Devagiri Journal of Science 5(1),62-70
© 2019 St. Joseph's College (Autonomous), Devagiri
www.devagirijournals.com
ISSN 2454-2091

Growth performance of seedlings of *Acacia nilotica* raised from select Candidate Plus Trees (CPTs) in Tamil Nadu, India.

[1]Panneer Selvam K.*, [2]Vennila, S., [3]Ezhumalai, R., [1]Sekar, D. R. S., [1]Vijayaraghavan, A., & [4]Sivaprakash, M.

Institute of Forest Genetics and Tree Breeding, Coimbatore, Tamil Nadu.
[2]Barathiar University, Coimbatore, Tamil Nadu.
[3]Forest Research Institute, Dehradun,Uthrakand.
[4] Forest College and Research Institute, Mettupalayam, Tamil.

Received: 27.08.2019

Revised and Accepted: 30.08.2019

Key words: Babul, Tank bed plantations, Progeny, Nursery, livelihoods, Global warming.

Abstract

Acacia nilotica is an important and multipurpose tree legume spread all over the India and World. It sustains and grows in many degraded lands and supporting to enrich the soil nutrients and soil fertility. The present work was to assess the variation in Babul progenies and their adaptation to different agroclimatic zones of Tamil Nadu tank bed plantation. The results of the nursery experiments revealed that three progenies viz., BPT 33, BPT 41 and BPT 26 significantly higher collar diameter, shoot length and root length. Hence the integration of these progenies in the tree improvement programme would result in better field performance for higher and quality seed production to increase the green cover, to enhance the productivity and climate resilient.

1.Introduction:

Babul is the most useful tree since its origin. It is a very strong and tough timber and nearly twice as hard as teak. Its wood is good for carts, agricultural implements, Charcoal, construction purposes, pulp and papermaking. The bark is used for tanning in leather industries. Babul gum is used for various purposes and leaves are good fodders for sheep, goats and camels. Animals also eat the pods. The thorny branches are also used as a fencing material.

In India, it is recognized worldwide as a multipurpose tree legume (National Academy of Sciences, 1980) and has both nutritional and medicinal values based on the presence of numerous secondary metabolites and essential metals (Bwai *et al*., 2015). It occurs from sea level to over 2000m and can withstand extremes of temperature (>50^0 C) and air dryness but it is frost sensitive when young. The horizontal increase of land area is not possible but vertical increase of the forest productivity is possible by increasing forest cover and also bridge the gap between the actual forest productivity by unit area is possible only by through planting of genetically improved quality planting stock. The *Acacia nilotica* is one of the multipurpose tree species in social forestry programme grown in tank bed of Tamilnadu. The farmers are also have been showing more interest

*Corresponding author
E-mail: panneer@icfre.org

to cultivate in their farmland bunds for fodder fuel wood, medicinal uses, gum etc.

2. Materials and Methods:

Tamil Nadu has an area of 130,058 km^2 and it has 17% of forest area, nearly 89% of the forests are owned by the national government. The Tamil Nadu Forest Department (TNFD) introduced *A. nilotica* as plantation in 1960-1981 under Social Forestry Programme in 8,296 tank beds covering an area of 1,37,623ha in, different Districts of Tamil Nadu. The survey is carried out in this forest areas owned by government.

Extensive field survey has been carried out in *Acacia nilotica* tank bed plantations in different parts of Tamil Nadu for selection of Plus trees based on physical characters such as girth, Clear Bole Height (CBH), total tree height, canopy diameter and appearance. The growth parameters and GPS reading of the selected trees were been collected. The collected data are compiled for the superior CPTs. The seeds were collected from selected 50 CPTs and produced the seedlings

3. Results and Discussion:

The *A. nilotica* is a multipurpose tree which can be useful for all types of soils.The extensive field survey conducted in Tamil Nadu and the Candidate plus trees were selected based on various parameters such as Girth, Clear Bole Height (CBH), Tree height, Canopy height and the trees which are free from any pests and diseases etc. The trees in the districts such as Coimbatore, Salem, Thiruvallur and Viruthunagar showing wide range of variations in the tank bed plantations.

