Effect of different growing media on shoot growth of dragon fruit cuttings [*Hylocereusundatus* L. (Haworth) Britton & Rose]

Abstract

The present investigation was carried out on the effect of different growing media on shoot development of dragon fruit cutting (*Hylocereusundatus*L.) was conducted in the polyhouse at the Department of Horticulture, BabasahebBhimraoAmbedkarUniversity (A Central University), VidyaVihar Rae Bareli Road, Lucknow U.P. (India) during the year 2022-23. The experiment was laid out in a randomizedblockdesign(RBD)with 08 treatments combination forshootdevelopmentparameterofdragonfruitcuttingswithonefactorandthreereplicationsunderpolyhouse.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 recordedminimumdays taken to sprouts initiation,number of sprouts per cutting, shootlength, shoot fresh weight, shoot dry weight, root to shoot ratio. REWRITE FULLY

Comment [h1]:

Keywords:shootgrowth, growing media,vermicompost, FYM,cocopeat.

Introduction:

Dragon fruit [*Hylocereusundatus* 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. According to the skin and pulp colour, the 16 species that make up the genus Hylocereus can be divided into three distinct species: *Hylocereuscostaricensis* (red skin and red pulp), *Hylocereuspolyrhizus* (red skin and red pulp), *Hylocereusundatus* (red skin, white pulp), and *Hylocereusmegalanthus* (yellow peel and white pulp) (Nerd *et al.* 2002). 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. According to Vaillant*et al.* (2005), dragon fruit is a potential crop that might be produced profitably in dry areas. 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. There are several different growth media in which stem cuttings can be grown. The media ought to be clean, homogeneous in

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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 media composition (mixing sand with organic materials) can be an alternative growing medium for successful propagation if you want to get high-quality cuttings.

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Material and Methods: The present investigation was carried out at the Horticulture Research Farm, Department of Horticulture, BabasahebBhimraoAmbedkar University (A Central University), VidyaVihar Rae Bareli Road, Lucknow U.P. (India) during the year 2022-23 to study the effect of different growing media on shoot development of dragon fruit (*Hylocereusundatus* 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. Shooted 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 shoot growth parameters-minimumdays taken to sprouts initiation, number of sprouts per cutting, shootlength, shoot fresh weight, shoot dry weight, root to shoot ratio 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).

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Results and Discussion:

Shoot parameters:

Number of days taken for sprouting: In the present investigation, influence of different growing media and their combinations have greatly influenced the days taken for sprout initiation. Significant differences were seen between Auxin concentrations for days taken to first sprout. Similar results were also concluded by Awasthi*et al.* (2008) [4] in guava and Minz (2021) [11] in dragon fruit cuttings.

Sprouting Percentage: The maximum percentage of sprouting was recorded at 30 days in cuttings grown in(T7) Soil+Sand+ Vermicompost (33.33%), which was followed by (T8) Soil + Vermicompost+ Coco Peat(31.68 %). While, the control (T1) recorded the minimum percentage of

sprouting(11.44%).The maximum percentage of sprouting was recorded at 60 days in cuttings combination with (T7) Soil+Sand+ Vermicompost(49.88%), which was at par with (T8) Soil + Vermicompost+ Coco Peat (48.68%). While, the control (T1) recorded minimum percentage of sprouting(18.22 %).

Number of sprouts per cutting: The data pertaining to number of sprouts per cutting as influenced by different growing media with different combination at the different stages of growth. Number of sprouts per cutting at 30 days after planting:The maximum number of sprouts per cutting (0.85) was recorded in the cuttings grown in (T_7) Soil+Sand+ Vermicompost, which was at par with (T_6) (0.77) Soil+Sand+FYM. While minimum numbers of sprouts (0.44) were recorded in control (T_1). Number of sprouts per cuttings at 60 days after planting:The maximum number of sprouts (1.59) was recorded in cuttings grown in (T_7)Soil+Sand+ Vermicompost, which was at par with (T_6)Soil+Sand+FYM(1.51). While the minimum numbers of sprouts (1.15) were recorded in (T_1) control.Number of sprouts per cuttings at 90 days after planting:The maximum number of sprouts (2.02) was recorded in cuttings grown in (T_7) Soil+Sand+ Vermicompost, which were followed by (T_6)Soil+Sand+FYM(1.96). While minimum numbers of sprouts (1.45) were recorded in control (T_1). This result was in close agreement with the evaluation of Panchal *et al.* (2014) [16] in Sapota. Similarly. Rashmita*et al.* (2016) [18] also recorded maximum number of sprouts in treatment consisting of soil + vermicompost (1:1) in pear (*Prunuspersica* L.) cuttings.

