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EFFECT OF MEDIA AND LENGTH OF CUTTING ON ROOTING OF DRAGON FRUIT (RED FLESH - *HYLOCEREUS POLYRHIZUS* L.) UNDER MANIPUR CONDITION

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ABSTRACT

Present investigation was carried out during the month of June - November, 2023 to evaluate the effect of media and length of cutting on root growth of dragon fruit (Red Flesh - *Hylocereus polyrhizus* L.) under Imphal valley condition of Manipur. Results recorded significant among the treatments and it was planned on Factorial Randomized Block Design with two factors viz., different rooting media i.e., Soil (control), Soil + Vermicompost (3 :1 ratio), Soil + Peat moss (3 :1 ratio), Soil + FYM (3 :1 ratio), Soil + Humic acid (2% i.e. 20ml/kg soil), Soil + Vermicompost + Humic acid (2%), Soil + Peat moss + Humic acid (2%) and Soil + FYM + Humic acid (2%) and length of cuttings (15 cm and 30 cm). Among the treatments, L₂M₁ i.e. Soil + Vermicompost (3:1ratio) + 30cm length of cutting exhibited the best performance in all the parameters including number of roots per cutting (30.34), number of aerial roots per cutting (17.14), root length (55.45 cm), root volume (1.95 cc), fresh weight of root (5.60 g) and dry weight of root (1.51 g).

Keywords : Rooting media, length of cutting, rooting, Dragon fruit

Introduction

Dragon fruit is a tropical climbing vine, non-climacteric fruit belonging to the family Cactaceae. The tropical and subtropical forests of Mexico and South America are the native homeland of the dragon fruit (Mirzahi and Nerd, 1996). Dragon fruit is a nutrient-dense fruit that offers numerous health benefits, including boosting the immune system with its high vitamin C and antioxidant content, supporting heart health with flavonoids, promoting bone health with calcium and phosphorus, and improving skin health and cholesterol levels with vitamin B₃. Dragon fruit plants thrive in tropical regions with temperatures ranging from 20 to 30°C which not suited for intense sunlight and it requires about 500 to 1500 mm of rainfall annually. It thrive in well-draining soils, typically exceling in sandy loam soils rich in organic matter, which provides optimal growing conditions for the plant. The ideal pH for optimal growth is between 5 and 6.5. Stem cutting propagation is a straightforward and frequent method for

reproducing dragon fruit plants. To ensure successful propagation, it's essential to obtain cuttings from robust, disease-free, and pest-free mother plants, providing a strong foundation for healthy growth. Cuttings of various lengths, from 10 to 60 cm, can be used for propagation, but longer cuttings (over 30 cm) are particularly well-suited for rainfed plantations, promoting more vigorous growth. Organic materials used as growing media can provide plants with essential nutrients. Additionally, organic materials contain both macro and micro-pores that help maintain a balance of air and water for optimal plant growth (Sudarjatet *al.* 2018). These plants typically start bearing fruit in their second year and reach peak productivity within five years. The present investigation was aimed to standardized dragon fruit cutting propagation technique under Imphal Valley condition of Manipur by evaluating different media and cutting lengths on rooting success.

Materials and Methods

An experiment "Effect of Rooting Media and Length of Cutting on Rooting and Vegetative Growth of Dragon Fruit (Red Flesh - *Hylocereus polyrhizus* L.) Under Manipur Condition" was carried out during the month of June - November, 2023 in the experimental field, Department of Horticulture, College of Agriculture, CAU, Imphal. The experiment was laid on Factorial Randomized Block Design with two factors viz., different rooting media i.e. **M**₀-Soil (control), **M**₁-Soil + Vermicompost (3 :1 ratio), **M**₂-Soil + Peat moss (3 :1 ratio), **M**₃-Soil + FYM (3 :1 ratio), **M**₄- Soil + Humic acid (2% i.e. 20ml/kg soil), **M**₅- Soil + Vermicompost + Humic acid (2%), **M**₆- Soil + Peat moss + Humic acid (2%) and **M**₇-Soil + FYM + Humic acid (2%) and length of cuttings (**L**₁-15 cm and **L**₂-30 cm). Stem cuttings were planted in polyethylene bags containing a customized rooting medium designed to promote healthy root growth for each treatment. Cuttings were planted by making V shape cutting of the stem and inserting about 5 cm depth of their length in the media filled polythene bags and light irrigation immediately. Statistical analysis was performed using the analysis of variance method (Gomez and Gomez, 1984), and the significance of various data was determined using the F-test at 5% probability level to interpret the present investigation.

Results and Discussion

Effect of rooting media on root growth parameters

Among the various parameters studied, significant differences were found among different rooting media and length of cutting on rooting performance of the cuttings (Table 1). Among different rooting media, **M**₁ i.e. Soil + Vermicompost (3:1ratio) performed best in all the parameters under study viz., number of roots per cuttings(11.18), number of aerial roots per cutting(14.18), root length (50.56 cm), root volume (1.81 cc), fresh weight of root (4.90 g) and dry weight of root (1.31 g). The incorporation of organic matter can increase soil porosity, allowing roots to grow more easily. Vermicompost enhances soil structure, texture, aeration, and water-holding capacity, and is rich in essential plant nutrients, which improves soil fertility. The increase in root number and length directly impacts the fresh weight of roots. The current study's results match with previous research on dragon fruit by Rahad *et al.*(2016), Chahal (2020), and Dhruve *et al.* (2018), as well as Deshmukh *et al.* (2019) work on

pomegranate cuttings, indicating consistent findings across different studies.

