Research Article

Development and Evaluation of Organic Growth Promoting Formulation on Growth and Development of Tree Seedlings

M Prabhu[1], M Tilak[2]*, S Balasaraswathi[3], K Sivakumar[4] and M Umadevi[5]

[1]Tamil Nadu Forest Department, TN, India
[2]Department of Agroforestry, FC&RI, TNAU, Mettupalayam, TN, India
[3]Regional Sericultural Research station, Central Silk Board, Salem, TN, India
[4]Department of RS&GIS, TNAU, Coimbatore, TN, India
[5]Department of Crop improvement, AC&RI, TNAU, Kudumiyanmalai, TN, India

Abstract

The effect of organic growth promoter on the growth, improvement of the five prominent nursery tree seedlings (*Chloroxylon swietenia, Ailanthus excelsa, Madhuca longifolia, Syzygium cumini, Azadirachta indica*) was investigated. The study was formulated with an aim to explore the use of organic growth promoter to improve the plant growth attributes. The following parameters like height and biomass of shoot and root, collar diameter estimation, leaves counting, leaf sprout, leaf colour, leaf area index estimation, and Chlorophyll were estimated. The organic growth promoter has significantly increased the above parameters. Soil application and pellet (slow release) of the organic growth promoter increased the shoot height, root height, shoot biomass, root biomass and microbial population when compared to the control. The maximum shoot height was found with soil application in *Syzygium cumini* (28.9cm) and the maximum root height was found in *Madhuca longifolia* (60.5cm). The maximum shoot biomass was registered in *Syzygium cumini* (2.496g) and root biomass was registered maximum in *Madhuca longifolia* (2.856g). Soil application in *Madhuca longifolia* was recorded the highest basal diameter increment (5.98mm). Foliar spray of the organic growth promoter increased the leaf chlorophyll and carotenoid content, leaf area and leaf colour when compared to the control. The maximum chlorophyll was recorded in *Azadirachta indica* (0.7322 mg/g). The maximum chlorophyll b was recorded in *Azadirachta indica* (1.1912 mg/g). The maximum total chlorophyll was recorded in *Azadirachta indica* (2.173mg/g). The maximum carotenoid was recorded in *Azadirachta indica* (0.9529mg/g). Overall, the result of this study suggested that the organic growth promoter application increases the plant growth and reduces the nursery period time.

Keywords: Organic growth promoter, biometrical studies (Height, Biomass, etc.), Chlorophyll and Carotenoid estimation

***Correspondence**
Author: M Tilak
Email: mtilakiard@gmail.com

Introduction

Organic fertilizers are 'naturally' occurring compounds to increase crop production and fertility in a sustainable agroecosystem [1]. It contains essential nutrients to improve the health and productivity of soil and encourage plant growth. Organic fertilizer improves the soil pH, physical and chemical structure [2]. Organic matter plays a major role in improving biological transformation, water holding capacity in the soil [3]. The major benefit from the organic materials used is to solve many problems arising from industrial waste. If more chemical nitrogen fertilizer is applied to the soil, some of the excess nitrogen is converted to nitrates, which are harmful to human health [4]. Hence, with this background, the present study was taken for the study on development of organic growth promoter for improving the tree seedling growth and reduce its nursery life with the following objectives, to formulate organic growth promoter, to study the biometrical attributes of selected tree species at different stages of growth and to study the biochemical parameters of leaves in selected tree species.

Materials and Methods

Study site

A study was conducted in the nursery that is located at H-block of Forest College and Research Institute (FC & RI) Mettupalayam in the sylvan surroundings of Jakanari Reserve Forest, about 40 km north of Tamil Nadu Agricultural University (TNAU) main campus, Coimbatore. It is situated over a sprawling expanse of 200 ha of reserve forest, located off the foothills of Nilgiris on the Kotagiri road. The college is perched at an altitude of 300 m with a longitude of 77.56'E, the latitude of 11.19'N and enjoys an annual rainfall of 830 mm. The mean maximum and

minimum temperature are 32.2^{o}C and 23.2^{o}C respectively.

