Bulletin of Pure and Applied Sciences.
Vol.38 B (Botany), No.2.
July-December 2019: P.85-92
Original Research Article

Print version ISSN 0970 4612
Online version ISSN 2320 3196
DOI: 10.5958/2320-3196.2019.00012.0
Available online at www.bpasjournals.com

Checklist and Conservation of Spices' Plant Species in Ijesa Region of Osun State, Nigeria

Kayode J[1,*], Cole AT[2], Obembe MO[3]

Author's Affiliation
[1,3]Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria
[2]Department of Science Laboratory Technology, Osun State College of Technology, Esa-Oke, Nigeria

***Corresponding Author:**
Kayode J
Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria
E-mail:
joshua.kayode@eksu.edu.ng

Received on 15.08.2019,
Accepted on 06.11.2019

Keywords:

Conservation, spices, Annihilative, Ijesa region

Abstract

The spices' plant species in Ijesa region of Osun State, Nigeria were examined in this study through field observation and interviews with randomly selected respondents using a semi-structured questionnaire matrix. The interviews were focused, conversational and two-way in communication. Spices plant species used and the part(s) of the species used were indentified. The cultivation status of the identified spices' plant species was defined. Group interviews were conducted in each community to validate the information obtained during the individual interviews. Also the abundance status of the spices' plant species in each community was determined. A total of 29 spices' plant species, belonging to 18 families were identified in the region. Thus the identified spices were derived from diverse plant species; most of them were aromatic and pungent and contained various active ingredients. The flower/fruits/seeds formed the major parts used and their extractive methods used were destructive and annihilative. 45% of the identified species were not cultivated but occurred in the wild where a number of anthropogenic activities affect their demography. 28% of these species were rare and they were mostly indigenous tree species that were not cultivated in the study area. Strategies that could ensure sustainable supply of the spices plant species were recommended.

INTRODUCTION

In the recent time, an increasing interest on the ethnobotany of Ijesa region was developed in the Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria. This project was tagged 'Ijesa Ethnobotany'. The interest on this region was borne out of the rich flora species of her vegetation that is been annihilated by serious anthropogenic factors (Oni and Kayode 2018). At present a gross dearth of adequate data abounds on the flora species in the region.

Equally inadequate is the number of ethnobotanical studies conducted in the region. Prominent among the conservation studies so far conducted within the 'Ijesa ethnobotany project' were those of Kayode *et al.* (2008) on medicinal plant species; Kayode *et al.* (2016) on conservation potentials of Ijesa myths; and Oni and Kayode (2018) on wild edible plant species of the region.

Kayode and Ogunleye (2008) described the spices as the most widely utilized plant species in Nigeria. Being the sources of powder and/or seeds used in cooking soup and/or stew with strong aroma (Schippers 2000) as well as their nutritional and medicinal values, the spices plant species are considered important for study. Previous study revealed that spices-derived plants were of diverse habit and sometimes uncultivated. Thus, the study being reported aimed at the identification of spices-derived plants in Ijesa region, determine their abundance and propose strategies that will conserve the rare spices-derived plants in the region.

MATERIALS AND METHODS

Five of the Ijesa's six Local Government Areas (LGAs of Osun State, Nigeria, were randomly selected. Similarly in each LGA, a community is randomly selected. Thus the following communities were selected, Ereja, Ilesa in Ilesa West LGA, Iyemogun, Ilesa in Ilesa East LGA, Ijebu-Jesa and Iloko-Ijesa in Oriade LGA, Esa-Oke in Obokun LGA, and Ibodi in Atakumosa West LGA. All these communities were located within 22km radius from Ilesa, the traditional and economic headquarters of Ijesa region.

In each community, 10 respondents were randomly selected and interviewed with the aid of a semi-structured questionnaire matrix. The interviews were focused, conversational and two-way in communication. During the interviews, spices species used and the part(s) of the species used were indentified. The cultivation status of the identified spices' species was defined.

Group interviews were conducted in each community with the aim of validating the information obtained during the individual interviews described above. In each community three groups interviews were conducted. Each group was made up of at least four individuals.

