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Genotypic Growth Performance Evaluation of Malabar Neem (*Melia Dubia*) in Low Hills of Himachal Pradesh

Dushyant Sharma^{1*}, Kamal Sharma¹, Suman Jha² and Ashok Kumar³

¹ College of Horticulture and Forestry, Neri, Hamirpur, Himachal Pradesh, India, 177001

² Nansari Agricultural University Nansari, Gujarat, India, 396450

³ Forest Research Institute, Dehradun, Uttarakhand, India, 248006

*E-mail: sharmadus@gmail.com

Abstract: *Melia dubia* is a very useful fast growing tree species used in pulp wood, plywood and timber industry. On-farm trial of 17 improved genotypes of *Melia dubia* procured from Division of Genetics and Tree propagation, Forest research Institute, Dehradun was established under Randomized Block Design (RBD) at village Lethwin, Tehsil Ghumarwin, District Bilaspur, Himachal Pradesh falling under low hills conditions of the state. Data on growth parameters viz. height and diameter were recorded after one year of plantation and genetic parameters viz. phenotypic variance, genotypic variance, heritability, genetic gain and genetic advance were worked out using standard procedures. Significant variation for diameter, height and genetic parameters was found among the evaluated genotypes. Genetic parameters recorded high values for heritability and genetic advance for diameter as well as height growth in all evaluated genotypes indicating scope of early selection for these traits. The maximum values for height as well as diameter growth were recorded for genotypes 241 and 231 which indicated their suitability for the cultivation in the area under study and further scope in site specific multilocational growth performance evaluation under varied agro-climatic conditions of the state.

Keywords: *Melia dubia*, Heritability, Genetic advance, Genotypes

INTRODUCTION

Melia dubia (Malabar Neem in Hindi and Malai Vembu in Tamil) is a promising tree highly suitable

for farm forestry and agro forestry for generating higher income per unit area in the semi-arid regions. One of the main problems that farmers face today

is decreasing income per unit area per year against sudden increase in the value of agricultural lands. Planting tree species such as *Melia dubia* fetches a handsome price in the market with assured buyback, and requires low maintenance expenditure realizing higher returns. In addition, the trees also aid the planet by preventing temperature rise and checking gas emission into the atmosphere. *Melia dubia* is fast growing tree and the wood from this tree is used in plywood, pulp wood and timber industry. In India there is a huge gap between demand and supply for wood and planting of *Melia dubia* can ensure a considerable benefit to farming community. In India the currently demand production of raw materials for pulp and paper is 5.04 million tonnes and supply is just 2.76 million tonnes. The projected demand by 2020 is 13.2 million tonnes [5]. The wood is also used for packing cases, cigar boxes, ceiling planks, building purposes, agricultural implements, pencils, mach boxes, splints and [6]. Keeping in view the importance of growing *Melia dubia* and lack of no earlier record on introduction and performance evaluation of this species in Himachal Pradesh seedlings of 17 improved genotypes of *Melia dubia* were procured from Forest Research Institute, Dehardun and on-farm trial was established in Bilaspur district of the state to evaluate their growth performance in low hills of Himachal Pradesh.

MATERIALS AND METHODS

On-farm genotypic performance trial of seventeen improved genotypes were procured from Division of Genetics and Tree Propagation, Forest Research Institute, Dehardun were established at village Lethwin, Tehsil Ghumarwin, District Bilaspur, Himachal Pradesh in August, 2017. The study area has subtropical climate and comes under low hills zone of Himachal Pradesh having an altitude of 730 m amsl and lies between 31°30'47.59" N Latitude & 76°38'55.10" E Longitude. The experiment was established by planting seedlings of 17 genotypes of *Melia dubia* with three replications and each

replication consisting of five seedlings in Randomized Block Design (RBD). Data on growth parameters viz. height and diameter were recorded after one year of plantation and genetic parameters viz. phenotypic variance, genotypic variance, heritability, genetic gain and genetic advance were worked out using standard procedures in July, 2018. The collar diameter was recorded with the help of digital calliper in centimeters (cm) and height with the help of Ravi Multimeter in metres (m). Statistical Analysis of growth and genetic parameters of genotypes was done using JMP-10 software [2].

