*Original Research Article*

**Impact of Various Rooting Media on *Ficus Lyrata* ‘Fiddle Leaf Fig’ Capacity for Rooting and Growth**

**ABSTRACT**

| **Aims:** To check the growth performance of *Ficus lyrata* using various rooting media in different combinations.  **Study design:** Completely Randomized Design  **Place and Duration of Study:** The present study was carried out during 2020-21 under a low-cost polyhouse of Instructional-cum-Research farm, Department of Horticulture, School of Agricultural Sciences, Nagaland University, India.  **Methodology:** Cuttings with at least 2-3 nodes and one leaf were taken and planted in ten treatments combination with three replications viz.; T1: Top soil (control), T2: Riverbed coarse sand, T3: Riverbed fine sand, T4: Cocopeat, T5: Perlite, T6: Rice husk, T7: Soil + Riverbed fine sand + Cocopeat, T8: Soil + Cocopeat + Perlite, T9: Soil + Cocopeat + Perlite + Rice husk, T10: Riverbed fine sand + Cocopeat + Perlite.  **Results:** According to the data, it was observed that the best treatment with respect to shoot length (15.63 cm), number of leaves per cutting (4.33), stem diameter (0.38 mm), leaf length (13.40 cm), leaf breadth (10.40 cm), root length (31.29 cm) and number of roots per cutting (32.96) was noticed in T10 (Riverbed fine sand + Cocopeat + Perlite) while the lowest for all the characters was reported in T1 (Top soil).  **Conclusion:** The combined application of soilless media Riverbed fine sand + Cocopeat + Perlite was found to be give better rooting and vegetative performance in cuttings of Fiddle Leaf Fig. |
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*Keywords: Ficus lyrata; Riverbed fine sand; Cocopeat; Perlite; Soilless; Fiddle Leaf Fig.*

1. INTRODUCTION

*Ficus lyrata* Warb. (known as fiddle-leaf fig) is an evergreen tree or shrub, belong to the family Moraceae and native to West and Central Africa tropical rain forest (Bercu, 2015). They are one of the most popular houseplant which is suitable for growing indoors due to their showy appearance.  Because of its big, deep green, waxy, violin-shaped leaves, *Ficus lyrata* is a popular ornamental plant that may be utilized as a foliage interiorscaping plant in temperate zones or as a popular landscape plant in tropical and subtropical regions (Abdolinejad and Salmi, 2023). It is an evergreen tree and grows upto a height of about 5-11 meters, upright-spreading and produces 20-45 cm long and 25 cm wide, dull green, thick, fiddle shaped leaves which are quite attractive (Ramadan et al. 2008). The leaves are simple coriaceous, obovate leaves with cordate or squared basal ends and slightly wavy and scalloped margins (Mioulane, 2004). The flowers are inconspicuous and not showy. The fruits are solitary fleshy synconium, are round green, with 2.5-3 cm diameter and are yellowish-brown when ripe (Dressler *et al.,* 2014; Ramadan et al. 2008). Apart from their ornamental values, *Ficus lyrata,* as a houseplant is capableof removing chemicals like formaldehyde, ammonia and benzene from the air more efficiently than most medicinal air purifiers. It is also a rich source of antioxidants like flavonoids and phenols which is found useful in treating liver fibrosis and lower cholesterol levels (Abdel-Hameed, 2009).

