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Effect of Root Trainer Size and Potting Mixes on Growth and Survival of Seedlings of *Dalbergia Latifolia*

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Abstract: ***The present study was undertaken to compare the effect of inorganic fertilizers and biofertilizers with different sizes of root trainer on the growth parameters, biomass and survival rate in Dalbergia latifolia. The four sizes of root trainers and 37 potting mixtures (treatment) along with control were tried. The study was conducted in green house of the institute. In each treatment 30 seedlings were prepared with 3 replicates in each root trainer cell size. At the end of 12 months of experiment 03 seedlings were selected randomly from each replicates of each treatment for measurement of growth parameters and biomass studies. The result indicates that the highest growth performance of Dalbergia latifolia was found in 400 CC root trainer size along with treatment T19 (Soil, sand and FYM with 1: 1: 1 ratio and 20 gm VAM). The VAM biofertilizer was found the most efficient in improving the seedling growth, root fiberocity, stem collar diameter, biomass and survival percentage of seedlings. VAM application helps in the growth of plants and increasing productivity by nitrogen fixation, phosphorous utilization, preventing attack of roo pathogen and enhancement of tolerance to moisture stress condition in the plants in the most natural way, which has resulted in increasing the growth of seedlings.***

Keywords: VAM, seedling growth, biomass, survival, root fiberocity, stem collar diameter

1. Introduction

Decreasing non - renewable reserves - all over the world and the increasing cost of chemical fertilizers have necessitated the demand for alternative renewable source to meet the need of plant nutrients. Bio - fertilizers are and effective, cheap and renewable supplement to chemical fertilizers. Consedering the problem of chemical fertilizers it has been globally recognized to incorporate bio - fertilizers in integrated plant nutrition system for meeting the nutitional demand of plants. In this system judicious combination of chemical fertilizers and bio - fertilizers are applied to provide ideal nutrition for plants and their optimum utilization along with maintenance of soil productivity. Bio - fertilizers are group of micro - organisms consist of bacteria, fungi, algae etc. These alone or in combination are known to be increasing plant growth by way of various bio - chemical activities in the soil. Mainly there are two groups of bio - fertilizers i. e. symbiotic and non symbiotic. Symbiotic group comprises rhyzobium, frankia (nitrogen fixing organisms) and mycorrhizae (especially for phosphorous) and covers most of the terrestrial and aquitic plant community. While non symbiotic group includes azatobactor, azospiricullum, pseudomonas etc. living in free environment. The role of each micro - organism is very specific and plant interact with them to fulfil there requirement for various minerals. The application of bio - fertilizers in agriculture sector is well recognize but is lacking in the forestry sector. The use of biofertilizers practice is scarce in forest nurseries and plantations.

Dalbergia latifolia commonly known as Shisham belongs to family fabaceae. It grows scattered in mixed deciduous forest with teak as one of its common associates. It is a moderate light demander and grows fairly well on black cotton soil. This species does not produce seed as regularly and abundantly. This species is categorized in RET as per IUCN Ver.2.3 1994 as threat status. The criteria for threat due to population reduction, poor regeneration. The present study was undertaken to standardized the technology for production of quality planting stock in root trainer with potting media *Dalbergia latifolia*.

In present scenario of ban on polythene bags in forest nurseries, it is become necessity of alternatives of polythene bags. So in place of polythene bags, root trainer may be an alternative of aforesaid material. Various researchers is reviewed and their detailed highlighted on the suitability of root trainer size for different forestry species in *Acacia nilotica* the seedling raised in 300CC Hickopots performed the best in nursery as well as in the field (Ginwal, 2001) and *Jatropha curcus* (Muzamil Rasool et. al., 2018), *Albizia proccera* (Arti Ghabru et. al., 2023) studied to refine the potting media and improve seedling growth of *Santalum album* in root trainers (Annapurna et. al., 2004), standardization of best growing media and container type for quality stock production in *Emblica officinalis* (Raveena Negi et. al., 2020).