Experimental design

Due to the importance of fast-growing tree species and its potential uses, the present work is conducted for knowing the growth attribute and its nutritional content of selected tree species by introducing Organic growth promoter. For this study purpose, the following treatments were imparted (T_1 - Soil application, T_2 - Foliar spray, T_3 - Pelleting, T_4 - Control). The treatments were arranged in a completely randomised block design with 10 replications. 50 No. of seedlings are taken comprising 5 species, each species having 10 nos. This set of 50 taken is repeated four times through replications R_1, R_2, R_3 and R_4. Total of 200 numbers of seedlings was evaluated.

Preparation of organic growth promoting agent

The organic ingredients used for preparing organic growth promoter are Peptone=50g/l, Beef extract=50g/l, Malt extract=50g/l, Yeast extract=50g/l, Cellulose=6g/l, Glacial acetic acid-0.1N=5ml.The above ingredients were mixed with water and sterilized and to prevent contamination organic preservative was added. Pellet was prepared by mixing the formulation with cellulose. Organic fertilizer was applied at 15 days interval during the study period. The dosage of application of organic growth promoter for Soil application (10 ml/plant) and for foliar spray (10 ml/plant) and for pellet (1g/plant). The plants without treatments served as control.

Biometric analysis

To assess the growth rate of the planted tree seedlings, the following biometric observations Shoot length (cm), Root length (cm), Shoot Biomass (g), Root Biomass (g), Collar diameter (mm), No. of. Leaves (No's), No. of. Sprouts (No's), Root length (cm), Leaf area index (cm^2), Microbial population Count - Bacteria, Fungi and Actinomycetes, Chlorophyll estimation (mg/g) and Carotenoid estimation (mg/g) were recorded at 15 days time during the study period of 2.5-month interval.

Shoot length (cm)

The shoot height of each plant tree seedlings was initially measured from the ground level to the leading terminal tip using the standard scale and is expressed in centimeter. The shoot length was recorded at 15 days time during the study period of 2.5-month interval.

Root length (cm)

The Root height of each plant tree seedlings was initially measured from the ground level to the terminal tip of the root using the standard scale and is expressed in centimeter. The root length was recorded at 15 days time during the study period of 2.5-month interval.

Shoot Biomass (g)

The shoot biomass of each plant tree seedlings was initially measured from the ground level to the leading terminal tip using the weighing balance and is expressed in g.

Root Biomass (g)

The Root biomass of each plant tree seedlings was initially measured from the ground level to the leading terminal tip using the weighing balance and is expressed in g.

Collar diameter (mm)

The collar diameter was measured at ground level using digital calipers and expressed in mm. The Collar diameter was measured in the interval at 15 days for 2.5 months.

No. of Leaves (Nos.)

The No. of. Leaves of each plant tree seedlings were counted at an interval of 15 days for 2.5 months.

No. of Sprouts (Nos.)

The No. of. New sprouts of each plant tree seedlings were counted at an interval of 15 days for 2.5 months.

Leaf colour (Nos.)

The leaf colour of each plant tree seedlings were recorded at an interval of 15 days for 2.5months.

Leaf Area Index (cm^2)

The Leaf Area Index of each plant tree seedlings was recorded at an interval of 15 days for 2.5 months by using graph sheets.

Chlorophyll estimation

Total leaf chlorophyll content (mg/g) was estimated by acetone method. The chlorophyll was estimated adopting the method and expressed as mg per gram of fresh weight. Fully matured fresh leaf samples of 250 mg were collected and washed in distilled water and then ground with 10 ml of 80 percent acetone using pestle and mortar. The homogeneous solution was centrifuged at 500 rpm for 10 minutes. The supernatant was collected and the volume was made up to 25 ml using 80 percent acetone. The optical density of the content was measured at 663, 652 and 645 nm. The chlorophyll a, chlorophyll b and total chlorophyll content were calculated using the following formula.