India has made great strides in the production of flowers and decorative plants, especially cut flowers and foliage plants that have a high export potential (Singh *et al.,* 2020). Ornamental vegetative propagated plants, like Fiddle leaf fig, philodendron, *Monstera deliciosa* variegated, are in high demand and are typically ordered for workplaces and by garden lovers. Hence, there is a need for quick, inexpensive propagation techniques that guarantee the development of healthy, high-quality seedlings. For the healthy development of plant, high-quality plant growing substrate becomes a basic requirement (Younis *et al.,* 2013). An appropriate growth medium would provide the plant with adequate anchoring or support, serve as a store for water and nutrients, and allow for the exchange of gases between the atmosphere and the roots as well as the diffusion of oxygen to the roots (Batool *et al.,* 2022). The success of propagation of many houseplants by stem cutting is very limited due to its low capacity for adventitious root formation limiting its commercial production by growers and nursery owners who have encountered difficulty and recorded very low survival rate in their propagation (Rzepka-Plevnes and Kurek, 2001). In order to ensure high performance and consistent quality of the species, horticulturists must therefore pay close attention to the quality of the plant materials used when composting the media, particularly for ornamentals of economic value whose demand requires that their difficult-to-root phenomenon be resolved. In light of this, the current experiment was carried out to investigate how various rooting media affected Ficus lyrata rooting and performance.

2. material and methods

The investigation was carried out during 2020-21 under a low-cost polyhouse of Instructional-cum-Research farm, Department of Horticulture, School of Agricultural Sciences, Nagaland University which is located at an latitude of 250 45’ 53” N and longitude of 930 53’ 04” E at an altitude of 310 m above the mean sea level. The experiment was laid out in Completely Randomized Design with three replications. The experiment consist of 10 treatments of five rooting media in different combination viz.; T1: Top soil (control), T2: Riverbed coarse sand, T3: Riverbed fine sand, T4: Cocopeat, T5: Perlite, T6: Rice husk, T7: Soil + Riverbed fine sand + Cocopeat, T8: Soil + Cocopeat + Perlite, T9: Soil + Cocopeat + Perlite + Rice husk, T10: Riverbed fine sand + Cocopeat + Perlite. Stem cuttings of about 3-6 cm with at-least 2-3 nodes were taken from the mother plants and dipped in coconut water (100 %) for 10 minutes before planting in the rooting media. The cuttings were given a slanted cut and then inserted in the rooting media filled in a 6 x 8-inch black polybag. Foliar spraying with water was done every day to prevent moisture loss during initial days as cuttings were very prone to drying. Observations on rooting and vegetative parameters *viz.,* number of roots per cutting, root length (cm) percentage of rooting (%), days to axillary bud formation, days to first leaf unfolding, shoot length (cm), number of leaves per cutting, leaf length (cm), leaf breadth (cm) and leaf area (cm2) were recorded 60 and 150 days after planting. The mean experimental data recorded during the period of investigation were computed and analyzed in accordance with the procedure outlined by Gomez and Gomez, 1984.

3. results and discussion

**3.1 Effect of rooting media on growth parameters 60 days after planting**

According to the data showed in table 1, significant variations was observed among the different treatments. The highest shoot length was reported with application of Riverbed fine sand + Cocopeat + Perlite (15.63 cm) which was statistically at par with Soil + Cocopeat + Perlite + Rice husk (14.43 cm), Soil + Riverbed fine sand + Cocopeat (14.05 cm) and Perlite (13.40 cm) while the minimum shoot length was reported in Top soil (control) (9.53 cm). The maximum number of leaves per cutting was noted in Riverbed fine sand + Cocopeat + Perlite (4.33) which was at par with Soil + Cocopeat + Perlite (3.33) and Soil + Riverbed fine sand + Cocopeat (3.96 cm). The lowest number of leaves per cutting was observed in Top soil (control) (2.00). Stem diameter was found to be highest in Riverbed fine sand + Cocopeat + Perlite measuring about 0.38 mm followed by Soil + Cocopeat + Perlite (0.35 mm) while the least stem diameter was recorded in Top soil (control) (0.22 mm). Leaf length was also observed to be highest in treatment Riverbed fine sand + Cocopeat + Perlite (13.40 cm) followed by Soil + Cocopeat + Perlite (11.52 cm) and Soil + Cocopeat + Perlite + Rice husk (11.23 cm). However, minimum leaf length was reported in Top soil (control) (8.07 cm). Maximum leaf breadth was noted in Riverbed fine sand + Cocopeat + Perlite (10.40 cm) which was statistically at par with Soil + Cocopeat + Perlite + Rice husk (8.58 cm) while the lowest breadth of leaf was noticed in Top soil (control) (6.07 cm). Leaf area was found to be largest in Riverbed fine sand + Cocopeat + Perlite (139.34 cm2) followed by Soil + Cocopeat + Perlite + Rice husk (99.08 cm2) and Soil + Cocopeat + Perlite (97.30 cm2) and the lowest leaf area was observed in Top soil (control) (51.55 cm2). Root length was reported to be longest in Riverbed fine sand + Cocopeat + Perlite (31.29 cm) followed by Soil + Cocopeat + Perlite + Rice husk (26.76 cm) and Soil + Riverbed fine sand + Cocopeat (26.26 cm) while the shortest length of root was recorded in Top soil (control) (11.44 cm). Number of roots per cutting was noticed to be higher in Riverbed fine sand + Cocopeat + Perlite (32.96) followed by Soil + Cocopeat + Perlite + Rice husk (29.95) and Soil + Cocopeat + Perlite (29.86). However, the lowest number of roots per cutting was noted in Top soil (control) (21.78). Axillary bud formation and leaf unfolding was shown to be earliest in the cuttings when planted in Riverbed fine sand + Cocopeat + Perlite (13.44 days and 26.81 days respectively) followed by Soil + Cocopeat + Perlite + Rice husk (14.00 days and 27.22 days respectively). The longest days for axillary bud formation (29.33 days) and leaf unfolding (52.49 days) was noted in Top soil (control).

