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EFFECT OF POTTING MIXTURE IN RAISING OF AIR-LAYERED LITCHI (*LITCHI CHINENSIS* SONN.) CV. BEDANA

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ABSTRACT

A study conducted entitled 'Effect of potting mixture in raising of air-layered litchi (*Litchi chinensis* Sonn.) cv. Bedana'' was carried out at Horticulture research station, Chinthapalli Andhra Pradesh under Dr. YSRHU, Venkataramannagudem, Andhra Pradesh during the year 2024-2025. The experiment was laid out in a randomized block design with three replications which consisting of eleven different combinations *viz*., Red earth + FYM (2:1) + VAM, Red earth + vermicompost (2:1) + VAM, Red earth + Sand (2:1) +VAM, Red earth + Cocopeat (2:1) + VAM, Red earth + FYM + Vermicompost (2:1:1) +VAM, Red earth + FYM + Sand (2:1:1) +VAM, Red earth + FYM + Cocopeat (2:1:1) +VAM, Red earth + Vermicompost + Sand (2:1:1) +VAM, Red earth + Vermicompost + Cocopeat (2:1:1) + VAM, Red earth + Sand + Cocopeat (2:1:1) +VAM, Red earth + VAM. Potting media had the significant performance on the growth parameters. The treatment red earth in combination with FYM, vermicompost and VAM recorded maximum increase in plant height (9.49cm), increase in shoot length (11.33 cm), increase in shoot diameter (2.06mm), length of longest shoot (17.58 cm), increase in number of branches (3.67) and survival percentage (92.51%). The least was recorded inred earth with VAM. From the above study it can be concluded that the potting mixture containing (T_5) red earth in combination with FYM, vermicompost and VAM was found to be most suitable potting media for the growth and survival of litchi air-layers.

***Key words*:** Litchi, potting mixture, Air-layering, FYM, vermicompost

Introduction

Litchi (*Litchi chinensis* Sonn.), a prized member of the *Sapindaceae* family, which comprises over 1,000 species and125 genera. It is an important evergreen fruit crop that is grown in subtropical climate. It isgrowing up to 10 -15 meters tall, with a dense, glossy round canopy and dark green leaves. The leaves are compound, usually made up of 4-8 leaflets and for producing the popular and aromatic fruit called litchi or lychee. According to Menzel (2001), it is originated in Southern China. The fruit's edible portion is called as aril, and it is a luscious, fleshy milky white pulp. Fruit contains phenolic compounds with antioxidant properties (Hu *et al*., 2010) and is a good source of vitamin C (Wall, 2006). Litchi contains bioactive substances with nutritional qualities(Chukwuma *et al.*,2021). Propagationof litchi by seed is usually not recommended due to their long juvenile phase and the seed have very short viability.

Commercially it is propagated by air-layering. Propagation of litchi by air layering offers several practical benefits and is widely used due to its reliability and it is easiest and common method of propagation.Litchifruit has high demand and nutritional value in present days, its reliable propagation and survival remain major problem for expanding the cultivation in Andhra Pradesh. There is a need to produce healthy planting material because

the demand for it is rising dramatically in subtropical regions of Andhra Pradesh. The choice of potting media plays an important role in determining the survival percentage and growth of the litchi. An ideal potting mixture provides better aeration, drainage, water holding capacity and nutrients for producing good planting material.

Materials and Methods

The present experiment was carried out at Horticulture Research Station, Chinthapalli, Andhra Pradesh under Dr. Y.S.R Horticultural University, Venkataramannagudem, West Godavari district, Andhra Pradesh. The experiment was laid out in 11 different treatment combinations each replicated thrice *viz.*, T_1 (Red earth + FYM (2:1) + VAM), T_2 (Red earth + vermicompost (2:1) + VAM), T_3(Red earth + Sand (2:1) +VAM), T_4(Red earth + Cocopeat (2:1) + VAM) , T_5(Red earth + FYM + Vermicompost (2:1:1) +VAM), T_6(Red earth + FYM + Sand (2:1:1) +VAM), T_7 (Red earth + FYM + Cocopeat (2:1:1) +VAM), T_8 (Red earth + Vermicompost + Sand (2:1:1) +VAM), T_9 (Red earth + Vermicompost + Cocopeat (2:1:1) + VAM), T_{10} (Red earth + Sand + Cocopeat (2:1:1) +VAM), T_{11} (Red earth + VAM) and the combinations are prepared and filled in polybags.