$$\text{Chlorophyll a (mg/g)} = \frac{12.7 \times \text{OD at } 663 - 6.29 \times \text{OD at } 645 \times V}{1000 \times W}$$

$$\text{Chlorophyll b (mg/g)} = \frac{22.7 \times \text{OD at } 645 - 4.68 \times \text{OD at } 663 \times V}{1000 \times W}$$

$$\text{Carotenoids (mg/g)} = \frac{(7.6 \times \text{OD at } 480) - (1.49 \times \text{OD at } 510) \times V}{1000 \times W}$$

$$\text{Total chlorophyll (mg/g)} = \frac{\text{OD at } 652 \times 1000 \times V}{34.50 \times 1000 \times W}$$

Where, V = volume made (25 ml) W = weight of fresh sample taken (250 mg)

Results

Among the selected tree species, the maximum shoot height was found with soil application in *Syzygium cumini* (28.9cm) followed by *Madhuca longifolia* (20.2cm) compared to the control of *Syzygium cumini* (13.99cm) and *Madhuca longifolia* (15.98cm) respectively and minimum height growth was registered in control. (**Tables 1-5**) The maximum root height was found in *Madhuca longifolia* (60.5cm) compared to control of *Madhuca longifolia* and the minimum root length was recorded in *Ailanthus excelsa* (12.5cm) (**Table 6**). Soil application of formulation to *Madhuca longifolia* recorded the highest basal diameter increment (5.98mm) followed by *Syzygium cumini* (5.58mm) compared to control *Madhuca longifolia* (4.77mm) and control *Syzygium cumini* (4.56mm) respectively and lowest diameter increment was observed in soil application *Dalbergia latifolia* (3.12mm) compared to control *Dalbergia latifolia* (3.02mm) (**Tables 7-11**).

Table 1 Shoot length (in cm) of *Chloroxylon swietenia* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	4.49	5.6	6.51	7.77	8.46	**9.56**	**7.065**[a]
Foliar spray	6.54	7.3	7.78	8.04	8.98	**9.5**	**8.023333**[c]
Pelleting	5.69	6.39	7.19	8.09	8.5	**9.02**	**7.48**[b]
Control	5.33	5.9	7.66	8.38	8.72	**9.33**	**7.553333**[b]
Mean	**5.5125**[a]	**6.2975**[b]	**7.285**[c]	**8.07**[d]	**8.665**[e]	**9.3525**[f]	
CD Value of Treatments			**0.324936**				
CD Value of Days			**0.397969**				
CD Value of Treatments × Days			**0.796007**				

Table 2 Shoot length (in cm) of *Ailanthus excelsa* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	10.2	12.85	13.74	14.95	16.1	**17.2**	**14.17333[b]**
Foliar spray	10.42	10.89	11.26	11.53	12.85	**14.9**	**11.975[a]**
Pelleting	11.92	12.72	13.54	14.39	15.41	**17.02**	**14.16667[b]**
Control	10.65	10.76	11.1	11.8	12.18	**14.43**	**11.82[a]**
Mean	**10.7975[a]**	**11.805[b]**	**12.41[c]**	**13.1675[d]**	**14.135[e]**	**15.8875[f]**	
CD Value of Treatments			**0.266782**				
CD Value of Days			**0.326747**				
CD Value of Treatments × Days			**0.653305**				

Table 3 Shoot length (in cm) of *Madhuca longifolia* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	13.05	16.1	16.66	18.75	18.92	**20.2**	**17.28[b]**
Foliar spray	12.3	12.8	13.12	13.92	14.04	**16.93**	**13.85167[a]**
Pelleting	14.66	15.46	16.26	17.16	18.26	**19.94**	**16.95667[b]**
Control	12.3	12.75	13.36	13.98	14.42	**15.98**	**13.79833[a]**
Mean	**13.0775[a]**	**14.2775[b]**	**14.85[b]**	**15.9525[c]**	**16.41[c]**	**18.2625[d]**	
CD Value of Treatments			**0.672387**				
CD Value of Days			**0.82349**				
CD Value of Treatments × Days			**1.647017**				