100 % rooting in cuttings was reported when planted in Soil + Riverbed fine sand, Soil + Rice husk, Soil + Riverbed fine sand + Cocopeat, Soil + Cocopeat + Perlite, Soil + Cocopeat + Perlite + Rice husk and Riverbed fine sand + Cocopeat + Perlite. The lowest percentage of rooting was observed in cuttings planted in Top soil (control) with only 28.47 % rooting. Growth medium is known to have effect on value of potted ornamental plants including plant height (Vendrame *et al.,* 2005). The increase in the vegetative and rooting value of *Ficus lyrata* 60 days after planting was observed to be highest when cuttings were planted in the medium containing fine sand, cocopeat and perlite. These might be due to better rooting of the houseplant when planted in soilless media which has higher water retaining ability and aeration, thus facilitating better root growth, thereby increasing the absorption of nutrient and improving the vegetative growth of the plant. Similar findings was reported by Wahyuningtyas *et al.* (2022) in *Cratoxylum arborescens* cuttings and Netam *et al*., 2020 on pomegranate cuttings. Sakr *et al.* (2007) reported tallest plants in cuttings of croton when planted in media containing sand. Sardoei and Rahbarian (2014) also found an increase in shoot length of *Ficus benjamina* when planted in sand and perlite. Increased in number of roots per cutting in cocopeat, riverbed coarse sand and perlite might be due to the high porosity and increased water holding capacity of the growing media (Rashidha *et al.,* 2021). Vlad *et al.* (2013) reported maximum number of roots per cutting (16.2) when cuttings of *Ficus elastica Serijeriana* were planted in media containing perlite.

