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# Ethnobotanical survey of plant species utilised as spices among the indigenous people of Bayelsa State, Nigeria

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**Abstract**. Plant species used as spices in Bayelsa State, Nigeria, were assessed in this study. A total of twenty four spicy plants were identified. This included a fungal species and twenty three plant species. These species were of diverse life forms (25% trees; 8% shrubs, 58% herbs and 4% grasses). The study also revealed that the spicy plants identified were heterogeneously distributed across the three senatorial zones of the State. Fruits/seeds were the most utilized parts of the indigenous spicy plants identified. 63% of the identified spicy plants were sourced from the wild and 38% were cultivated in the State. Parts of the plants utilized for spices were fruits, seeds, leaves, shoots, bulbs, rhizomes and in some cases the entire-part. Fruits and seeds dominated the parts used (46%), while rhizome and the entire-parts were the least utilized parts (4%) for spices in the study area. Most of the methods employed in harvesting the spicy plants were annihilative and inhibitory. Also environmental pollution among other factors threatens the existence of the spicy plants growing in the wild in the study area. In conclusion conservational strategies that will ensure sustainable use of the identified spicy plant species were proposed.

**Keywords**: Spicy plants; Conservation; Bayelsa State; Indigenous people.

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## Introduction

Bayelsa (Nigeria) is a State with rich Ijaw cuisine prepared not without tangs of spicy plants which make delicacies from the region a toothsome dessert. Spices are plant materials (seeds, fruits, leaves, root buds, whole plants) traditionally use for flavouring, garnishing or improving the quality of food. They occupy pivotal role in the realm of traditional health care system as medicine and perfumes, and cosmetics for traditional rites (MacMillian, 1984; Kamala, 2008). FAO (2005) and Kayode and Ogunleye (2008) asserted that spices are the most commonly used plants in Nigeria and Africa at large, and such plants are usually aromatic and pungent by nature (Achinewu et al., 1995) due to the phytochemicals and essential oils embedded in them (MacMillian, 1984). Literally, these phytochemicals (from evolutionary view) are used to warn-off predators. Be that as it may, fundamental to ecological functions are the interaction between man and plant. Yet, spicy plants are important to the dynamism of the relationship and must be conserved because a shift in their floristic composition may affect a whole awful lot. Bayelsa State is rich in spicy plants; some are cultivated while a higher proportion grows in the wild. Spicy plants are part of the Non Timber Forest Products (NTFPs), and are easily prepared by milling, pounding, smashing and cooking otherwise simply by adding or mixing (Mathewo, 2015). Considerable knowledge of these botanicals are in the possession of indigenous women who uses spices for domestic and culinary purposes. Like every other NTFPs, spices have economic value and are potential source of employment opportunity (Soladoye and Sonibere, 2003; Olife et al., 2013).

## Materials and methods

### The study area

The study was conducted in Bayelsa State which is one of the six states that make up the South-South geopolitical zones of Nigeria (Figure 1). It is geographically located on Lat. 4° 45' N, long 6° 05' E in the very heart of the Niger Delta Region of Nigeria. The state has a population figure fairly above 1,704,515 (2006, Census) and a land mass area of about 9415.85 $km^2$. Factually, Bayelsa State derived its name from the acronym of three Local Government Areas (LGAs): Balga, Yelga and Salga which were formally part of old Rivers State whence Bayelsa State was carved up in 1996. And the three LGAs were what constituted what is now known as the 8 LGAs (Brass, Nembe, Ogbia, Southern Ijaw, Kolokuma/ Opokuma, Ekeremor, Sagbama and Yenagoa) that make up present Bayelsa State. The state is located in the low lying deltaic plain and is criss-cross by network of Rivers Niger distributaries. The soil consist of what the geologic units refers as sedimentary alluvium and abandoned beach ridges formed in the early Holocene epoch (Akpokodje, 1989). Physiographically, a number of soil types exist in the state these include: sandy loamy, loamy sandy, silty loamy, transported sandy soil and silty-clayey-mud locally known as chikoko. Vital soil nutrients and organic matter are embedded in the various soil types; they find expression in the vigorous vegetation of the State. Two distinctive types of vegetative zones exist in the State: tropical rain forest and mangrove swamp forest. The temperature ranges between 26 °C to 31 °C, with high relative humidity depending on the season of the year. High rain fall occur between April

