Nigerian Journal of Ecology (2010) 11:29-32.

ISSN: 1116-753X

Morphological traits of *Buchholzia coriacea*- a medicinal plant from seven provenances in Nigeria

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(Accepted 27 October, 2010)

ABSTRACT
Investigations were conducted on the variability in the morphological traits of seeds of *Buchholzia coriacea* Engler from seven sources in southwestern Nigeria. The sources were Erifun, Olukosi, Ore, Ogbere, Ago-Owu, Omo forest reserve and Eleiyele. Seeds were collected from ten (10) mother trees within each source and thoroughly mixed before selection. Samples of thirty (30) seed were selected from each provenance through random sampling as genetic representatives of each provenance. Weight (g), length (cm), diameter (mm) and volume (cm^3) of the seeds were assessed and data collected were analysed using descriptive statistics and ANOVA. Significant differences ($P < 0.05$) were observed in seed traits among the provenances. Seeds from Omo Forest Reserve had the highest values for seed length (5.0 cm), diameter (4.2mm) and volume (37.9cm^3). However, the highest value for seed weight (40.5g) was obtained in seeds from Ore. Seeds from Ogbere had 4.9cm in length while the least value (3.7cm) was obtained in seeds from Erifun. The least value in seed diameter (3.3mm) was recorded for both Erifun and Ago-Owu. For seed weight, Ogbere had 39.6g while Omo had 37.3g. The least value, 28.2g was obtained among seeds from Erifun. In conclusion, when morphological traits of *Buchholzia coriacea* seeds are to be considered for selection, preference should be given to seeds from Omo forest reserve as they had the highest values in all but one of the morphological traits measured.

Keywords: *Buchholzia coriacea*, Medicinal plant, Morphological traits, Provenances, Variation

INTRODUCTION

According to Desai *et al*. (1997), seeds provide a way for species to survive in addition to protecting and sustaining other life. Embryonic life are practically suspended and then revived to develop again through seeds. The provenance of seed or plant material can have profound implications on the success of any silvicultural technique. Seed orchards represent the link between tree improvement programmes and reforestation through a delivery of consistent, abundant yields of genetically improved seeds as the nursery is the provenance of new trees for future forest where natural regeneration is not practised.

Oni and Gbadamosi (1998) studied the variations in progenies of *Dacryodes edulis* G. Don. from four provenances in South western Nigeria and observed significant differences in the fruit characters. Variations were also observed in the relative growth rate, net assimilation rate and root/shoot ratio among the provenances. Ngulube *et al.* (1997) also explored the variations in fruit and seed within *Uapaca kirkiana* Muell. Arg species. There were significant differences in fresh fruit weight and dependent parameters (exocarp, mesocarp and seeds) and seed length, width, thickness and weight (following processing) among 12 natural populations. Casas and Caballero (1996) observed a marked divergence between the managed and unmanaged wild populations of *Leucaena esculenta* (DC) Benth, a species that was mainly used as human food among the Mixtec in Mexico. It was noted that the frequency of the phenotypes preferred by people was higher in the wild population managed *in-situ*. The study confirmed that through *in-situ* forms of management, it is possible to modify the phenotypic structure of plant population.

Ginwal *et al.* (1998) studied a range wide sample of *Dalbergia sissoo* Roxb provenances in India for pod, seed and germination characteristics. They observed significant geological variation among the seed provenances for morphological characters of pod and seed. Seed width

showed a significant positive trend with altitude and seed weight.

Buchholzia coriacea Engler is a member of the family Capparaceae. It has a dense crown that flowers throughout most of the year. It is a forest tree with large, glossy, leathery leaves and conspicuous creamy white flowers. Seeds are about 2-3 in a fruit. They are blackish with a spicy taste. The species extends from Cote d'Ivoire to Gabon (Keay, 1989). The seeds of *B. coriacea* are edible and have medicinal value. These seeds gave the plant its common name of "wonderful kola" because of its usage in traditional medicine. The seed is used in the treatment of various ailments by rural dwellers and with the increasing awareness on traditional medicine; it is gradually gaining ground among the elites (Burkill, 1985, Cunningham, 1993).