Voucher specimen of the identified spices species were collected and later authenticated at the Herbarium of the Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria. They were also documented and later deposited at the Herbarium.

Also the abundance status of the spices' species in each community was determined, according to Oni and Kayode (2018), using the time taken to physically sight the species in each community.

The species were considered:
Abundant when sighted in less than 1 hour, and scored 3
Frequent when sighted within 1 and 2hours, scored 2
Rare when sighted after 2 hours, scored 1.

The average score of:
3 proved the species as Abundant, 2 as Frequent and 1 as Rare.

Consequent on the above, revisits were made to the sampled communities where 5 residents who have maintained continuous residence in each of the community for a minimum of 15 years were purposefully selected and interviewed on their indigenous ecological knowledge on the rare species.

Key informants, consisting of nutritional experts, health officials, agriculture and forestry officials were identified within the region (Ijesa Region), were identified and interviewed on the nutritional and medical values of the identified spices' species.

Secondary information on the phytochemical constituents of the identified spices' species were obtained from journals, literature and the web.

RESULTS AND DISCUSSION

A total of 29 spices' plant species, belonging to 18 families were identified in the region (Table 1). Three each of the identified spices' species were members of the families Annonaceae, Alliaceae and Mimosaceae. The families Caesalpiniaceae, Lamiaceae, Rutaceae, Solanaceae and Zingiberaceae have 2 species each while each of the remaining family's possessed 1 species each. The results revealed that the identified spices were derived from diverse plant species. Kayode and Ogunleye (2008) have earlier identified 25 plant species used as spices in Kaduna State, Nigeria.

Table 1: Checklist of identified spices' plant species in Ijesa region of Osun State, Nigeria

S. No.	Family	Scientific Name	English	Yoruba
1	Annonaceae	*Enantia chlorantha*	Moambee	Awopa, Osopupa
2		*Monodora myristica*	African Nutmeg	Ariwo, Abo-lakose
3		*Xylopia aethiopica*	Negro pepper	Eeru Alamo, Arunje
4	Alliaceae	*Allium ascalonicum*	Shallot or spring onion	Alubosa Elewe
5		*Allium cepa*	Onion	Alubosa
6		*Allium sativum*	Garlic	Aayu, Ayuu
7	Euphorbiaceae	*Bridelia ferruginea*	Fula-Fulfulde	Ira
8	Caesalpiniaceae	*Afzelia Africana*	African oak	Apa
9		*Diallum guineense*	Black Tamarind	Awin
10	Irvingiaceae	*Irvingia gabonensis*	African wild mango	Oro
11	Lamiaceae	*Ocimum basilicum*	Scent leaf, Basil	Efinrin wewe
12		*Ocimum gratissimum*	Tea bush	Efinrin
13	Anacardiaceae	*Spondias mombin*	Hog plum	Iyeye
14	Lythraceae	*Lawsonia inermis*	Henna	Laali
15	Marantaceae	*Thaumatococcus daniellii*	Sweet prayers' plant	Eeran
16	Mimosaceae	*Acacia nilotica*	Egyptian mimosa	Kasia
17		*Parkia biglobosa*	African locust bean	Iru
18		*Tetrapleura tetraptera*	Aidan Tree	Aridan
19	Moringaceae	*Moringa oleifera*	Horse radish tree	Ewe-igbale
20	Myristicaceae	*Myristica fragrans*	Nutmeg	Ariwo,
21	Myrtaceae	*Syzygium guineense*	Water berry, water pear, snake bean tree	Adere
22	Piperaceae	*Piper guineense*	Climbing black pepper	Iyere
23	Poaceae	*Cymbopogan giganteus*	Lemon grass	Koriko-Oba
24	Rutaceae	*Citrus aurantifolia*	Lime	Osan Wewe

25		*Zanthoxylum zanthoxyloides*	Candlewood	Ata
26	Solanaceae	*Capsicum frutescensis*	Chillies	Shombo
27		*Solanum indicum*	Garden egg	Igba
28	Zingiberaceae	*Aframomum melegueta*	Alligator pepper	Ataare
29		*Zingiber officinale*	Ginger	Ata-ile funfun

