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EFFECT OF DIFFERENT GROWING MEDIA ON ROOT GROWTH OF DRAGON FRUIT CUTTINGS [*HYLOCEREUS UNDATUS* L. (HAWORTH) BRITTON & ROSE]

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ABSTRACT

The present investigation was carried out on the effect of different growing media on root development of dragon fruit cutting (*Hylocereus undatus* L.) was conducted in the polyhouse at the Department of Horticulture, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar Rae Bareli Road, Lucknow U.P. (India) during the year 2022-23. The experiment was laid out in a randomized block design (RBD) with 08 treatments combination for root development parameter of dragon fruit cuttings with one factor and three replications under polyhouse.Treatment combination has showed the significant difference. Among the different treatment combinations used Soil, Sand, Vermicompost, Coco Peat, FYM, Soil+ Sand+ FYM, Soil+ Sand+ Vermicompost, Soil + Vermicompost+ Coco Peat, enriched with different growing media combination has recorded minimum days taken to root initiation, maximum root length, root thickness, root volume, fresh weight, dry weight.

Keywords **:** rooting media, root growth, dragon fruit cuttings, vermicompost, cocopeat.

Introduction

Dragon fruit [*Hylocereus undatus* L. (Haworth) Britton & Rose] is a perennial climbing cactus, it is a tropical climbing vine fruit crop that is a member of the Cactaceae family. It first gained appeal as an attractive plant before becoming a fruit crop, and today it is grown all over the world. Other names for it include strawberry pear, pitaya, pitahaya, pitaya, and night-blooming cereus.

It was very recently brought to India, and many regions are starting to cultivate it. Farmers from West Bengal, Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, Gujarat, Orissa, and the Andaman & Nicobar Islands have already begun their cultivation, with the average total area under dragon fruit production in these areas being less than 400 hectares. They might prove to be a successful new crop for farmers. The ideal growing conditions for dragon fruit are tropical climates with an average yearly rainfall of 500–1500 mm and temperatures between 20–30 °C. Because it is an epiphyte, it thrives in soil that has been greatly enriched with organic matter. ragon fruit is a fruit that is rich in nutrients and is supplemented with calcium and minerals, particularly phosphorus. Additionally, it has a lot of vitamin C and other antioxidants that support the immune system. Among the anti-oxidants found in it are flavonoids, phenolic acid, and betacyanin. Cultivation of this plant is widespread due to its significant industrial, medicinal, and economic importance. (2012) Ortiz-Hernández and Carrillo-Salazar. According to Vaillant *et al.* (2005), dragon fruit is a potential crop that might be produced profitably in dry areas. This crop is thought to utilise water quite effectively. It is a perennial fruit crop that returns quickly, beginning to produce in the second year after planting and reaching its maximum production in five. The easiest, quickest,

and most effective method of propagating dragon fruit is by stem cutting. Cross-pollination prevents seeds from being true to type even when the seed propagation process is fairly straightforward (Andrade *et al*., 2005). Stem cuttings are the best method for achieving dragon fruit reproduction. A clipped or removed portion of the mother plant is used to shoot stem cuttings. Cuttings are extensively practised and embraced around the world. While eliminating variability and promoting shooting and shooting abilities, it nevertheless retains the desirable mother plant's traits. Cuttings also provide resistance to a variety of disease-related issues, resulting in the plant's healthy growth and development. Therefore, utilising vegetative propagation techniques like cuttings, a high proportion of plantlets with a robust shoot and shoot system can be produced to satisfy the need for increasing commercial output in India. There are several different growth media in which stem cuttings can be grown. The media ought to be clean, homogeneous in texture and fineness, but loose and thoroughly aerated. It should be devoid of weed seeds, nematodes, pests, and disease. Good media has the ability to retain moisture but is also well-drained. It is essential to choose the right growing medium while propagating dragon fruit because it is essential to its growth and cultivation. The availability, quality, material cost, effectiveness, practicality for growing dragon fruit, and appropriateness in chemical, biological, and physical features all play a role in the choice and preference of a growing medium. The different types of media that are utilised to treat cuttings are a worry for their growth and development. The media composition (mixing sand with organic materials) can be an alternative growing medium for successful propagation if you want to get high-quality cuttings. One of the things that can be used to boost the availability of nutrients in soil is healthy media compositions. According to Mubarok *et al.,* (2017), some often used media include soil, sand, FYM, vermicompost, Cocopeat, etc. There is little and no commercially viable research on the effects of various media compositions on the rooting and shooting of dragon fruit cuttings.