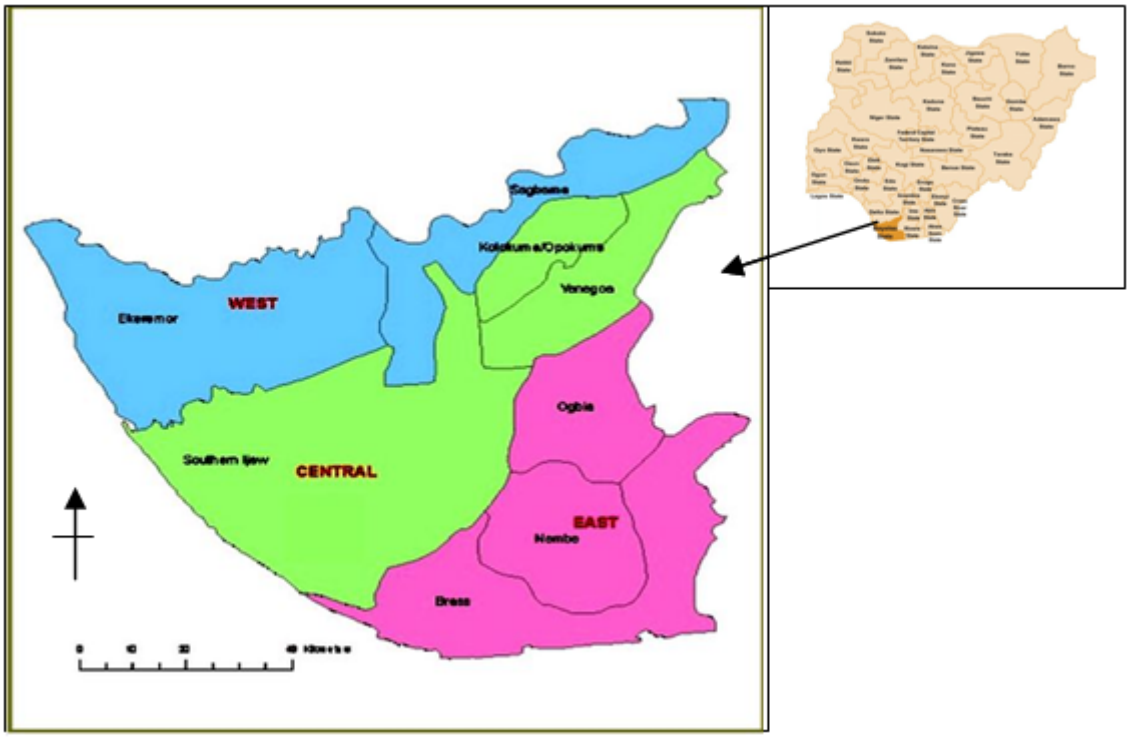


**Figure 1**. Map of Bayelsa State, Nigeria.

and November and dry season with sparse rainfall between December and March.

## Methodology

The Approaches of Kayode (2002 and 2005) were employed for the study: these consist of a combination of social survey and direct field observation. The 8 LGAs of Bayelsa State were divided into 3 zones (Bayelsa East (BE), Bayelsa West (BW) and Bayelsa Central (BC) based on the existing geopolitical delineation. Five communities were selected from each of the LGAs. (In other words, 40 villages that were still relatively free from urban influences) were selected for the study. 10 indigenous people that have maintain a continuous domicile for a minimum period of 10 years were selected and interviewed with the aid of a semi structured questionnaire matrix.

The interviews were carried out in manner that allow for fairly open framework, focus conversational, and two way communication as suggested by Kayode and Ogunleye (2008).