Preparation of Air-layers

Mature, semi-hard wood growth that are straight and healthy branchesare selected. About 25-30 cm from the tip of the branch, stem was girdled by removing a ring of bark with a sharp knife. After that, the girdled region covered with a 1:1 mixture of cocopeat and vermicompost then wrapped with polyethylene sheet. Both ends are tightly secured with thread to retain moisture. Then the prepared air-layers were left on the mother plant for 8-10 weeks. After development of sufficient rooting the air-layers detached from mother plant and placed in the different types of potting media which was prepared.

Plate 1: Removal of bark 2-2.5cm on a selected branch

Observations recorded

The observations recorded at 60 and 120 days after transplanting.The difference between the plant height of the layers at the time of transplanting and the plant height obtained after the 120 days after transplanting of air layers was used to calculate the increase in plant height. The difference between the shoot length of the layers at the time of transplanting and the shoot length 120 days after the transplanting of air layers was used to calculate the increase in shoot length. The difference between the shoot diameter measured at the time of air layer transplantation and the shoot diameter obtained by the layers six months after transplanting was used to calculate the growth in shoot diameter.The difference between the shoots at 60 and 120 days after transplanting expressed as increase in number of branches.The survival percentage of air-layers was estimated at 120 days after transplanting with the following formula:

$$\text{Survival percentage} = \frac{\text{Total number of survival plants}}{\text{Total number of layered plants}} \times 100$$

Data Analysis: Analysis of the experimental data recorded on various growth parameters of air-layers of litchi was statistically analyzed using analysis of variance (ANOVA) employing Randomised Block Design.

Results and Discussion

Growth characteristics

The growth characteristics like increase in plant height (cm), increase in shoot length (cm) increase in shoot diameter (mm), length of longest shoot (cm) and increase in number of branches and survival percentage(%), which are described under following heads.

Plate 2: Placing of media wrapped with polythene sheet

Table 1: Effect of potting mixture on increase in plant height, increase in number of branches and length of longest shoot in air-layeredlitchi cv. Bedana.

Treatments	Initial	After 60 days	After 120 days	Increase in Plant height (cm)	After 60 days	After 120 days	Increase in number of branches	Length of longest shoot (cm)
T_1	25.96	28.85	31.52	5.56	4.40	7.12	2.72	13.76
T_2	26.17	29.52	32.02	5.85	4.82	7.52	2.70	14.00
T_3	23.59	25.12	28.12	4.53	3.62	5.41	1.79	12.00
T_4	23.83	25.56	28.56	4.73	3.88	6.01	2.14	12.64
T_5	29.14	31.38	38.63	9.49	6.57	10.24	3.67	17.58
T_6	26.23	27.82	32.28	6.05	5.52	8.21	2.69	14.62
T_7	27.15	27.77	33.52	6.37	5.87	9.12	3.25	15.24
T_8	25.74	26.84	31.88	6.14	5.85	9.02	3.17	15.00
T_9	29.19	30.52	36.34	7.15	6.00	9.56	3.56	16.32
T_{10}	24.28	25.29	28.41	4.14	3.26	5.24	1.99	11.28
T_{11}	23.15	24.38	26.72	3.56	3.12	4.54	1.42	10.38
SE m ±	**0.03**	**0.47**	**0.54**	**0.35**	**0.24**	**0.21**	**0.01**	**0.35**
CD at 5%	**0.11**	**1.40**	**1.60**	**1.04**	**0.73**	**0.64**	**0.03**	**1.04**

Increase in plant height

The media consisting red earth combined with (T_5) FYM, vermicompost, and VAM (2:1:1) produced the maximum increase in plant height (9.49 cm), followed by (T_9) red earth combined with vermicompost, cocopeat, and VAM (7.15 cm), while the combination of (T_{11}) red earth and VAM recorded minimum (3.56 cm) increase in plant height. It might due to treatment preserved the more favourable conditions for the plant growth by supplying the ideal amount of nutrients and soil moisture through FYM and vermicompost, which promotes the early development of roots and shoots. FYM binds soil aggregates together and is a rich source of soil nutrients, its addition has an impact on soil physics, chemistry, and biology (Khott, 2017).These results similar in accordance with Etissa and Ravishanker (2003) in Avocado, Parasana *et al.*, (2013) in Mango and Dawar *et al.*, (2021) in pomegranate.

