EffectofDifferentPottingMediaonSeedsGermination& GrowthofDahiman(*Cordia macleodii*Hook.) in Nursery

ABSTRACT: The study was conducted at the Herbal Garden, IGKV, Raipur (C.G.) from July to January during the 2023-24 session. The study aimed to evaluate the impact of various potting mixtures on the growth of Dahiman (*Cordia macleodii*) in a nursery setting. The experiment used a Complete Randomized Design (CRD) with three replications and nine different treatments. The treatments involved different combinations of potting mixtures: T_1 (sand + soil + FYM, 1:1:1), T_2 (soil + sand + vermicompost, 1:1:1), T_3 (soil + vermicompost + FYM, 1:1:1), T_4 (sand + soil + lemongrass compost, 1:1:1), T_5 (sand + soil + FYM, 2:1:1), T_6 (sand + soil + vermicompost, 1:1:1), T_7 (sand + soil + vermicompost, 1:1:2), T_8 (sand + soil + FYM, 1:1:2), and T_9 (control). The T_7 treatment (sand + soil + vermicompost, 1:1:2) stood out as the most effective, significantly improving all growth parameters for both Dahiman. These findings indicate that the T_7 treatment (sand + soil + vermicompost, 1:1:2) is the best choice for promoting healthy growth in Dahiman seedlings.

Keywords: Seedlings,Complete Randomized Design, FYM&Vermicompost .

INTRODUCTION

The rare species *Cordia macleodii* is also referred to as Dahiman or Dahiphalas. The family Boraginaceae is where it belongs.The original home of *Cordia macleodii* is India. In India, it is commonly found in drug-addled, wet deciduous forests like Chhattisgarh. The tree is between 9 and 12 meters tall, with light green bark that is 12 to 15 mm thick. Broadly oval, glossy, dark green leaves are present. The hue of flowers is yellowish-white. The fruits appear in March through June, and the blooms appear in March through April. According to a number of pharmacological investigations, *Cordia macleodii* plants exhibit wound healing, hepatoprotective,analgesic, anti-inflammatory, antibacterial, and antioxidant properties.

Seedlings are small plants with enough potential to grow into mature trees. These seedlings grow naturally, but they can also be propagated by seeding and germinating, which helps them to sprout quicker and boost their chances of survival. The factors must be optimal to produce a health and vigorous seedlings, and among them, the genes and the nursery environment determine to a large degree how a tree can survive (Jaenicke, 1999). Development of seedlings begins with the acquisition of viable germplasm or rootstocks that can be

germinated or developed through vegetative means (Wolny *et al.,* 2018)

All too often, nurseries operate with minimal inputs and outdated techniques, and therefore produce poor seedlings (Jaenicke, 1999). Therefore, to enhance the quality of seedlings produced, nurseries should demonstrate high quality standards that incorporates structured planning and quality control, appropriate substrates and containers, nursery hygiene, and good equipment (Jaenicke, 1999).

Nurseries provide the means to control moisture, light physical and chemical soil constituents in such a way as to produce healthy and uniform seedlings for planting (Doran, 1997). Several factors can influence seedling growth in the nursery. But potting substrate is the most important factor from the nursery environment. This is because, first it is basically a plant's first food; secondly, it physicallysupports a growing seedling and thirdly, it stores and supplies nutrients, water and air to the root system (Jaenicke, 1999).

MATERIAL AND METHOD

The experiment has been carried out during season of 2023 – 2024 in Herbal Garden of Indira Gandhi Krishi Vishwavidyalya,Raipur.CompletelyRandomized Design (CRD) was employed with nine (9) treatments and three (3) replication each. The treatment details are .: T_1 (sand + soil + FYM, 1:1:1), T_2 (soil + sand + vermicompost, 1:1:1), T_3 (soil + vermicompost + FYM, 1:1:1), T_4 (sand + soil + lemongrass compost, 1:1:1), T_5 (sand + soil + FYM, 2:1:1), T_6 (sand + soil + vermicompost, 1:1:1), T_7 (sand + soil + vermicompost, 1:1:2), T_8 (sand + soil + FYM, 1:1:2), and T_9(control soil only).The seedsof (*Cordia macleodii*Hook.)were sown in 2 cm depth in polybags prepared with different potting mixture on July,2023.