Plant species whose seeds, leave, fruits, rhizomes, bulb or whole parts are used for spicy purposes by the respondents were identified and their voucher specimen was collected. The sources of such plant species, their life form, methods of harvest and utilization were also noted and documented. Secondary information was obtained from group interviews conducted with women at mills and fishing camps. Field information was confirmed and compared with floras of the region (including those of Hutchinson and Dalziel, 1954; Keay et al., 1964; Gill, 1992; Nyananyo, 2006). Relative abundant status of the identified spicy plants was determined based on the time taken to assess a sample of the species within the vegetation of the communities (after Ronger et al., 1988). Where a sample was sighted less than 1 h, it was considered as very abundant; it was abundant when sighted < 23 h and it was

considered as frequent when sighted within 24 h, 3 days of searching. It was considered as occasional when found > 1 week, but rare when it takes more than 1 week to assess it.

Meanwhile, level of spicy plants distribution within the 3 geopolitical zones where determined using $X^2$ Test.

## Results and discussion

A total of 24 spice plants were assessed in the study area (Table 1). One of the species assessed is the edible mushroom (*Agaricus* sp.). The others are of plant origin: their life forms comprise

**Table1.** List of spices utilized among major ethnic group in Bayelsa State of Nigeria.

| | Family name | Botanical names | Vernacular names | LF* | Part utilize |
|---|---|---|---|---|---|
| 1 | Zingiberaceae | *Aframomum citratum* | Fisani, sani, ehie, alligator pepper | H | Seed |
| 2 | Zingiberaceae | *Aframomum danielli* | Ehie, sani, Fisani, Alligator pepper | H | " |
| 3 | Zingiberaceae | *Aframomum melegueta* | Ataiko, Grains of paradise, Fisani | H | " |
| 4 | Polyporaceae | *Agaricus* sp., *Lentinus tuberregium* | Akasi, Edible Mushroom | Fb | Entire section |
| 5 | Euphorbiaceae | *Alchornea cordifolia* | Epie tin, Christmas bush | S | Fresh shoot |
| 6 | Alliaceae | *Allium cepa* | Onion (yabase ayou) | H | Bulb/leaf |
| 7 | Alliaceae | *Allium sativum* | Garlic, gali | H | Bulb |
| 8 | Solanaceae | *Capsicum annuum* | Igina, red pepper | H | fruit |
| 9 | Asteraceae | *Chromolaena odoratum* | Gbolow furutuo, siam weed | H | Fresh shoot |
| 10 | Rutaceae | *Citrus sinensis* | Lila ponmo, orange | T | Fresh shoot |
| 11 | Poaceae | *Cymlopogon citratus* | Beke piri, lemon grass | H | Leaf |
| 12 | Annonaceae | *Dennettia tripetala* | Pepper fruit ( piri tin) | T | Fruit/Seed |
| 13 | invingiaceae | *lrvingia smittii* | Bakalaza tin | T | Seed |
| 14 | Annonaceae | *Monodora myristica* | Arigogo,Calabash nutmeg | T | Seed |
| 15 | Rutaceae | *Murraya koenigii* | Curry leaf (curi) | H | Leaf |
| 16 | Lamiaceae | *Ocimum gratissimum* | Furukana, scent leaf | H | Leaf |
| 17 | Poaceae | *Pennistum purpureum* | Osiia usi, elephant grass | G | Fresh shoot |
| 18 | Piperaceae | *Piper guineense* | Oziza, climbing pepper | H | Fruit |
| 19 | Cucurbiataceae | *Telfairia occidentalis* | Ogu seed Fluted pumpkin | H | Seed |
| 20 | Fabaceae | *Tetrapleura tetraptera* | Apaupau, pakiopaki, aidan tree | T | Seed |
| 21 | Asteroceae | *Vernonia amygdalina* | Kiriologbo, bitter leaf | S | Leaf |
| 22 | Araceae | *Xanthosoma mafaffa* | Odu, cocoyam | H | Leaf/ Shoot |
| 23 | Annonaceae | *Xylopia aethiopica* | Enge, Africa pepper | T | Fruit/ Seed |
| 24 | Zingiberaceae | *Zingiber officinale* | Ginga | H | Rhizome |

*Life Form, **T**= tree, **H**= herb, **S**= shrub**, Fb**=fruiting body, **G**=grass.

of tree, shrub, herb and grass. 58.33% of the species assessed are herbs, 25% are trees, 8.33% are shrub and 4.17% are grasses (Figure 1).

