

SURVEY COLLECTION PROPAGATION AND CONSERVATION OF INDIGENOUS SPICE GERMPLASM IN NIGERIA

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ABSTRACT

A survey to document, collect propagate and conserve plants used as spices in Nigeria was conducted in five different agro-ecological zones of Mangrove Swamp, Rain-forest, Derived, Guinea and Sudan types of savanna using structured questionnaires administered to a total of 217 respondents. A total of 26 plant spices from 20 genera spread over 15 families were identified to be used as spices. A considerable percentage (70%-80%) were obtained from the wild and occasionally from deliberated protected stands on farmland. The remaining (20%-25%) are cultivated on small acreages. Propagation studies show that some of the spices can be propagated through seeds, vegetative cutting, rhizomes and bullets. The different spices show varying degree of dormancy ranging from five days in *Arachis hypogea* L. to 56 days in *Xylopia aethiopica* (Dannal) A. Rich.

Identified factors constituting threat to the spices include: little or no knowledge of their reproductive physiology, bush burning urbanizations and development of plantation agriculture. A culturally compatible model of conservation is proposed and discussed.

INTRODUCTION

The natural forests of West and Central Africa are rich in natural resources and have tremendous biodiversity (Okafor, 1975; FAO, 1983; Burkill, 1985; Denton, Adelaja and Edema, 1988; Olajide et al, 1999; Fasola, 2000) particularly in plants that provide food, ornamentals, spices and ingredients for medicine. Several socio-economic changes such as increasing commercialization of agricultural production, high rates of urbanization, increasing mobility, and development of new housing schemes are resulting in the large-scale destruction of natural forests that are rich sources of plants used as spices locally. Also, the lucrative trade in herbal remedies is threatening the very source on which it depends. Indiscriminate harvesting to feed the growing demand for plant-based medicines could rapidly wipe out up to twenty percent total number of plant species currently used for natural remedies.

The objective of this paper is to identified tropical indigenous plants growing in the wild, propagate them and see how they can be used in conservation programmes in environmental conservation and botanic gardens development.

MATERIALS AND METHODS

Documentation Of Local Plants Used As Spices In Nigeria

For three years (2000-2003) the various plants used as spices in Nigeria among the different ethnic groups in fifteen states carefully selected to cover the five major agro-ecological zones of mangrove swamp, rain forest, derived, Guinea and Sudan types of savanna (fig. 1) were studied. Oral interviews and structured questionnaires were administered on a total of 217 respondents and these include farmer, potherb merchants in popular markets, traditional doctors, hotels and restaurants.