The growth of *A. nilotica* in various tank bed plantations are collected and represented in statistical data using bar charts. The trees of *A. nilotica* with superior and inferior characters in Tamil Nadu tank bed plantations.

Aerial view of the tank bed plantation of *Acacia nilotica*

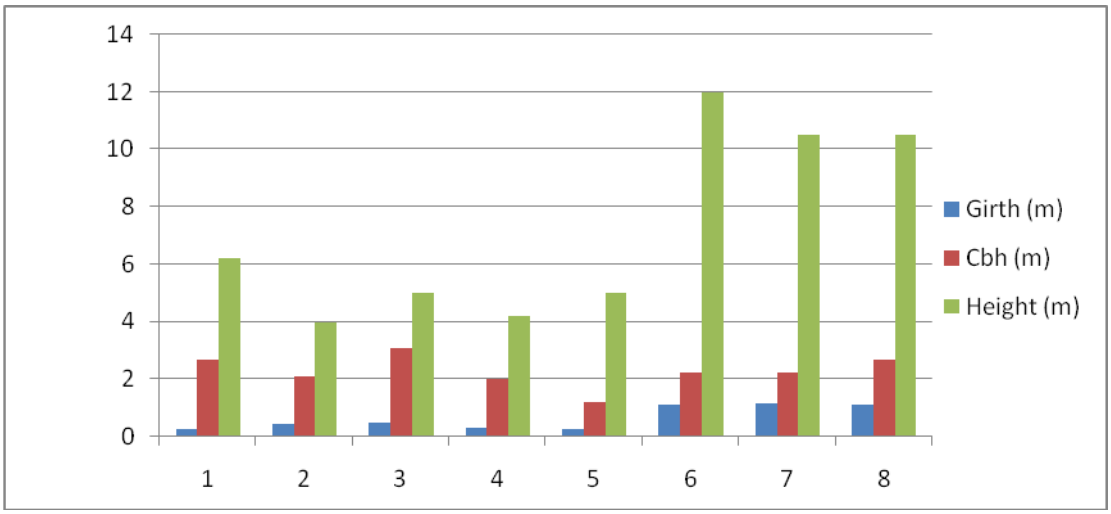
Tank bed plantation of *Acacia nilotica*

Tank bed plantation of *Acacia nilotica* CPTs

***Acacia nilotica* on canal bank**

Growth performance in nursery

Fig 1: Growth of 10 year old trees at Vachivakam tank bed plantation in Thiruvalluvar district.



In Tiruvallur district, the plantation possess superior trees with maximum girth of 155cm and the CBH of 2.15m and the total height is about 9.5m and minimum girth of 43cm with 2.13m CBH and 4.8m height. In Virudhunagar district, the minimum girth of the plantation was 40cm with 1.4m CBH and 8m height and the maximum girth of 256cm and 2.2m CBH and height of 14.5m. It acts as carbon sink for the removal of CO_2 from the atmosphere and supports the carbon sequestration.

Therefore, through tank bed plantations of *A. nilotica* will support to fix the atmospheric nitrogen in the soil and increase the soil fertility similarly it can sustain almost all types of the problematic soil such as saline, alkaline etc. the accumulated atmospheric CO_2 can be reduced easily through the *A. nilotica* and improves the green cover even under the water logged conditions. The similer study conducted in plantations of different age groups in Tamil Nadu has shown that there exists wide variation in morphometric featured among trees and therefore the productivity of the plantations is low.

Table.1 Variation in seedlings growth characteristics of *A.nilotica* in nursery condition.