B. coriacea is a wild medicinal plant with unregulated exploitation. Very little information is available on the variation in morphological traits as a result of provenance. In many areas of Africa, the loss of biodiversity caused by rapid vegetation clearing for agricultural and livestock expansion has resulted in a drastic decline in the supply of traditional medicines. At the same time, demand for these medicines has increased as the population has risen (Okafor and Ham, 1999). The existence of variations within food yielding trees which could be exploited for their conservation, domestication, improvement and utilization was reported by Hamrick and Godt (1989). Therefore, in this study, investigations were conducted on the variation in morphological traits of seeds of *Buchholzia coriacea* from seven provenances.

MATERIALS AND METHOD

Provenances of seed samples

Mature seeds of *Buchholzia coriacea* were collected from seven provenances in Southwestern Nigeria. Table 1 shows the provenances as well as their geographical locations.

Selection of seed samples

Seeds were collected from ten (10) mother trees within each provenance and thoroughly mixed before selection. Due to the out crossing nature of tropical forest trees, thirty (30) seed samples were selected from each provenance through random sampling as genetic representative of each provenance. The weight (g), length (cm), diameter (cm) and volume (cm^3) of the seeds were assessed for variation from each provenance.

The seed weight was measured using the Metler balance while the length (end to end) and diameter (middle) of the seeds were measured with a meter rule and a vernier calliper respectively. Seed volume was measured using the displacement method.

Data collected were processed and subjected to analysis of variance using SAS computer package. Least significant difference (LSD) was used to separate the significantly different means.

Table 1: Provenance location of *B. coriacea* in south western Nigeria

S/N	Selected provenance	Identification		Location			
		Country	State	Latitude	Longitude	Rainfall (mm)	FAO Soil Type
1	Erifun	Nigeria	Ogun	6°93'	3°46'	1488	Dystric nitosols
2	Olukosi	Nigeria	Ogun	7°46'	3°03'	1174	Lithosols
3	Ore Forest Reserve	Nigeria	Ondo	6°74'	4°86'	1749	Ferric luvisols
4	Ogbere	Nigeria	Ogun	6°73'	4°15'	1687	Dystric regosols
5	Ago-Owu Forest Reserve	Nigeria	Osun	7°24'	4°33'	1466	Ferric luvisols
6	Omo Forest Reserve	Nigeria	Ogun	6°35'	4°05'	2180	Ferric luvisols
7	Eleiyele	Nigeria	Oyo	7°51'	3°56'	1253	Ferric luvisols

Source: GIS through the Agroecological Studies Unit, IITA, Ibadan

RESULTS

Seed length

There were significant differences in the length of seeds from all the provenances (5% probability level) (Table 2). Seeds from Omo Forest Reserve had the highest value of 5.0cm for seed length. This was closely followed by seeds from Ogbere with 4.9cm. Both Ago-Owu and Ore had 4.6cm while Eleiyele and Olukosi had values of 4.5cm and 4.1cm respectively. The lowest value (3.7cm) was obtained in seeds from Erifun (Table 3). There was no variation in the length of seeds from Ago-Owu, Eleiyele and Ore. However, the length of seeds from Ogbere and Omo Forest Reserve were significantly different from those of other provenances.

Seed Diameter

Seeds from all the provenances also varied significantly in diameter (Table 2). Seeds from Omo Forest Reserve also had the highest value (4.2cm). Eleiyele closely followed this with 4.1cm while Ogbere and Ore had 4.0cm. The least value of 3.3mm was recorded for both Erifun and Ago-Owu (Table 3). LSD revealed that seeds from Ore, Omo Forest Reserve, Eleiyele and Ogbere were significantly different from seeds obtained from Erifun, Olukosi and Ago-Owu.