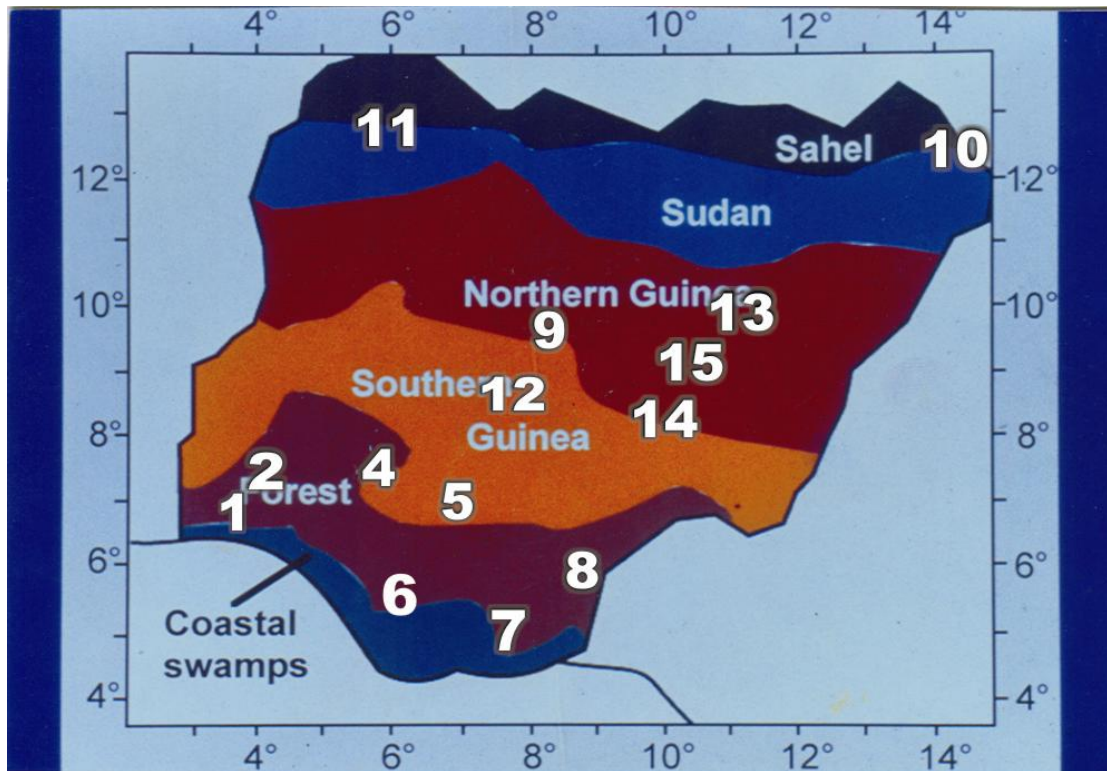


Figure 1: Map of Nigeria showing the Survey Areas marked (1-15) in the different agroecological zones

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|------------|-----------|-------------|----------------|
| 1. Lagos | 2. Ogun | 3. Oyo | 4. Ondo |
| 5. Edo | 6. Delta | 7. Rivers | 8. Cross River |
| 9. Kaduna | 10. Borno | 11. Sokoto | 12. Abuja |
| 13. Bauchi | 14. Benue | 15. Plateau | |

Taxonomic identification was undertaken through literature review and examination of preserved specimens in botanical gardens and herbaria of Obafemi Awolowo University, Ile-Ife, the University of Ibadan, Ibadan and the Forestry Research Institute of Nigeria, Ibadan to obtain correct scientific names and other characteristics of the different spices.

RESULTS AND DISCUSSION

Identified Spices

The plants identified during the survey commonly used as spices in Nigeria showing the parts consumed and /or propagated, their local and family names and the status of cultivation are listed in Table 1. The agro-ecological distribution is as shown in Table 2. A total of 26 plants from twenty genera and spread over 15 families were identified. The families and numbers of species within are: Piperaceae – 1, Zingiberaceae - 4, Rosaceae – 1, Mimosaceae – 2, Anonaceae 3, Labiatae – 2 Solanaceae – 2, Gnetaceae – 1, Sapotaceae -1, Gramineae -1, Euphorbiaceae – 1, Asclepiadiaceae -1, Papilionaceae - 3, Acanthaceae – 1 and Balanophoraceae. The species occurrence in the forests of the study areas varied from one ecological zone to the other. Some of the species observed growing wild in the forests appeared to be protected. Plants in this category include: *Monodora myristica*, (Gaenth) Dungal; *Xylopi aethopica*, (Danal) A. Rich; *Tetrapleura tetraptera*, (Schum and Thonn) Taub; *Parkia biglobosa*, L; *Cymbopigon citratus*, L. *Anona senegalensis* (Pers var *senegalensis*) and *Asystasia gagentica*, (Linn) T. Anders; It was further observed that apart from the wild species, other spice plants are grown and protected in home gardens, and within homestead farmlands.

Table 1: List of indigenous spices in Nigeria showing the local and family names, cultivation status, and edible portion.