However, the technology has not been standardized for *Dalbergia latifolia*. The objective of the present study is to compare the growth of seedlings in different cell size of root

trainer with various potting mixture for production of quality planting stock of *Dalbergia latifolia*.

2. Materials and Methods

Fresh seeds were collected from identified superior trees by hand plucking at peak maturity. After collection seeds were tested for viability and germination percentage for development of packages of nursery techniques in reference to standardization of root trainer cell size with various potting mixture for *Dalbergia latifolia.*

Before sowing the seeds in various potting mixture, the seeds were soaked in tape water for 24 hrs. The potting mixtures were composed with various fertilizers and chemicals. Different size of root trainer *viz.*90 CC, 150 CC, 300 CC, and 400 CC, were used for standerdization of root trainer cell size with potting mixture. Observation were recorded on seedling growth, biomass of seedlings, fiberocity of roots, root volume, and survival percentage. Total 37 potting mixture / treatment were tried using various combinations of chemical fertilizers and bio - fertilizers. Details of potting mixture (T0, T1, to T36) are as below:

T. No.	Treatment (Potting mixture)	T. No.	Treatment (Potting mixture)
T0	Control (Only Soil)	T19	T1 + 60gm Rizobium
T1	Soil + Sand + FYM (1: 1: 1)	T20	T1 + 40gm VAM
T2	Soil + Sand + FYM (2: 1: 1)	T21	T1 + 60gm VAM
T3	Soil + Sand + FYM (1: 2: 1)	T22	T1 + Urea 2gm
T4	Soil + Sand + FYM (1: 1: 2)	T23	T1 + Urea 4gm
T5	Soil + Sand + Vermicompost (1: 1: 1)	T24	T1 + Urea 6gm
T6	Soil + Sand + Vermicompost (2: 1: 1)	T25	T1 + 2gm Single Super Phosphate
T7	Soil + Sand + Vermicompost (1: 2: 1)	T26	T1 + 4gm Single Super Phosphate
T8	Soil + Sand + Vermicompost (1: 1: 2)	T27	T1 + 6gm Single Super Phosphate
T9	Soil + Sand + Vermicompost (2: 2: 1)	T28	T1 + 2gm Murate of Potash
T10	T1 + 20gm Azotobactor	T29	T1 + 4gm Murate of Potash
T11	T1 + 40gm Azotobactor	T30	T1 + 6gm Murate of Potash
T12	T1 + 60gm Azotobactor	T31	T1 + 2gm Urea + 2gm SSP + 2gm MoP
T13	T1 + 20gm PSB	T32	T1 + 4gm Urea + 4gm SSP + 4gm MoP
T14	T1 + 40gm PSB	T33	T1 + 6gm Urea + 6gm SSP + 6gm MoP
T15	T1 + 60gm PSB	T34	T1 + 2Ogm Neem cake
T16	T1 + 20gm Rizobium	T35	T1 + 5Ogm Neem cake
T17	T1 + 40gm Rizobium	T36	T1 + 1OOgm Neem cake
T18	T1 + 60gm Rizobium		

3. Experimental Design

Experimental design was RBD (Random Block Design).09 seedlings were taken for each treatment with 03 replicates. Total 333 seedlings were taken for each cell size. Different dosage of biofertilizers and chemical fertilizers was applied to standardize the potting mixture and appropriate cell size of root trainers for production of quality planting stock. Normal watering was done after application. After one year of the experiment following observations were taken to assess the response of seedlings with various potting mixture in each cell size.

Observations

1) Growth and survival percentage of seedling.
2) Seedling biomass in the terms of root and shoot biomass.
3) Root fiberocity
4) Root volume

Table 1: Effect of various chemical and biofertilizers on seedling growth, biomass and survival percentage of *Dalbergia latifolia* under nursery stage in 90 CC cell size root trainer.