1 Month old seedling					6 Month old seedling		
S.NO	Plus Tree	Collar diameter (mm)	Shoot length(cm)	Root length(cm)	Collar diameter (mm)	Shoot length(cm)	Root length(cm)
01	BPT 1	2.38	23.98	43.98	6.05	82.48	51.62
02	BPT 2	2.62	24.56	46.18	6.15	83.60	52.15
03	BPT 3	2.48	23.78	44.50	6.00	80.32	48.66

04	BPT 4	2.26	20.32	40.60	5.05	76.88	49.60
05	BPT 5	2.18	21.67	40.12	5.13	78.32	48.12
06	BPT 6	1.83	19.38	38.60	4.90	62.80	48.30
07	BPT 7	2.48	26.92	46.60	6.50	85.68	56.38
08	BPT 8	2.13	20.68	39.28	5.00	80.35	48.33
09	BPT 9	2.60	26.53	45.32	6.55	86.60	56.18
10	BPT 10	2.03	21.78	35.68	5.05	82.32	48.96
11	BPT 11	2.50	20.19	38.32	5.00	82.18	49.20
12	BPT 12	2.18	20.16	35.21	5.16	82.80	48.13
13	BPT 13	2.36	21.20	38.32	5.20	85.30	49.35
14	BPT 14	2.13	23.25	41.60	6.30	81.63	53.16
15	BPT 15	2.26	22.16	40.16	5.30	80.35	48.16
16	BPT 16	2.18	24.22	40.38	5.83	86.30	49.98
17	BPT 17	2.42	18.56	43.80	4.92	62.32	48.63
18	BPT 18	2.48	26.32	45.60	6.50	86.32	56.28
19	BPT 19	2.56	25.67	46.28	6.30	88.50	55.64
20	BPT 20	1.75	16.86	33.96	4.98	59.62	47.50
21	BPT 21	2.48	24.35	44.61	6.15	85.62	50.30
22	BPT 22	1.80	17.86	34.86	5.10	60.32	47.80
23	BPT 23	2.00	20.32	35.12	5.18	68.60	48.00

24	BPT 24	2.36	23.92	43.28	6.05	84.32	53.20
25	BPT 25	2.16	22.12	33.89	5.85	83.25	49.23
26	BPT 26	2.98	28.24	48.32	6.80	89.25	58.50
27	BPT 27	1.56	17.83	32.98	5.00	60.32	48.10
28	BPT 28	2.58	26.12	45.20	6.30	86.63	53.60
29	BPT 29	2.63	25.38	46.38	5.90	86.50	55.18
30	BPT 30	2.12	22.63	40.65	4.90	80.32	48.15
31	BPT 31	1.25	16.30	32.36	4.56	56.50	46.20
32	BPT 32	2.30	24.12	45.50	5.98	85.73	50.38
33	BPT 33	3.43	36.50	55.30	7.56	95.63	65.13
34	BPT34	2.36	23.63	42.18	5.80	86.50	54.86
35	BPT 35	2.28	21.78	40.35	5.70	85.60	52.00
36	BPT 36	2.38	24.16	46.16	5.90	83.26	55.68
37	BPT 37	2.46	23.73	43.28	2.60	84.58	53.60
38	BPT 38	2.18	21.62	35.86	4.80	82.65	49.86
39	BPT 39	2.65	26.82	46.32	6.40	87.32	56.80
40	BPT 40	2.12	22.54	36.81	4.93	80.68	48.15
41	BPT 41	3.12	32.30	52.50	7.15	92.15	62.50

42	BPT 42	1.58	18.32	36.32	5.00	68.32	48.68
43	BPT 43	1.96	20.14	35.43	5.10	69.50	49.16
44	BPT 44	1.82	19.86	34.67	4.96	65.23	47.00
45	BPT 45	2.12	22.36	33.82	5.00	70.30	48.98
46	BPT 46	2.21	23.12	44.16	5.19	72.60	50.15
47	BPT 47	3.43	36.50	55.30	7.56	95.63	54.86
48	BPT 48	1.80	18.35	33.67	5.13	60.32	48.32
49	BPT 49	1.98	20.59	36.32	4.76	65.20	47.32
50	BPT 50	1.50	17.60	34.63	4.96	59.38	48.000

