is a member of the Cactaceae family. It has achieved international acclaim, initially first valued for its ornamental qualities and later cultivated for its fruit. It is also referred to as pitaya, pitahaya, strawberry pear, or night-blooming cereus. Dragon fruit has vibrant red or pink, thornless skin and juicy flesh that can range from white to rich magenta. Its outer layer is decorated with bracts or scales, giving it a unique appearance. The *Hylocereus* species originates from the tropical and subtropical forests of Mexico, Central, and South America. Because of its high market value and drought tolerance, dragon fruit is viewed as a profitable crop for cultivation in dry areas. (Jana & Basu, 2025) [6]. Dragon fruit is typically propagated through sexual means using seeds and asexual methods such as grafting and stem cuttings. The most straightforward, cost-effective, and convenient method of propagating dragon fruit is via stem cuttings. While seed propagation is quite simple, the seeds often do not produce true-to-type plants due to cross-pollination. (Kakade *et al.,* 2019) [7]. The growing medium is essential for the successful propagation and cultivation of dragon fruit. The selection of the growing medium should be based on factors such as availability, production cost, compatibility with dragon fruit growth, and the suitability of its physical, chemical, and biological properties. (Barrett *et al.*, 2016) [2]. To provide balanced growing media and encourage healthy plant growth, soil, sand, vermicompost, and cocopeat all have unique but complementary functions. Although soil is the main substrate for plant development, providing vital nutrients, water, and microbial activity, it occasionally lacks the right drainage or structure (Raviv & Lieth, 2008) [14]. Amendments including sand, vermicompost, and cocopeat are added to the growing medium to improve its physical, chemical, and biological qualities in order to get around these restrictions.

Materials and Methods
The investigation was carried out during the year 2024-25 at Pt. Kishori Lal Shukla, College

of Horticulture and Research Station, Rajnandgaon (C.G.) The experiment was conducted using a Completely Randomized Design with three replications. Fresh dragon fruit cuttings, obtained from one-to two-year-old stem sections of the genotype Pink into Pink, each containing 4-6 nodes, were procured from the dragon fruit block of the Horticulture Nursery, which was already existed at Pt. Kishori Lal Shukla, College of Horticulture and Research Station, Rajnandgaon (C.G.). A total of 10 cuttings were taken in each treatment, which were treated in different media *viz*. soil, sand, vermicompost, cocopeat and their mixture at different ratios by volume basis. Total of 12 different treatments were formed *i.e.* T_0-Soil (Control), T_1-Sand, T_2-Cocopeat, T_3-Soil + Sand (1:1), T_4-Soil + Cocopeat (1:1), T_5-Sand + Cocopeat (1:1), T_6-Soil + Vermicompost (1:1), T_7-Sand + Vermicompost (1:1), T_8-Cocopeat + Vermicompost (1:1), T_9-Soil + Sand + Vermicompost (1:1:1), T_{10}-Soil + Cocopeat + Vermicompost (1:1:1) and T_{11}-Sand + Cocopeat + Vermicompost (1:1:1) to study their impact on root and shoot parameters of dragon fruit stem cutting. The cuttings were established in grow bags filled with planting media and placed under partial shade. Planting was carried out during the first week of January. All experimental cuttings were consistently maintained and identical cultural practices including fertilization, irrigation and plant protection measures were followed throughout the entire investigation period. Various plant growth parameters were recorded during the study *viz.* days taken to sprout initiation, number of sprouts per cuttings, shoot length (cm), fresh weight of shoot (g), dry weight of shoot (g), survival percentage of cuttings were recorded and analyzed statically to find out the significant results.

Results and Discussions

Days taken to sprout initiation

The analysis revealed significant differences among the various growing media and their combinations, with respect to days taken to sprout initiation. The minimum days to sprout initiation (35.77) were observed in T_6-Soil + Vermicompost (1:1), followed by T_9-Soil + Sand + Vermicompost (1:1:1) with days taken to sprout initiation (37.36). However, the maximum number of days taken to sprout initiation (54.72) were recorded under the treatment T_0 (Soil), which was statistically at par with T_1 (52.35) & T_2 (54.39) at 5% level of significance. The differences in sprouting time may be attributed to the nutrient rich nature of vermicompost, which creates favorable physical and biological conditions that enhance enzymatic and biochemical activities in the plant. Similar observation were also reported by Awasthi *et.al* (2008) [1] in guava, Ghani *et al.* (2019) [4] in pomegranate, Tani *et al.* (2021) [15] and Minz (2021) [10] in dragon fruit cuttings.

Number of sprouts per cutting'

At 60 DAP, the maximum number of sprouts per cutting (3.95) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was significantly followed by the treatment T_9 and T_7 recording 2.86 and 2.42 number of sprouts per cuttings, respectively. However, the minimum number of sprouts per cutting (1.15) was recorded in (T_0-Soil), which was statically at par with T_2 (1.26).

