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Variability studies of pod and seed characterstics of *Dalbergia sissoo* in Chhattisgarh

Sandeep Kumar Shukla[1], Sunil Tiwari[2*]
[1] Department of Botany, Govt EVPG College, Korba, Chhattisgarh, India
[2] Department of Forestry, Kamla Nehru College, Korba, Chhattisgarh, India

Abstract
Variability studies in different seed sources of *Dalbergia sissoo* with respect to seed, pod, germination and seedling traits were under taken at Departmental nursery. Five provenances namely Bilaspur, Bastar, Korba, Raigarh and Sarguja of Chhattisgarh, India were used in the study. The present study revealed that highly significant differences among provenances in all studied parameters except pod thickness. Highest variation among provenances in seed traits were observed in seed weight and seed length while seed thickness has the lowest variation.

Keywords: variability, seed characteristics, pod, *Dalbergia sissoo*

Introduction
Dalbergia sissoo is a large rapid growing plant that occurs and found in natural forest and agriculture bunds of Chhattisgarh. It is a valuable species which provide wood for variety of purpose, fodder for livestock it is an important agroforestry species Due to its multipurpose use and nitrogen fixing ability it is considered as one of the priority species in plantation programs, Dalbergia species is an important species with lot of variability which can be exploited for its improvement in evolving superior seeds, genetic differences associated with the place of origin have been several times as great as that among individual trees with in the population, so it becomes necessary to conduct seed source testing prior to a more intensive breeding work (Sniezko and stewart,1989) [7]
Variability studies are the prerequisites for genetic improvement of any tree species under various agro climatic conditions, (Sharma *et al*, 1994, Vakshaiya, 1992). The significance of variation studies and provenance testing in forest tree improvement is very well realized (Salazar, 1989; Isik, 1986 and Mehta and Sen, 1995) [5]. Shiv kumar and Banerjee (1984), Mathur *et al*., (1984) [4], Bagchi and Dobriyal (1990) [1] and Ginwal *et al* (1996) [3] have reported seed source variability in seed and seedling traits of Indian provenances of *A. nilotica.* Provenance tests in native species are desirable to screen the available variation for higher productivity and future breeding work (Burely and Wood, 1976). studying genetic variability is very important in improving this species in future selections, the present study reports the findings of morphological variations in pod and seed charcterstics of *Dalbergia*..

Material and Methods
The fully mature seeds were collected from the five provenances of Chhattisgarh, India (Geographical Location: Table:1). The air dried seeds with a moisture content of 7.660 ± 0.84%
To determine the variability in seed and pod morphological characters, seed length, seed width, seed thickness, seed weight, pod length, pod width, pod thickness, pod weight were measured for each provenance. A total of 150 seeds per provenance were randomly selected (3 replicates of 50 seeds) and organized in a completely randomized design (CRD) for measuring each morphological character (that is, 50 x 3 x 5 = 750 experimental units). Measurement was made on individual seed using a vernier caliper for seed & pod length, seed & pod width and seed& pod thickness and an electronic weighing balance for seed and pod weight.
Data collected on seed morphology were subjected to Analysis of Variance (ANOVA). The coefficient of variation and heritability were calculated using the method Burton and Devane (1953).

Table 1: Geographic Location of pod /seed collection of *Dalbergia sissoo* in Chhattisgarh

Provenance	Latitude (N)	Longitude (E)	Altitude (m)
Bilaspur	21^{0}47$^{'}$	81^{0}14$^{'}$	265
Bastar	19^o.10$^{'}$	81^o.95$^{'}$	552
Korba	22^0.35$^{'}$	82^o.68$^{'}$	252
Raigarh	21^0.9$^{'}$	83^o.4$^{'}$	219
sarguja	22^o.5$^{'}$	82^o.5$^{'}$	611

Results and Discussion
A significant difference ($p \leq 0.05$). in pod and seed characteristics was noticed across the different provenances of *Dalbergia sissoo* in Chhattisgarh. The seed length (0.848cm) and width (0.510cm) was found maximum in the Bastar provenance, the minimum values for seed Length (0.528cm) and width (0.394cm) were recorded in Raigarh provenance. Seed weight (0.072g) showed a highest value in Bastar provenance and lowest (0.057g) in Korba provenance. The different seed dimensions in Raigarh and Sarguja were found almost similar.Sarguja provenance have highest viable seeds (100%). The minimum viability of the seeds was recorded in Korba provenance. The Bilaspur provenance also showed a good seed viability (97.5). The pod weight elucidate a highest value in Baster provenance (2.82gm) and minimum in Korba provenance (0.94gm). A highest pod length was recorded in Sarguja provenance (7.68cm) and minimum in Korba provenance (4.84cm) Bastar provenance showed a highest pod width (2.27cm) than other provenances. The average number of seeds per pod (05) was recorded highest in Sarguja and Bastar provenances.

Table 1: Pod characteristics in different provenances of *Dalbergia sissoo* from Chhattisgarh.

Provenances	Pod weight (gm)	Pod Length (cm)	Pod Width (cm)	Pod Thickness (cm)	Avg. Seeds per Pod
Bilaspur	1.94±0.19	5.68±1.32	1.84±0.12	0.198±0.10	04±1.00
Baster	2.82±0.12	7.22±1.24	2.27±0.27	0.180±0.11	05±1.12
Korba	0.94±0.10	4.84±1.01	1.45±0.18	0.144±0.09	03±1.00
Raigarh	1.56±0.21	6.14±1.24	1.72±0.21	0.164±0.12	04±1.18
Sarguja	1.87±0.17	7.68±0.94	2.12±0.15	0.158±0.07	05±1.14
Mean	1.820	6.312	1.826	0.168	4.200
SD	0.681	1.150	0.376	0.020	0.836
R^2	0.998	0.998	0.997	0.285	0.845
F Value	1153.9	1410.4	779.9	0.999	13.66
P Value	0.001	0.0001	0.001	0.452	0.000

Table 2: Seed characteristics in different provenances of *Dalbergia sissoo* from Chhattisgarh.

Provenances	Seeds weight (gm)	Seed Length (cm)	Seed Width (cm)	Seed Thickness (cm)	Viability test
Bilaspur	0.060±0.001	0.662±0.022	0.442±0.033	0.200±0.020	97.5±2.25
Bastar	0.072±0.001	0.848±0.019	0.510±0.045	0.212±0.011	95.0±2.32
Korba	0.057±0.001	0.557±0.024	0.401±0.017	0.222±0.018	85.0±1.94
Raigarh	0.065±0.002	0.528±0.029	0.394±0.025	0.146±0.010	90.6±3.65
Sarguja	0.070±0.001	0.607±0.029	0.425±0.029	0.162±0.021	100.0±2.28
MEAN	0.0648	0.6404	0.4344	0.1884	93.62
SD	0.0057	0.1133	0.0414	0.0293	5.312
R^2	0.852	0.972	0.949	0.976	0.976
F Value	14.39	87.41	46.180	100.03	109.05
P Value	0.001	0.021	0.0001	0.0002	0.0017

The variation refers to the differences in individuals for a particular parameter, these differences may partly due to the genetic factors and partly due to environmental factors. the observed value of trait is the phenotypic value of that individual, There is a possibility of genetic improvement in *Dalbergia sissoo* based on studied parameters. Bastar provenance is considered best seed source on the basis of pod and seed morphological characteristics for future genetic improvement programme of *Dalbergia sissoo.*

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