



# INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 2)

Available online at: [www.ijariit.com](http://www.ijariit.com)

## Early Performance of Eucalyptus Clones in Vindhyan Region of Uttar Pradesh, India

Anubha Srivastav

[anubhasri\\_csfer@icfre.org](mailto:anubhasri_csfer@icfre.org)

Centre for Social Forestry and Eco-rehabilitation  
Allahabad under Indian Council of Forestry Research  
and Education, Dehradun MOEF and CC, New Delhi

Anita Tomar

[anitatomar@icfre.org](mailto:anitatomar@icfre.org)

Centre for Social Forestry and Eco-rehabilitation  
Allahabad under Indian Council of Forestry Research  
and Education, Dehradun MOEF and CC, New Delhi

Alok Yadav

[yadava@icfre.org](mailto:yadava@icfre.org)

Centre for Social Forestry and Eco-rehabilitation  
Allahabad under Indian Council of Forestry Research  
and Education, Dehradun MOEF and CC, New Delhi

S. D. Shukla

[shuklasd\\_csfer@icfre.org](mailto:shuklasd_csfer@icfre.org)

Centre for Social Forestry and Eco-rehabilitation  
Allahabad under Indian Council of Forestry Research  
and Education, Dehradun MOEF and CC, New Delhi

Yogesh Agrawal

[anubhasri\\_csfer@icfre.org](mailto:anubhasri_csfer@icfre.org)

Centre for Social Forestry and Eco-rehabilitation  
Allahabad under Indian Council of Forestry Research  
and Education, Dehradun MOEF, and CC, New Delhi

### ABSTRACT

The present study was carried out to assess the early growth performance of Eucalyptus clones in Vindhyan region of Uttar Pradesh for identification of promising clones for the region. A clonal trial was established in the year 2016 in Vindhyan region of Eastern Uttar Pradesh with 19 clones to assess their suitability. The results of early growth performance evaluation of these clones after one year of planting were carried out for annual measurements of survival, total height, girth at breast height (gbh), soil chemical and physical analysis. The data were analyzed statistically. The results of early growth performance evaluation of these clones after one year of planting were carried out for annual measurements of height, girth at breast height (gbh) and soil analysis. The data were analyzed statistically. The highest value of increment in gbh belonged to clones 526 (9.04 cm) followed by 2136 (8.84 cm), P-50 (8.53 cm), P-14 (8.33 cm), P-32 (8.04 cm), 2023 (7.88 cm) and P-13 (7.81 cm) respectively, whereas the lowest values belonged to clone 3021 with 4.70 cm and control with 2.97cm. The clones with good height were P-50 (4.04 m), 526 (3.82 m), 2136 (3.76 m) and P-13 (3.73 m). The remaining clones had different ranks of gbh and height increments as compared to the control. The other clones had different levels and differed from each other significantly. Therefore, in future, promising clones may be recommended to be planted in agro forestry for this specific region.

**Keywords:** Eucalyptus Clones, Adaptability, Vindhyan Region, Promising, Agro Forestry.

### 1. INTRODUCTION

Eucalyptus, one of few trees which due to its astonishing growth characteristics are capable of reducing wide gap between demand and production of wood in shortest possible time (Chandra and Yadava, 1986). The species provide ample scope for genetic improvement due to wide geographic distribution and natural occurrence of variation. In view of the present study was carried out with an objective to assess the growth and productivity of different species of Eucalyptus on poor and degraded soils. The total area of eucalypts planted in India is estimated to exceed 2,500,000 ha. (Deweese and Saxena, 1995; Midgley et al., 2002). The demand for wood from the forest or commercial plantation for timber, fuel wood, and pulp and paper production is increasing each year at an alarming rate. Therefore, there is an urgent need for improvement in production of forest resources to meet the needs of fuel-wood, timber, and wood production on a sustainable basis and increase biomass yield from farm forestry plantations. (Patil et al.

2012). *Eucalyptus* is widely planted in farm forestry system throughout the world more particularly in India to provide wood products in the region of scarcity. *Eucalyptus* is among the most widely cultivated forest trees in the world with over 22 million hectares (Nichols *et al.* 2010). In India alone, more than one million hectare area is under *Eucalyptus* plantations which are bound to increase in the next few decades in view of the demand for the wood (Turnbull, 1999).