T. No.	Treatment	TSL (cm)	Dia (mm)	Fiberocity (No. of lateral roots)	Root Volume	Growth increment against control	Biomass Gm/plant	Survival %
T0	Control (Only Soil)	23.26	0.11	27.00	0.54	0.00	0.83	55.00
T1	Soil + Sand + FYM (1: 1: 1)	27.06	0.12	33.22	0.93	16.34	1.01	65.00
T2	Soil + Sand + FYM (2: 1: 1)	29.12	0.14	33.00	0.83	25.19	1.37	65.00
T3	Soil + Sand + FYM (1: 2: 1)	28.52	0.14	35.44	0.78	22.61	0.95	70.00
T4	Soil + Sand + FYM (1: 1: 2)	27.17	0.12	35.22	0.86	16.81	0.90	70.00
T5	Soil + Sand + Vermicompost (1: 1: 1)	28.63	0.13	33.56	0.87	23.09	1.26	70.00
T6	Soil + Sand + Vermicompost (2: 1: 1)	29.95	0.16	40.00	1.22	28.76	1.07	65.00
T7	Soil + Sand + Vermicompost (1: 2: 1)	27.27	0.13	34.56	0.87	17.24	1.05	62.00
T8	Soil + Sand + Vermicompost (1: 1: 2)	28.53	0.15	31.11	1.18	22.66	1.45	67.00
T9	Soil + Sand + Vermicompost (2: 2: 1)	29.03	0.15	39.00	1.27	24.81	1.75	70.00
T10	T1 + 20gm Azotobactor	29.21	0.16	37.00	1.36	25.58	1.72	70.00
T11	T1 + 40gm Azotobactor	28.95	0.15	40.22	1.36	24.46	1.47	72.00
T12	T1 + 60gm Azotobactor	29.82	0.16	35.44	1.37	28.20	1.57	72.00
T13	T1 + 20gm PSB	29.45	0.15	36.11	0.94	26.61	1.28	70.00
T14	T1 + 40gm PSB	27.49	0.13	39.67	1.37	18.19	1.72	70.00
T15	T1 + 60gm PSB	26.70	0.13	37.22	1.89	14.79	1.66	70.00

T16	T1 + 20gm Rizobium	27.93	0.17	33.33	0.66	20.08	1.33	70.00
T17	T1 + 40gm Rizobium	31.22	0.14	37.00	1.08	34.22	1.67	74.00
T18	T1 + 60gm Rizobium	29.80	0.12	37.56	0.83	28.12	1.26	74.00
T19	T1 + 20gm VAM	**35.57**	**0.20**	**50.56**	**1.89**	**52.92**	**2.07**	**75.00**
T20	T1 + 40gm VAM	30.85	0.17	43.44	1.41	32.63	1.78	75.00
T21	T1 + 60gm VAM	28.37	0.15	43.67	1.08	21.97	1.59	71.00
T22	T1 + Urea 2gm	26.29	0.13	34.56	0.77	13.03	0.93	59.00
T23	T1 + Urea 4gm	25.00	0.12	32.89	0.74	7.48	0.91	56.00
T24	T1 + Urea 6gm	24.00	0.11	30.11	0.65	3.18	0.87	52.00
T25	T1 + 2gm Single Super Phosphate	26.20	0.14	32.89	0.83	12.64	1.14	62.00
T26	T1 + 4gm Single Super Phosphate	25.50	0.14	32.78	0.84	9.63	1.11	66.00
T27	T1 + 6gm Single Super Phosphate	24.90	0.12	28.56	1.29	7.05	1.21	63.00
T28	T1 + 2gm Murate of Potash	27.13	0.14	29.22	0.78	16.64	1.25	68.00
T29	T1 + 4gm Murate of Potash	27.78	0.14	36.00	0.91	19.43	1.46	68.00
T30	T1 + 6gm Murate of Potash	25.97	0.13	35.56	1.04	11.65	1.52	65.00
T31	T1 + 2gm Urea + 2gm SSP + 2gm MoP	26.75	0.14	39.33	0.96	15.00	1.58	65.00
T32	T1 + 4gm Urea + 4gm SSP + 4gm MoP	24.96	0.14	37.78	0.94	7.31	1.35	60.00
T33	T1 + 6gm Urea + 6gm SSP + 6gm MoP	24.80	0.14	35.00	1.16	6.62	1.23	58.00
T34	T1 + 2Ogm Neem cake	28.83	0.16	38.67	0.86	23.95	1.15	70.00
T35	T1 + 5Ogm Neem cake	26.38	0.11	39.78	1.08	13.41	1.43	67.00
T36	T1 + 1OOgm Neem cake	27.48	0.19	38.11	0.87	18.14	1.24	62.00