The polybags were set up in accordance with the experimental design, with three replications of each type of polybag per treatment. The seedsgermination and growth parameters of the seedlings were observed, and the mean of these data was computed.

The height of the plant was measured every month for all the treatments usinga meter scale in centimeters. The height from the ground level to the terminal apex of the plant was measured and their mean was recorded.The diameter of the plant was measured using a Vernier caliper at 1 cm above the ground level. The collar diameter was measured every month for all the treatments and their mean was recorded.The leaves number for each plant was counted every month for all the treatments and their mean was recorded.

Seeds Germination Percentage

Germination percentage (Maguire 1962) was calculated by number of germinating seedlings divided by the total number of seeds sown in poly bags and multiplied by 100.

Survival Percentage

Total number of survived seedlings was counted from each treatment. Success

percentage was calculated by using following formula:

SURVIVAL (%) =total number of seedlings survived/total number of germinated seedlings X1OO

RESULTS AND DISCUSSION

The current investigation was conducted to know the effectofdifferentpottingmediaonseedsgermination andgrowthofDahiman(*Cordia macleodii*Hook.) in nursery.The findings from the current study are presentedunder suitable headings, along with tables and figures.

Germination percentage. The study revealed that T_7 Sand + Soil + Vermicompost1:1:2 had the highest germination percentage(60.16) % of *Cordia macleodii*, whereas T_9 Control (soil only) had the lowest germination percentage (13.46) % (Table 1 & figure 1).The results show highest germination percentage due to the more portion of vermicompost as it contains alot ofmineral nutrients, active soilenzymes and microbes (Dominguez, 2004). Vermicompostsimprove seed germination, seedlingvigor, and plant productivity more than what would have been possible from inorganic mineral nutrient sources, while using as little as 10–40 % of the total plant rooting volume (Subler *et al*.1998; Gopalakrishnan et al., 2012; Alsina et al., 2013).

The findings of this study are consistent with the findings of Gawankar*et al.,* (2019)who found that the effect of different potting media on seed germination and seedling growth in jackfruit (*Artocarpus heterophyllus* Lam.) containing soil, vermicompost, cocopeat, and rice husk in a 1:1:1:1 proportion was best for obtaining the highest germination percentage (93.0%), 11.88 days for initiation of germination, 22.88 days for 50% germination, and 24.25 days for total germination. Panchal et al., (2014), Meena et al., (2014)and Purwantoro, (2016) reported that use of vermicompost and rice husk was useful as they had components which favour the nutritional status, pH levels and organic carbon content. The findings are consistent with previous studies on papaya by Arvind (2014), and Ramteke *et al.,* (2015).

Survival percentage.The study revealed that T_7 Sand + Soil + Vermicompost 1:1:2 had the highest survival percentage (37.4) % of *Cordia macleodii*, whereas T_9 Control (soil only) had the least impact on seedling survival percentage (15.06) % (Table 1 & figure 1).The results shows very less survival rate of seedlings while more germination percentage rate is due to climatic factors as the seedlings were in open field condition therefore there is less survival percentage of seedlings.

According to Mulugeta's 2014 study, which examined the effects of various potting mixtures on the growth and survival of *Albizia Gummifera* and *Cordia Africana*seedlings, the survival rates of *C. africana* (98.333%) and *A. gummifera* (95.000%) were considerably higher in T_4

than in T_{10}. These results are consistent with the findings of this study.