Material and Methods

The present investigation was carried out at the Horticulture Research Farm, Department of Horticulture, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar Rae Bareli Road, Lucknow U.P. (India) during the year 2022-23 to study the effect of different growing media on root development of dragon fruit (*Hylocereus undatus* L.) cuttings under polyhouse. The experiment field was situated at 26'55' North latitude and 80'59'longitude and the elevation was 123 meter above mean sea level (MSL). The present investigation was laid out in randomized block design (RBD) with 08 treatments combination replicated thrice and number of cuttings in each replication are two. Thus, there were total 48 plants. Rooted cuttings of three-year-old plant were collected from progressive farmer Shri Ram Sharan Verma at Rasoolpur in Sultanpur planted directly in the field. The various treatment combinations of (T1- Soil, T2- Sand, T3- Vermicompost, T4- Coco Peat, T5- FYM, T6- Soil+ Sand+ FYM, T7- Soil+ Sand+ Vermicompost, T8-Soil + Vermicompost+ Coco Peat) respectively. The observation on root growth parameters- days taken to root initiation, average number of roots per cutting, average length of roots pre cutting, root thickness, root volume, fresh weight of root, dry weight of root recorded at 30,60 and 90 DAP. The data recorded from the present studies were subjected to analysis by using standard method suggested by Panse and Sukhatme (1967).

Result and Discussion

Root growth parameters

The root parameters for dragon fruit cuttings were recorded for the following variables namely; days taken to root initiation, an average number of roots, average length of root (cm), root thickness (mm), root volume (cc), root fresh weight (g) and root dry weight(g). The data recorded has been presented in tabular form and supported by graphical representation

Root association character

Length of longest root (cm)

The data on the length of longest root per cuttings of Dragon fruit as influenced by different growing media with different combination are differed significantly among the treatments at 30, 60 and 90 days after planting. The maximum length of longest root per cutting at 30 days after planting was recorded in the stem cuttings grown in Soil+ Sand+ Vermicompost (T7) (3.97 cm) which was at par with Soil + Vermicompost+ Coco Peat (T8) (3.55 cm). While, the minimum length of longest root was recorded in (T1) soil (2.56 cm). The maximum length of longest root per cutting at 60 days after planting was recorded in the stem cuttings grown in Soil+ Sand+ Vermicompost (T7) (8.99 cm) which was at par with Soil + Vermicompost + Coco Peat (T8) (7.12 cm). While, the minimum length of longest root was recorded in (T1) soil (5.87cm). The maximum length of longest root per cutting at 90 days after planting was recorded in the stem cuttings grown in Soil+ Sand+

Vermicompost (T7) (17.85 cm) which was at par with Soil + Vermicompost+ Coco Peat (T8) (16.88 cm). While, the minimum length of longest root was recorded in (T1) soil (12.12 cm).

Average number of roots per cutting

The data on the average number of roots per cuttings of Dragon fruit as influenced by different growing media with different combination are differed significantly among the treatments at 30, 60 and 90 days after planting. The highest average number of roots per cuttings of dragon fruit at 30 days after planting was recorded in the cuttings grown in Soil+ Sand + Vermicompost (T7) (5.44 cm) which was at per with Soil + Vermicompost+ Coco Peat (T8) (5.13 cm). While, the minimum length of longest root was recorded in (T1) soil (3.45 cm). The maximum average number of roots per cutting at 60 days after planting was noticed in the stem cuttings grown in Soil+ Sand + Vermicompost (T7) (13.89cm) which was at par with Soil + Vermicompost+ Coco Peat (T8) (13.11 cm). While, the minimum length of longest root was recorded in (T1) soil (5.99 cm). The maximum average number of the roots per cutting at 90 days after planting was recorded in the grown in with Soil+ Sand + Vermicompost(T7) (25.08 cm) which was at par with Soil + Vermicompost+ Coco Peat (T8) (25.01 cm). While, the minimum length of longest root was recorded in (T1) soil (17.33 cm

Diameter of roots per cutting (mm)

The data on root diameter of Dragon fruit stem cuttings as influenced by growing media with different combination are differed significantly among the treatments at 30, 60 and 90 days after planting. The data revealed that the highest root diameter was seen in cuttings grown in (T8) Soil + Vermicompost+ Coco Peat (0.26 mm), which was at par with the treatment (T3) Vermicompost (0.22). Least root diameter of Dragon fruit cuttings was seen in control (T1) (0.12 mm) at 30 days after planting. The data revealed that the highest root diameter was seen in cuttings grown in (T6) Soil+ Sand+ FYM (0.47 mm) which was found at par with (T5) FYM (0.46 mm) and the least root diameter of Dragon fruit cuttings was seen in control (T1) (0.24 mm) at 60 days after planting. Highest root diameter was seen in cuttings grown in(T8) Soil + Vermicompost+ Coco Peat (1.11 mm), which was followed by (T5) FYM (1.09 mm). While the lowest root volume was found in (T1) control (0.87 mm) at 90 days after planting.

