

Original Research Article

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## Effect of Various Growing Media on Early Seedling Growth in *Khaya senegalensis* (Desr.) A. Juss.

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### ABSTRACT

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*Khaya senegalensis* (African Mahogany) is one of plantation species growing in Indian condition. A study was undertaken to evaluate organic based potting mixtures for early growth and biomass in *Khaya senegalensis*. Total ten potting mixture combinations were prepared using different organic materials such as Coco peat, Rice husk, Perlite, Vermiculite, FYM, Castor Cake, Neem Cake, Sugarcane press mud and Vermicompost with Red Soil. Among 10 treatments, T<sub>9</sub> i.e., potting mixture composition of vermicompost and red soil in the ratio of 1:1, resulted in maximum seedling growth in terms of height, collar diameter, root length, number of leaves and seedling biomass at 120 days after sowing, followed by T<sub>5</sub> (Sand: Red soil: FYM of 1:1:1) and T<sub>7</sub> (Neem cake: Red soil of 1:1 ratio) in *Khaya senegalensis*. Therefore, treatment T<sub>9</sub> is suggested to use in the nursery for raising large scale seedling production of *Khaya senegalensis*.

### Introduction

*Khaya senegalensis* is one of the exotic species and it has been exported from West Africa (Gambia) to Europe since the first half of the 19<sup>th</sup> century. This species has been exploited heavily for its timber. There is local demand for this species.

Trees are largely used in avenue planting along the road side as well as in the gardens (Watt and Breyer-Brandwijk, 1962). It is a medium sized tree which can grow between 15 and 30 meters in height with maximum diameter upto 1 meter. This tree is found to be suitable for salty and saline soils. The heartwood is brown with a pink-red pigment

made up of coarse interlocking grains. *Khaya senegalensis* is characterized by leaves arranged in a spiral formation clustered at the end of branches; along with white, sweet-scented flowers and fruit changing from grey to black when ripened.

The wood is used conventionally for carpentry, interior trim and construction. To supply large quantity of healthy seedlings, proper nursery techniques are required. Therefore, in the present study, different growing media were tested for seed germination and seedling vigour in *Khaya senegalensis*.

## Materials and Methods

The present investigation was carried out in Forest Nursery of College of Forestry, Navsari Agricultural University Navsari, Gujarat during July to October 2013. Seeds were collected from matured trees located in the Botanical Garden, Waghai, South Dangs Forest Division, Gujarat. In the study, total 10 different potting mixtures viz., T<sub>1</sub> - Coco peat + Red Soil (1:1), T<sub>2</sub> - Rice husk + Red Soil (1:1), T<sub>3</sub> - Perlite + Red Soil (1:1), T<sub>4</sub> - Vermiculite + Red Soil (1:1), T<sub>5</sub> - Sand + Red soil + FYM (1:1:1), T<sub>6</sub> - Castor Cake + Red Soil (1:1), T<sub>7</sub> - Neem Cake + Red Soil (1:1), T<sub>8</sub> - Sugarcane press mud + Red Soil (1:1), T<sub>9</sub> - Vermicompost + Red Soil (1:1) and T<sub>10</sub> - Red Soil (Control) were prepared. These potting mixtures were filled into polythene bags and arranged by following completely randomized design with three replications under mist chamber. Further, seeds were soaked in water for 12 hours and later seeds were sown on polybags filled with different combination of potting mixture. Daily germination count was made up to 21 days from the date of sowing. The complete emergence of shoot above the ground was treated as germination and per cent germination was worked out. Further, seedling growth parameter such as shoot length, root length, number of leaves, survival per cent, fresh and dry weight of seedlings. Seedling biomass was recorded for seedling of 90 days young. Seedlings were dried using hot air oven set for 65±2°C for five days (based on constant weight, drying period was maintained). Data were subjected to statistical analysis by following Panse and Sukhatme (1967).