Plant height (cm). The study revealed that theheight of *Cordia macleodii* seedlings increased significantly with the number of days in the plant height, revealing a significant impact of the treatment. The treatments with the statistically highest effects on plant height in 30 days are T_7 sand+soil+vermicompost @ 1:1:2 (6.7 cm) and T_8 sand+soil+ FYM @ 1:1:2 (6.16 cm).The highest plant height measured in 60 days was 15.53 cm in T_7 sand+soil+vermicompost at a ratio of 1:1:2. The highest plant height measured in 90 days in T_7 sand+soil+vermicompost @ 1:1:2 (22.4 cm) The maximum plant height in T_7 sand+soil+vermicompost at 1:1:2 (30.9 cm) was measured after 120 days. The highest plant height was measured in T_7 sand+soil+vermicompost @ 1:1:2 in 150 days (35.56 cm), and in T_7 sand+soil+vermicompost @ 1:1:2 in 180 days (36.7 cm) (Table 1 & figure 2).The highest plant results as vermicompost stimulates to influence the microbial activity of soil, increases the availability of oxygen, maintains normal soil temperature, increases soil porosity and infiltration of water, improves nutrient content and increases growth, yield and quality of the plant (Arora et al. 2011).

The results of this study are consistent with those of Ghising*et al.,* (2022), who found that a 2:1:1 potting media combination of soil, sand, and vermicompost produced the highest heights for *Tectona grandis* seedlings. The chemical and physical characteristics of the rooting media were enhanced by the addition of cocopeat, farmyard manure, and vermicompost to various media, which promoted the growth and development of seedlings (Panchal *et al.,* 2014). Vermicompost is also beneficial to the general growth and development of the plant. Abirami *et al.,* (2010) The same results on *Pinus gerardiana* seedling growth were also noted by Kumar *et al.,* (2016), who found that growing media containing soil, sand, and vermicompost produced the highest heights. The growth of *Grevillea robusta* seedlings raised in a mixture of soil, sand, and vermicompost was found to be outstanding by Khaplee*t al.,* (2012) and Sood and Ram (2019) in the case of *Oroxylum indicum.*

Collar diameter (mm). The study revealed that the collar diameter of the *Cordia macleodii* seedlings increased significantly with the number of days in the collar, revealing a significant treatment effect. The treatments with the statistically highest effect on collar diameter in 30 days are T_7 sand+soil+vermicompost @ 1:1:2 (1.69 mm) and T_8 sand+soil+ FYM @ 1:1:2 (1.59 mm). T_7 sand+soil+vermicompost @ 1:1:2 recorded the maximum collar diameter in 60 days (2.79 mm), while T_7 sand+soil+vermicompost @ 1:1:2 recorded the maximum collar diameter in 90 days (3.89 mm). The greatest collar diameter in T_7 sand+soil+vermicompost @ 1:1:2 was measured after 120 days (5.92 mm). The greatest collar diameter was measured in T_7 sand+soil+vermicompost @ 1:1:2 (6.92 mm) in 150 days, and in T_7

sand+soil+vermicompost @ 1:1:2 (7.66 mm) in 180

Table1:Effect of different potting media on germination percentage,survival percentage, plant height, collar diameter and No. of leaves of *Cordiamacleodii* in nursery