At 90 DAP, the maximum number of sprouts per cutting (4.39) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was found significantly superior over all other treatments. However, the minimum number of sprouts (1.59) per cutting was recorded in the (T_0-Soil).

At 120 DAP, the maximum number of sprouts per cutting (6.31) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was at par with T_9-Soil + Sand + Vermicompost (1:1:1) recording 6.18 sprouts per cutting. However, the minimum number of sprouts (3.21) per cutting was recorded in treatment (T_0-Soil). This might be due to higher organic matter content in vermicompost, which is related to the buildup of high concentration of nutrients especially nitrogen and phosphorus in the cells and also good moisture capacity of the medium. This result was in close agreement with the evaluation of Panchal *et al.* (2014) [12] in Sapota. Similarly, Mishra *et al.* (2014) [11] also recorded maximum number of sprouts in kagzilime and Tani *et al.* (2021) [15] dragon fruit cuttings.

Shoot length (cm)

At 60 DAP, significant differences were observed among the treatments with respect to shoot length. The maximum shoot length (26.80 cm) was recorded under the treatment T_6-Soil + Vermicompost (1:1) which was found at par with T_9-Soil + Sand + Vermicompost (1:1:1) having average shoot length of 24.07 cm. However, the minimum length of the shoot (19.12 cm) was observed in T_0-Soil, which was statically at par with T_2, T_5, T_4 & T_1 having average shoot length of 20.38, 20.29, 20.28 & 19.38 cm, respectively.

At 90 DAP, the maximum shoot length (31.83 cm) was recorded under the treatment T_6-Soil + Vermicompost (1:1), which was significantly superior over all other treatments. However, the minimum length of shoot (23.04 cm) was observed in T_0-Soil, which was statically at par with T_8, T_5, T_4, T_2 & T_1 having average shoot length of 25.70, 24.72, 24.26, 23.69 & 23.28 cm, respectively.

At 120 DAP, the maximum shoot length (37.70 cm) was recorded under the treatment T_6-Soil + Vermicompost (1:1), which was found at par with T_9-Soil + Sand + Vermicompost (1:1:1) having shoot length of 35.16 cm. However, the minimum length of the shoot (26.05 cm) was observed in T_0-Soil, which was statically at par with T_2 (27.67) & T_1 (27.64). The observed improvement might be due to better media combinations that provided more nutrients, retained more water, and offered good aeration, porosity and drainage than other mixtures. These conditions encouraged stronger root growth and in turn, better shoot development. Tani *et al.* (2021) [15] found similar results in dragon fruit cuttings, noting that soil + vermicompost and soil + sand + vermicompost produced the longest shoots. Minz (2021) [10] also reported that soil + cocopeat + vermicompost gave the highest shoot length among all tested media.

Fresh weight of shoot (g)

The maximum fresh weight of shoot (123.98 g) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was followed by T_9-Soil + Sand + Vermicompost (1:1:1) having fresh weight of shoot (120.52 g). Both these treatments are at par at 5% level of significance and significantly superior than all other treatments. However, the minimum fresh weight of shoot (71.43 g) was observed in the treatment T_0-Soil, which was statically at par with T_1 (75.67 g). This may be due to improved physical and chemical properties of growing media. Vermicompost

contains humic acids and growth regulating substances plant growth hormone, which might have increased the plant growth. Similar results were in accordance with Tani *et al.* (2021) [15] and Ingole *et al.* (2024) [5] in dragon fruit stem cutting.

Dry weight of shoot (g)

The maximum dry weight of shoot (12.67 g) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was at par with T_9-Soil + Sand + Vermicompost (1:1:1) at 5% level of significance, recording dry weight of shoot (12.08 g). However, the minimum dry weight of shoot (7.32 g) was observed in T_0-Soil, which was statically at par with T_1 (7.68 g). The increase in shoot fresh and dry weight might be due to the beneficial interaction among media components, which enriched nutrients and improved the physical, chemical and biological properties of the growing medium. Dhakar *et al.* (2016) [3] found similar results in papaya seedlings, where soil + FYM + sand + vermicompost (1:1:1:1) gave the highest dry weight. Likewise, Tani *et al.* (2021) [15] observed that soil + vermicompost (1:1) resulted in maximum shoot dry weight in acid lime.