ANOVA TEST

		Sum of Squares	df	Mean Square	F	Sig.
TSL	Between Groups	583.059	36	16.196	.543	.977
	Within Groups	2208.051	74	29.839		
	Total	**2791.110**	**110**			
Root Volume	Between Groups	10.242	36	.285	2.622	.000
	Within Groups	8.029	74	.108		
	Total	**18.271**	**110**			
Biomass	Between Groups	9.857	36	.274	4.381	.000
	Within Groups	4.625	74	.063		
	Total	**14.482**	**110**			

Table 2: Effect of various chemical and biofertilizers on seedling growth, biomass and survival percentage of *Dalbergia latifolia* under nursery stage in 150 CC cell size root trainer.

T. No.	Treatment	TSL (cm)	Dia (mm)	Fiberocity (No. of lateral roots)	Root Volume	Growth increment against control	Biomass Gm/plant	Survival %
T0	Control (Only Soil)	33.00	0.19	28.22	0.82	0.00	1.22	58.00
T1	Soil + Sand + FYM (1: 1: 1)	39.46	0.21	38.33	2.20	19.58	2.14	69.00
T2	Soil + Sand + FYM (2: 1: 1)	39.00	0.20	35.67	2.04	18.18	2.32	70.00
T3	Soil + Sand + FYM (1: 2: 1)	37.26	0.22	36.00	1.98	12.91	2.13	72.00
T4	Soil + Sand + FYM (1: 1: 2)	37.23	0.20	36.22	1.98	12.82	2.45	72.00
T5	Soil + Sand + Vermicompost (1: 1: 1)	37.75	0.20	38.78	1.67	14.39	2.69	70.00
T6	Soil + Sand + Vermicompost (2: 1: 1)	39.47	0.20	36.33	1.87	19.61	2.42	70.00
T7	Soil + Sand + Vermicompost (1: 2: 1)	39.88	0.20	34.67	2.03	20.85	2.34	70.00
T8	Soil + Sand + Vermicompost (1: 1: 2)	47.59	0.30	37.22	2.10	44.21	2.57	70.00
T9	Soil + Sand + Vermicompost (2: 2: 1)	40.29	0.20	39.33	2.10	22.09	2.11	72.00
T10	T1 + 20gm Azotobactor	47.70	0.31	38.22	1.52	44.55	1.99	75.00
T11	T1 + 40gm Azotobactor	38.62	0.28	37.22	1.94	17.03	2.09	75.00
T12	T1 + 60gm Azotobactor	43.41	0.28	37.89	1.77	31.55	2.33	75.00
T13	T1 + 20gm PSB	48.38	0.28	40.22	1.61	46.61	2.61	72.00
T14	T1 + 40gm PSB	48.81	0.30	45.44	1.62	47.91	2.12	70.00
T15	T1 + 60gm PSB	43.53	0.24	42.33	2.18	31.91	1.97	70.00
T16	T1 + 20gm Rizobium	43.33	0.27	44.56	1.04	31.30	2.48	75.00
T17	T1 + 40gm Rizobium	40.47	0.23	36.78	1.30	22.64	1.84	77.00
T18	T1 + 60gm Rizobium	44.88	0.21	36.67	1.93	36.00	1.66	75.00
T19	T1 + 20gm VAM	**49.00**	**0.34**	**47.33**	**2.38**	**48.48**	**3.45**	**80.00**
T20	T1 + 40gm VAM	41.36	0.26	42.89	2.17	25.33	2.47	78.00
T21	T1 + 60gm VAM	43.82	0.26	40.78	2.18	32.79	2.09	75.00
T22	T1 + Urea 2gm	41.75	0.21	32.00	1.18	26.52	1.46	62.00
T23	T1 + Urea 4gm	40.33	0.20	33.00	1.04	22.21	1.38	60.00
T24	T1 + Urea 6gm	40.56	0.21	30.67	1.12	22.91	1.46	55.00
T25	T1 + 2gm Single Super Phosphate	41.11	0.30	40.22	1.36	24.58	1.82	70.00
T26	T1 + 4gm Single Super Phosphate	46.26	0.30	40.00	1.22	40.18	1.82	70.00
T27	T1 + 6gm Single Super Phosphate	44.21	0.30	39.00	1.07	33.97	1.48	70.00