Treatments	Germination %	Survival %	Plant height (cm)						Collar diameter (mm)						No.of leaves					
	30 D		30 D	60 D	90 D	120 D	150 D	180 D	30 D	60 D	90 D	120 D	150 D	180 D	30 D	60 D	90 D	120 D	150 D	180 D
T1	17.1	15.3	3.9	12.7	14.6	23.5	27.8	28.5	1.2	2.2	3.3	4.4	5.4	6.6	1.4	6.6	11.4	16.4	20.4	25.5
T2	31.6	20.6	4.6	12.9	18.3	26.4	31.8	32.8	1.3	2.4	3.5	5.1	5.6	6.8	2.7	8.1	12.8	17.8	22.8	27.6
T3	46.3	23.7	5.5	14.2	20.4	28.4	33.6	37.6	1.4	2.6	3.7	5.7	6.7	7.0	3.7	8.8	13.8	18.8	23.9	28.8
T4	22.7	20.1	4.6	13.4	17.5	25.1	30.9	31.6	1.3	2.4	3.5	4.6	5.6	6.7	2.3	7.6	12.3	17.5	21.8	27.1
T5	20.5	16.7	3.8	12.6	16.4	24.4	29.8	30.3	1.2	2.3	3.4	4.5	5.5	6.6	2.1	7.4	11.8	16.8	21.0	26.7
T6	40.4	22.3	5.0	13.8	19.5	27.7	32.8	33.6	1.4	2.5	3.6	5.7	6.5	6.9	3.2	8.4	13.6	18.4	23.6	28.4
T7	60.1	37.4	6.7	15.5	22.4	30.9	35.5	36.7	1.6	2.7	3.8	5.9	6.9	7.6	4.6	9.5	14.5	19.6	24.8	29.9
T8	52.4	34.6	6.1	14.3	21.6	29.5	34.5	35.4	1.5	2.7	3.8	5.8	6.8	7.1	4.2	9.4	14.3	19.4	24.4	29.4
T9	13.4	15.0	3.5	12.2	13.6	22.3	27.4	28.5	1.1	2.1	3.2	4.4	5.3	6.4	1.5	5.8	10.8	15.5	20.3	25.0
Sem±	1.74	1.78	0.20	0.28	0.20	0.27	0.21	1.05	0.0	0.02	0.02	0.05	0.04	0.09	0.13	0.17	0.14	0.17	0.17	0.17
CD@ 0.05%	5.23	5.35	0.62	0.84	0.62	0.81	0.63	3.16	0.0	0.07	0.07	0.17	0.13	0.29	0.41	0.51	0.43	0.51	0.50	0.51
C.V.(%)	8.94	13.52	7.37	3.59	1.98	1.78	1.16	5.57	2.78	1.68	1.16	1.94	1.319	2.46	8.27	3.72	1.96	1.65	1.30	1.06

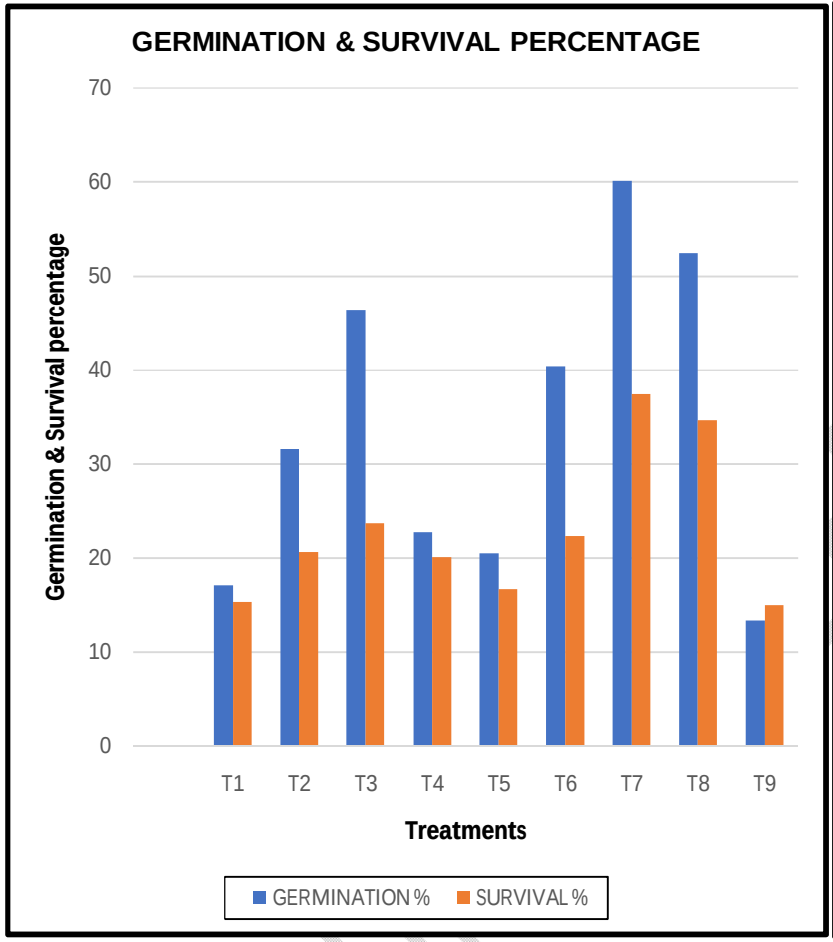

Fig 1: effect of different potting mixture treatments on germination and survival percentage of *Cordia macleodii* in nursery