**Table 1: Effect of different rooting media on growth attributes of *Ficus lyrata* 60 days after planting**

| **Treatments** | **Shoot length** | **Number of leaves per cutting** | **Stem diameter** | **Leaf length** | **Leaf breadth** | **Root length** | **Number of roots per cutting** | **Days for axillary bud formation** | **Days for leaf unfolding** | **Rooting %** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T1 | 9.53 | 2.00 | 0.22 | 8.07 | 6.07 | 11.44 | 21.78 | 29.33 | 52.49 | 28.47 |
| T2 | 10.67 | 2.83 | 0.28 | 10.43 | 8.13 | 17.49 | 27.51 | 24.87 | 50.10 | 61.90 |
| T3 | 10.93 | 2.83 | 0.34 | 9.70 | 7.35 | 12.60 | 24.33 | 22.12 | 38.20 | 100.00 |
| T4 | 12.67 | 2.17 | 0.34 | 9.33 | 7.05 | 25.35 | 29.03 | 23.22 | 40.87 | 57.14 |
| T5 | 13.40 | 2.33 | 0.28 | 8.92 | 6.22 | 18.76 | 24.67 | 26.10 | 50.77 | 61.90 |
| T6 | 10.27 | 2.33 | 0.24 | 8.55 | 7.89 | 18.89 | 22.30 | 22.33 | 39.00 | 100.00 |
| T7 | 14.05 | 3.96 | 0.31 | 10.57 | 8.40 | 26.26 | 28.81 | 14.11 | 35.52 | 100.00 |
| T8 | 11.33 | 3.33 | 0.35 | 11.52 | 8.41 | 19.90 | 29.86 | 16.08 | 31.14 | 100.00 |
| T9 | 14.43 | 2.56 | 0.34 | 11.23 | 8.58 | 26.76 | 29.95 | 14.00 | 27.22 | 100.00 |
| T10 | 15.63 | 4.33 | 0.38 | 13.40 | 10.40 | 31.29 | 32.96 | 13.44 | 26.81 | 100.00 |
| S Em± | 0.81 | 0.36 | 0.02 | 0.76 | 0.61 | 0.60 | 0.71 | 0.53 | 0.87 | 2.29 |
| CD at 5% | 2.42 | 1.09 | 0.07 | 2.28 | 1.83 | 1.78 | 2.10 | 1.57 | 2.58 | 6.81 |

T1: Top soil (control), T2: Riverbed coarse sand, T3: Riverbed fine sand, T4: Cocopeat, T5: Perlite, T6: Rice husk, T7: Soil + Riverbed fine sand + Cocopeat, T8: Soil + Cocopeat + Perlite, T9: Soil + Cocopeat + Perlite + Rice husk, T10: Riverbed fine sand + Cocopeat + Perlite

**3.2 Effect of rooting media on growth parameters 150 days after planting**

There was gradual increase in the plant characters 150 days after planting, with highest shoot length in cuttings planted in Soil + Cocopeat + Perlite (19.82 cm) which was statistically at par with Riverbed fine sand + Cocopeat + Perlite (19.46 cm), Soil + Cocopeat + Perlite (18.85 cm), Soil + Riverbed fine sand + Cocopeat (18.60 cm) and Soil + Perlite (18.56 cm) while the shortest length of shoot was observed in Top soil (control) (11.15 cm). Number of leaves per cutting was reported to be maximum in Riverbed fine sand + Cocopeat + Perlite (6.33) followed by Soil + Cocopeat + Perlite (5.78) and Soil + Riverbed fine sand + Cocopeat (5.22) and minimum number of leaves per cutting was noted in Top soil (control) (2.33). Length of leaf was found to be maximum in Riverbed fine sand + Cocopeat + Perlite (14.57 cm) followed by Soil + Cocopeat + Perlite + Rice husk (14.12 cm) while minimum leaf length was recorded in Top soil (control) (8.60 cm). The largest leaf breadth was also observed in Riverbed fine sand + Cocopeat + Perlite (11.17 cm) followed by Soil + Riverbed fine sand + Cocopeat (11.10 cm) and Soil + Cocopeat + Perlite + Rice husk (10.70 cm) and the smallest leaf breadth was observed in Top soil (control) (6.00 cm). Root length was observed to be longest in Soil + Cocopeat + Perlite (61.70 cm) folloed by Riverbed fine sand + Cocopeat + Perlite (55.16 cm) while shortest length of root was recorded in Top soil (control) (32.70 cm). The maximum number of roots per cutting was reported in Riverbed fine sand + Cocopeat + Perlite (109.27) followed by Soil + Cocopeat + Perlite + Rice husk (106.23) and Soil + Riverbed fine sand + Cocopeat (92.87). However, number of roots per cutting was found to be least in Top soil (control) (46.10).