Increase in shoot length

The potting media (T_5) red earth in combination with FYM, vermicompost, and VAM (2:1:1) showed the maximum increase in shoot length (11.33 cm), followed by the media consisting red earth in combination with vermicompost, cocopeat, and VAM (10.60 cm), while the minimum increase in shoot length was recorded in (T_{11}) red earth and VAM(4.70 cm). This may be because of its higher nutrient content and water-holding capacity, which produced favourable conditions for the increased shoot growth when compared to other potting media. FYM and vermicompost composition has better water-holding capacity, porosity, and soil aeration than soil aloneand it provides substantial amount of nutrients, particularly nitrogen and micronutrients, for healthy shoot and root growth (Chopde *et al.*, 1999). Similar reports with Solanki *et al.*, (2023) in pomegranate and Panchal *et al.*, (2014) in Khirni

Increase in shoot diameter

Significantly more average shoot diameter (2.06 mm) was recorded in the media containing (T_5) red earth in

Plate 3: Appearance of rooting

Plate 4: Fully developed roots

Table 2: Effect of potting mixture on increase in shoot length, increase in shoot diameter and survival percentage in air-layered litchi cv. Bedana.

Treatments	Initial	After 60 days	After 120 days	Increase in shoot length (cm)	Initial	After 60 days	After 120 days	Increase in shoot diameter (mm)	Survival Percentage (%)
T_1	4.10	7.32	10.55	6.45	7.86	8.22	8.75	0.89	81.47 (64.48*)
T_2	4.52	7.43	11.58	7.06	7.80	8.41	8.76	0.96	82.24 (65.05*)
T_3	3.72	5.57	9.13	5.42	7.21	7.62	7.98	0.77	75.41 (60.25*)
T_4	3.98	6.72	10.68	6.71	7.42	7.88	8.24	0.82	77.38 (61.58*)
T_5	4.93	8.70	16.25	11.33	8.68	9.56	10.74	2.06	92.51(74.12*)
T_6	4.54	7.91	13.03	8.49	7.92	8.54	9.08	1.16	86.28(68.64*)
T_7	4.71	8.27	14.77	10.06	8.12	8.62	9.56	1.44	87.67(69.43*)
T_8	4.64	8.10	14.42	9.78	8.14	8.68	9.32	1.18	88.28(69.96*)
T_9	4.76	8.30	15.35	10.60	8.22	8.86	10.08	1.86	90.21(71.25*)
T_{10}	3.68	5.47	8.83	5.16	7.53	8.02	8.06	0.53	69.25(56.30*)
T_{11}	3.64	5.32	8.34	4.70	7.12	7.52	7.54	0.42	62.46(52.19*)
SE m ±	**0.01**	**0.20**	**0.37**	**0.31**	**0.01**	**0.01**	**0.02**	**0.02**	**0.55**
CD at 5%	**0.03**	**0.60**	**1.11**	**0.93**	**0.03**	**0.05**	**0.06**	**0.06**	**1.66**
*Figures in parenthesis are angular transformed values									

combination with FYM, vermicompost and VAM (2:1:1). The minimum increase in shoot diameter (0.42 mm) was recorded in (T_{11}) red earth in combination with VAM (2:1). The stimulatory effect of nutrients and amino acids may be the cause of the increased cell wall flexibility. It could be the reason for the increase in shoot diameter. The presence of vermicompost and FYM in potting media is might be the reason for increase in stem diameter enhancing the nutrient uptake in the plants. Similar results were reported by solanki *et al.*, 2023 in pomegranate and Saritha *et al.*, 2019 in litchi.