Seed Volume

The volume of seeds from the selected provenances significantly differ at 5% probability level (Table 2). The highest value, 37.9cm^3 was observed in seeds from Omo Forest Reserve. This was closely followed by 37.3cm^3 from Ogbere, and 37.0cm^3 from Ore. Eleiyele, Ago-Owu and Olukosi had 36.9cm^3, 32.1cm^3 and 29.2cm^3 respectively. Seeds from Erifun had the least value of 24.5cm^3. It was observed that there was no variation in the volume of seeds from Ore, Ogbere, Omo Forest Reserve, Eleiyele and Ago-Owu (Table 3). The mean volume of seeds from Erifun and Olukosi were significantly different from that of seeds from other provenances.

Table 2: Analysis of variance for morphological traits in seeds of *B. coriacea*

Parameter	Degree of freedom	Mean of squares	F	P-level
Seed length				
Among provenances	6	6.4794	18.39*	0.0000
Error	203	0.3524		
2) Seed diameter				
Among provenances	6	4.0522	12.5681*	0.0000
Error	203	0.3224		
3) Seed volume				
Among provenances	6	789.6700	5.9108*	0.00001
Error	203	133.5969		
4) Seed weight				
Among provenances	6	568.3475	4.2611*	0.000457
Error	203	133.3790		

*=significant at α=0.05

Seed Weight

Significant differences were obtained in the weight of seeds from all the provenances ($p<0.05$) (Table 2). The highest value of 40.5g was obtained in seeds from Ore. Ogbere had 39.6g while Omo Forest Reserve had 37.3g. Eleiyele, Ago-Owu and Olukosi had 34.6g, 34.2g and 31.9g respectively. The least value, 28.2g was obtained among seeds from Erifun. Least significant difference showed that seeds from Erifun and Ore were significantly lower in weight than seeds from Olukosi, Ore, Ogbere, Eleiyele and Omo Forest Reserve (Table 3).

Table 3: Morphological variations among the seeds of *B. coriacea* from seven provenances.

Provenances	Parameters			
	Mean seed length (cm)	Mean seed diameter (cm)	Mean seed volume (cm^3)	Mean seed weight (g)
Ogbere	5.0a	4.0a	37.3a	39.6a
Omo Forest Reserve	5.0a	4.2b	37.9b	37.3b
Ore	4.6b	4.0a	37.0c	40.5c
Ago-Owu Eleiyele	4.6b	3.3c	29.2ac	34.2d
Olukosi	4.5b	4.1ab	36.9b	34.6d
Erifun	4.1c	3.7d	32.1d	31.9e
	3.7d	3.3c	24.5e	28.2f

Means with the same letter under each column are not significantly different from each other at α=0.05 according to LSD.

DISCUSSION AND CONCLUSION

Tree improvement harnesses the variation in natural populations of tree species and utilizes this in the enhancement of tree performance in a desired trait. In this stuidy, variations were observed in length, diameter, weight and volume of seeds from all the provenances. Seeds from Omo forest reserve, Ore, Ogbere and Olukosi were 'big' while seeds from Eleiyele, Ago-Owu and Erifun were smaller in size. The size of seed is usually an indication of high energy (food) reserves and so the silviculturist may decide to select seeds from provenances with larger seeds. Also, for commercial/ economic purposes, larger seeds are more desirable, as the market prices are determined by the size of the seed. This is in agreement with the observations of Ngulube *et al*. (1997) on seeds of *Uapaca kirkiana* species. Since matured fruits were selected from all the provenances the variation in size could not be as a result of differences in the developmental stages of the fruits. The variation in these parameters could be due to environmental conditions rather than genetic factors. The variations in the morphological traits emphasized the importance of selecting suitable seed provenances before commencing domestication programme. In seed collection, sizes of seeds should be put into consideration for orchard establishment of the species.

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