SIN	Spices	Local Names	Status	Family	Edible Portion
1.	<i>Piper guineense</i> (Schum & Thonn)	Iyere	W	Piperaceae	Seed/leaf
2.	<i>Aframomum melegueta</i> (Hook. F) K. Schum	Atare	W/C	Zingiberaceae	Seed
3.	<i>Aframomum longiscarpum</i> (Hook. F) K. Schum	Oburo	W/C"	..	
4.	<i>Parinari curatellifolia</i> . (Planch Benth)	Lome/Gbafilio	W	Rosaceae	
5.	<i>Tetrapleura tetraptera</i> (Schum & Thonn) Taub	Aidan	W	Mimosaceae	Fruit
6.	<i>Xylopiya aethiopica</i> (Danal) A. Rich	Eru	W	Anonaceae	Seed
7.	<i>Zingiber officinale</i> L.	Atale	C	Zingiberaceae	Rhizome
8.	<i>Ocimum gratissimum</i> L.	Efinrin	W/C	Labiatae	Leaf
9.	<i>Ocimum basilicum</i> L.	Efinin wewe	W/C"	..	
10.	<i>Monodora myristica</i> (Gaenth) Dungal.	Ariwo	W	Anonaceae	Seed
11.	<i>Allium sativum</i> L.	Ayu	C	Alliaceae	Bulb
12.	<i>Capsicum annum</i> L.	Ata Rodo	C	Solanaceae	Fruit
13.	<i>Capsicum frutescens</i> L.	Ata wewe	C"	..	
14.	<i>Gnetum africanum</i> Welw	Okazi	W/C	Gnetaceae	Leaf
15.	<i>Gongronema latifolium</i> Benth	Utazi	W/C	Asclepiadiaceae	..
16.	<i>Cymbopogon citrates</i> L.	Achara	C	Gramineae	Leaf/Stem/Stalk
17.	<i>Parkia biglobosa</i> L.	Iru	W/C	Mimosaceae	Seed
18.	<i>Dioclea reflexa</i> (Hook. F.)	Arin	W	Papilionaceae	..
19.	<i>Xylopiya quintasii</i> (Danal) A. Rich	Palufon	W	Anonaceae ..	
20.	<i>Keayodendron brideloides</i> (A Mildbri ex Hutch and Dalz J. Leandri	Igberi	W"	Anonaceae	
21.	<i>Piper nigrum</i> (Schum & Thoon)	Ata	W	Piperaceae ..	
22.	<i>Allium cepa</i> L.	Alubosa	C	Alliaceae	Bulb
23.	<i>Arachis hypogea</i> L.	Epa	C	Papilionaceae	Seed
24.	<i>Thonningea sanguinea</i> Vahl	Kula.	W	Balanophoraceae	Root
25.	<i>Asystasia gagentica</i> (Linn.) T. Anders	Iregeje	W/C	Acanthaceae	Seed
26.	<i>Annona senegalensis</i> (Pers. var. senegalensis)	Ibobo	W	Anonaceae ..	

W -Wild
C - Cultivated
W /C - Wild/Cultivated

These groups have been cultivated and are widely used. These include: *Piper guineense*, (Schum and Thonn); *Aframomum melegueta*, (Hook. F) K. Schum, *Zingiber officinale* L.; *Ocimum gratissimum*, L.; *Ocimum basilicum*, L.; *Allium sativum* L.; *Allium cepa* L.; *Capsicum spp.*, L.; *Gnetum africanum*, Welw; *Aracchis hypogea* L.; *Keayodendron brideloides* (A. Mildbri ex Hutch and Dalz) J. Leandri, *Piper nigrum*. (Schum and Thonn) (Fig. 1-16)



Plate 2: Vine of *Piper guineense* Schum & Thonn (Piperaceae)
Semi woody climber on a small tree in deep shade. Veining of leaf distinctive.
Fruits immature (All parts, leaves, fruit, the stem, when scratched) have a spicy smell.
Was found during the survey to be one of the well known bush pepper.
Hausa name is Maisoro; Yoruba-Iyere, Igbo



Plate 3: Seeds of *Parinari curatellifolia* Planch Benth (Rosaceae)
Tree, 4m high, leaves leathery, shining green above,
Pale green with yellow prominent midrib and soft beneath. Inflorescence
Whitish green with soft indumention. Fruits brown and ovoid.