Most of the identified species are aromatic and pungent thus supporting the previous assertion of Achinewu, *et al.* (1995) that plants used as spices and condiments are usually aromatic and pungent. These plants, according to Macmillan (1984), Dziezak (1989) and Iwu (1993) contained various types of essential oils. Secondary information revealed the various active ingredients contained in these species (Table 2). Ayoola *et al.* (2008) asserted that these phytochemicals have beneficial effects on health and play active roles in amelioration of diseases.

Table 3 revealed that diverse parts of the identified species were being utilized as spices in the study area. The flower/fruits/seeds formed the major parts used (45%), leaves (38%), barks of stem/ stems constituted 34%, bulbs 10%, roots and rhizomes 3% each. Study by Kayode and Ogunleye (2008) also recorded the rhizome as the least part of the plants used as spices. The proportion of stems/stem barks used for spices in this study (34%) calls for concern in view of the fact that the extractive method involved is destructive and annihilative. Fasola and Egunyomi (2002) have earlier raised concern about debarking activities in Nigeria that are done indiscriminately. Debarking is now known to cause plant mortality (Cuningham 1988, John 1988 and Peters 1996).

Multiple parts (Table 3) were utilized as spices in some of the identified species. In *A. africana* and *D. guineense,* the stem barks and leaves were used as spices, in *T. daniellii,* the leaves and fruits were used. The barks and fruits (seeds) of *I. gabonensis* were used as spices.. Anon. (2019) asserted that different plant parts like leaf, root, bulb, fruit, seed, etc. are used as spices. The diversity in the parts of the identified plant valued for spices tends to lend credence to the assertion of Osabor *et al.* (2016) that varying quantities of the phytochemicals abounds in the plant parts.

Table 4 revealed that 55% of the identified species were cultivated while 45% were not cultivated but occurred in the wild. Field observation revealed the preponderance of a number of anthropogenic activities especially farming, increase in population and construction activities abound in the study area. These factors were found to have gross effects on the demography of the identified species.

Table 2: Phyochemical constituents of the identified plant spices' species in Ijesa region of Osun State, Nigeria

S. No.	Spices' plant species	Phytochemical constituents
1	*Acacia nilotica*	Polyphenols, saponins, alkaloids, terpenoids, proteins and polypeptides
2	*Aframomum melegueta*	Alkaloids, tannins, saponin, steroids, cardiac glycoside, flavonoid, terpenoids and phenol.
3	*Afzelia africana*	Alkaloids, Tannins, Saponins, Cardiac glycoside, Flavonoids terpenoids and phenols
4	*Allium ascalonicum*	Organosulphur compounds, carbohydrates, flavonoids and saponins
5	*Allium cepa*	Carbohydrates, glycosides, proteins, alkaloids, saponins, flavonoids, acid compounds, reducing sugars and oils
6	*Allium sativum*	alkaloids, flavonoids, cardiac glycosides, terpenes,