*Ficus lyrata* ‘Fiddle Leaf Fig’ was more successful in rooting when planted in soilless media probably due to its finer root structure which helps in absorbing more nutrients and recover faster from the cut wounds. Percentage of rooting was highest when stem cuttings were planted in rooting media riverbed fine sand, cocopeat and perlite. This findings were in accordance with results reported by Wahyuningtyas *et al.* (2022) in *Cratoxylum arborescens* cuttings, Netam *et al*., 2020 on pomegranate cuttings and Sardoei and Rahbarian (2014) in *Ficus benjamina.* According to Jaenicke (1999), root development is important for good inoculation with symbionts, for efficient nutrient uptake and for out planting success. In addition to having a porous structure for root growth and development, an ideal substrate for cultivation should be able to retain water and nutrients [(Waseem *et al.* 2013)](https://pmc.ncbi.nlm.nih.gov/articles/PMC8054669/#b22-tlsr-32-1-83). According to the results found by Shirzad *et al.* (2012), rooting percent of *Ficus benjamina* was maximized when planted in perlite and sand. Vlad *et al.* (2013) also reported maximum percentage of rooting in *Ficus elastica Serijeriana* cuttings when planted in media containing perlite.

**Table 2: Effect of different rooting media on growth attributes of *Ficus lyrata* 150 days after planting**

| **Treatments** | **Shoot length** | **Number of leaves**  **per cutting** | **Stem diameter** | **Leaf length** | **Leaf breadth** | **Root length** | **Number of roots per cutting** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| T1 | 11.15 | 2.33 | 0.35 | 8.60 | 6.00 | 32.70 | 46.10 |
| T2 | 12.67 | 3.22 | 0.37 | 9.52 | 9.20 | 42.68 | 53.60 |
| T3 | 15.52 | 4.67 | 0.40 | 11.87 | 8.68 | 37.80 | 65.00 |
| T4 | 12.24 | 3.67 | 0.42 | 10.75 | 7.53 | 45.41 | 53.10 |
| T5 | 16.04 | 4.78 | 0.37 | 10.29 | 9.30 | 35.66 | 66.70 |
| T6 | 18.56 | 4.67 | 0.48 | 12.97 | 10.10 | 46.43 | 91.33 |
| T7 | 18.60 | 5.22 | 0.48 | 11.48 | 11.10 | 51.39 | 92.87 |
| T8 | 18.85 | 5.78 | 0.43 | 13.51 | 10.47 | 48.48 | 83.90 |
| T9 | 19.82 | 5.00 | 0.40 | 14.12 | 10.70 | 61.70 | 106.23 |
| T10 | 19.46 | 6.33 | 0.53 | 14.57 | 11.17 | 55.16 | 109.27 |
| S Em± | 0.62 | 0.29 | 0.04 | 0.41 | 0.30 | 0.53 | 0.77 |
| CD at 5% | 1.85 | 0.87 | NA | 1.21 | 0.90 | 1.57 | 2.30 |

T1: Top soil (control), T2: Riverbed coarse sand, T3: Riverbed fine sand, T4: Cocopeat, T5: Perlite, T6: Rice husk, T7: Soil + Riverbed fine sand + Cocopeat, T8: Soil + Cocopeat + Perlite, T9: Soil + Cocopeat + Perlite + Rice husk, T10: Riverbed fine sand + Cocopeat + Perlite

4. Conclusion

From the above results, it was observed that the maximum rooting and vegetative characters of *Ficus lyrata viz.,* number of roots per cutting (32.96 and 109.27), root length (31.29 cm) percentage of rooting (100 %), days to axillary bud formation (13.44 days), days to first leaf unfolding (26.81 days), shoot length (15.63 cm), number of leaves per cutting (4.33 and 6.33), stem diameter (0.38 mm), leaf length (13.40 cm and 14.57 cm) and leaf breadth (10.40 cm and 11.17 cm) 60 and 150 days after planting rerspectively was found when the cuttings were planted in the media containing riverbed fine sand, cocopeat and perlite. It can be concluded from the data that cuttings of *Ficus lyrata* when planted in soilless media give better result as compared to when planted in soil.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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