Fresh weight of the roots per cutting (g)

The data on the fresh weight of the roots per cuttings as influenced by different mixture of different growing media with different combination are differed significantly among the treatments at 30, 60 and 90 days after planting. The highest fresh weight of the roots per cuttings at 30 days after planting was found in cuttings grown in(T7) Soil+ Sand+ Vermicompost (0.26 g) which was at par with treatment (T6) Soil+ Sand+ FYM (0.24 g), the least was seen in control (T1) (0.13 g). The highest fresh weight of the roots per cuttings at 60 days after planting was found in cuttings grown in (T5) FYM (1.67 g), which was found at par with (T7) Soil+ Sand+ Vermicompost (1.63 g). The least fresh weight of roots of Dragon fruit cuttings was seen in control (T1) (0.97 g). Among the treatments, it was found that the cuttings grown in (T7) Soil+ Sand+ Vermicompost (1.89 g) showed highest fresh weight and it was found at par with (T8) Soil + Vermicompost+ Coco Peat (1.85 g). The least fresh weight was seen in cuttings dipped in tap water (T1) control (1.35 g).

Dry weight of the roots (g)

The data on dry weight of roots per cutting as influenced by different mixture of different growing media with different combination are differed significantly among the treatments at 30, 60 and 90 days after planting.

Dry weight of the roots of Dragon fruit cuttings at 30 days after planting (g): The highest dry weight of the roots per cuttings at 30 days after planting was seen in cuttings grown in (T7) Soil+Sand+ Vermicompost (0.18 g) which was at par with (T8) Soil + Vermicompost + Coco Peat (0.16 g). The least dry weight of roots was observed in (T1) control (0.03 g). The dry weight of the roots per cuttings at 60 days after planting was highest in cuttings grown in (T7) Soil+Sand+ Vermicompost (0.36 g) which was found at par with (T8) Soil + Vermicompost+ Coco Peat (0.28 g). The least fresh weight of roots was seen in (T1) control (0.19 g). The dry weight of the roots per cuttings at 90 days after planting was found highest in the cuttings grown in (T7) Soil+Sand+ Vermicompost (0.41 g) and it was found at par with (T8) Soil + Vermicompost+ Coco Peat (0.39 g). The least dry weight was seen in cuttings dipped in tap water (T1) control (0.31 g).

Table 1: Effect of different growing media on root growth of dragon fruit cuttings [*Hylocereus undatus* L. (Haworth) Britton & Rose]

Treatment	Experimental details	Length of longest root			Average number of roots per cutting			Diameter of root per cutting (mm)			Fresh weight of root per cutting (g)			Dry weight of root cutting (g)		
		30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
T1	Soil	2.56	5.87	12.12	3.45	5.99	17.33	0.12	0.24	0.87	0.13	0.97	1.35	0.03	0.19	0.31
T2	Sand	3.12	6.45	15.44	3.98	11.95	24.35	0.15	0.42	0.99	0.12	1.30	1.71	0.06	0.21	0.32
T3	Vermicompost	3.12	6.23	15.12	4.41	12.41	23.44	0.22	0.39	1.04	0.15	1.35	1.74	0.09	0.25	0.36
T4	Coco Peat	3.49	6.55	16.41	4.51	12.55	23.45	0.21	0.43	1.03	0.21	1.48	1.77	0.11	0.22	0.33
T5	FYM	3.14	7.12	16.55	4.66	12.45	24.01	0.10	0.46	1.09	0.22	1.67	1.65	0.14	0.29	0.37
T6	Soil+ Sand +FYM	3.47	6.59	16.44	4.97	12.77	24.65	0.18	0.47	1.08	0.24	1.58	1.55	0.15	0.31	0.34
T7	Soil+ Sand + Vermicompost	3.97	8.99	17.85	5.44	13.89	25.08	0.19	0.44	1.06	0.26	1.63	1.89	0.18	0.36	0.41
T8	Soil + Vermicompost + Coco Peat	3.55	7.12	16.88	5.13	13.11	25.01	0.26	0.43	1.11	0.23	1.58	1.85	0.16	0.28	0.39
C.D.		0.159	0.316	0.837	0.227	0.303	1.131	0.010	0.022	0.051	0.011	0.070	0.040	0.007	0.014	0.012
SE(m)		0.052	0.103	0.273	0.074	0.099	0.369	0.003	0.007	0.017	0.003	0.023	0.013	0.002	0.004	0.004

Conclusion

Among various media compositions, the media combined with Soil+ Sand + Vermicompost responded better and showed superior performance for the root parameters like average number of roots, root thickness, root volume, fresh and dry weight of roots. Similarly, the treatment Soil +Sand + Vermicompost noted minimum days to root initiation.

