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Initial growth performance of improved genotypes of *Melia dubia* in low hills of Himachal Pradesh

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Abstract

The present study was conducted to evaluate early growth performance of 16 improved genotypes of *Melia dubia* under low hills conditions of Himachal Pradesh. The seedlings were procured from Forest research Institute, Dehradun and planted under Randomized Block Design (RBD) in experimental farm of College of Horticulture and Forestry, Neri, Hamirpur, Himachal Pradesh. Three months growth was recorded and analysed for height, diameter and genetic parameters. Significant variation was recorded for diameter and height growth among seedlings of different genotypes. Both diameter and height growth traits showed high values for heritability and genetic advance indicating good scope of early selection for these traits in these genotypes. Genotype 241 and 231 were found best in terms of evaluated traits.

Keywords: *Melia dubia*, heritability, genetic advance, genotypes

1. Introduction

Melia dubia commonly known as "Malai Vembu" belongs to the family Meliaceae. It is a deciduous and fast growing tree with straight bole. It is indigenous to the western ghats of southern India and it is common in moist deciduous forests of Kerala. It is also found in the tropical moist deciduous forests of Sikkim, Himalaya, North Bengal, Upper Assam and Khasi hills of Orissa. The tree has been considered as the best alternate pulpwood species. Besides, it has also been extensively exploited by many other industries like match wood and medicine. Owing to its importance, this species has been identified as potential, commercially viable pulpwood species. The current production of raw materials for pulp and paper is 2.76 million tonnes, against the demand of 5.04 million tonnes, a shortfall of 45 percent. The projected demand by 2020 is 13.2 million tonnes, which is still more staggering, Palsynia *et al.*, (2009) [6]. Inadequate raw materials and stringent forest policies have forced the wood based industries to become self-reliant in terms of acquiring their own raw materials. Hence, tree species *viz.*, Eucalyptus, Casuarina and Leuceana are promoted in large scale. In order to replace these exotic tree species, efforts have been made to identify indigenous tree species with superior quality pulps. *Melia dubia* has been screened as one of the best alternate of pulpwood species (Bharti, 2006) [1]. Being an indigenous species it has great potential to meet the demands of pulpwood and other needs. Inadequate raw materials and stringent forest policies have forced the wood based industries to become self-reliant in terms of acquiring their own raw materials. Hence, tree species *viz.*, Eucalyptus, Casuarina and Leuceana are promoted in large scale. In order to replace these exotic tree species, efforts have been made to identify indigenous tree species with superior quality pulps. Although commercial cultivation of *Melia dubia* has been started in many states of India especially in south India but there is no reports on introduction of *Melia dubia* in Himachal Pradesh. So the present study was conducted on evaluation of growth parameters of *Melia dubia* in district Hamirpur under low hills conditions of Himachal Pradesh.

2. Material and Methods

Seedlings of 16 improved genotypes were procured from Division of Genetics and Tree Propagation, Forest Research Institute, Dehradun and planted at forestry research farm of College of Horticulture and Forestry, Neri, district Hamirpur, Himachal Pradesh in the last week of August, 2017. The study area fall under low hills zone of Himachal Pradesh between 31°41'47.6" N Latitude & 72°28'06.3" E Longitude with altitude of 650 m amsl having subtropical climate and the soil type medium deep to deep loamy soils. The experiment was laid with seedlings of 16 genotypes of *Melia dubia* × 5 Replications = 80 seedlings in

Randomized Block Design (RBD). Observations on growth parameters of seedlings viz., collar diameter and height was recorded after 3 months of planting in the last week of November, 2017. The collar diameter was recorded with the help of digital calliper in millimetre (mm) and height with the help of measuring tape in centimetres (cm). Statistical Analysis was performed by JMP- 10 software (2007) [2].

3. Results and Discussions

Analysis of variance revealed that the variation for initial height ($p=0.0003$) and diameter ($p=0.0209$) were significant due to genotypes under study (Table 1). Overall, six genotype viz. 28, 231, 238, 241, 622 and 624 showed higher value for height than population mean (52.41 cm). Among all the genotypes tested, 241 showed maximum height (98.3 cm) followed by 231 (93.6 cm) (Figure 1).

Table 1: ANOVA for height and diameter

Character	Source of variation	Sum of Squares	F Ratio	Prob > F
Height	Genotype No.	11836.2	3.5149	0.0003*
	Rep	1000.075	1.1137	0.3585
Diameter	Genotype No.	111.4018	2.1187	0.0209*
	Rep	8.63861	0.6161	0.6527