Effect of length of cutting on root growth parameters

Root parameters were significantly influenced by length of cuttings (Table 1). For different length of dragon fruit cuttings, **L**₂ (30 cm) recorded the best performance in all the parameters viz., number of roots per cuttings(22.33), number of aerial roots per cutting(9.20), root length(44.12 cm), root volume(1.64 cc), fresh weight of root(3.77 g) and dry weight of root(0.98 g). The result indicates that better rooting was associated with increasing length of cutting. Better performance of **L**₂ (30 cm cutting length) for all the rooting parameters may be due to the difference in the amount of stored material necessary for growth and developing roots. Plant hormones, like auxins, play a role in root growth regulation. The current study's results parallel with previous research conducted by Ahsan-Ullah *et al.* (2015), Balaguera-Lopez *et al.* (2010), and Vargas-Santiago *et al.* (2003), demonstrating consistency in findings.

Effect of rooting media and length of cutting on root growth parameters

The results obtained in the present investigation revealed that rooting parameters were significantly influenced by interaction of different rooting media and length of cuttings. Among the different treatment combinations, **L**₂**M**₁ i.e. Soil + Vermicompost (3:1 ratio) + 30cm length exhibited the best performance in all the parameters viz., number of roots per cutting(30.34), number of aerial roots per cutting(17.14), root length(55.45 cm), root volume(1.95 cc), fresh weight of root(5.60 g) and dry weight of root(1.51 g).Vermicompost provides essential nutrients, which are readily available for uptake by the cutting. Longer cuttings have more nodes and a larger surface area, allowing for better nutrient absorption and utilization. Vermicompost may enhance auxin production or activity, further stimulating root development. Longer cuttings have a larger diameter, allowing for better water uptake and transport to the roots, which is enhanced by vermicompost's water-holding capacity. The combination of vermicompost and longer cuttings may create a synergistic effect, where the benefits of each component enhance the effects of the other, leading to optimal root growth development.

Table 1: Effect of different rooting media and length of cutting on number of roots per cutting, number of aerial roots per cutting, root length (cm), root volume (cc), fresh weight of root (g) and dry weight of root (g) of Dragon Fruit cuttings

Treatments	No. of roots per cutting	No. of aerial roots per cutting	Root length (cm)	Root volume (cc)	Fresh weight of root (g)	Dry weight of root (g)
M ₀	11.18 (3.41)	3.61(2.02)	30.68	1.30	1.53	0.37
M ₁	26.76 (5.21)	14.18 (3.81)	50.56	1.81	4.90	1.31
M ₂	15.03 (3.89)	3.83 (2.08)	49.73	1.52	2.91	0.82
M ₃	17.28 (4.18)	4.29 (2.19)	36.02	1.65	3.80	0.83
M ₄	13.16 (3.68)	4.24 (2.17)	33.02	1.45	1.96	0.64
M ₅	24.05 (4.93)	12.28 (3.48)	49.07	1.71	4.20	1.19
M ₆	17.28 (4.15)	5.65 (2.46)	46.73	1.49	2.75	0.78
M ₇	24.65 (5.00)	13.67 (3.73)	33.73	1.67	3.77	0.89
S.Ed (±)	0.05	0.07	0.59	0.02	0.05	0.02
CD _(0.05)	0.10	0.14	1.21	0.05	0.10	0.03
L ₁	15.01 (3.89)	6.24 (2.53)	38.26	1.50	2.68	0.73
L ₂	22.33 (4.73)	9.20 (2.96)	44.12	1.64	3.77	0.98
S.Ed (±)	0.02	0.03	0.30	0.01	0.02	0.01
CD _(0.05)	0.05	0.07	0.60	0.02	0.05	0.02
L ₁ M ₀	9.90 (3.22)	3.18 (1.92)	29.02	1.27	1.50	0.29
L ₁ M ₁	23.18 (4.87)	11.21 (3.42)	45.67	1.66	4.20	1.11
L ₁ M ₂	10.09 (3.25)	3.54 (2.01)	46.89	1.54	2.32	0.72
L ₁ M ₃	13.01 (3.68)	4.25 (2.18)	34.01	1.55	3.10	0.76
L ₁ M ₄	11.11 (3.41)	4.07(2.14)	30.01	1.34	1.60	0.42
L ₁ M ₅	20.46 (4.58)	9.32 (3.13)	45.02	1.58	3.30	1.02
L ₁ M ₆	11.34 (3.44)	4.13 (2.15)	42.21	1.53	2.30	0.70
L ₁ M ₇	20.99 (4.64)	10.21 (3.27)	33.23	1.56	3.14	0.79
L ₂ M ₀	12.46 (3.60)	4.03 (2.13)	32.34	1.32	1.55	0.45
L ₂ M ₁	30.34 (5.55)	17.14 (4.20)	55.45	1.95	5.60	1.51
L ₂ M ₂	19.97 (4.52)	4.12 (2.15)	52.56	1.50	3.50	0.92
L ₂ M ₃	21.54 (4.69)	4.33 (2.20)	38.02	1.74	4.50	0.90
L ₂ M ₄	15.21 (3.96)	4.41 (2.21)	36.03	1.56	2.31	0.85
L ₂ M ₅	27.64 (5.30)	15.23 (3.83)	53.12	1.83	5.10	1.36
L ₂ M ₆	23.21 (4.87)	7.18 (2.77)	51.24	1.45	3.20	0.86
L ₂ M ₇	28.30 (5.37)	17.12 (4.20)	34.23	1.78	4.40	0.98
S.Ed (±)	0.07	0.10	0.84	0.03	0.07	0.02
CD _(0.05)	0.14	0.19	1.71	0.07	0.14	0.05

*(The values in the parenthesis are square root transformed)

Conclusion

The present investigation revealed that the use of Soil + Vermicompost (3:1 ratio) with 30cm length of cutting is ideal for rooting of under Imphal valley condition of Manipur which can be recommended for vegetative propagation technique for this important minor and exotic dragon fruit.

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