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Can the bark extravitism among the aboriginal Yoruba populace of Kwara State, Nigeria, be sustained?

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Abstract

The stem barks used in native pharmaceuticals by the Yoruba aboriginals in Kwara State, Nigeria were considered in this study. A rapid appraisal method involving the use of a semi-structured questionnaire matrix was employed to identify plant species whose stem barks were extracted for medicinal purpose. The medicinal value of the identified species, their methods of utilization, and abundance defined. The results obtained revealed that dependence on the use of medicinal plants for health management was prominent among the aboriginals. 40 plants species, belonging to 22 families, were observed to have their barks valued as medicine and/or for health maintenance in the study area. 23% of these species were rare on the abundance scale used in this study. Strategies that would enhance the conservation of the rare species and enhance their sustainability for both present and future generations were proposed.

Keywords: Extravitism; Aboriginal; Kwara State; Nigeria

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1. Introduction

In the recent times, the attentions of plant ecologists and vegetation scientists in Nigeria were skewed towards the effects of bark extravitism on biodiversity loss especially as it affects the abundance of medicinal plant species in the country. Estimates have continued to suggest that over 70% of Nigerians reside in the rural areas (Kayode et al., 2015) where their health maintenance mostly depended on the biological resources available in their vegetation (Kayode and Omotoyinbo, 2008).

The stress presently exerted on Nigerian vegetation cannot be over-emphasised. The country is reputed for having one of the highest deforestation rates in the world (3.5%) (Kayode et al., 2015). Also, burning of the vegetation is now a regular occurrence in the country (Kayode, 2006a) thus causing decline in the demography of plant species. Other anthropogenic factors tend to complicate this position, particularly the increasing rate of bark extraction for medicinal purposes (Fasola and Egunyomi, 2002). Bark extraction is predatory and annihilative (Cunninghan, 1988; Johns, 1988; Peters 1996). It has negative and detrimental effects on the integrity of the mother source (Momma, 1994) thus compromising its capacity to supply *ad infinitum.*

The recent economy recession being experienced in the economy is equally affecting health maintenance and management in the country. The cost of orthodox medicine has skyrocketed beyond the reach of resource-poor (Kayode et al., 2017) thus restricting their dependence to the use of plant derived medicine. Hence, the compelling needs to conserve the medicinally important species for the use of present and future generations.

Consequent on the above, the study being reported here is aimed at proposing sustainable strategies that would enhance the sustainable supply of plant species whose stem barks are used for medicinal purposes by the aboriginal Yoruba in Kwara State of Nigeria.

2. Methods

Two rural communities were selected from each of the 12 Yoruba speaking Local Government Areas (LGAs) of the State for the study.. These are Asa, Ekiti, Ifelodun, Ilorin East, Ilorin South, Ilorin West, Irepodun, Isin, Moro, Offa, Oke-Ero and Oyun LGAs. In each of these communities, 10 respondents were randomly selected and interviewed severally with the aid of a semi-structured questionnaire matrix aimed at the identification of plant species whose barks were extracted for medicinal values in the study area. The respondents were later classified into 3 groups, with each group consisting of at least 3 individuals, and interviewed. This was aimed at establishing group consensus on the individual responses provided.

Also, a major market in each LGA was selected where 5 botanical vendors were randomly selected and interviewed to provide information on the plants whose barks are sold in the market. Key informants, consisting of health, forestry and community development officers were indentified in each LGA and interviewed.

All the interviews were focused, conversational and two-way in communication. The medicinal value of each identified species was defined. Vouchers specimens of the species were collected and deposited at the Herbarium of the Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria.

The abundance of each of the identified plant species in the communities sampled was determined, according to Kayode (2004), by using the frequency of occurrence of each species within 1 kilometre radius of the community sampled as:

'Rare' (R) when the frequency within the defined area was less than 5,

'Frequent' (F) when the frequency was between 5 and 30 individuals,

'Abundant' (A) when the frequency surpassed 30 individuals

Consequent on the identification of the rare species, the communities sampled were revisited and five respondents were selected in each community. The indigenous knowledge (IK) of the selected respondents on the identified rare species was determined and used to propose conservation strategies that would conserve these species.