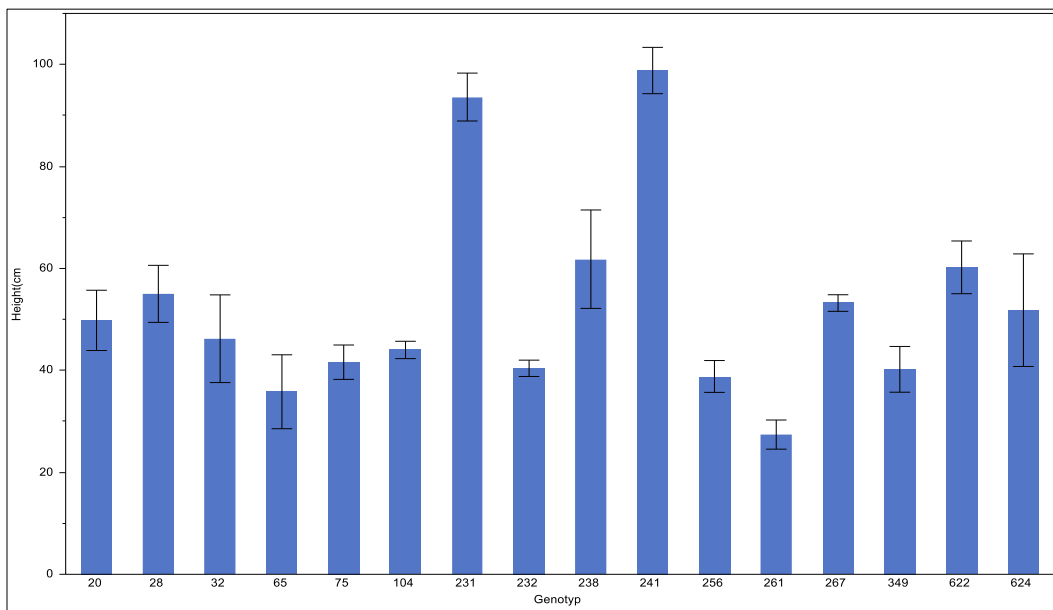


Fig 1: Genotype wise variation in height for three months old *Melia dubia* seedlings

For the diameter, four genotypes viz. 65, 231, 241 and 622 performed above the overall population mean (Figure 1.). However, among all sixteen genotypes, 241 showed thickest diameter (11.50 mm) followed by 231 (10.60 mm), Figure 2. The variance component analysis showed that the genetic

variance was higher as compared to environmental variance for both the characters which is reflected in heritability value where both the character showed higher heritability value (0.67). The expected genetic advance (GA) was moderately higher for diameter as compared to height (Table 2).

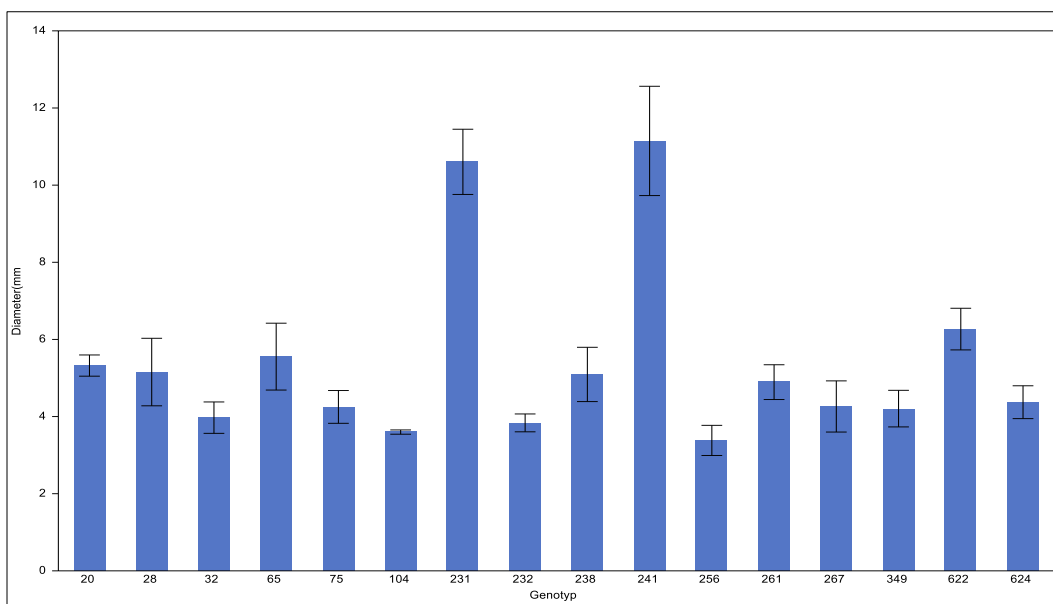


Fig 2: Genotype wise variation in diameter for three months old *Melia dubia* seedling

Table 2: Variance components for height and diameter

Component	Height (cm)	Diameter
Vg	341.52	4.17
Ve	165.12	2.02
Vp	506.64	6.19
GCV	35.26	38.03
ECV	24.52	26.47
PCV	42.95	46.33
H ²	0.67	0.67
GG	31.26	3.45
GA	59.64	64.30

The variation in the productivity of tree species is mainly depends on the genotype of the species. In addition, the species grows in different climatic conditions which ultimately reflect on species performance, hence, environment also has significant influence on the productivity. In the present study also there is significant variation in the girth, height. The variation in productivity has also been reported in tree species by Kumar *et al.* (2010) ^[5] in *Eucalyptus tereticornis*, Prasad *et al.* (2011) ^[7] in *Lucaena leucocephala* and by Jayraman and Rajan (1991) ^[3] in *Eucalyptus auriculiformis* ^[1]. Plethora of workers reported the existence of significant differences and superiority of few seed sources, open pollinated families and provenances in tree species like *Lagerstroemia* spp. (Jamaludheen *et al.*, 1995) ^[4] in different age gradations which lend support to the current findings genotypes of *Melia dubia*. Assessment of genetic variability is a key to progress in tree improvement programme (Zobel, 1981) ^[8] and is a useful tool in determining the strategies for tree improvement and breeding of any species.

4. Conclusions

Significant variation among all genotypes was found for height as well diameter growth. The high value of heritability (h^2) and genetic advance (GA) for both height and diameter growth in evaluated genotypes suggest that early selection can be made for these traits in *Melia dubia*. Genotype 241 and 231 performed outstanding among all genotypes for evaluated traits under present study however these genotypes need further site specific multilocational field trials for evaluation of growth parameters under different agro-climatic conditions of low and mid hills of Himachal Pradesh.

5. References

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