		steroids and resins
7	*Bridelia ferruginea*	Alkaloides, Flavonoids, Tannin, Anthraquinone, Phlobatinnins, Saponin, Cardiac glycosides
8	*Capsicum frutescensis*	Phenolic acid, alkaloid, flavonoid, capsaicinoid and carotenoid
9	*Citrus aurantifolia*	Saponins, phenolic compounds and anthraquinones
10	*Cymbopogan giganteus*	Alkaloids, terpenoids, flavonoids, carotenoids and tannins
11	*Diallum guineense*	Alkaloids, Echitamine, Lactone, Triterpenes, Amyrine, and Lupeol
12	*Enantia chlorantha*	Alkaloids, Echitamine, Lactone, Triterpenes, Amyrine, and Lupeol
13	*Irvingia gabonensis*	Fatty acids, Ellagic acid, Ellagitannin, crude fiber, Crude ash
14	*Lawsonia inermis*	Tannins, Alkaloids, Terpenoids, Quinones, Xanthones, Flavonoids, Phenolic compounds
15	*Monodora myristica*	Terpenoids, sterols, alkaloids, fatty acids, saponins, flavonoids, glycosides and coumarins
16	*Moringa oleifera*	Alkaloids, triterpenoids, flavonoids, tannins, saponins, glycosides and carbohydrates
17	*Myristica fragrans*	Alkaloids, flavonoids, saponins, tannins, phenols, anthraquinones, cardiac glycosides, coumarins, anthocyanin, chalcones, emodins, and triterpenoids.
18	*Ocimum basilicum*	Alkaloids, tannins, flavonoids, cholesterol, terpernoids, glycosides, phenols, cardiac glycosides, carbohydrates, and phlobatannins
19	*Ocimum gratissimum*	Tannins, alkaloids, flavonoids, terpenes, saponins, carbohydrates and cyanogenetic glycosides
20	*Parkia biglobosa*	Alkaloids, tannins, saponins, flavonoids, steroids, glycoside and sugars
21	*Piper guineense*	Piperine, trichostachine, and lignans; Leaves: lignin dihydrocubebin. Phellandrene, pinene, and limonene. pyrrolidine amide wisanidine, pipreidine amides, dihydrowisanine, Dihydropiperine, wisanine, and N-formyl piperine.
22	*Solanum indicum*	Proteins , alkaloids, tannins, saponins and flavonoides
23	*Spondias mombin*	Tannins, Saponins, Flavonoids, alkaloids and phenols
24	*Syzygium guineense*	Steroids, terpenoids, saponins, flavonoids, tannins alkaloids, phenols, and glycosides
25	*Tetrapleura tetraptera*	Saponins, tannins, Oleanolic acid, glycosides, scopoletin, and aridanin
26	*Thaumatococcus daniellii*	Terpenoids, flavonoids, alkaloids, cardiac glycosoides and tannins
27	*Xylopia aethiopica*	Alkaloids, saponins, tannins, reducing sugar, anthraquinones, steroids, flavonoids, and glycosides
28	*Zanthoxylum zanthoxyloides*	Tannin, Saponin, Flavonoids, Alkaloids
29	*Zingiber officinale*	Phenolic compounds: shogaols and gingerols, Sesquiterpenes: bisapolene, zingiberene, zingiberol, sesquiphellandrene, curcurmene

Table 3: Parts used in the identified spices' plant species in Ijesa region of Osun State, Nigeria

S. No.	Parts used	Botanicals of spice species	Proportion (%) of the botanicals
1	Barks of stem/stem	*A. nilotica, A. africana, B. ferruginea, D. guineense, E. chlorantha, I. gabonensis, S. mombin, T. tetraptera, X. aethiopica*	31%
2	Leaves	*A. africana. C. aurantifolia, C. giganteus, D. guineense, L. inermis, M. oleifera, O. basilicum, O. gratissimum, S. mombin, S. guineense, T. daniellii*	38%
3	Flower/fruits/ Seeds	*A. melegueta, C. frutescensis, C. aurantifolia, D. guineense, I. gabonensis, M. myristica, M. oleifera, M. fragrans, P. biglobosa, P. guineense, S. mombin, S. guineense, T. daniellii, X. aethiopica*	48%
4	Bulbs	*A. ascalonicum, A. cepa, A. sativum,*	10%
5	Roots	*Z. zanthoxyloides*	3%
6	Rhizomes	*Z. officinale*	3%

Table 4: Cultivation status of the identified spices' plant species in Ijesa region of Osun State, Nigeria

Status	Tree Spices' Species	Proportion (%) of the identified species
Cultivated	*A. nilotica, A. melegueta, A. ascalonicum,, A. cepa, A. sativum, C. frutescensis, C. aurantifolia, C. giganteus, L. inermis, M. oleifera, M. fragrans, O. basilicum, O. gratissimum, P. guineense, S. indicum, S. mombin,*	55%
Non-Cultivated	*A. africana, B. ferruginea, D. guineense, E. chlorantha, I. gabonensis, M. myristica, P. biglobosa, S. guineense, T. tetraptera, T. daniellii, X. aethiopica, Z. zanthoxyloides, Z. officinale*	45%