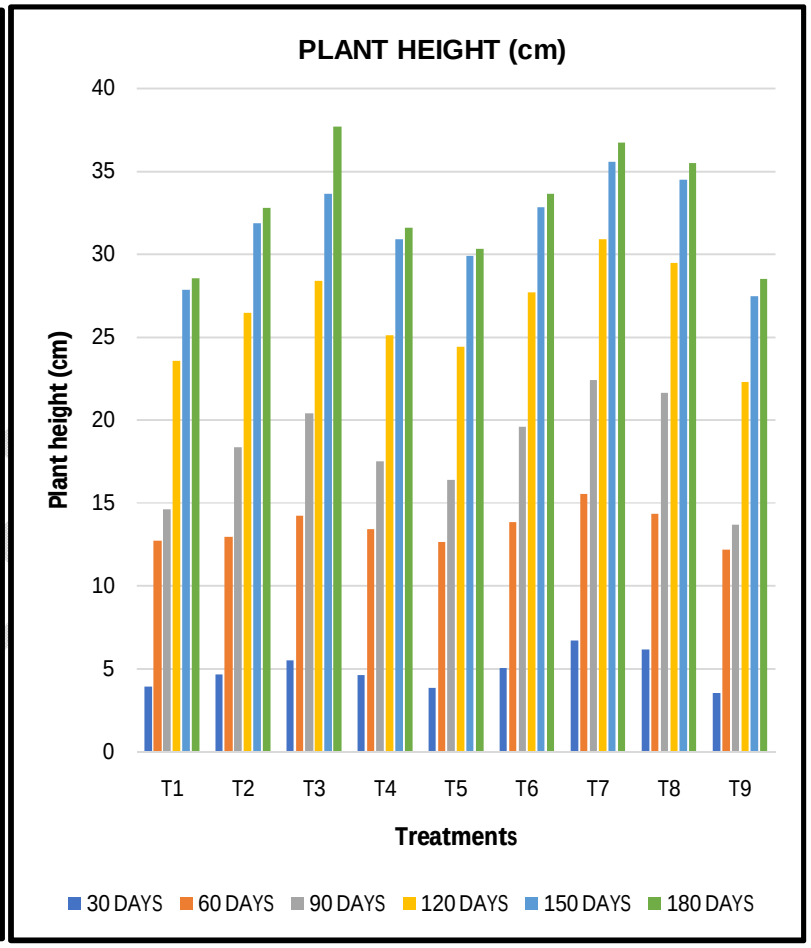

Fig 2: effect of different potting mixture treatments on plant height of *Cordia macleodii* in nursery