Sprout length and shoot length (cm): The data pertaining to length of sprout and shoot per cutting as influenced by different growing mediawith different combination at the different stages of growth. Sprout length at 30 days after planting (cm) the maximum sprout length was recorded in cuttings grown in (T_7)Soil+Sand+Vermicompost (2.10 cm) which was at par with (T_8)Soil + Vermicompost+ Coco Peat(2.05 cm). While the least was found in (T_1) control (1.08 cm).Shoot length at 60 days after planting (cm) the highest shoot length was recorded in cuttings grown in (T_7)Soil+Sand+Vermicompost (5.44 cm), which was followed by (T_6)Soil + sand + FYM (6.36 cm). While minimum length of shoots (1.04 cm) was recorded in control (T_1).Shoot length at 90 days after planting (cm) the maximum shoot length (8.76 cm) was recorded in cuttings combination with Soil+Sand+Vermicompost(T_7), which was followed by (T_8) Soil + Vermicompost+ Coco Peat(7.66 cm). While the minimum shoot length (2.97 cm) was recorded in control (T_1).

Diameter of shoot per cutting: Diameter of shootat 30 days after planting (mm) **t**he maximum diameter of shoot (2.06 mm) was recorded in cuttings grown in (T_7)Soil+Sand+Vermicompost, which was on are with (T_8)Soil + Vermicompost+ Coco Peat(2.01 mm). While minimum diameter

of shoot (1.07 mm) was recorded in control (T_1).Diameter of shoot per cutting at 60 days after planting (mm) the maximum diameter of shoot (2.06 mm) was recorded in (T_7)Soil+Sand+Vermicompost, which was at par with (T_8)Soil + Vermicompost+ Coco Peat(2.01 mm). While minimum diameter of shoot (1.07 mm) was recorded in control (T_1). Diameter of shoot per cuttings at 90 days after planting (mm) the maximum diameter of shoot (3.14 mm) was recorded in (T_7)Soil+Sand+Vermicompost, which was at par with (T_8)Soil + Vermicompost+ Coco Peat(2.98 mm). While minimum diameter of shoot (1.45 mm) was recorded in control (T_1). The results of Verma*et al*. (2019) in dragon fruit and Rana *et al.* (2020) research on sweet orange were in accordance with these findings

Number of spines per areole: The data pertaining to the Number of spines per areole as influenced by different growing media with different combination at the different stages of growth.1 Number of spines per areole cutting at 30 days after planting (mm) the maximum number of spines per areole (3.86) was recorded in cuttings grown in (T_7)Soil+Sand + Vermicompost, which was at par with (T_8)Soil + Vermicompost+ Coco Peat(3.79). While minimum number of spine (3.25) was recorded in control (T_1). Number of spines per areole cutting at 60 days after planting (mm) the maximum number of spines per areole (4.04) was recorded in (T_7)Soil+Sand+ Vermicompost, which was at par with (T_8)Soil + Vermicompost+ Coco Peat (3.92). While minimum numberof spine (3.77) was recorded in control (T_1). Number of spines per areole cuttings at 90 days after planting (mm) the maximum number of spines per areole (4.21) was recorded (T_7)Soil+Sand+ Vermicompost, which was on par with (T_8)Soil + Vermicompost+ Coco Peat (3.92). While minimum number of spine(3.77) was recorded in control (T_1).

Shoot fresh weight (g): The data on the shoot fresh weight of Dragon fruit cuttings as influenced by different mixture of different growing media with different combination. The treatments differed significantly at 30, 60 and 90 days after planting.Shoot fresh weight of Dragon fruit cuttings at 30 days after planting (g) the highest shoot fresh weight was seen in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost (12.14 g), which was found at par with (T_8)Soil + Vermicompost+ Coco Peat(11.15 g). Lowest fresh weight was seen in (T_1) control (9.11 g).Shoot fresh weight of Dragon fruit cuttings at 60 days after planting (g) the highest shoot fresh weight was observed in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost(22. 85 g) and it was found at par with (T_6)Soil + sand + FYM (24.25 g). The least shoot fresh weight of Dragon fruit cuttings was observed in (T_1) control (19.59 g). Shoot fresh weight of Dragon fruit cuttings at 90 days after planting (g) the highest shoot fresh weight was recorded in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost (48.55 g), which was at par with (T_8)Soil + Vermicompost+ Coco

Peat(40.47 g). The least shoot fresh weight of Dragon fruit cuttings was recorded (T_1) in control (25.85 g). Similar results were in accordance with Dhakar*et al*. (2016) [7] in papaya and Yadav *et al*. (2012) [25] in acid lime.

Shoot dry weight (g): The data on the shoot dry weight of Dragon fruit cuttings as influenced by different mixture of different growing media. The treatments differed significantly at 30, 60 and 90 days after planting.Shoot dry weight of Dragon fruit cuttings at 30 days after planting (g) Among the combination highest shoot dry weight was seen in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost (4.77 g), which was at par with (T_8)Soil + Vermicompost+ Coco Peat(4.25 g) and the least shoot dry weight of Dragon fruit cuttings was found in (T_1) control (1.96 g). Shoot dry weight of Dragon fruit cuttings at 60 days after planting (g) the highest shoot dry weight was seen in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost(6.78 g), which was at par with (T_8)Soil + Vermicompost+ Coco Peat(6.01 g). The minimum shoot dry weight of Dragon fruit cuttings was recorded in (T_1) control (3.45 g).Shoot dry weight of Dragon fruit cuttings at 90 days after planting (g) the maximum shoot dry weight was recorded in Dragon fruit cuttings grown in (T_7)Soil+Sand+ Vermicompost (9.85 g), which was at par with (T_8)Soil + Vermicompost+ Coco Peat (9.45 g). The minimum shoot dry weight of Dragon fruit cuttings was recorded (T_1) in control (6.79 g). Similar findings were also observed by Dhakar*et a*l. (2016) [7] in papaya seedling where media combined with soil + FYM+ Sand + Vermicompost (1:1:1:1) recorded significantly maximum dry weight. Similarly, Prajapati*et al*. (2017) [17] reported that media with Soil + Vermicompost (1:1) registered maximum dry weight of shoot in acid lime.