## 2. MATERIAL AND METHODS

The district of Allahabad is located between 24° 47' N and 25° 47' N latitudes and between 81° 19'E and 82° 21'E longitudes. It covers an area of 5246 km<sup>2</sup>. This district lies in the southern part of the state in the Gangetic plain and adjoining Vindhyan Plateau of India. The district may be divided into the three distinct physical parts as the Trans-Ganga or the Gangapar Plain, the Doab and Trans-Yamuna or the Yamunapar tract which are formed by the Ganga and its tributary. Trans Ganga tract comprises poor sandy soil (full of kankar) with stretches of sodic lands popularly known as 'USAR'. An experimental trial was established in the year 2016 in Trans Ganga tract to assess the Performance of *Eucalyptus* species/clones in Vindhyan region of Uttar Pradesh at Allahabad district. The trial was conducted under statistical design of Randomized Complete Blocks with three replicates and 3 x 2 m spacing for 19 clones (413,7,526, IFGTB-4,K-25, 288, 2013, 2023, 2070, 2136, 3018, 2031, P-13, P-14, P-23, P-32, P-45, P-50, P-66) of 03 eucalyptus species (*E. hybrid*, *E. tereticornis* and *E. camaldulensis*) along with control for 20 treatments in Allahabad district of Vindhyan region of Eastern Uttar Pradesh. The clonal seedlings were planted at 3 x 2 m in randomized block design with three replications. The standard doses of NPK and FYM were applied at onset of monsoon during planting. The soil texture and analysis was done for pH, EC, Organic Carbon and NPK contents using standard procedures ( Jackson, 1985). The annual increment of each species/clone was calculated using all the growth parameters ( gbh and height ) at the end of one year. The data were statistically analysed by standard ANOVA technique using RBD software.

## 3. RESULTS AND DISCUSSION

The height of eucalyptus clones differed significantly among different *Eucalyptus* species. The clones 2136, P-50,P-14, P-32 and 526 recorded significantly higher height increment with 3.76, 4.04 , 3.67, 3.70 and 3.70 m respectively ( Table 1) followed by higher gbh increment of 8.84, 8.53, 8.33, 8.04 and 9.04 cm. The clones 7 and 288 ( *E. tereticornis*) showed height increment of 3.51 and 3.54 followed by girth increment with 5.72 and 6.01 cm respectively. The lowest height increment was recorded in the control with 2.91 m and lowest girth increment of 2.97 cm. Out of nineteen clones, clones of three thousand series performance was not encouraging and clones of P-series performed superior over all the clones. The P- series clones are selections from CSO seedlings of Punjab, clone 526 is of *E. camaldulensis* and clone 2136 is a selection from CSO seedling. On comparing the relative mean annual increment for height and girth parameters, it was found that in most of the treatments, it was related in a similar manner (Fig1). The results of soil analysis showed that it was sandy loam in texture with 7.5 pH , EC 0.68 m mho/cm, organic carbon 0.42 % and NPK content 98.3, 18.5, 268.8 kg/ha respectively. The results of the analysis of variance (ANOVA) for mean height increments showed high levels of significance (Table 2). The mean girth increment was also analysed significantly using ANOVA (Table 3). The results of early growth performance indicated that out of nineteen clones, all clones gave superior results for growth indicators as compared to control. The clone of species *E. camaldulensis* performed best over other clones/species. Similarly, significant differences in different *Eucalyptus* species have been reported by various workers. Lal (2005) conducted a study to assess the comparative growth performance of various Eucalyptus species. Red Gum (*Eucalyptus camaldulensis* L.) is renowned globally for its fast growth, high levels of drought tolerance and adaptability to diverse climatic conditions and soils, which makes it popular among eucalypt tree growers (Bindumadhava *et al.* 2011). Kumar and Bangawa (2006) observed significant differences in growth attributes among seven species of *Eucalyptus* species. These results are in confirmation with results of Gomes and Correia (1995). It is also established *E. camaldulensis* as a pure species is adapted to low-to intermediate rainfall environments with a dry season of up to 8 months (Eldridge *et al.* 1993). Several studies have reported the significant growth performance of Eucalypt clones in the world. The results from these studies shows that Eucalypts hybrid has similar or better growth than their parent and significant differences in growth between hybrid clones may be attributed to genetic constitution as well as environmental factors ( Obella *et al.* 2005, Arya *et al.* 2009).The results of study confirm that *E. camalulensis* clones are better suited to growth at early stage in Vindhyan region of Allahabad district of Uttar Pradesh state of India. However, these are early growth results, with expected low juvenile–mature correlations, and growth monitoring will continue in this trial series for confirm assessment of promising clones for the region.