T28	T1 + 2gm Murate of Potash	39.33	0.20	43.22	0.96	19.18	1.57	72.00
T29	T1 + 4gm Murate of Potash	45.55	0.23	41.67	0.90	38.03	1.92	70.00
T30	T1 + 6gm Murate of Potash	44.91	0.21	35.33	0.87	36.09	1.45	70.00
T31	T1 + 2gm Urea + 2gm SSP + 2gm MoP	41.50	0.20	37.56	1.10	25.76	1.60	70.00
T32	T1 + 4gm Urea + 4gm SSP + 4gm MoP	47.55	0.28	40.67	1.12	44.09	1.65	65.00
T33	T1 + 6gm Urea + 6gm SSP + 6gm MoP	46.96	0.28	38.89	1.21	42.30	1.44	62.00
T34	T1 + 2Ogm Neem cake	42.84	0.27	34.78	1.30	29.82	2.42	70.00
T35	T1 + 5Ogm Neem cake	43.07	0.23	35.44	1.07	30.52	2.51	70.00
T36	T1 + 1OOgm Neem cake	49.25	0.27	33.78	1.16	49.24	2.65	76.00

ANOVA TEST

		Sum of Squares	df	Mean Square	F	Sig.
TSL	Between Groups	1664.410	36	46.234	1.840	.014
	Within Groups	1859.208	74	25.124		
	Total	**3523.618**	**110**			
Root Volume	Between Groups	24.595	36	.683	6.297	.000
	Within Groups	8.029	74	.108		
	Total	**32.623**	**110**			
Biomass	Between Groups	25.178	36	.699	4.152	.000
	Within Groups	12.464	74	.168		
	Total	**37.642**	**110**			

Table 3: Effect of various chemical and biofertilizers on seedling growth, biomass and survival percentage of *Dalbergia latifolia* under nursery stage in 300 CC cell size root trainer.