Table 1: Response of different growing media on number of sprouts and shoot length of dragon fruit cuttings

Treatments	No. of sprouts per cutting			Shoot length (cm)		
	60 DAP	90 DAP	120 DAP	60 DAP	90 DAP	120 DAP
T_0-Soil	1.15^{h}	1.59^{i}	3.21^{g}	19.12^{d}	23.04^{f}	26.05^{f}
T_1-Sand	1.46^{g}	2.13^{h}	4.01^{f}	19.38^{d}	23.28^{ef}	27.64^{ef}
T_2-Cocopeat	1.26^{h}	2.19^{gh}	4.13^{f}	20.38^{cd}	23.69^{ef}	27.67^{ef}
T_3-Soil + Sand (1:1)	2.28^{c}	3.11^{d}	5.02^{bc}	22.12^{c}	26.99^{bcd}	32.62^{bc}
T_4-Soil + Cocopeat (1:1)	1.52^{g}	2.40^{fg}	4.20^{ef}	20.28^{cd}	24.26^{def}	29.04^{de}
T_5-Sand + Cocopeat (1:1)	1.57^{g}	2.52^{f}	4.35^{def}	20.29^{cd}	24.72^{def}	31.06^{cd}
T_6-Soil + Vermicompost (1:1)	3.95^{a}	4.39^{a}	6.31^{a}	26.80^{a}	31.83^{a}	37.70^{a}
T_7-Sand + Vermicompost (1:1)	2.42^{c}	3.35^{c}	5.23^{b}	21.93^{c}	27.84^{bc}	33.12^{bc}
T_8-Cocopeat + Vermicompost (1:1)	1.97^{e}	2.96^{de}	4.85^{bcd}	21.59^{c}	25.70^{cdef}	31.89^{c}
T_9-Soil + Sand + Vermicompost (1:1:1)	2.86^{b}	3.64^{b}	6.18^{a}	24.07^{b}	29.01^{b}	35.16^{ab}
T_{10}-Soil + Cocopeat + Vermicompost (1:1:1)	2.09^{d}	3.05^{d}	4.94^{bc}	22.08^{c}	27.04^{bcd}	31.97^{c}
T_{11}-Soil + Cocopeat + Vermicompost (1:1:1)	1.73^{f}	2.82^{e}	4.67^{cde}	21.58^{c}	26.04^{cde}	31.23^{cd}
S.Em. ±	0.05	0.07	0.18	0.64	0.93	0.94
S.Ed	0.07	0.10	0.25	0.90	1.32	1.32
C.D. @ 5%	0.14	0.21	0.53	1.87	2.76	2.73
C.V.	4.60	4.48	6.47	5.09	6.20	5.19

*DAP-Days After Planting

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD-value comparison of treatment means.

Survival percentage of cuttings

The maximum survival percentage (96.45%) was noticed under the treatment T_6-Soil + Vermicompost (1:1), which was at par with T_9 & T_7 having survival percentage 94.75% and 90.56%, respectively. However, the minimum survival percentage (71.78%) was recorded in (T_0-Soil), which was statically at par with T_1 (73.78%). The higher survival rate in these media combinations could be explained by the favorable physical conditions and increased biochemical activity caused by vermicompost (Wazir *et al.*, 2003) [16]. Mishra *et.al* (2014) [11]. Similar trends were reported by Ghani *et al.* (2019) [4] in pomegranate cuttings, Tani *et al.* (2021) [15] and Ingole *et al.* (2024) [5].

Table 1: Response of different growing media on days taken to sprout initiation, fresh weight of shoot, dry weight of shoot, survival of dragon fruit stem cuttings

Treatments	Days taken to sprout initiation	Fresh weight of shoot	Dry weight of shoot	Survival percentage of cuttings
T_0-Soil	54.72^{g}	71.43^{g}	7.32^{h}	71.78^{h}
T_1-Sand	52.35^{fg}	75.67^{fg}	7.68^{gh}	73.78^{gh}
T_2-Cocopeat	54.39^{fg}	77.92^{f}	8.12^{fg}	78.24^{efg}
T_3-Soil + Sand (1:1)	43.28^{bc}	106.65^{b}	10.50^{b}	88.49^{bc}
T_4-Soil + Cocopeat (1:1)	51.39^{ef}	81.81^{ef}	8.67^{ef}	75.56^{fgh}
T_5-Sand + Cocopeat (1:1)	48.28^{de}	87.70^{de}	8.93^{de}	81.45^{def}
T_6-Soil + Vermicompost (1:1)	35.77^{a}	123.98^{a}	12.67^{a}	96.45^{a}
T_7-Sand + Vermicompost (1:1)	41.54^{b}	107.80^{b}	10.45^{b}	90.56^{ab}
T_8-Cocopeat + Vermicompost (1:1)	47.54^{d}	98.67^{c}	9.87^{bc}	86.10^{bcd}
T_9-Soil + Sand + Vermicompost (1:1:1)	37.36^{a}	120.52^{a}	12.08^{a}	94.75^{a}
T_{10}-Soil + Cocopeat + Vermicompost (1:1:1)	45.36^{cd}	99.98^{c}	9.93^{bc}	85.87^{bcd}
T_{11}-Soil + Cocopeat + Vermicompost (1:1:1)	46.33^{cd}	93.94^{cd}	9.65^{cd}	83.77^{cde}
S.Em. ±	1.10	2.20	0.25	2.13
S.Ed	1.56	3.11	0.35	3.01
C.D. @ 5%	3.24	6.46	0.73	6.25
C.V.	4.10	4.46	4.44	4.40