Table 4 Shoot length (in cm) of *Syzygium cumini* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	14.11	17.05	19	25.2	26.61	**28.9**	**5.091667[d]**
Foliar spray	13.14	14.15	14.87	15.62	15.91	**16.55**	**0.986667[b]**
Pelleting	15.17	16.07	16.87	17.77	18.87	**20.99**	**1.586667[c]**
Control	14.09	14.8	11.14	11.78	12.68	**13.99**	**1.213333[a]**
Mean	**14.1275[a]**	**15.5175[b]**	**15.47[c]**	**17.5925[d]**	**18.5175[e]**	**20.1075[f]**	
CD Value of Treatments			**0.632063**				
CD Value of Days			**0.774113**				
CD Value of Treatments × Days			**1.548104**				

Table 5 Shoot length (in cm) of *Azadirachta indica* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	6.48	8.95	9.85	14.3	15.65	**17.85**	**12.18[d]**
Foliar spray	8.69	10.08	10.88	11.55	11.76	**13.94**	**11.15[c]**
Pelleting	8.4	8.8	9.6	10.5	11.6	**13.99**	**10.48166667[b]**
Control	6.87	7.22	8.9	9.22	9.5	**11.23**	**8.823333333[a]**
Mean	**7.61[a]**	**8.7625[b]**	**9.8075[c]**	**11.3925[d]**	**12.1275[e]**	**14.2525[f]**	
CD Value of Treatments			**0.47291**				
CD Value of Days			**0.579182**				
CD Value of Treatments × Days			**1.158281**				

Table 6 Root length (in cm) of the seedlings during the seedling growth

S.No	Species	Treated	Untreated
1.	*Chloroxylon swietenia*	19.0	9.0
2.	*Ailanthus excels*	12.5	10.0
3.	*Madhuca longifolia*	60.5	32.5
4.	*Syzygium cumini*	54.0	40
5.	*Azadirachta indica*	19.5	16.0
	Mean	**33.1**	**21.5**
	t stat	**3.647317**	
	P(T<=t) two-tail	**0.00534**	

Table 7 Collar diameter (in mm) of *Chloroxylon swietenia* on various days of observation

Treatments	0th day	15th day	30th day	45th day	50th day	75th day	Mean
Soil application	1.643	2.149	2.4	2.47	2.6	**3.12**	**2.397[ab]**
Foliar spray	1.681	1.981	2.281	2.681	3.081	**4.4**	**2.684167[c]**
Pelleting	1.6	2.19	2.32	2.48	2.58	**3.33**	**2.416667[b]**
Control	1.455	2.115	2.32	2.47	2.59	**3.02**	**2.328333[a]**
Mean	**1.59475[a]**	**2.10875[b]**	**2.33025[c]**	**2.52525[d]**	**2.71275[e]**	**3.4675[f]**	
CD Value of Treatments			**0.096216**				
CD Value of Days			**0.117844**				
CD Value of Treatments × Days			**0.23616**				

Table 8 Collar diameter of *Ailanthus excelsa* on various days of observation

Treatments	0th day (mm)	15th day (mm)	30th day (mm)	45th day (mm)	50th day (mm)	75th day (mm)	Mean
Soil application	2.826	3.417	3.75	4.352	4.51	**5.2**	**4.009167[b]**
Foliar spray	3.112	3.412	3.712	4.112	4.512	**4.98**	**3.973333[b]**
Pelleting	2.82	3.47	4.24	4.44	4.56	**4.91**	**4.073333[b]**
Control	2.9	3	3.78	3.97	4.11	**4.65**	**3.735[a]**
Mean	**2.9145[a]**	**3.32475[b]**	**3.8705[c]**	**4.2185[d]**	**4.423[e]**	**4.935[f]**	
CD Value of Treatments			**0.108693**				
CD Value of Days			**0.133116**				
CD Value of Treatments × Days			**0.265498**				