**Table 1. Mean Annual Increment (MAI) in height (m) and girth (cm) of clones of Eucalyptus Species after one year of planting**

S. No.	Treatments/clones	Mean annual increment(MAI) in height (m)	Mean annual increment(MAI) in girth (cm)
1.	P-13	3.73	7.81
2.	P-50	4.04	8.53
3.	P-66	3.51	5.95
4.	P-14	3.63	8.33
5.	P-23	3.63	7.53
6.	P-32	3.70	8.04
7.	P-45	3.32	5.62
8.	2136	3.76	8.84
9.	2023	3.63	7.88
10.	2013	3.64	7.75
11.	2070	3.64	6.57
12.	3018	3.55	5.85
13.	3021	3.27	4.70
14.	IFGTB-4	2.95	5.44
15.	07	3.51	5.72
16.	526	3.82	9.04
17.	288	3.04	6.01
18.	413	3.64	6.46
19.	K-25	3.26	5.83
20.	Control	2.91	2.97

**Table 2. Analysis of variance for mean annual increment in height (m) after one year**

Source	D.F.	SS	MSS	Cal. F	TAB F (5%)	TAB F (1%)
Treatment	19	5.03	0.26	11	S	S
Replication	2	1	0.5	21.37	S	S
Error	38	0.89	0.02			
TOTAL	59	6.91				
S.EM=	0.09	CD(5%)=	0.25		TAB. F (5%)=	1.87
SE.d=	0.12	CD(1%)=	0.34		TAB. F(1%)=	2.42
CV=	4.35					

**Table 3. Analysis of variance for mean annual increment in girth (cm) after one year**

Source	D.F.	SS	MSS	Cal. F	TAB F (5%)	TAB F (1%)
Treatment	19	139.56	7.35	192	S	S
Replication	2	0.06	0.03	0.8	NS	NS
Error	38	1.45	0.04			
TOTAL	59	141.07				
S.EM=	0.11	CD (5%) =	0.32		TAB. F (5%) =	1.87
SE.d=	0.16	CD (1%) =	0.43		TAB. F (1%) =	2.42
CV=	2.9					