T. No.	Treatment	TSL (cm)	Dia (mm)	Fiberocity (No. of lateral roots)	Root Volume	Growth increment against control	Biomass Gm/plant	Survival %
T0	Control (Only Soil)	36.52	0.23	39.83	3.25	0.00	2.88	66.00
T1	Soil + Sand + FYM (1: 1: 1)	40.12	0.27	46.00	4.13	9.86	4.63	75.00
T2	Soil + Sand + FYM (2: 1: 1)	49.72	0.30	48.33	4.78	36.14	3.35	75.00
T3	Soil + Sand + FYM (1: 2: 1)	51.60	0.27	51.83	4.83	41.29	5.16	75.00
T4	Soil + Sand + FYM (1: 1: 2)	45.36	0.27	61.50	4.97	24.21	4.47	75.00
T5	Soil + Sand + Vermicompost (1: 1: 1)	48.02	0.30	53.83	4.67	31.49	4.48	77.00
T6	Soil + Sand + Vermicompost (2: 1: 1)	50.42	0.30	61.17	6.58	38.06	6.53	80.00
T7	Soil + Sand + Vermicompost (1: 2: 1)	50.67	0.32	59.17	6.43	38.75	5.39	82.00
T8	Soil + Sand + Vermicompost (1: 1: 2)	51.89	0.33	49.33	5.70	42.09	5.28	87.00
T9	Soil + Sand + Vermicompost (2: 2: 1)	51.52	0.32	51.17	6.08	41.07	6.07	87.00
T10	T1 + 20gm Azotobactor	54.00	0.30	58.00	4.68	47.86	4.88	82.00
T11	T1 + 40gm Azotobactor	53.20	0.30	49.50	4.28	45.67	4.35	87.00
T12	T1 + 60gm Azotobactor	54.41	0.38	49.17	5.90	48.99	4.96	87.00
T13	T1 + 20gm PSB	57.52	0.30	45.33	5.87	57.50	4.52	85.00
T14	T1 + 40gm PSB	55.94	0.32	47.33	5.82	53.18	3.86	87.00
T15	T1 + 60gm PSB	60.04	0.35	47.33	5.32	64.40	4.67	90.00
T16	T1 + 20gm Rizobium	66.41	0.35	48.33	5.62	81.85	7.31	85.00
T17	T1 + 40gm Rizobium	59.61	0.35	44.00	5.18	63.23	4.60	89.00
T18	T1 + 60gm Rizobium	59.96	0.37	46.00	5.97	64.18	5.40	87.00
T19	T1 + 20gm VAM	**75.37**	**0.40**	**85.67**	**7.83**	**106.38**	**7.53**	**91.67**
T20	T1 + 40gm VAM	53.70	0.37	76.17	7.22	47.04	6.21	88.33
T21	T1 + 60gm VAM	57.23	0.37	68.83	6.77	56.71	5.00	83.33
T22	T1 + Urea 2gm	41.92	0.33	46.67	5.88	14.79	4.82	72.00
T23	T1 + Urea 4gm	40.70	0.30	42.00	5.78	11.45	5.93	69.00
T24	T1 + Urea 6gm	38.92	0.30	40.00	5.33	6.57	6.49	66.00
T25	T1 + 2gm Single Super Phosphate	44.84	0.30	56.17	5.80	22.78	6.05	74.00
T26	T1 + 4gm Single Super Phosphate	48.85	0.33	57.67	6.67	33.76	6.59	72.00
T27	T1 + 6gm Single Super Phosphate	52.75	0.37	49.67	5.80	44.44	6.38	72.00
T28	T1 + 2gm Murate of Potash	56.52	0.35	46.33	6.05	54.76	5.79	75.00
T29	T1 + 4gm Murate of Potash	59.34	0.40	49.17	6.92	62.49	5.89	80.00
T30	T1 + 6gm Murate of Potash	53.25	0.33	58.50	5.43	45.81	4.41	75.00
T31	T1 + 2gm Urea + 2gm SSP + 2gm MoP	48.38	0.33	49.67	5.68	32.48	6.29	70.00
T32	T1 + 4gm Urea + 4gm SSP + 4gm MoP	47.11	0.30	53.50	6.58	29.00	6.90	70.00
T33	T1 + 6gm Urea + 6gm SSP + 6gm MoP	47.53	0.27	52.50	4.88	30.15	5.19	70.00
T34	T1 + 2Ogm Neem cake	51.42	0.28	49.50	5.58	40.80	7.14	80.67
T35	T1 + 5Ogm Neem cake	48.44	0.32	47.33	5.65	32.64	6.80	80.33
T36	T1 + 1OOgm Neem cake	45.49	0.32	55.33	5.46	24.56	5.88	77.33

ANOVA TEST

		Sum of Squares	df	Mean Square	F	Sig.
TSL	Between Groups	6365.048	36	176.807	5.855	.000
	Within Groups	2234.509	74	30.196		
	Total	**8599.558**	**110**			
Root Volume	Between Groups	82.015	36	2.278	2.096	.004
	Within Groups	80.438	74	1.087		
	Total	**162.453**	**110**			
Biomass	Between Groups	131.046	36	3.640	4.798	.000
	Within Groups	56.144	74	.759		
	Total	**187.190**	**110**			

Table 4: Effect of various chemical and biofertilizers on seedling growth, biomass and survival percentage of *Dalbergia latifolia* under nursery stage in 400 CC cell size root trainer.