Length of longest shoot

The maximum length of the longest shoot (17.58 cm) was recorded in the media containing (T_5) red earth in combination with FYM, vermicompost and VAM while the minimum length of longest shoot was recorded in media containing (T_{11}) red earth with VAM. (10.38cm). The increase in the length of shoots is due to supply of nutrients from organic matter present in the potting media (Khot, 2017). FYM and vermicompost provides macro and micronutrients and improves the microbial activity, water holding capacity and enhance the nutrient uptake and also VAM enhances nutrient absorption from the media. These results are in conformity with Saritha *et al.*, (2019) in litchi and Sardoei, (2014) in guava.

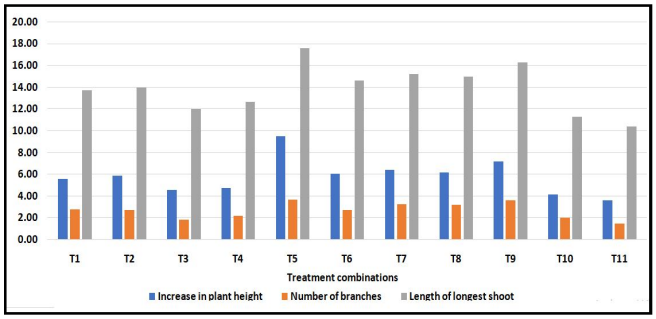

Fig. 1: Effect of potting mixture on increase in plant height,number of branches and length of longest shoot on air-layered litchi.

Increase in number of Branches

The maximum increase in number of branches recorded in the media containing (T_5) red earth in combination with FYM,vermicompost and VAM (3.67). The minimum number of branches in media containing (T_{11}) red earth in combination with VAM (1.42). This could be due to vermicompost and FYM have a high organic matter content, which makes nutrients available

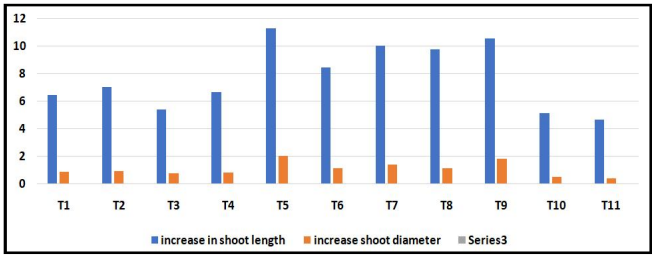

Fig. 2: Effect of potting mixture on increase in shoot length and shoot diameter in air-layered litchi.

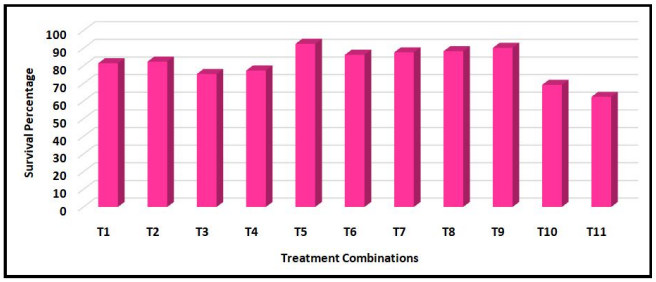

Fig. 3: Effect of potting mixture on survival percentage in air-layered litchi.

to meristematic cells. Because of the organic materials in the growth media, there are morenumber of side branches. This might be also due to there are more primary and secondary roots, which improve the media's ability to absorb nutrients(Saritha *et al*., 2019). The results found similar with the findings of Manzhi (2021) in guava,Singh *et al*., (2020) and Tyagi and Patel (2004) in Guava.

Survival percentage

Significantly the maximum survival percentage of transplanted rooted air-layers (92.51%) was recorded in treatment containing (T_5) red earth along with FYM, vermicompost and VAM (2:1:1) whereas the minimum survival percentage (62.46%) was obtained in media containing (T_{11}) red earth with VAM. This could be due to vermicompost in the media provides air-layers with nutrients, well decomposed organic matter, optimal moisture, and chemicals that promote plant growth (Deshmukh *et al.*, 2019). These results are similar conformity with Das *et al*., (2006) in sapota, and Dawar *et al.*, (2021) in Pomegranate.