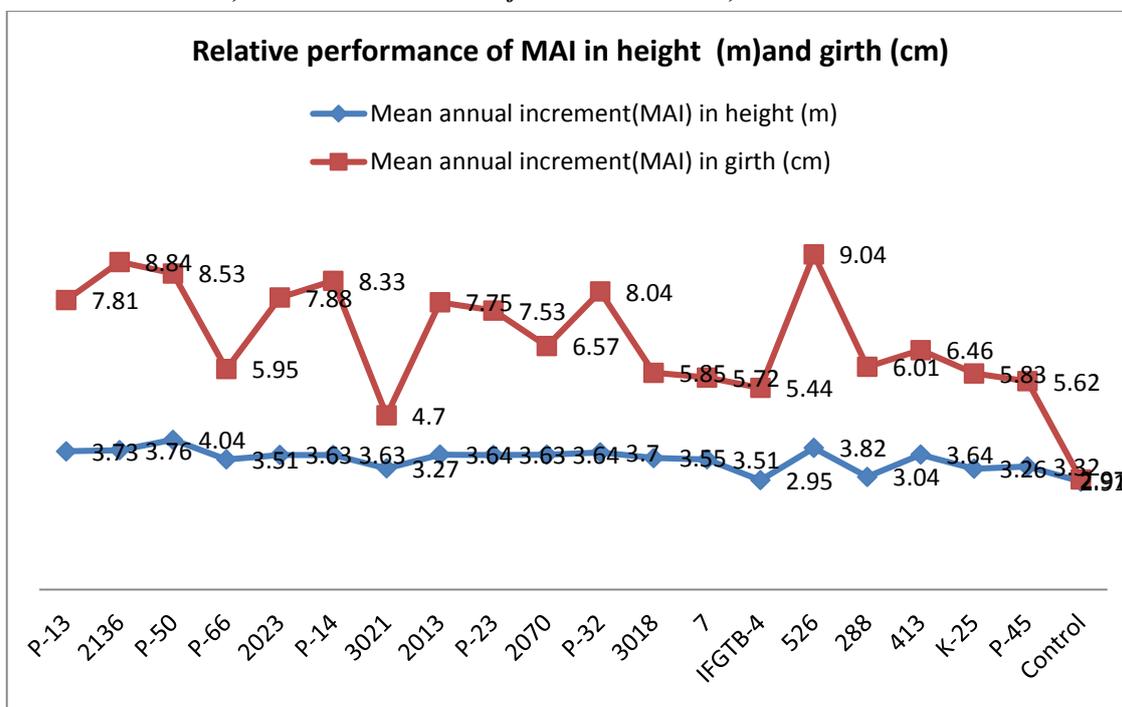


Fig.1: Relative performance of MAI in height (m) and girth (cm)

#### 4. REFERENCES

- [1] D. Arya, S. Sharma, S. Arya. 2009. Micro-propagation of superior eucalyptus hybrids FRI-5 (*E. camaldulensis* Dehn x *E. tereticornis* Sm) and FRI-14 (*E. torelliana* F.V. Muell x *E. citriodora* Hook): A commercial multiplication and field evaluation. *African Journal of Biotechnology* 8(21): 5718–5726.
- [2] Bindumadhava, H. , Tamak, J. , Mahavishnan1, K. , Upadhyay, A. P. , Varghese, M. and Sharma , N. , 2011. Clonal propagation in *Eucalyptus camaldulensis* using minicutting technique ,*Current Science*, Vol. 101, No. 12, 25 .
- [3] Chandra, J. P. and Yadava, M. P. S. 1986. Clonal propagation of Mysore gum (*Eucalyptus hybrid*). *Indian Forester*, 112;783 – 791.
- [4] Dewees, P. A. and Saxena, N. C., 1995. Wood product markets as incentives for farmer tree growing. In: ARNOLD, J. E. M. and DEWEES, P. A. (Eds.) *Tree management in farmer strategies: responses to agricultural intensification*”, Oxford University Press, Oxford, pp 198–241.
- [5] Eldridge, K. G., Davidson, J., Harwood, C. E. and Vanwyk, G. (1993): *Eucalypt Domestication and Breeding*. Oxford University Press.
- [6] Gomes, F. and Correia, C., 1995, Clonal selection and evaluation of genotype x environment interactions of *Eucalyptus globulus* clones. *Silva – Lusitana*, 3: 145 – 162.
- [7] Jackson, M.L. 1985. *Soil Chemical Analysis*. Chemical Publishing Co., Inc. New York, NY
- Kumar, R. and Bangarwa, K. S., 2006, Clonal evaluation in *Eucalyptus tereticornis* Sm. *Environ Ecol*, 24 (4): 1188 – 1191.
- Lal, P., 2005, Performance of Eucalyptus clones in Punjab. Proc.; *National Symposium on Exotics in Indian Forestry, held at Department of Forestry and Natural Resources, PAU, Ludhiana, March, 15 – 18, 2005*, p. 45.
- [8] Midgley, S. J., Turnbull, J. W. and Pinyopusarerk , K, 2002. Industrial Acacias in Asia: Small brother or big competitor? In: WEI, R. P. and XU, D. (Eds.) Proc. International Symposium on Eucalyptus Plantations, Guangdong, China, pp 19–36.
- [9] Nichols, J.D., Smith, R.G.B, Grant, J.C. and Glencross, K. 2010. Subtropical eucalypt plantations in Eastern Australia. *Journal of Australian Forest* 73: 53 – 62.
- [10] P. Oballa, E. Chagala-Odera, L. Wamalwa, V. Oeba, E. Mutitu, L. Mwangi. 2005. *The Performance of Eucalyptus Hybrid Clones and Local Landraces in Various Agro-Ecological Zones in Kenya*. International Service for the Acquisition of Agri-Biotechnology Applications, Nairobi, Kenya. 121pp.
- [11] Patil, H. Y., Patil ,S. J., Mutanal, S. M. and Shahapurmath, G.,2012. Growth and productivity of different *Eucalyptus* species on degraded land, *Karnataka J. Agric. Sci.*,25 (1) : 92-93.
- [12] Tumbull, J.W., 1999, *Eucalyptus plantations*. *New Forests*, 17; 37 – 52.