3. Results

Field observation revealed that the respondents in this study were of diverse socio-economic classes (Table 1) and were observed to have adequate knowledge on the use of barks derivable from plants in their vicinity. Table 2 shows that a total of 40 species belonging to 22 families have their barks extracted in the Yoruba-speaking areas of Kwara State, Nigeria. 6 of these species were members of the family Caesalpiniaceace, 4 were Mimosaceae, 3 each were members of the families Anacardiaceae and Meliaceae. The families Annonaceae, Bombaceae, Combretaceae, Moraceae and Rubiaceae have 2 members each while in other families, each has one member. Table 3 revealed that 35% of the identified species were abundant, 43% were frequent while 23% of them were rare. Only 33% of the identified species were cultivated in the study area. 67% were not cultivated (Table 4).

Similarly field observation revealed that the respondents possessed considerable indigenous knowledge (IK) on the rare species (Table 5). The IK revealed that these species were tree species and most of them (with the exception of *P. kotschyi* and *T. alnifolia*) were capable of thriving in the rainforest and derived savanna vegetation. *P. kotschyi* and *T. alnifolia* thrived abundantly in the savanna. All of them could be propagated from the seeds and were of tremendous ethnobotanical values in the study area.

Table 1. Socio-economic status of respondents in the Yoruba-speaking areas of Kwara State, Nigeria

Feature	Description	Proportion (%) of Respondents
Sex	Male	53

	Female	47
Age (Yrs)	< 25	38
	> 25	62
Religion	Christian	48
	Moslem	46
	Others	6
Education	Literate	28
	Illiterate	72
Economic	Resource-poor	76
	Resource-rich	24

Table 2. List of species whose barks are extracted by the aboriginals in the Yoruba-speaking areas of Kwara State, Nigeria

Family	Species	Vernacular Name
Amplidaceae	*Cissus populnea* Guill. & Perr.	Ogbolo
Anacardiaceae	*Anacardium occidentale* L.	Kaju
	Mangifera indica L.	Mangoro
	Spondias mombin L.	Iyeye

Annonaceae	*Annona muricata* L.	Eko omode
	Hexalobus crispiflorus A. Rich.	Lawale
Apocynaeceae	*Alstonia congensis* De Wild.	Awopa
Asteraceae	*Vernonia amygdalina* Delile	Ewuro
Bignoniaceae	*Kigelia africana* (Lam,) Benth.	Pandoro
Bombacaceae	*Bombax buonopozense* P. Beauv.	Ponpola
	Adansonia digitata L.	Ose
Caesalpiniaceae	*Burkea africana* Hook.	Asapa
	Daniellia oliveri (Rolfe)HutcH.& Dalziel	Iya
	Erythrophyleum ivorense A. Chev.	Obo
	Piliostigma thonningii (Schumach.) Milne-Redh.	Abafe
	Senna podocarpa (Guill. & Perr.) Lock	Ajarere
	Senna siamea (Lam.) Irwin & Barneby	Kasia
Canabaceae	*Trema orientalis* (L.) Blume	Afee
Combretaceae	*Anogeissus leiocarpus* (DC) Guill. & Perr.	Ayin
	Terminalia superba Engl. & Diels	Idi
Dilleniaceae	*Tetracera alnifolia* Willd.	Opon
Euphorbiaceae	*Alchornea laxiflora* (Benth) Pax and Hoffman	Ijandu
Gentianaceae	*Anthocleista nobilis* G. Don	Sapo
Malvaceae	*Ceiba pentandra* (L.) Gaertn.	Eegun
Meliaceae	*Azadirachta indica* A. Juss.	Dongoyaro
	Khaya ivorensis A. Chev.	Ogano or Agano
	Pseudocedrela kotschyi (Schweinf.) Harms	Emigbegi
Mimosaceae	*Acacia nilotica* (L.) Willd. ex Dallie	Bonni
	Entada africana Guill. & Perr.	Igbaluwere
	Parkia biglobosa (jacq.) R. Br. ex G. Don	Igba
	Prosopis africana (Guill. & Perr.) Taub	Aayan
Moraceae	*Ficus asperifolia* Miq.	Ipin
	Ficus sur Forssk.	Opoto
Moringaceae	*Moringa oleifera* Lam.	Igbale