From the present study, it can be concluded that the among different potting mixture,(T_5) red earth in combination with FYM, vermicompost and VAM is found to be superior to all other treatments for survival and growth of litchi air-layers in terms of increase in plant height, shoot length, shoot diameter, length of longest shoot, increase in number of branches and survival percentage.The media is made up of nutrient-rich FYM and vermicompost, and when combined with VAM, it increases nutrient absorption, root development, and plant establishment. On the basis of growth and survival (T_5) red earth in combination with FYM, vermicompost and VAM ideal for the growth of litchi air-layers.

References

Chopde. N., Patil B.N., Pagar P.C. and Ram Gawande R. (1999). Effect of different pot mixtures on germination and growth of custard apple (*Anona squamosa* L.). *Journal of Soils And Crops*. **9(1)**, 69-71.

Chukwuma, C.I., Izu G.O., Chukwuma M.S., Samson M.S., Makhafola T.J. and Erukainure O.L. (2021). A review on the medicinal potential, toxicology, and phytochemistry of litchi fruit peel and seed. *Journal of Food Biochemistry*, **45(12)**, 13997.

Das, B.K., Das J.N. and Acharya G.C. (2006). Effect of potting media on air grafting of five sapota varieties. *Orissa Journal of Horticulture*. **34(2)**, 18-22.

Dawar, I.S., Sharma T.R., Nagar O.P. and Pal S. (2021). Influence of different PGR and growing media for growth and development of marcottage in pomegranate (*Punica granatum* L.) cv bhagwa. *International Journal Of Chemical Stuides*. **9(3)**, 255-60.

Etissa, E. and Ravishanker S.G.M.H. (2003). Influence of potting media types and weight on emergence and shoot growth of avocado (*Perseaamericana* Mill.) seedlings. *Fruits* (Paris). **58(6)**, 345-56.

Khot, A.A. (2017). Effect of different potting media on success and growth of bullock's heart (*Annona reticulata* L.). M.Sc. (Agri.) Thesis Submitted to Dr. BS Konkan Krishi Vidyapeeth, Dapoli, Maharashtra.

Hu, Z.Q., Huang X.M., Chen H.B. and Wang H.C. (2010). Antioxidant capacity and phenolic compounds in litchi (*Litchi chinensis* Sonn.) pericarp. *Acta Horticulturae*. **863**, 567-74.

Manjhi, D. (2021). Effect of foliar application of GA3 and NAA with different growing media on growth and survivability of air-layered plants of Guava (*Psidium guajava* L.) (Doctoral dissertation, Rajmata VijayarajeScindia Krishi Vishwa Vidyalaya).

Menzel, C. (2001). The physiology of growth and cropping in lychee. *South Africa Litchi Grow Association Yearbook*. **12**, 9-14.

Panchal, G.P., Parasana J.S., Patel S.R. and Patel M.V. (2014). Effect of different growing medias and levels IBA on growth and development of Khirni (*Manilkara hexandra* Roxb) seedlings cv. local. *Global Journal of Bio-Science and Biotechnology*. **3(4)**, 379-83.

Parasana, J.S., Leua H.N. and Ray N.R. (2013). Effect of different growing medias mixture on the germination and seedling growth of mango (*Mangifera indica*) cultivars under net house conditions. *The Bioscan*. **8(3)**, 897-00.

Sarita, B.P., Kour K., Mehla U., Bhawana S.S., Jasrotia A. and Bushan B. (2019). Effect of different potting media on nutrient composition of soil and leaves of litchi air layers. *International Journal of Current Microbiology Applied. Sciences*. **8(10)**, 928-33.

Sardoei, A.S. (2014). Effect of different media of cuttings on rooting of guava (*Psidium guajava* L.). *European Journal of Experimental Biology*. **4(2)**, 88-92.

Singh, U.K. and Choudhary A. (2020). Effect of foliar spray of plant growth regulators and micronutrient on guava (*Psidium guajava*). *International Journal of Agriworld*. **1(1)**, 8-13.