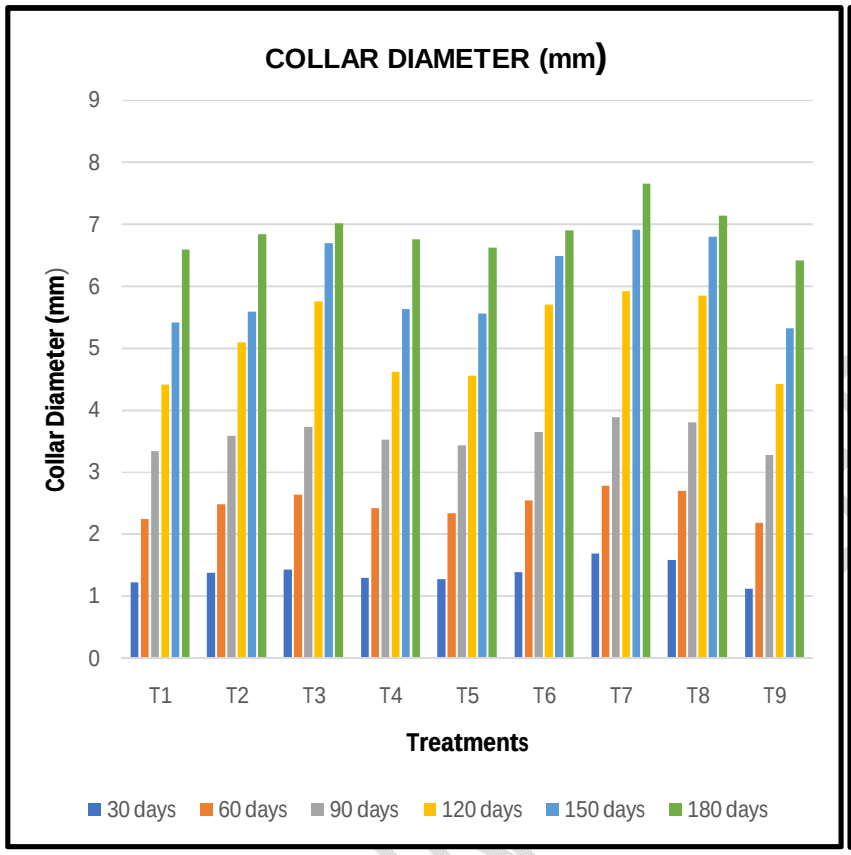

Fig 3: Effect of different potting mixture treatments on collar diameter of *Cordia macleodii* in nursery

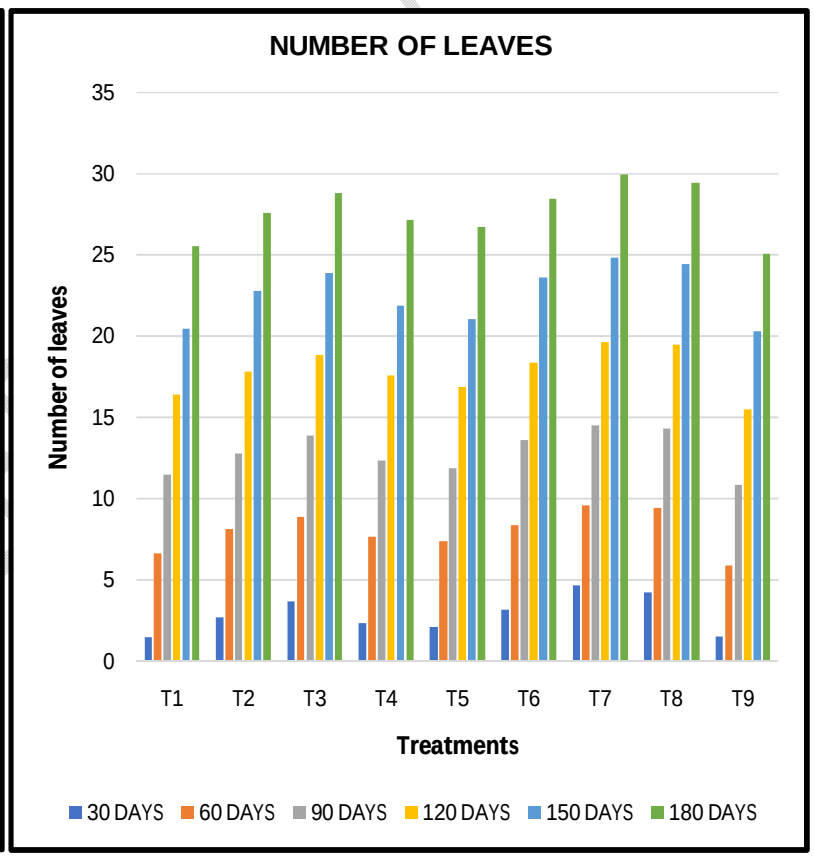

Fig 4: Effect of different potting mixture treatments on number of leaves of *Cordia macleodii* in nursery

Days(Table 1 & figure 3). The highest collar diameter results as vermicompost stimulates to influence the microbial activity of soil, increases the availability of oxygen, maintains normal soil temperature, increases soil porosity and infiltration of water, improves nutrient content and increases growth, yield and quality of the plant (Arora et al. 2011).