Table 9 Collar diameter of *Madhuca longifolia* on various days of observation

Treatments	0th day (mm)	15th day (mm)	30th day (mm)	45th day (mm)	50th day (mm)	75th day (mm)	Mean
Soil application	3.665	4.006	4.19	4.91	5.21	**5.98**	**4.660167[c]**
Foliar spray	3.518	3.918	4.218	4.618	5.018	**5.43**	**4.453333[b]**
Pelleting	3.665	4.06	4.38	4.52	4.72	**5.3**	**4.440833[b]**
Control	3.524	3.994	4.135	4.16	4.27	**4.77**	**4.142167[a]**
Mean	**3.593[a]**	**3.9945[b]**	**4.23075[c]**	**4.552[d]**	**4.8045[e]**	**5.37[f]**	
CD Value of Treatments			**0.106213**				
CD Value of Days			**0.130085**				
CD Value of Treatments × Days			**0.259597**				

Table 10 Collar diameter of *Syzygium cumini* on various days of observation

Treatments	0th day (mm)	15th day (mm)	30th day (mm)	45th day (mm)	50th day (mm)	75th day (mm)	Mean
Soil application	3.366	3.776	4.23	4.691	4.96	**5.58**	**4.433833[b]**
Foliar spray	3.085	3.485	3.785	4.185	4.585	**5.32**	**4.074167[a]**
Pelleting	3.33	3.76	4.52	4.64	4.84	**5.55**	**4.44[b]**
Control	3.218	3.753	3.98	4.07	4.2	**4.56**	**3.9635[a]**
Mean	**3.24975[a]**	**3.6935[b]**	**4.12875[c]**	**4.3965[d]**	**4.64625[e]**	**5.2525[f]**	
CD Value of Treatments			**0.171275**				
CD Value of Days			**0.209769**				
CD Value of Treatments × Days			**0.419327**				

With regard to the shoot biomass maximum was registered in *Syzygium cumini* (2.496g) compared to control *Syzygium cumini* (1.375g), minimum was registered *Chloroxylon switenia* (0.402g) compared to control *Chloroxylon switenia* (0.215g) (**Table 12**), and root biomass maximum was registered at *Madhuca longifolia* (2.856g) compared to control *Madhuca longifolia* (0.675g), minimum was registered *Chloroxylon switenia* (0.424g) compared to control *Chloroxylon switenia* (0.23g) (**Table 13**). The maximum leaf count was recorded at *Syzygium cumini* (46 Nos) compared to the control of *Syzygium cumini* (24 Nos.), minimum was counted in *Ailanthus excelsa* (26 Nos.) compared to the control of *Ailanthus excelsa* (17Nos.) (**Tables 14-16**). The maximum Leaf sprout was recorded in *Ailanthus excelsa* (8 Nos. /week) compared to the control of *Ailanthus excelsa* (4 Nos. /week) and the minimum was counted in *Madhuca longifolia* (3 Nos.) compared to the control of *Madhuca longifolia* (2Nos) (**Tables 17-19**).

Table 11 Collar diameter of *Azadirachta indica* on various days of observation

Treatments	0th day (mm)	15th day (mm)	30th day (mm)	45th day (mm)	50th day (mm)	75th day (mm)	Mean
Soil application	1.865	2.291	2.56	3.19	3.44	**3.99**	**2.889333^{bc}**
Foliar spray	1.786	1.986	2.286	2.686	3.086	**4.45**	**2.713333^{a}**
Pelleting	1.85	2.21	2.88	3.08	3.32	**4.23**	**2.928333^{c}**
Control	1.738	2.384	2.82	2.96	3.16	**3.74**	**2.800333^{b}**
Mean	**1.80975^{a}**	**2.21775^{b}**	**2.6365^{c}**	**2.979^{d}**	**3.2515^{e}**	**4.1025^{f}**	
CD Value of Treatments			**0.084152**				
CD Value of Days			**1.030642**				
CD Value of Treatments × Days			**0.206406**				