## Results and Discussion

Number of days taken to germinate varied among potting mixture and it ranged from 7.58 (T<sub>9</sub>: Vermicompost + Red Soil in 1:1

ratio) to 13.33 days (T<sub>10</sub>: Red Soil-Control). The plant survival varied among potting mixture treatments and it was highest of 83.09 per cent in T<sub>9</sub>, followed by T<sub>5</sub>. However, it was the least in T<sub>2</sub> with survival of 51.84 per cent. There was a significant variation among 10 potting mixture treatments including red soil as control.

Shoot length was found to be highest in T<sub>9</sub> (56.42 cm), followed by T<sub>5</sub> (53.11 cm) and T<sub>7</sub> (52.71 cm) and it was the least in control treatment (T<sub>10</sub>; 47.33 cm). Similarly, other growth parameters such as collar diameter (0.62 to 1.13 mm), number of leaves per plant (12.34 to 14.02), root length (16.13 to 23.40 cm), fresh weight of plant (8.45 to 21.44 g) and dry weight of plant (3.08 to 8.95 g) also varied significantly among treatments (Table 1). Seedling collar diameter, root length, number of leaves and seedling biomass were recorded to be highest in treatment T<sub>9</sub> i.e., potting mixture composition of vermicompost and red soil in the ratio of 1:1, followed by T<sub>5</sub> (Sand: Red soil : FYM of 1:1:1) and T<sub>7</sub> (Neem cake: Red soil of 1:1 ratio) in *Khaya senegalensis*.

The overall result showed that organic based materials such as vermicompost, neem cake as well as FYM resulted in positive influence on seedling growth and vigour of *Khaya senegalensis* in nursery condition. This may be due to organic materials are generally rich in most of the essential plant nutrients viz., vitamins, enzymes, micronutrients and hormones; therefore, increased growth was observed in seedlings of *Khaya senegalensis*. Such positive results have been reported in many forest species. For instance, Biradar *et al.*, (2001) and Cristina *et al.*, (2008) studied the effect of different composition of vermicompost as potting mixture on seedling growth in neem and pine (*Pinus pinaster*) and recorded positive result as compared to soil alone as growing media.

**Table.1** Influence of various growing media on germination, seedling survival, growth and biomass in *Khaya senegalensis* (African mahogany)

Treatments	Seedling vigour parameter recorded at 120 DAS							
	Days taken to germination	Survival (%)	Shoot length (cm)	Collar diameter (mm)	Number of leaves per plant	Root length (cm)	Fresh weight of plant (g)	Dry weight of plant (g)
T <sub>1</sub> : Coco peat + Red Soil (1:1)	10.17	55.86	50.58	0.84	12.65	20.10	12.22	4.83
T <sub>2</sub> : Rice husk + Red Soil (1:1)	12.33	51.84	48.59	0.74	12.42	18.13	8.62	3.63
T <sub>3</sub> : Perlite + Red Soil (1:1)	10.67	55.98	50.08	0.77	12.55	20.03	11.91	4.43
T <sub>4</sub> : Vermiculite + Red Soil (1:1)	11.34	64.77	49.64	0.69	12.45	19.03	9.26	3.96
T <sub>5</sub> : Sand + Red Soil + FYM (1:1:1)	7.67	81.05	53.11	0.93	13.83	21.43	17.26	7.53
T <sub>6</sub> : Castor Cake + Red Soil (1:1)	9.50	67.30	51.87	0.88	12.93	20.67	15.49	6.20
T <sub>7</sub> : Neem Cake + Red Soil (1:1)	8.67	72.85	52.71	0.91	13.46	21.23	16.31	6.60
T <sub>8</sub> : Sugarcane pressmud + Red Soil (1:1)	10.00	70.69	50.47	0.86	12.74	20.27	14.25	5.73
T <sub>9</sub> : Vermicompost + Red Soil (1:1)	7.58	83.09	56.42	1.13	14.02	23.40	21.44	8.95
T <sub>10</sub> : Red Soil (Control)	13.33	59.49	47.33	0.62	12.34	16.13	8.45	3.08
S.Em. ±	0.300	1.22.	0.633	0.028	0.308	0.734	0.298	0.039
C.D. at 5%	0.87	3.53	1.83	0.08	0.89	2.13	0.86	0.12
C.V. %	5.14	3.19	2.14	5.84	4.12	6.35	3.81	2.18

Such kind of positive role of different composition of potting mixture on seedling growth in different species viz., *Eucalyptus* hybrid (Srivastava *et al.*, 1998), Rathore *et al.*, (2004) in *Casuarina equisetifolia*; *Dysoxylum malabaricum* (Gunaga and Vasudeva, 2011); *Terminalia bellirica* (Bali *et al.*, 2013) and other forest species (Devaranavadgi *et al.*, 2010).