The growth performances of 50 progenies at 180 DAS under nursery evaluation are present in the table 1. The growth performance of the seedlings varied significantly among the progeny. The BPT 33 progenies recorded the highest collar diameter , shoot length and root length followed by BPT 41 and NPT 26. A superfluity of workers reported the existence of significant differences and superiority of few species, seed sources, progenies and provenances in various tree species like Acacia nilotica (Padmini and Banerjee, 1986). Eucalyptus tereticornis (Otegbeye, 1990), Santalum album (Bagchi and Sindhu Veerendra, 1991), Tecomella undulate (Jindal et al., 1991), Tectona grandis (Parthiban, 2001) and Khaya senegalensis (Sondarva et al., 2017) which thus lend support to the current findings.The variation in neem progenies and their adaptation to different eco climatic regions of southern parts of country. The results of the nursery experiments revealed that three progenies viz., NPT 20, NPT 10 and NPT 28 significantly higher collar diameter shoot length, fresh weight, dry weight and leaf area. Hence the integration of these progenies in the tree improvement programme would result in better field performance for higher seed production (Radhakrishnan etal., 2019).

4. Conclusion:

Among the 50 progenies evaluated under nursery, three progenies viz., BPT 33, NPT 41 and NPT 26 consistently expressed superiority for growth characteristics

particularly collar diameter shoot length and root length and these three progenies are focused for tree improvement programme. The genetically superior variety selected can provide better timber yield, uniform timber yielding variety, uniform growth. It can sustain even in water logged condition resistant to drought and all types of soils through that large sum of accumulated carbon in the atmosphere can get sequestrated by *Acacia nilotica* plantations. Planting the genetically superior material can also increase the yield upto 3 to 5 fold and increase the green cover under Trees Outside Forest, enhance the rural livelihood and combat the global warming.

5. References

Bagchi, S.K., Sindhuveerendra, H.C. (1991). Variation and relationship in developmental growth phases of Santalum album after pruning. *Ind. Forest.,* 117:1053- 1058.

Bwai, M.D., Uzama D., Abubakar S., Olajide, O.O., Ikokoh, P.P., Magu, J (2015). Proximate, elemental, phytochemical and anti-fungal analysis of Acacia nilotica fruit. *Pharmaceut. Biol. Evaluat.,* 2(3):52-59.

Jindal, S.K., Manjit Singh, Solanki, K.R., Kachar, N.L. (1991). Variability and change in genetic parameter of height in juvenile progenies of *Tecomella undulata* (Sm.). *J. Tree Sci.,* 10(1):25-28.

Kaushik, J.C. and Mandal, B.S., (2005). The role of mycorrhiza in stree management for seedling growth of Dalbergia sissoo and Acacia nilotica. *Bull NIE*, 15, 133-137.

Otegbeye, G.O. (1990). Provenance variation in Eucalyptus camaldulensis in a field trial within the Northern Guinea savanna zone of Nigeria. Silvae Genet. 39(3, 4): 103-107.

Padmini, S., Banerjee, A.C. (1986). Provenance trials of *Acacia nilotica*. *J. Tree Sci.,* 5:53-56.

Panneer Selvam, K., Ezhumalai, R., Vijayaraghavan. A., Sivaprakash4, M. & Sathyabama, B (2018). Acacia nilotica tree improvement Programme through tank bed plantations of Tamil Nadu to increase the green cover, enhance the rural livelihood and mitigate global warming. *Dev. J. Sci.,* 4(1), 08-15.

Parthiban, K.T. (2001). Seed source variations, molecular characterization and clonal propagation in teak (Tectona grandis Linn f.). Ph.D. Thesis, Tamil Nadu Agricultural University, Coimbatore.

Prabakaran, P., Kumaran, K., Radhakrishnan, S. and Vijayalakshmi, D.(2019). Variations studies in growth performance of NEEM (Azadirachta indica A. JUSS)

progenies in the nursery. *Internat. J. Advan. Biol., Res.,* 9(2): 118-122.

Schmutterer, H. (1995). The Neem Tree: Source of unique natural products for integrated pest management, Medicine, Industry and Other Purposes.