The Application of Vermicompost with soil and Sand was found to be best and performed better among all the media combinations in terms of root growth parameters.

Plate 1 : Photographs of the research trial

References

Andrade, R.A. de, Oliveira, IV.De M.And Martins, A.B.G. (2005). Influence of condition and storage period in germination of red pitaya seeds. *Revista Brasileira de Fruticultura*, **27**(1): 168-170.

Awasthi, P., Lal, S. And Singh, B. C. (2008). Influence of stooling time and IBA concentrations on growth attributes of stooled shoots in guava Pant Prabhat. *Progressive Research*, **3**(2): 154-156.

Dhakar, S.S., Kaushik, R.A. and Sarolia, D.K. (2016). Influence of growing media and Containers on germination & seedling growth of papaya (*Cartca papaya* L.) cv. PusaNanha. *Green Farming,* **72**, 451-454.

Dvin, S.R., Moghadam, E.G. and Kiani, M. (2011). Rooting response of hardwood Cuttings of MMI11 Apple clonal rootstock to Indole butyric acid and rooting media. *Asian Journal of Applied Sciences*, **4**(4), 453-458.

Minz, V. (2021). Effect of growing media and plant growth regulators on root and shoot growth of dragon fruit cuttings. M.Sc. (Horti.) Fruit Science thesis, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattishgarh, Pp. 1-78.

Mizrahi, Y., and A. Nerd. (1996). "New crops as a possible solution for the troubled Israeli export market." 37-45.

Panchal, G.P., Parasana, J.S, Patel, S.R. and Patel, M.V. (2014). Effect of different growing medias and levels of IBA on growth and development of khimi (*Manilkara he*xandra L.) seedlings cv. Local. *Global Journal of Bio-science Biotechnology*, **3**(4): 379-383.

Prajapati, D. G., Satodiya, B. N., Desai, A B. And Nagar, P. K. (2017). Influence of storage period and growing media on seed germination and growth of acid lime seedlings (Citrus aurantifoliaSwingle) cv. Kagzi. *Journal of Pharmacognosy and Phytochemistry,* **6**(4): 1641-1645.

Panse, V.G. and Sukhatame, P.V. (1967). Statistical Methods for Agriculture Workers, p 381, edn 2. Indian Council of Agricultural Research, New Delhi.

Rana, H., Sharma, K., Negi, M. (2020). Effect of organic manure and biofertilizers on plant growth, yield and quality of sweet orange (*Citrus sinensis* L.). *International Journal of Current Microbiology and Applied Sciences*, **9**(4): 2064-2070.

Ranawana, S.R.W.M.C.J.K. and Eswara, J.P. (2009). Effect of type and size of stem cutting and propagation media for multiplication of pineapple (*Ananas comosus* L.). *Tropical Agricultural Research*, **20**: 388-394.

Rashmita, R. (2015). Effect of different media on rooting and survival of Pear (*Pyruspyrifolia* L.) Cuttings cv. Pathamakh. M.Sc (Ag.) Horticulture thesis, Birsa Agricultural University, Kanke, Ranchi, Jharkhand. Pp. 1-68.

Valliant, F., Imbert, E. And Belleca, F.L. (2005). Pitahaya (*Hylocereus spp.*): a new fruit crop, a market with a future. *Edition Diffusion Presse Sciences*, **61**(4):237 250.

Nerd, A., Sitrit, Y., Kaushik, R.A. and Mizrahi, Y. (2002). High summer temperatures inhibit flowering in vine pitaya crops (*Hylocereus spp*.). *Scientia Horticulturae*, **9**(6): 343-350.

Verma RS, Lata R, Ram RB, Verma SS, Prakash S. (2019). Effect of organic, inorganic and bio-fertilizers on vegetative characters of dragon fruit (*Hylocereus undatus* L.) plant. *The Pharma Innovation Journal*, **8**(6):726- 728.

Yadav, R.K., Jain, M.C. and Jhakar, R.P. (2012). Effect of media on growth and development of acid lime (*Citrus aurantifolia swingle*) with or without Azotobacter. *African Journal of Agriculture Research*, **7**(48): 6421-6426.