RESULTS AND DISCUSSIONS

Analysis of variance components for one year growth data revealed significant variation in growth parameters (Table 1) as well as genetic parameters (Table 2). Genotype 241 performed best in average height (5.27 m) as well as average diameter (3.90 cm) followed by genotype 231 (height 4.94 m and diameter 3.75 cm). The lowest performing genotypes were found to be 256 and 232 in terms of both diameter as well as height (Table 1, Figure 1 and Figure 2).

Table 1
Genotype wise Variance components for height and diameter

Genotypes	Height(m)	Diameter (cm)
20	3.45 de	2.51 cd
28	3.55 de	2.33 de
32	3.43 de	2.28 def
65	3.39 ef	2.13 efg
75	2.81 gh	1.96 fgh
104	2.81 gh	1.89 gh
231	4.94 ab	3.75 a
232	2.59 gh	1.79 gh
235	2.98 fg	2.02 efg
238	4.70 b	3.74 a
241	5.27 a	3.90 a
256	2.53 h	1.61 h
261	2.72 gh	1.93 fgh
267	4.19 c	3.17 b
349	2.81 gh	2.06 efg
622	3.86 cd	2.72 c

*Values not connected by same letter are significantly different

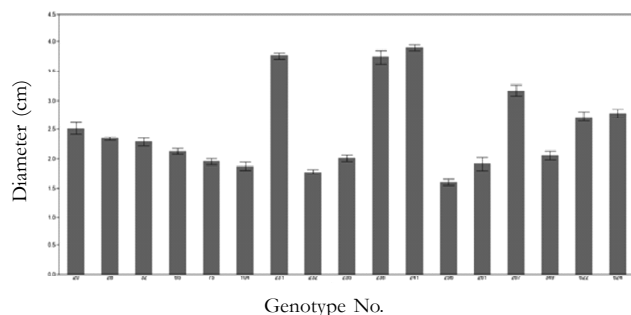


Figure 1: Genotype wise variation in seedling diameter (cm) of *Melia dubia*

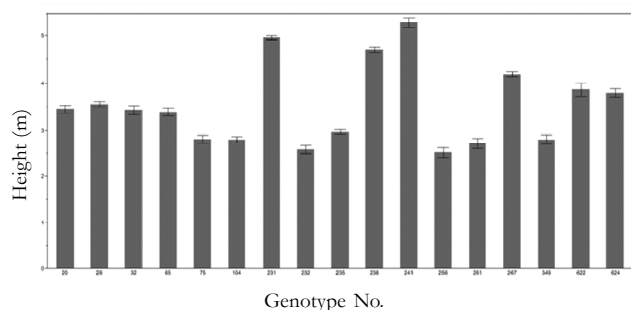


Figure 2: Genotype wise variation in seedling height (m) of *Melia dubia*

The higher values of heritability (h^2), genetic gain (GG), genetic advance (GA) as well as high value of genetic variance clearly indicated that variation in recorded parameters is due to the genetic make of genotypes. There was also dominance of genotypic coefficient of variation (GCV) over environmental coefficient of variation showing the role of genotype with minimum effect of environmental factors on expression of traits under study (Table 2).

Table 2
Variance components for height and diameter

Parameters	Height	Diameter
Vg	0.71	0.53
Vp	0.80	0.60
h^2	0.89	0.89
GG	1.63	1.42
GA	46.52	56.84
GCV	20.23	21.30
ECV	2.63	2.54
PCV	22.85	23.83

Similar results were found by results are in agreement with the findings of other researchers on *Melia dubia* [1,4,7,8] while doing genotypic evaluation of growth traits. The variation in productivity has also been reported in many other tree species like *Terminalia chebula* [9], *Eucalyptus tereticornis* [3], and in *Grewia optiva* [10].

CONCLUSIONS

There was significant variation among all genotypes evaluated for diameter and diameter growth. This source of variation for studied traits was found to be mainly genetic make-up of the genotypes which was expressed up to the maximum indicated by high values heritability (h^2) and genetic advance (GA) and there was very less effect of the environment of trial location on expression of the traits indicated by very less value of environmental coefficient of variation. Among evaluated genotypes 241 and 231 were best performers in evaluated traits however these require more site specific trials for further evaluation before their recommendation for large scale commercial cultivation in the state.

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