Table 12 Root biomass (in g) of the seedlings during the seedling growth

S.No	Species	Treated	Untreated
1	*Chloroxylon switenia*	0.424	0.23
2	*Ailanthus excels*	1.156	0.77
3	*Madhuca longifolia*	2.856	0.675
4	*Syzygium cumini*	2.588	1.414
5	*Azadirachta indica*	1.948	0.489
	Mean	1.7944	0.7156
	t stat	**5.39625**	
	P(T<=t) two-tail	**0.000435**	

Table 13 Shoot biomass (in g) of the seedlings during the seedling growth

S.No.	Species	Treated	Untreated
1	*Chloroxylon switenia*	0.402	0.215
2	*Ailanthus excels*	0.987	0.69
3	*Madhuca longifolia*	2.424	0.512
4	*Syzygium cumini*	2.496	1.375
5	*Azadirachta indica*	1.759	0.456
	Mean	1.6136	0.6496
	t stat	**5.320971**	
	P(T<=t) two-tail	**0.00048**	

Table 14 No. of Leaves on various days of observation

S.No	Species	0th day		15th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	19	18	24	21
2.	*Ailanthus excels*	5	5	9	8
3.	*Madhuca longifolia*	9	10	11	9
4.	*Syzygium cumini*	15	14	19	15
5.	*Azadirachta indica*	7	8	11	10
	Mean	**11**	**11**	**14.8**	**12.6**
	t stat	**-1**		**5.07469**	
	P(T<=t) two-tail	**0.34346**		**0.000668**	

Table 15 No. of. Leaves on various days of observation

S.No	Species	30th day		45th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	28	23	32	25
2.	*Ailanthus excels*	11	10	15	13
3.	*Madhuca longifolia*	18	11	24	12
4.	*Syzygium cumini*	22	18	28	20
5.	*Azadirachta indica*	16	11	22	14
	Mean	**19**	**14.6**	**24.2**	**16.8**
	t stat	**6.626115**		**5.745663**	
	P(T<=t) two-tail	**9.63×10^{-5}**		**0.000278**	

Table 16 No. of. Leaves on various days of observation

S.No	Species	50th day		75th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	38	28	40	30
2.	*Ailanthus excels*	21	15	26	17
3.	*Madhuca longifolia*	32	16	39	18
4.	*Syzygium cumini*	35	22	46	24
5.	*Azadirachta indica*	26	16	30	17
	Mean	30.4	19.4	36.2	21.2
	t stat	**7.171805**		**5.909916**	
	P(T<=t) two-tail	**5.24×10^{-5}**		**0.000226**	

Table 17 No. of. Sprouts on various days of observation

S.No	Species	0th day		15th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	6	3	4	3
2.	*Ailanthus excels*	6	3	8	4
3.	*Madhuca longifolia*	4	2	4	2
4.	*Syzygium cumini*	4	2	3	2
5.	*Azadirachta indica*	4	2	4	2
	Mean	4.8	2.4	4.6	2.6
	t stat	**8.142857**		**5.237229**	
	P(T<=t) two-tail	**1.92×10^{-5}**		**0.000537**	

Table 18 No. of. Sprouts on various days of observation

S.No	Species	30th day		45th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	6	4	6	3
2.	*Ailanthus excels*	7	2	6	2
3.	*Madhuca longifolia*	4	3	3	2
4.	*Syzygium cumini*	4	2	5	3
5.	*Azadirachta indica*	4	2	4	2
	Mean	5	2.6	4.8	2.4
	t stat	**5.546841**		**6.677987**	
	P(T<=t) two-tail	**0.000358**		**9.08×10^{-5}**	

Table 19 No. of. Sprouts on various days of observation

S.No	Species	50th day		75th day	
		Treated	Untreated	Treated	Untreated
1.	*Chloroxylon swietenia*	7	3	7	3
2.	*Ailanthus excels*	8	3	8	4
3.	*Madhuca longifolia*	3	2	3	2
4.	*Syzygium cumini*	4	2	4	2
5.	*Azadirachta indica*	3	2	3	1
	Mean	5	2.4	5	2.4
	t stat	**4.357801**		**5.546841**	
	P(T<=t) two-tail	**0.001829**		**0.000358**	