T. No.	Treatment	TSL (cm)	Dia (mm)	Fiberocity (No. of lateral roots)	Root Volume	Growth increment against control	Biomass Gm/plant	Survival %
T0	Control (Only Soil)	36.75	0.27	50.67	4.97	0.00	4.53	70.00
T1	Soil + Sand + FYM (1: 1: 1)	47.35	0.35	65.33	6.37	28.84	6.11	75.00
T2	Soil + Sand + FYM (2: 1: 1)	50.30	0.40	64.50	7.53	36.87	6.81	75.00
T3	Soil + Sand + FYM (1: 2: 1)	45.53	0.38	60.50	6.73	23.89	6.35	75.00
T4	Soil + Sand + FYM (1: 1: 2)	47.92	0.37	68.00	6.09	30.39	6.10	77.00
T5	Soil + Sand + Vermicompost (1: 1: 1)	45.34	0.36	69.67	5.80	23.37	5.62	80.00
T6	Soil + Sand + Vermicompost (2: 1: 1)	47.20	0.38	67.67	6.85	28.44	5.88	84.00
T7	Soil + Sand + Vermicompost (1: 2: 1)	52.82	0.39	65.00	7.07	43.73	6.72	82.00
T8	Soil + Sand + Vermicompost (1: 1: 2)	49.33	0.39	57.00	7.22	34.23	7.28	90.00
T9	Soil + Sand + Vermicompost (2: 2: 1)	41.83	0.40	60.33	7.35	13.82	5.12	88.00
T10	T1 + 20gm Azotobactor	50.81	0.36	66.50	7.32	38.26	7.25	85.00
T11	T1 + 40gm Azotobactor	62.15	0.40	59.17	9.15	69.12	7.88	87.00
T12	T1 + 60gm Azotobactor	71.38	0.40	67.83	8.89	94.23	8.10	88.00
T13	T1 + 20gm PSB	66.31	0.38	57.67	9.02	80.44	7.62	87.00
T14	T1 + 40gm PSB	55.60	0.35	60.17	9.32	51.29	4.62	90.00
T15	T1 + 60gm PSB	49.26	0.33	53.00	7.17	34.04	6.47	94.00
T16	T1 + 20gm Rizobium	58.75	0.35	57.33	6.97	59.86	6.08	91.67
T17	T1 + 40gm Rizobium	60.25	0.37	56.67	6.83	63.95	6.47	94.00
T18	T1 + 60gm Rizobium	59.85	0.38	58.83	7.09	62.86	7.56	94.00
T19	T1 + 20gm VAM	**77.00**	**0.43**	**86.17**	**11.33**	**109.52**	**8.79**	**96.00**
T20	T1 + 40gm VAM	41.72	0.38	78.83	7.62	13.52	7.24	92.00
T21	T1 + 60gm VAM	39.94	0.36	69.83	6.93	8.68	6.87	92.00
T22	T1 + Urea 2gm	48.23	0.35	57.33	6.28	31.24	5.87	76.00
T23	T1 + Urea 4gm	44.85	0.34	60.33	6.00	22.04	5.71	70.00
T24	T1 + Urea 6gm	42.47	0.32	62.33	6.43	15.56	5.36	70.00
T25	T1 + 2gm Single Super Phosphate	62.45	0.38	60.67	6.70	69.93	5.67	80.00
T26	T1 + 4gm Single Super Phosphate	51.55	0.37	61.00	6.88	40.27	5.84	77.00
T27	T1 + 6gm Single Super Phosphate	49.40	0.36	56.17	6.18	34.42	5.75	75.00
T28	T1 + 2gm Murate of Potash	57.63	0.37	56.83	8.45	56.82	6.60	80.00
T29	T1 + 4gm Murate of Potash	59.61	0.38	60.17	6.40	62.20	5.28	80.00
T30	T1 + 6gm Murate of Potash	63.40	0.38	67.50	6.47	72.52	6.04	75.00
T31	T1 + 2gm Urea + 2gm SSP + 2gm MoP	58.09	0.35	59.50	6.58	58.07	5.62	76.00
T32	T1 + 4gm Urea + 4gm SSP + 4gm MoP	59.66	0.37	61.17	7.60	62.34	7.18	76.00
T33	T1 + 6gm Urea + 6gm SSP + 6gm MoP	58.30	0.33	54.00	5.88	58.64	5.63	70.00
T34	T1 + 2Ogm Neem cake	49.51	0.35	64.50	6.43	34.72	7.26	84.00
T35	T1 + 5Ogm Neem cake	52.78	0.38	69.83	6.83	43.62	7.50	82.00
T36	T1 + 1OOgm Neem cake	57.69	0.38	63.67	6.92	56.98	7.30	82.00