Ochnaceae	*Lophira alata* Banks ex P. Gaertn.	Ponhon
Papilionaceae	*Pericopsis laxiflora* (Benth.) Meeuwen	Sedun
Rubiaceae	*Mitragyna inermis* (willd.) Kuntze	Okobo
	Nauclea latifolia Sm.	Egbesi
Sapotaceae	*Vitellaria paradoxa* C. F. Gaertn	Emi
Tiliaceae	*Grewia mollis* Juss.	Sora igbo

Table 3. Abundance of the identified bark-extracted species in the Yoruba-speaking areas of Kwara State, Nigeria

Status	Identified Species
Abundant	*A. digitata, A. occidentalis, A. leiocarpus, A. indica, C. siamea, C. pentandra, M. indica, M. oleifera, P. biglobosa, P. thonnigii, P. Africana, S. podocarpa, V. amygdalina, V. paradoxa* **Proportion: 35%**
Frequent	*A. nilotica, A. congoensis, A. muricata, A. laxiflora, A. nobilis, B. africana, C. populnea, D. oliveri, E. africana, E. ivorensis, F. asperifolia, F. sur, H. crispiflorus, M. inermis, N. latifolia, S. mombin, T. superb* **Proportion: 43%**
Rare	*B. buonopozense, G. mollis, K. ivorensis, K. africana, L. alata, P. laxiflora, P. kotschyi, T. alnifolia, T. orientalis* **Proportion: 23%**

Table 4. Cultivation status of the identified bark-extracted species in the Yoruba-speaking areas of Kwara State, Nigeria

Status	**Identified Species**
Cultivated:	*A. nilotica, A. digitata, A. occidentalis, A. muricata, A. indica, C. siamea, F. asperifolia, F. sur, M. indica, M. oleifera, S. podocarpa, S. mombin, V. amygdalina*

Proportion: 33%

Non-cultivated: *A. congoensis, A. laxiflora, A. leiocarpus, A. nobilis, B. buonopozense, B. africana, C. pentandra, C. populnea, D. oliveri, E. africana, E. ivorense, G. mollis, H. cripiflorus, K. ivorensis, K. africana, L. alata, M. inermis, N. latifolia,P. biglobosa, P. laxiflora, P. thonnigii, P. africana, P. kotschyi, T.alnifolia, T. superba, T. orientalis, V. paradoxa.*

Proportion: 67%

Table 5. Respondents' indigenous knowledge on the identified bark-extracted species in the Yoruba-speaking areas of Kwara State, Nigeria

S/n	Feature	Identified Rare. Species	Respondents' Indigenous Knowledge	Conservation Inference
1	Growth Form	*B. buonopozense* *G. mollis* *K. ivorensis* *K. africana* *L. alata* *P. laxiflora* *P. kotschyi* *T. alnifolia* *T. orientalis*	Tree Tree Tree Tree Tree Tree Tree Liane / Tree Tree	Plantation of the trees could be developed in each local government area.
2	Habitat	*B. buonopozense* *G. mollis*	Rainforest and derived savanna Rainforest and derived savanna	The study area is located in the derived savanna zone hence these trees will thrive well if cultivated in the

		K. ivorensis *K. africana* *L. alata* *P. laxiflora* *P. kotschyi* *T. alnifolia* *T. orientalis*	Rainforest and derived savanna Rainforest and derived savanna Rainforest and derived savanna Savanna Savanna Rainforest and derived savanna Rainforest and derived savanna	study area. *G. mollis* and *P. kotschyi* are known to be resistance to fire *P. laxiflora* is known for enriching the soil. It fix nitrogen
3	Propagation	*B. buonopozense* *G. mollis* *K. ivorensis* *K.africana* *L. alata* *P. laxiflora* *P. kotschyi* *T. alnifolia* *T. orientalis*	Seeds Seeds, coppice, pollard Seeds Seeds Seeds Seeds Seeds Seeds Seeds	All the species can be cultivated from seeds. The aboriginals were familiar with cultivation from seeds. It is well known that *P. kotschyi* reproduced profusely from seeds Effective mobilization could enhance the cultivation of these species in the study area The ability of *G. mollis* to coppice and pollard may constitute favourable incentives to its cultivation in the study area.