*****The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD-value comparison of treatment means.

Conclusion

It can be inferred from the current study's findings about the response of various growing media on the parameters of shoot growth and survivability in dragon fruit cuttings that the growing media has an impact on the cuttings' development and success. For the majority of the growth parameters, the combination of soil and vermicompost worked best out of all the treatments. Vermicomposting the soil enhances the cuttings' ability to produce shoots.

References

1. Awasthi P, Lal S, Singh BC. Influence of stooling time and IBA concentrations on growth attributes of stooled shoots in guava Pant Prabhat. Progressive Research. 2008;3(2):154-156.
2. Barrett GE, Alexander PD, Robinson JS, Bragg NC. Achieving environmentally sustainable growing media for soilless plant cultivation systems: A review. Scientia Horticulturae. 2016;212(7):220-234.
3. Dhakar SS, Kaushik RA, Sarolia DK. Influence of growing media and containers on germination and seedling growth of papaya (*Carica papaya* L.) cv. Pusa Nanha. Green Farming. 2016;7(2):451-454.
4. Ghani M, Sharma MK, Habibi HK. Effect of growing media on rhizogenesis and growth of rooted stem cuttings of pomegranate (*Punica granatum* L.) cv. Phule Bhagwa Super under open field condition. International Journal of Current Microbiology and Applied Sciences. 2019;8(7):915-923.
5. Ingole AD, Raut UA, Mahalle SP, Kumar A. Effect of different soil media on rooting of dragon fruit cuttings. Environment and Ecology. 2024;42(1A):271-276.
6. Jana H, Basu D. Dragon fruit cultivation: A manageable and profit providing agri-enterprise in India. International Journal of Current Research. 2025;17(1):31115-31122.
7. Kakade V, Dinesh D, Singh D, Bhatnagar PR, Kadam D. Influence of length of cutting on root and shoot growth in dragon fruit (*Hylocereus undatus*). Indian Journal of Agricultural Sciences. 2019;89(11):1793-1796.
8. Khot AA. Effect of different potting media on success and growth of Bullock's Heart (*Annona reticulata* L.) [M.Sc. (Agri.) thesis]. Dapoli (Maharashtra): Dr. B. S. Konkan Krishi Vidyapeeth; 2017. p. 1-123.
9. Kumar V, Singh MK, Kumar M, Prakash S, Kumar A, Rao S, et al. Effect of different doses of IBA and rooting media on rooting of stem cutting of lemon (*Citrus limon* Burm) cv. Pant Lemon-1. Green Farming. 2015;7(7):587-591.
10. Minz V. Effect of growing media and plant growth regulators on root and shoot growth of dragon fruit cuttings [M.Sc. (Horti.) Fruit Science thesis]. Raipur (Chhattisgarh): Indira Gandhi Krishi Vishwavidyalaya; 2021. p. 1-78.
11. Mishra S. Effect of different rooting media on survival and success of air layers in kagzilime. Annals of Plant and Soil Research. 2014;16(3):264-267.
12. Panchal GP, Parasana JS, Patel SR, Patel MV. Effect of different growing medias and levels of IBA on growth and development of Khirni (*Manilkara hexandra* L.) seedlings cv. Local. Global Journal of Bio-Science and Biotechnology. 2014;3(4):379-383.
13. Rathwa AD, Singh V, Patel DD, Patel AH. Influence of propagation media on growth of hardwood and semi-hardwood cuttings of pomegranate cv. Bhagwa. Trends in Biosciences. 2017;10(28):6023-6027.
14. Raviv M, Lieth JH. Soilless Culture: Theory and Practice. Amsterdam: Elsevier; 2008. p. 418-422.
15. Tani M, Panigrahi HK, Sarkar A, Thakur G, Tahelyani R. Studies on the effect of different growing media on survivability, root and shoot growth of dragon fruit (*Hylocereus polyrhizus* L.) cuttings. The Pharma Innovation Journal. 2021;10(9):1497-1503.
16. Wazir MG, Amin NU, Ishtiaq M, Aziz A, Khan IA. Effects of different soil media on the growth of *Dracaena dermensis* var. *Janet Craige* cuttings. Sarhad Journal of Agriculture. 2003;19(1):31-40.