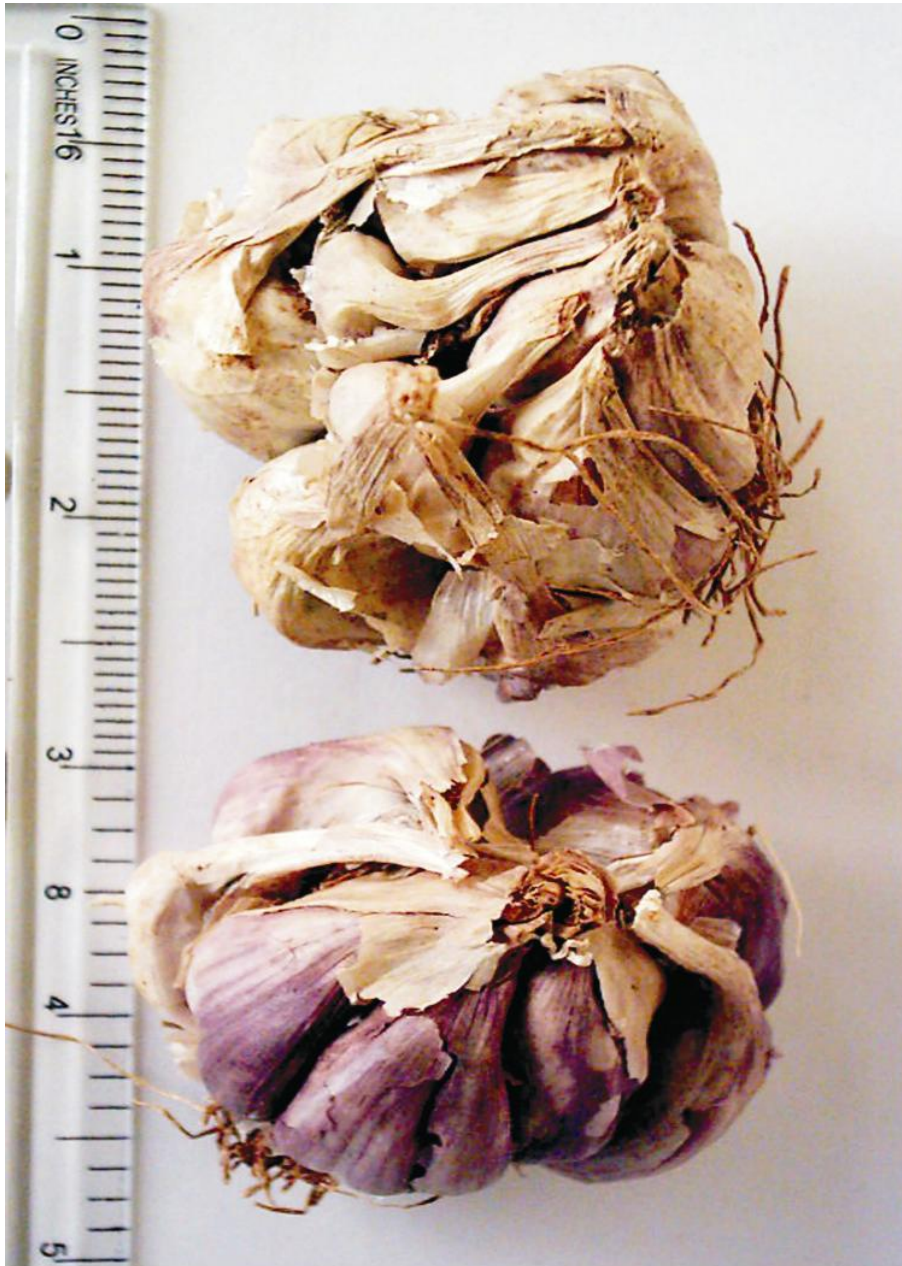


Plate 4: Bulbs of *Allium sativum* L. (Alliaceae)

Garlic *Allium sativum* is an erect biennial up to 60cm tall.

The bulbs have a flattened conical stem from which arise several cloves or individual sections consisting of thickened storage leaves and a growing point.

The leaves are flat, solid, and 2.5cm wide; the flowers are pink.