4	Utilization	*B. buonopozense* *G. mollis* *K. ivorensis* *K. africana* *L. alata* *P. laxiflora* *P. kotschyi* *T. alnifolia* *T. orientalis*	Food, medicine, fibre, dyes, building material, fodder Food, fibre, medicine Furniture, medicine Furniture, medicine Timber, fuelwood Timber, medicine Timber, medicine, dye Food, medicine Fuelwood, medicine, charcoal	The species all have multipurpose values Also, most of the aboriginals depend on plant-derived medicine. These may constitute positive incentives towards the adoption of the species for cultivation and domestication in the study area.

4. Discussion

The study revealed that the aboriginals were conscious of the medicinal importance of plant species in their environment. Previous study by Ngarivhume et al. (2015) asserted that the local knowledge of medicinal plants in the treatment ailments still exists in the rural areas and play an important role in primary health care services in the remote rural area. Medicinal plants are increasingly recognized worldwide as an alternative source of efficacious and inexpensive medications to synthetic chemo-therapeutic compound (Omogbadegun et al., 2011). Thus plants constitute a major economic resource of most countries of the world including Nigeria (Ekanem and Udoh, 2009).

The study revealed that bark extraction occurred in tree species of diverse families. The extraction methods utilized in these botanicals were mostly predatory or annihilative. These species suffer most from harvesting and many of them have been seriously depleted. Most of the debarked botanicals were indigenous species, uncultivated with poor regenerative abilities thus confirming the previous assertion of Kayode and Ogunleye (2008). Most of the species were habitat specific, slow growing and destructively harvested for their barks. Cunningham (2001) had earlier made similar assertion.

Considerable proportions of species with medicinally-valued barks are now rare and uncultivated in the study area. The need to enhance their continuous supply cannot be overemphasized. Recently the use of the aboriginals' indigenous knowledge has been found to possess considerable conservation potentials (Kayode,

et al., 2017). The rare species are mostly indigenous species. Kayode (2006b) asserted that the aboriginals have substantial knowledge about the indigenous flora species. All the rare species obtained in this study were trees, mostly of rainforest and derived savanna, capable of being propagated by seeds and were of enormous ethnobotanical values in the study area. All these have significant conservation inferences in the effort to enhance sustainable supply of the species.

Previous study by Kayode et al. (2017) expressed the willingness of the aboriginals to invest in the cultivation of indigenous tree species. Study conducted in Philippine by Peque and Hölscher (2014) revealed that a recent National Greening Program resulted in the cultivation of native tree species. The evolvement of such enlightenment program in Nigeria might likely produce similar outcome, especially in the rainforest and savanna vegetation of the country. Two of the rare species, *G. mollis* and *P. kotschyi*, were savanna habitat-specific, which is the prevailing vegetation in the study area. The species (*G. mollis* and *P. kotschyi*) were known, by the aboriginals, to be resistance to fire which is the most prevalent ecological problem in this vegetation in Nigeria. Also, the aboriginals confirmed the soil-enriching ability of *P. laxiflora.* Thus the use of this species in alley cropping could be encouraged in the study area. This will enhance its cultivation.

All the species can be cultivated from seeds. The aboriginals were familiar with cultivation from seeds. Field observation revealed that *P. kotschyi* was well known for its ability to reproduce profusely from seeds. Thus effective mobilization could enhance the cultivation of these species in the study area. Also the ability of *G. mollis* to coppice and pollard may constitute favourable incentives to its cultivation in the study area. Similarly, all the species all have multipurpose values, especially medicine. Most of the aboriginals depend on plant-derived medicine. The use of these species for medicine may constitute positive incentives towards the adoption of the species for cultivation and domestication in the study area.

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