Most of the identified species were abundant (52%, Table 5), 21% and 28% were frequent and rare respectively. Most of the abundant species were cultivated and/or easily available for purchase in the study area. All the rare species identified in this study were not cultivated in the study area. All except *Z. officinale* were indigenous trees. Previous study by Kayode (2008) enumerated the various challenges of Nigerian indigenous species to include long period to maturity. This, according to Shinwari and Khan (2000), often result to long number of years to reach flowering and fruiting stage, thus minimizing their regenerating possibilities. The Nigerian indigenous trees often reproduce poorly. At present they are poorly represented in the sapling stage. Also, most of their seeds are high light demanders hence they exhibit long period of dormancy within the seed bank in the soil.

The determination of the respondents' indigenous knowledge on the rare species revealed that the species were trees except *Z. officinale,* a rhizome. All of them thrive very well in the rainforest which is the vegetation of the study area and all of them have multipurpose values which include nutritional and medicinal. In addition, *A. africana, D. guineense, E. chlorantha, S. guineense* were good timber species. These multipurpose values could be exploited to constitute incentive for their conservation.

Table 5: Abundance status of identified spices' plant species in Ijesa region of Osun State, Nigeria

Status	Tree Spices' Species	Proportion (%) of the Identified Species
Abundant	*A. nilotica, A. ascalonicum, A. cepa, A. sativum, C. frutescensis, C. aurantifolia, L. inermis, M. oleifera, O. basilicum, O. gratissimum, P. biglobosa, P. guineense, S. indicum, T. tetraptera, T. daniellii.*	52%
Occasional	*A. melegueta, B. ferruginea, C. giganteus, I. gabonensis, M. fragrans, S. mombin,*	21%
Rare	*A. africana, D. guineense, E. chlorantha, M. myristica, S. guineense, X. aethiopica, Z. zanthoxyloides, Z. officinale*	28%

In conclusion, there is the need for public awareness of the potentials inherent in the cultivation of rare species identified in this study. Soladoye and Sonibare (2003) while observing the wide use of spices in every home in Nigeria suggested that spices could play considerable roles in the economy of the rural women. Previous study by Ekanem and Udoh (2009) asserted that plants now constitute a major economic resource of most developing countries such as Nigeria. The rare tree species could be domesticated. Although previous studies such as Kayode (2004), Kayode and Omotoyinbo (2009) enumerated myriad of reasons attributed to the apparent lack of interest in the cultivation of tree species in Nigeria, hence dependence has been limited to the wildlings in the forest. Unfortunately, the supply from the forest is no longer sustainable due to the unprecedented deforestation, increase use of fire in farm preparation and increase in land fragmentation in the study area. Thus the earlier call, by Adedeji *et al.* (2018) that some of the existing forest should be constituted into reserves should be seriously considered. The annihilative harvest methods should also be addressed. Perhaps, further studies should be conducted to determine whether comparable phytochemicals constituents find in the barks abound in the leaves. A positive results of such studies will make the leaves viable alternative to the use of the barks.

REFERENCES

[1]. Achinewu, S.C., Aniena, M.I. and Obomanu, F.G. (1995). Studies on spices of food value in the South eastern states of Nigeria 1: Antioxidants Properties. *J. African Med. Plants* 18,135-139.

[2]. Adedeji, D. E., Kayode, J. and Ayeni, M.J. (2018). An Ethnobotanical Study of Plant Species Used for Medicine by the Eegun Indigenous Tribal Group of Lagos State, Nigeria. *Not. Sci. Biol.* 10(3), 318-327.

[3]. Anon. (2019). Spices and condiments. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=105639 Assessed July 28, 2019.

[4]. Ayoola GA, Folawewo AD, Adesegun SA, Abioro OO, Adepoju BA, Coker HA (2008). Phytochemical and antioxidant screening of some plants of Apocynaceae from south west Nigeria. *African Journal of Plant Science* 2(10), 24-128.