Plate 5: Leaves of *Ocimum gratissimum* L. (Labiatae)
Woody herbs. An upright herb with ascending branches.
(1.8m) tall occurring in clumps amongst shrubs.
The shrub is aromatic, with very small flowers,
green/white in color with, bright yellow stamens. Alt \pm 1600m.



Plate 6: Leaves of *Ocimum basilicum*L. (Labiatae)
Herbs, stem pale green, leaves bright green.
Rachis of inflorescence purplish
Tinged, calyx green, corola whitish or pale lilac.
Plant strong scented like citrus.

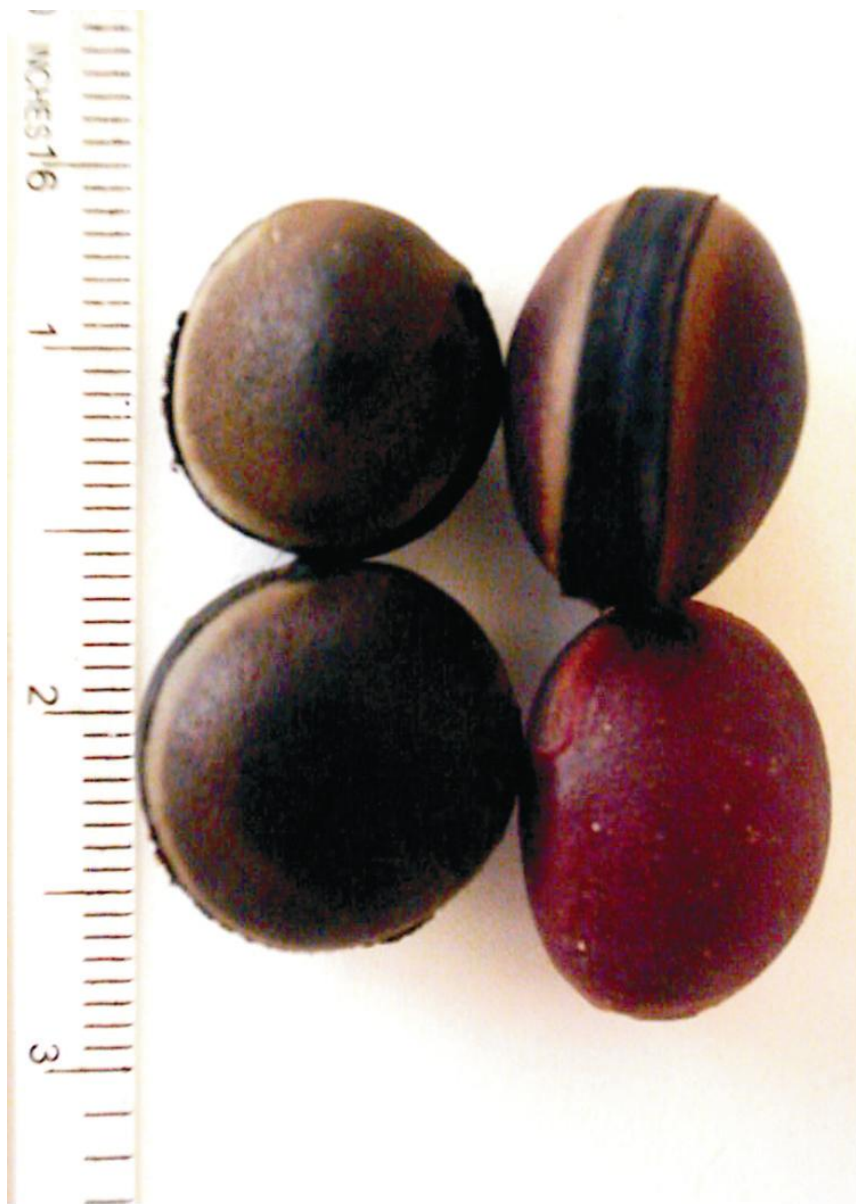


Plate 7: Seeds of *Dioclea reflexa* Hook. F. (Papilionaceae)
Liane, green brown-grey. Younger stem green, covered with long, brown hairs, petiole green covered with long brown hairs.
Leaflets, shining dark green above dull green with light beneath.
Calyx purple brown corolla violet pods green with brown hairs.



