

Correlation studies in teak for stem volume production

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ABSTRACT

The present investigation was carried out at the Department of Forestry, PGI, Dr Panjabrao Deshmukh Krishi Vidyapeeth Akola, Maharashtra and the observations were taken from National Teak Germplasm Bank, Lohara, Chandrapur, Maharashtra. It was conducted on thirty clones of teak (*Tectona grandis* L.) using randomized block design with three replications. The teak plantation was established in the year 1979 at the spacing of 8 x 8 m. One plant per treatment was selected randomly to record observations for six characters. Plant height showed positive and significant correlation with girth ($r = 0.823$) and volume ($r = 0.823$). It showed positive and non-significant correlation with girth ($r = 0.326$), leaf area ($r = 0.105$) and dry weight of leaf ($r = 0.141$). However it showed positive but significant correlation with volume ($r = 0.500$); girth showed positive and significant correlation with dry weight of leaf ($r = 0.389$); leaf area showed a positive and significant correlation with dry weight of leaf ($r = 0.879$) and number of branches ($r = 0.822$) and negative and non-significant correlation with volume ($r = 0.196$) at genotypic level. It showed a positive and significant correlation with dry weight of leaf ($r = 0.879$) and number of branches ($r = 0.822$); dry weight of leaf showed a positive and significant correlation with number of branches ($r = 0.701$) and positive and significant correlation with number of branches ($r = 0.637$) and non-significant correlation with volume ($r = 0.199$) at phenotypic level. Number of branches showed a positive and significant correlation with volume ($r = 0.445$) at genotypic and a positive and significant correlation with volume ($r = 0.140$) at phenotypic level.

Keywords: Correlation; positive; negative; stem volume; teak; clones

INTRODUCTION

Teak (*Tectona grandis* L.) belonging to the family Verbenaceae is one of the most important species for plantation in the tropics. It is naturally distributed in parts of India, Myanmar, Thailand, Laos and

Indonesia (Troup 1921). It is the most widely planted hardwood timber species in the world covering 2.25 Mha.

The Indian region is considered to be primary centre of genetic diversity and variability of teak with distribution over 8.9

Mha (Tewari 1992). Outside its natural range teak had been successfully introduced in Pacific, African, Central and South American regions. In India its natural zone of distribution is mostly confined to the peninsular region below 24°8' latitude (Kumarvelu 1991). Teak is used on a large scale, has high value and is easily established in plantation regimes which allow introduction of improved genetic material. However its seed yield per tree is low and only few seedlings are produced per 100 sown seeds in nurseries.

MATERIAL and METHODS

The study was conducted at National Teak Germplasm Bank, Lohara, Chandrapur, Maharashtra. Observations were taken from National Teak Germplasm Bank, Lohara, Chandrapur, Maharashtra. The plants were planted in the year 1979. The materials under study were constituted by thirty clones of teak (*Tectona grandis* L.) (Table 1). The observations were recorded on single tree of each randomly selected clone. The analysis of variance was carried out to test the significance of difference between the clones for the characters under study as per the standard method given by Singh and Chaudhary (1977).

RESULTS and DISCUSSION

The phenotypic and genotypic correlation coefficients among the different characters have been presented in Table 2

as estimates of degree of association among them. Plant height showed positive and significant correlation with girth ($r = 0.823$) and volume ($r = 0.823$). However it showed positive but non-significant correlation with leaf area ($r = 0.145$) and dry weight of leaf ($r = 0.196$) negative and non-significant correlation with number of branches ($r = -0.016$) at genotypic level. It showed positive and non-significant correlation with girth ($r = 0.326$), leaf area ($r = 0.105$) and dry weight of leaf ($r = 0.141$); however it showed positive but significant correlation with volume ($r = 0.500$) and negative and non-significant correlation with number of branches ($r = -0.002$) at phenotypic level. Girth showed positive and significant correlation with dry weight of leaf ($r = 0.389$), positive and non-significant correlation with leaf area ($r = 0.255$), number of branches ($r = 0.252$) and volume ($r = 0.145$) at genotypic level. It showed a positive and non-significant correlation with leaf area ($r = 0.063$), dry weight of leaf ($r = 0.134$) and number of branches ($r = 0.064$) and a positive and significant correlation with volume ($r = 0.860$) at phenotypic level. Leaf area showed a positive and significant correlation with dry weight of leaf ($r = 0.879$) and number of branches ($r = 0.822$) and negative and non-significant correlation with volume ($r = 0.196$) at genotypic level. It showed a positive and significant correlation with dry weight of leaf ($r = 0.879$) and number of branches ($r = 0.822$) and positive but non-significant correlation with volume ($r = 0.196$) at phenotypic level. Dry weight of leaf showed a positive and