Comment [h5]: LNGUAGE IMPROVEMNT IS NEEDED, MULTIPLE REPETATION IS FOUDN

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

Treatment	Experimental details	Number of days taken for sprouting			% Sprouting of shoot per stem cutting		Sprouting per stem cutting			Sprout and shoot length of stem cutting (cm)			Shoot diameter of stem cutting (mm)			Number of spines per areole (mm)			Fresh weight of shoot of stem cutting (g)			Dry weight of shoot of stem cutting (g)		
		30DAP	30DAP	60DAP	30DAP	60DAP	90DAP	30DAP	60DAP	90 DAP	30DAP	60DAP	90 DAP	30DAP	60DAP	90 DAP	30DAP	60DAP	90 DAP	30DAP	60DAP	90 DAP	30DAP	60DAP	90 DAP
T1	Soil	15.33	11.01	16.99	0.44	1.15	1.45	1.08	1.04	2.97	1.07	1.07	1.45	3.25	3.77	3.77	9.11	19.59	25.85	1.96	3.45	6.79
T2	Sand	13.35	15.35	18.55	0.59	1.32	1.55	1.69	3.85	5.66	1.75	1.75	1.47	3.55	3.78	3.89	10.15	19.45	28.45	2.14	4.7	7.09
T3	Vermicompost	12.55	16.51	23.77	0.63	1.37	1.65	1.65	3.99	5.99	1.88	1.88	1.99	3.74	3.74	3.82	10.25	20.14	29.36	2.96	4.78	7.55
T4	Coco Peat	11.12	18.99	28.77	0.66	1.41	1.75	1.72	4.26	6.41	1.98	1.98	2.11	3.74	3.81	3.74	10.85	19.96	35.45	3.45	4.89	7.65
T5	FYM	10	17.54	28.05	0.71	1.44	1.81	1.88	4.77	6.81	1.99	1.99	2.45	3.75	3.52	3.92	10.45	20.45	38.45	3.88	5.45	8.15

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T6	**Soil+ Sand +FYM**	9.455	19.55	32.44	0.77	1.51	1.96	1.85	5.21	6.55	1.88	1.88	2.74	3.77	3.79	4.06	10.44	20.85	34.85	3.99	5.98	8.05
T7	**Soil+ Sand + Vermicompost**	9.555	29.55	34.55	0.85	1.59	2.02	2.10	5.44	8.76	2.06	2.06	3.14	3.86	4.04	4.21	12.14	22.85	48.55	4.77	6.78	9.85
T8	**Soil + Vermicompost+ Coco Peat**	8.555	23.55	32.55	0.67	1.15	1.73	2.05	2.11	7.66	2.01	2.01	2.98	3.79	3.92	4.15	11.15	19.59	40.47	4.25	6.01	9.45
C.D.		**0.494**	1.209	1.222	0.025	0.070	0.093	**0.078**	**0.201**	**0.319**	**0.087**	**0.103**	**0.119**	**0.153**	**0.173**	**0.152**	**0.500**	**0.950**	**1.799**	**0.163**	**0.284**	**0.325**
SE(m)		**0.161**	0.395	0.399	0.008	0.023	0.031	**0.025**	**0.066**	**0.104**	**0.028**	**0.034**	**0.039**	**0.050**	**0.056**	**0.050**	**0.163**	**0.310**	**0.587**	**0.053**	**0.093**	**0.116**

Comment [h6]: Y CD IS SO LESS, SHOUDL BE LITLE MORE, SEEMS DATA IS NOT BASED ON REPLICATED TARISL OF MUTLIPLE TREATEMMTS. OR SIMIALR TREATMENTS WERE USED BUT DESIGNATED DIFFERENT OR THERE IS HUGE MISTAKES IN DATA COLLECTION.

Conclusion:

1. In shoot parameters, number of sprouting per cutting, shoot length, shoot fresh and dry weight and root to shoot ratio was influenced under the treatment T7-Soil + Sand + Vermicompost. However, the minimum days to sprout initiation were achieved under the treatment T7- Soil + Sand + Vermicompost.
2. In conclusion it can be stated that vermicompost is suitable to be used as growing media for cuttings. lt can be combined with soil and sand to improve the quality.
3. The Application of Vermicompost with soil and Sand was found to be best and performed better among all the media combinations in terms of shoot growth parameters.

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Comment [h7]: USE LATEST REFERNCES