Finally, it is concluded that potting mixture composed of Vermicompost + Red Soil @ 1:1 resulted in better growth in *Khaya senegalensis* and it is suggested use of this potting mixture for growing healthy seedlings in large scale under nursery condition.

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### References

Abdul, Nasir and Afaq, Majid Wani. (2014). Effect of growth regulators and potting media on morphological and biomass traits on G48 clone of Poplar. *Asian Journal of Agriculture and Food Science*, 2(1): 60-63.

Bahuguna, V.K., and Pyarelal. (1990). Effect of environment and different soil mixture on germination of *Acacia nilotica* seed at nursery stage. *Indian Forester*, 116: 474-478.

Bali, R.S., Chauhan, D.S., and Todaria, N.P. 2013. Effect of growing media, nursery beds and containers on seed germination and seedling establishment of *Terminalia bellirica* (Gaertn.) Roxb., a multipurpose tree. *Tropical Ecology*, 54(1): 59-66.

Bhardwaj, R.L. 2014. Effect of growing media on seed germination and seedling growth of papaya cv. Red lady. *African Journal of Plant Science*, 8(4): 178-184.

Biradar, A.P., Devaranavadgi, S.B., and Sunitha, S.D. 2001. Effect of vermicompost as potting media mixture on growth and vigour of neem seedling. *Kar. J. of Agri. Sci.*, 14: 512-513.

Cristina, L., Luis, S., Rafael, Z., and Jorge, D. 2008. Vermicompost as potting amendment for the growth of different progenies of pine seedlings (*Pinus pinaster*). *International congress, CH-Solothurn*, pp. 255-257.

Devaranavadgi, S.B., Wali, S.Y., Patil, S.B., Jambagi, M.B., and Kambrekar, D.N. 2010. Effect of nursery mixtures on nutrient content and quality parameters of seedlings of different tree species. *International Journal of Agricultural Sciences* 6(2): 265-369.

Gunaga, R.P., and Vasudeva, R. 2011. Effect of potting mixture on seedling growth in *Dysoxylum malabaricum*. *Indian J. of Forestry* 34(3): 307-310.

Masilamani, P., Annadurai, K., and Chenthil, A.P. (2013a). Influence of raw coir pith incorporation in nursery medium on seedling growth attributes of teak (*Tectona grandis* Linn. f.). *Indian J. of Forestry*, 36(2): 239-241.

Panse, V.G., and Sukhatme, P.V. 1967. *Statistical Methods for Agricultural Workers*, I.C.A.R., New Delhi.

Panwar. (2009). Effect of different growing media on germination of *Jatropha carcus*. *Indian J. of Agroforestry*, 11(2): 71-75.

Parasana, J.S., Leua, H.N., and Ray, N.R. (2013). Effect of different growing medias mixture on germination and seedlings growth of mango (*Mangifera indica* L.) cultivars under net house conditions. *The bioscan*, 8(3): 897-900.

Rathore, T.S., Annapurna, D., Joshi, G., and

- Srivatava, A. 2004. Effect of potting mixture and size of containers on the quality of seedling production in *Casuarina equisetifolia*. *Indian Forester*, 130(1-4): 323-332.
- Srivastava, R., Nanhorya, R., and Upadhyaya, J.K. 1998. Selection of proper potting mixture for root trainer of *Eucalyptus hybrid*. *Indian Forester*, 124 (7): 502-510.
- Watt, J.M., Breyer-Brandwijk, M.G. 1962. Medical and Poisonous Plants of Southern and Eastern Africa. EXS Livingstone, London. pp. 1463- 1469.

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