ANOVA TEST

		Sum of Squares	df	Mean Square	F	Sig.
TSL	Between Groups	8557.379	36	237.705	8.677	.000
	Within Groups	2027.145	74	27.394		
	Total	**10584.524**	**110**			
Root Volume	Between Groups	153.973	36	4.277	3.213	.000
	Within Groups	98.505	74	1.331		
	Total	**252.477**	**110**			
Biomass	Between Groups	143.438	36	3.984	5.145	.000
	Within Groups	57.306	74	.774		
	Total	**200.744**	**110**			

4. Results & Discussions

Growth performance of Dalbergia latifolia seedlings in different potting media with various combinations of biofertilizers, chemical fertilizers, vermicompost and neem cake in 90 CC, 150 CC, 300 CC and 400 CC cell size of root trainer was observed. The data revealed that after experiment i. e.12 months, the treatment T19 was found to be best treatment to estimulate the seedling growth, biomass, fiberocity, root volume and survival percentage. In 90 CC, the length of seedling was 35.57 cm, biomass 2.07 gm, root fiberocity 50.56, root volume 1.89 and survival percentage 75%, in 150 CC, the seedling length was 49 cm, biomass 3.45 gm, root fiberocity 47.33, root volume 2.38 and survival percentage 80%, as in 300 CC, the length of seedling 75.37 cm, biomass 7.53 gm, root fiberocity 85.67, root volume 7.83 and survival percentage 91.67% and in 400 CC, the length of seedling 77 cm, biomass 8.79 gm, root fiberocity 86.17, root volume 11.33 and survival percentage 96% was recorded with treatment T19. While in control the seedling length was found to be 23.26 cm, seedling biomass 0.83, root fiberocity 27, root volume 0.54 and survival percentage 55% in 90 CC, in 150 CC, seedling length 33 cm, biomass 1.22, root fiberocity 28.22, root volume 0.82 and survival percentage 58%, in 300 CC, the length was 36.52 cm, biomass 2.88, root fiberocity 39.83, root volume 3.25 and survival percentage 66%, and in 400 CC, the seedling length 36.75 cm, biomass 4.53, root fiberocity 50.67, root volume 4.97 and survival percentage 70% was recorded with treatment T19 (**Table – 1 to 4).**

The results indicate that 400CC cell size with treatment T19 was found to be more effective over control and other treatment to enhance the growth, biomass, root fiberocity, root volume and survival percentage of plants followed by 300CC cell size with treatment T19. Statistical analysis shows that treatment T19 was highly significant at 0.05 probability level in all cell size of root trainers over control and other treatment attempted.

5. Conclusion

As regard potting mixture with various cell sizes the highest growth and survival was found to be with 400 CC cell size root trainer followed by 300 CC cell size of root trainer. It is clearly indicate that the large size root trainer produce seedlings with maximum height, collar dia, biomass and root fiberocity expressed as root volume. Studies have confirmed that the use of biofertilizers helpful in producing the vigours plants and protect against root pathogens and toxic stress, results to achieve great potential in growth and survival of plants.

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