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Table 1. Details of the clones under study

Clone	Source	Clone	Source	Clone	Source
MHSC-A2	Maharashtra	APT-20	Andhra Pradesh	ORANR-3	Orissa
MHSC-A1	Maharashtra	APT-3	Andhra Pradesh	ORPB-18	Orissa
TNT-8	Tamilnadu	APT-16	Andhra Pradesh	APKEC-2	Andhra Pradesh
MHSC-J1	Maharashtra	TNT-12	Tamil Nadu	ORNAP-7	Orissa
APT-22	Andhra Pradesh	APT-17	Andhra Pradesh	APNPL-10	Andhra Pradesh
APT-11	Andhra Pradesh	TNT-11	Tamil Nadu	KLS-4	Kerala
TNT-14	Tamil Nadu	ORNAP-3	Orissa	ORANR-2	Orissa
TNT-13	Tamil Nadu	KLS-3	Kerala	ORPLM-1	Orissa
KLN-2	Kerala	APNPL-11	Andhra Pradesh	ORANR-6	Orissa
TNT-10	Tamil Nadu	APKEA-24	Andhra Pradesh	ORANP-6	Orissa

Table 2. Genotypic and phenotypic correlation coefficient (r)

Character		Girth (m)	Leaf area (cm ²)	Dry weight of leaf (g)	# branches	Volume (m ³)
Plant height (m)	G	0.823**	0.145	0.196	- 0.016	0.823**
	P	0.326	0.105	0.141	- 0.002	0.500**
Girth (m)	G		0.255	0.389*	0.252	0.145
	P		0.063	0.134	0.065	0.860**
Leaf area (cm ²)	G			0.879**	0.822**	0.196
	P			0.761**	0.795**	0.152
Dry weight of leaf (g)	G				0.701**	-0.016
	P				0.637**	0.199
# branches	G					0.445*
	P					0.140

*Significant at 5% level (361), **Significant at 1% level (463), G= Genotypic correlation, P= Phenotypic correlation

significant correlation with number of branches ($r = 0.701$) and non-significant correlation with volume ($r = -0.016$) at genotypic level. It showed a positive and significant correlation with number of branches ($r = 0.637$) and non-significant correlation with volume ($r = 0.199$) at phenotypic level. Number of branches

showed a positive and significant correlation with volume ($r = 0.445$) at genotypic and positive and significant correlation with volume ($r = 0.140$) at phenotypic level.

The study revealed that plant height exhibited positive and significant correlation with girth at genotypic level. Similar results

were reported by Kumar et al (1997), Siswamartana et al (2003), Swain et al (1996), Swain et al (1999) and Bendale et al (2005) in teak. It showed positive but non-significant correlation with leaf area and dry weight of leaf and negative and non-significant correlation with number of branches. Girth showed a positive and significant correlation with dry weight of leaf and volume and positive but non-significant correlation leaf area and number of branches. Leaf area showed a positive and significant correlation with dry weight of leaf and number of branches and positive but non-significant correlation with volume. Number of branches showed a positive and significant correlation with volume. Swain et al (1996), Kumar et al (1997) and Swain et al (1999) indicated little genetic gain upon selection.

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REFERENCES

- Bendale VW, Naik RY, Mehta JL, Bhawe SG and Pethe UB 2005. Variability studies in teak. *Journal of Ecobiology* **17(1)**: 29-34.
- Kumar A, Gogate MG, Sharma R and Mandal AK 1997. Genetic evaluation of teak clones of Allapalli region, Maharashtra. *Indian Forester* **123(3)**: 187-189.
- Kumarvelu G 1991. Teak in Asia. Technical Document GCP/RAS/134/ASB, FORSPA Publication 4, FAO-RAPA.
- Singh RK and Chaudhary BD 1977. Biometrical methods in quantitative genetic analysis. Kalyani Publishers, New Delhi, India, pp 200-223.
- Siswamartana S, Wibowo A and Purwanto S 2003. Early performance of progeny tests of teak in Cepu, central Java. Diset, Yogyakarta, Belun.
- Swain D, Mandal AK and Sharma R 1999. Genetic analysis in teak, *Tectona grandis*. *Journal of Tropical Forest Science* **11(3)**: 582-586.
- Swain D, Mohanty SC, Sharma R, Mandal AK and Gupta BN 1996. Preliminary analysis of quantitative characters in teak. Proceedings, Indian National Science Academy, Part B, Biological Sciences **62(2)**: 169-172.
- Tewari DN 1992. Monograph on teak, *Tectona grandis* Linn F. White Lotus, Dehradun, Uttarakhand, India.
- Troup RS 1921. The silviculture of Indian trees. Vol 2, The Clarendon Press, Oxford.

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