Plate 8: *Keayodendron brideloides* (A. Mildbri ex Hutch and Dalz)
J. Leandri (Annonaceae)
A tall straight cylindrical tree with conical crown up to 10m,
drooping branches 28-30m high, girth about 1m, slash thick dirty
white with brown spots. Fruits fairly big, shape resembles that of
Chrysophyllum, mature fruits yellow.



Pate 9: Rhizomes of *Zingiber officinale* L. (Zingiberaceae)
Scandent herb, flowers pink.



Plate 10: Fruits of *Aframomum melegueta* (Hook. F) K. Schum (Zingiberaceae)
A (7.6'' = 19cm = 0.19m) perennial shrub/herb growing by rhizome.
Inflorescence borne at the base of the rhizomes. Flower petals large,
pink/white the innermost one with yellow center. Fruit red when ripe,
seed black and edible, peppery seed in conjunction with colanut..
Leaves long and light green.



Plate 11: Fruits of *Aframomum longiscarpumi* (Hook. F.) K. Schum (Zingiberaceae)
Fruits deep pink red and some distance from leaves on long slender rhizome. Leaves up to 2.4m-4.5m in forest.



Plate 12: Bulb of *Allium cepa* (Alliaceae)
Onion is a biennial herb but normally grown as annual.
The bulb is formed from the bases of thickened food-storage leaves.
The hollow foliage leaves are produced from a flattened, basal conical stem.
Groups of 5-10 flowers are produced in umbels and the whole inflorescence may grow 100cm tall.



Plate 13: Fruits of *Tetrapleura tetraphera* (Schum & Thonn) Taub (Mimosaceae) 7.50m high, slash dirty white with water coming out of its dark; light brown at bottom and great at upper part of the stem. Flowers yellow.



Plate 14: Fruits of *Xylopia aethiopica* (Danal) A. Rich (Annonaceae)
A straight bole tree with sharp buttress. Slash dirty yellow and with
Allamanda leaves with white under surface and green above.
Fruits red when ripen. Produce very strong and pungent smell
and are used as stimulant.



Plate 15: Fruits of *Capsicum annum* L. (Solanaceae)
Shrub, but little branched from base, 2m (200cm = 6.66ft) tall;
corolla very light bluish-white, anthers dark blue-black;
fruit certainly utilized by villagers but not regularly cultivated.



Plate 16: Whole plant of *Cymbopogon citratus* (DC) Stapf. (Gramineae)
Grass with lemon scented leaves. (Lemon grass). Does not flower.

Propagation of the Spices

Propagation studies show some of the spices can be propagated through seeds, vegetative cuttings, rhizomes, bulbs and bulblets. The different spices show varying degrees of dormancy ranging from 5 days in *Arachis hypogea* L. to 56 days in *Xylopia aethiopica* (Danal) A. Rich. The critical soil wet potential for germination of seeds of some spices decreased from -0.1Mpa during the experiential phase to -0.02Mpa in the large phase. Seeds of spices such as *tetrapleura tetrapthora*, *Anona senegalensis* can be germinated after the seeds have been scanned with cure H₂SO₄ for up to 10 minutes.

Conservation of Spice Germplasm

Many of the spices identified in this study (70%) are either semi cultivated or growing to the wild. Population studies show that for some spices only about 2 stands can be found on 1000 ha of land survey indicating the level of threat to which they are exposed. Major factors constituting threat include the destruction of first land through bush burning particularly in the savanna grassland areas of Nigeria and the erosion problems experienced in the mangrove and rainforest ecologies.

CONCLUSION

It is concluded that Nigeria has a large repository of indigenous tropical plants that are useful as spices and these are at present being threatened by several human and environment factors. These plants can be protected for future exploitation as food, medicine and the improvement of the human environment by their incorporation into the development of modern botanic garden.

ACKNOWLEDGEMENTS:

The contributions to the success of the survey of Dr. O.A. Denton; Lukman Kassim and the financial support of the National Horticultural Research Institute, Ibadan is herewith acknowledged.

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