The results also have resemblance to Ghising*et al.,* (2022) observations of the maximum collar diameter for *Tectona grandis* seedlings on a mixture of soil, sand, and vermicompost. Additionally, the results closely match those of *Santalum album* by Annapurna et al. (2004) and *Grevillea robusta* by Khaple*et al.,*(2012), as well as *Oroxylum indicum* by Sood and Ram (2019). Additionally, according to Kumar *et al.,* (2016), *Pinus gerardiana* collar diameters are noticeably larger in soil that has been combined with vermicompost.

Number of leaves. The study revealed that there was a rise in the number of leaves in the *Cordia macleodii* seedlings with each passing day, revealing the significant effect of the treatment. The treatments with the statistically highest effect on the number of leaves after 30 days are T_7 sand+soil+vermicompost @ 1:1:2 (4.66) and T_8 sand+soil+ FYM @ 1:1:2 (4.26). In T_7 sand+soil+vermicompost @1:2 (9.56), the most leaves in 60 days were recorded. T_7 sand+soil+vermicompost @ 1:1:2 achieved the highest number of leaves in 90 days (14.5). T_7 sand+soil+vermicompost @ 1:1:2 recorded the highest number of leaves in 120 days (19.63). In T_7 sand+soil+vermicompost @ 1:1:2 during 150 days, the highest number of leaves was reported (24.83) The highest number of leaves in 180 days was seen in T_7 sand+soil+vermicompost @ 1:1:2 (29.93)(Table 1 & figure 4).

There were more leaves in T_7. The majority of plants food is produced in leaves, which are impacted by a variety of elements, the most important of which is the soil. The high number of leaves in the T_7 treatment could be attributed to increased production of photosynthesizing functional leaves (Borah *et al.,* 1994), which is aided by a well-balanced media containing sufficient organic matter and clay. This finding is consistent with previous research, which revealed that employing soil mixtures containing organic substrates such as leaf manure (Riaz *et al.,* 2008) and farmyard manure (Sudhakara *et al.,* 1995; Malewar*et al.,* 1998; Parasanna*et al.,* 2013) increased the number of leaves. Organic matter in potting mixtures affects water and nutrient availability (Peter-Onoh*et al.,* 2014) and increases seedling production (Baiyeri, 2003), and the compost in our combination may have released nutrients for seedling growth while also boosting water holding capacity. The other findings are consistent with those reported by R.L Bhardwaj (2014) in papaya, Abirami *et al.,* (2010) in *Myristica fragrans*, and Panchal *et al.,* (2014) in Juvekar *et al.,* (2019) in Kokum, Sood and Ram (2019) in *Oroxylum indicum*

and Kaur (2017) in *Mangifera indica*, Khaplee*t al.,* (2012) in *Grevillea robusta.*

CONCLUSION

The study revealed that theseedsgermination and growth of *Cordia macllodii*seedlings in nurseries were considerably influenced by various potting mixture treatments. In terms of the germination and survival percentages of *Cordia macllodii* and seedlings in nurseries, potting mixture treatments T_7(sand+soil+vermicompost1:1:2) showedsuperiorperformance.Treatments em ploying potting mixtures in *Cordia macllodii* seedling growth characteristics have been greatly influenced by T_7(sand+soil+vermicompost 1:1:2), which has produced maximum plant height, collar diameter, and number of leaves in the nursery.The results of the investigation regarding the growing performance of seedlings lead to the conclusion that a 1:1:2 mixture of potting medium containing sand, soil, and vermicompost encourages the seedlings' quick growth and illustrates that Treatments 7 and 8 have a good impact.

FUTURE SCOPE

The findings of this study provide valuable insights into theeffectofdifferentpottingmediaongerminatio nandgrowthofDahiman(*Cordia macleodii*Hook.) in nursery. However, further research avenues could be explored to enhance our understanding and contribute to sustainable agricultural practices. Some potential future research directions include:

1.To achieve faster germination of tree seedlings, other potting mixture concentrations and other tree species propagation materials can be utilized in future experiments.

2.Additionally, this research must to be carried out under various agroclimatic circumstances. In order to derive a sound conclusion and provide a solid foundation for suggesting an appropriate potting media to promote the growth of seedlings, the experiment should be conducted in an open field situation for an extended duration.

Disclaimer (Artificial intelligence)

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

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