[5]. Cunningham, A. B. (1988). Collection of wild plant food in Tembe Thonga Society: A guide to Iran age gathering activities? *Annals of the Natal Museum* 29(2), 433-446.

[6]. Dziezak, J.D. (1989). Innovative food trends: Species. *Food Technology* 43(1), 102-116.

[7]. Ekanem, A. P. and Udoh, F. V. (2009). The diversity of medicinal plants in Nigeria: An overview. African Natural Products: New Discoveries and Challenges in Chemistry and Quality, ACS Symposium series. *American Chemical Society* 1021:135-137.

[8]. Fasola, T. R. and Egunyomi, A. (2002). Bark extractivism and uses of some medicinal plants. *Nigerian Journal of Botany* 15, 26-30.

[9]. Iwu, M.M. (1993) Handbook of African Medicinal Plants. Boca Raton, CKC Press 435 pp.

[10]. Johns, A. D. (1988). Effects of 'selective' timber extraction on rainforest structure and composition and some consequencies for frugivores and folivores. *Biotropica* 20, 31-37.

[11]. Kayode, J. (2004). Conservation Perception of Endangered Tree Species by Rural Dwellers of Ekiti State, Nigeria. *Journal of Sustainable Forestry* 19(4), 1-9.

[12]. Kayode, J. (2008). Survey of Plant Barks Used In Native Pharmaceutical Extraction in Yorubaland of Nigeria. *Research Journal of Botany*. 3(1), 17-22.

[13]. Kayode, J. and Ogunleye, T. (2008). Checklist and Status of Plant Species Used as Spices in Kaduna State of Nigeria. *Research Journal of Botany*, 3 (1), 35-40.

[14]. Kayode, J., Aleshinloye, L and Ige, O. E. (2008). Ethnomedicinal use of Plant Species in Ijesa land of Osun State, Nigeria. *Ehnobotanical leaflets* 12, 164-170.

[15]. Kayode, J. and Omotoyinbo, M. A. (2009). Ethnobotanical utilization and conservation of chewing sticks plant species in Ekiti State, Nigeria. *Research Journal of Botany* 4(1):1-9.

[16]. Kayode, J., Arilewo, K and Ayeni, M. J. (2016). Potentials of Myths In Ijesa Indigenous Community of Nigeria in the Conservation of her Forest. *Bangladesh J. Bot*. 45 (5), 1151-1156.

[17]. Macmillan, H.F. (1984). A Handbook for Tropical Planting and Gardening. Macnidlan Scientific Publishers, London. 326 pp.

[18]. Osabor VN, Etiuma RA, Ntinya MU (2016). Chemical profile of leaves and roots of miracle fruit (Synsepalum dulcificum). *American Chemical Science Journal* 12(1), 1-8.

[19]. Oni O. G. and Kayode, J. (2018). Ethno-medicinal assessment of wild edible plants in Ijesa region, Osun State, Nigeria. *Bulletin of Pure and Applied Sciences* 37 B (2), 89-107.

[20]. Peters, C. M. (1996). Observations on the sustainable exploitation of non-timber tropical forest products: An ecologist's perspective. Pp. 19-41. In Ruiz-Perez, M. and Arnold,J. E. M. (Eds.). *Current issues in non-timber forest products research.* CIFOR-ODA, Rogor Camp Workshop.

[21]. Schippers, R. R. (2000). *African indigenous vegetables: An overview of cultivated species.* Natural Resources Institute/ACP-EU Technical Centre for Agricultural and Rural Cooperation, Chatham, UK, 214pp.

[22]. Shinwari, M. I. and Khan, M. A. (2000). Folk use of medicinal herbs of Magalla Hills, National Park, Islamabad. *Journal of Ethnopharmacology,* 69, 45-56.

[23]. Soladoye, M. O. and Sonibare, M. A. (2003). Non-timber forest products of Old Oyo National Park and their sustainability. *Nigerian Journal of Botany* 16, 16-32.