Moreover, all the selected species are dark green in colour when compared to control which was pale green in colour. With regard to the leaf area index (**Table 20**) maximum was registered in *Madhuca longifolia* (28.5cm^2) compared to control *Madhuca longifolia* (15 cm^2), the minimum was registered in *Chloroxylon switenia* (0.75cm^2) compared to control *Chloroxylon switenia* (1cm^2). The maximum chlorophyll a was recorded at *Azadirachta indica* (0.7322 mg/g) compared to the control of *Azadirachta indica* (0.1115 mg/g) and the minimum chlorophyll a was recorded at *Syzygium cumini* (0.10123mg/g) compared to the control of *Syzygium cumini* (0.04493 mg/g). The maximum chlorophyll b was recorded at *Azadirachta indica* (1.1912 mg/g) compared to the control of *Azadirachta indica* (0.99534 mg/g) and the minimum chlorophyll b was recorded in *Chloroxylon swietenia* (0.100mg/g) compared

to the control of *Chloroxylon swietenia* (0.1150 mg/g). The maximum total chlorophyll was recorded in *Azadirachta indica* (2.173mg/g) compared to the control of *Azadirachta indica* (0.22 mg/g) and the minimum Total chlorophyll was recorded in *Chloroxylon swietenia* (0.22 mg/g) compared to the control of *Chloroxylon swietenia* (0.2753 mg/g) (**Table 21**). The maximum carotenoid was recorded in *Azadirachta indica* (0.9529 mg/g) compared to the control of *Azadirachta indica* (0.2391 mg/g) and the minimum carotenoid was recorded in *Chloroxylon switenia* (0.1880mg/g) compared to the control of *Chloroxylon switenia* (0.3103 mg/g) (**Table 22**).

After applying the organic growth promoter in the tree seedlings, the observation on biometrics like height and biomass of shoot and root, collar diameter estimation, leaves counting, leaf sprout, leaf colour, Leaf Area Index estimation, Chlorophyll and carotenoid estimation results were estimated.

Table 20 Leaf area index of the seedlings during the seedling growth

S.No	Species	Treated (cm^2)	Untreated (cm^2)
1	*Chloroxylon switenia*	1.00	0.75
2	*Ailanthus excels*	11.75	2.25
3	*Madhuca longifolia*	28.5	15
4	*Syzygium cumini*	26.25	10.5
5	*Azadirachta indica*	6.75	2.75
	Mean	14.85	6.25
	t stat	**4.262016**	
	P(T<=t) two-tail	**0.002105**	

Table 21 Chlorophyll estimation of the seedlings during the seedling growth

S.No	Species	Cholorophyll a		Cholorophyll b		Total Cholorophyll	
		Treated (mg/g)	Untreated (mg/g)	Treated (mg/g)	Untreated (mg/g)	Treated (mg/g)	Untreated (mg/g)
1	*Chloroxylon swietenia*	0.11026	0.1414	0.100	0.1150	0.22	0.2753
2	*Ailanthus excels*	0.23739	0.089853	0.181542	0.0299	0.4869	0.1739
3	*Madhuca longifolia*	0.2929	0.07146	0.189616	0.08374	0.4956	0.168
4	*Syzygium cumini*	0.10123	0.04493	0.2268428	0.1465	0.4405	0.226
5	*Azadirachta Indica*	0.7322	0.1115	1.1912	0.99534	2.173	0.22
	Mean	0.294796	0.091829	0.37784	0.274096	0.7632	0.21264
	t stat	**1.904855**		**0.64235**		**1.323346**	
	P(T<=t) two-tail	**0.089193**		**0.536663**		**0.218351**	

Table 22 Carotenoid estimation of the seedlings during the seedling growth

S.No	Species	Treated (mg/g)	Untreated (mg/g)
1	*Chloroxylon switenia*	0.1880	0.3103
2	*Ailanthus excels*	0.468521	0.1861
3	*Madhuca longifolia*	0.452	0.1763
4	*Syzygium cumini*	0.2306	0.1316
5	*Azadirachta indica*	0.9529	0.2391
	Mean	0.458404	0.20868
	t stat	**2.065904**	
	P(T<=t) two-tail	**0.068819**	

Discussion

Organic fertilizers contain essential nutrients to improve the health and productivity of soil and encourage plant growth. Organic nutrients increase the abundance of soil organisms by providing organic matter and micronutrients for organisms such as fungal mycorrhiza, which aid plants in absorbing nutrients. Organic fertilizers provide increased physical and biological storage mechanisms to soils, mitigating risks of over-fertilization. Organic fertilizer nutrient content, solubility, and nutrient release rates are typically much lower than mineral (inorganic) fertilizers.

Organic nutrients like peptone, beef extract, malt extract, yeast extract, cellulose, glacial acetic acid has promoted the plant growth very fast. Peptone is a mixture of proteins and amino acids that are obtained by breaking down natural products such as animal tissues, milk and plants. The function of peptone is to provide a protein source so that

microorganisms can grow. Peptone has been used as the source of carbon and nitrogen for plant tissue culture [5]. Peptones are enzymatic or acid hydrolyzates of plant or animal tissue prepared under rigidly specified production condition [6].Yeast extract is the common name for various forms of processed yeast products made by extracting the cell contents (removing the cell walls); they are used as food additives or flavorings, or as nutrients for bacterial culture media. The application of active bread yeast was very effective in releasing CO_2, which reflected on improving net photosynthesis [7]; [8] and [9]. Nowadays, bread yeast (*Saccharomyces cerevisiae*) as a natural bio stimulant appeared to induce an astonished influence on growth and yield of many crops, since it has various basic function, i.e. CO_2 production as well as formation of alcohol, acids and esters, growth supplement for plants that eventually improve plant production [10]. However, it is a source of cytokinins and protein that enhance cell division and enlargement [11]. Moreover, [12] found that yeast extracts contain trehalose-6-phosphate syntheses which had a key enzyme for treadles biosynthesis. Also [13] found that yeast extracts improved all the pea tested vegetative growth parameters, green pods yield and pod quality were recorded using the highest level of yeast extracts (2%). It supported the beneficial effect of yeast on the nutritional status of Picul olive trees. In addition, biofertilization is very safe for human, animal and environment to get lower pollution and reduce soil salinity via decrease mineral usage fertilization as well as saving fertilization cost. Beef Extract has nutritive substances such as free amino acids. It is a low salt extract refined for use in microbial culture media, fermentation and other biological products[14] ; [15]. Malt Extract, also known as an extract of malt, is a sweet, treacly substance used as a dietary supplement. It was popular as a nutritional enhancer. [16] reported that the highest plant growth and the heaviest total bulbs yield and its best physical and chemical characters were recorded with that onion plants which received of Vitamin E at a rate of 100 ppm. Cellulose- is hygroscopic, that is it has the phenomenon of attracting and holding water molecules from the surrounding environment, which is usually at normal or room temperature. This is achieved through either absorption or adsorption with the absorbing or adsorbing substance becoming physically changed somewhat. This could be an increase in volume, boiling point, viscosity, or other physical characteristic or property of the substance, as water molecules can become suspended between the substance's molecules in the process. Glacial acetic acid is an excellent polar protic solvent. It is frequently used as a solvent for recrystallization to purify organic compounds which acts as a preservative**.**

Conclusion

In a holistic perspective, the current study revealed that the organic growth promoter which has the organic chemicals like Peptone, Yeast Extract, Malt extract, Beef extract as ingredients would improve the better growth of tree seedlings there by reducing the nursery period of the seedlings. Moreover, this organic promoter has increased the soil microbial activity in the rhizosphere which would have increased the nutrient availability in promoting the seedling growth.

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