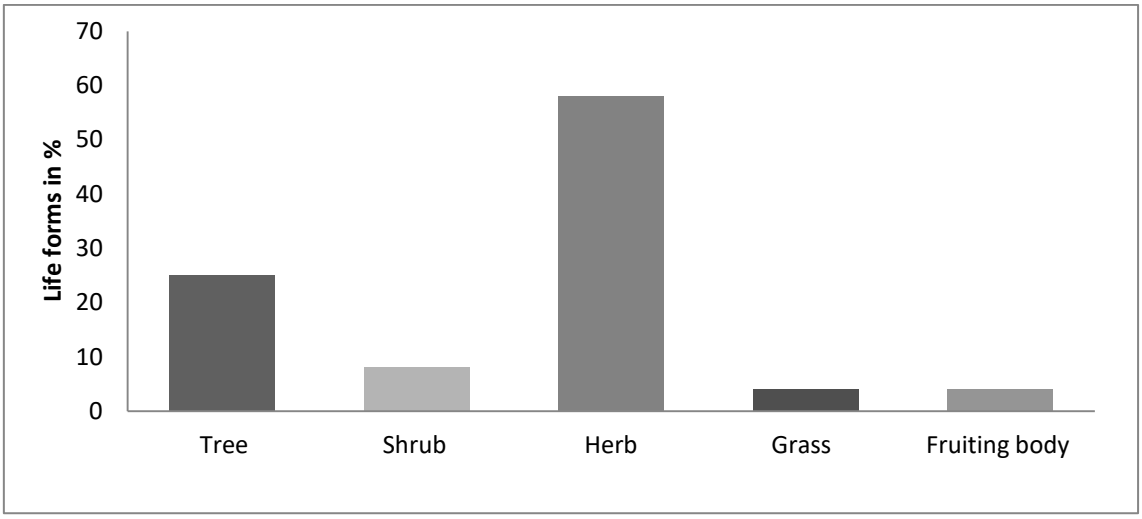


**Figure 1**. Life forms of spices in Bayelsa State, Nigeria.

The botanicals are either cultivated or sourced from the wild. 62.5% of the spice plants are sourced from the wild, while 37.5% are cultivated (Table 2). The parts of the botanicals utilized for spice include: fruit/seed, leaf/shoot, bulb, rhizome and an entire-part. A number of reasons explain respondents' choice of a particular spice plant, these include healthcare, cuisine, taboos among other things. However, dose formulation depends on cuisine and user's taste (Table 2). The table also shows that most of the techniques used for harvesting the botanicals are hazardous. $X^2$ test revealed that there is no significant difference ($p > 0.05$) in the occurrence of spicy plants in the three zones, an indication that spicy plants are heterogeneously distributed in the zones.

**Table 2**. Features of spicy plants utilized among major ethnic group in Bayelsa State of Nigeria.

| | **Botanical names** | **Method of harvest** | **Abundance status** | **Dose formulation** | **Reasons for choice** | **PS*** |
|---|---|---|---|---|---|---|
| 1 | *Aframomum citratum* | P/A | Frequent | Quantity depends on cuisine & user's taste | Gives characteristic taste and peppering sensation. | Wild |
| 2 | *Aframomum danielli* | P/A | " | " | " | Wild |
| 3 | *Aframomum melegueta* | P/A | Occasional | " | Gives characteristic piquant taste. | Wild |
| 4 | *Agaricus sp., Lentinus tuberregium* | NP/G | Very abundant | " | Soup thickener gives flavour | Wild |
| 5 | *Alchornea cordifolia* | NP/G | " | " | Gives additional flavour to taste | Wild |

**Table 2**. Continued.

| | Botanical names | Method of harvest | Abundance status | Dose formulation | Reasons for choice | PS* |
|---|---|---|---|---|---|---|
| 6 | *Allium cepa* | P/A | Abundant | " | Gives characteristic taste and additional flavour to food | Cultivated |
| 7 | *Allium sativum* | P/A | " | " | " | Cultivated |
| 8 | *Capsicum annuum* | NP/G | Very abundant | " | Gives characteristic peppery sensation | Cultivated |
| 9 | *Chromolaena odoratum* | NP/G | " | " | Give food identifiable taste. | Wild |
| 10 | *Citrus sinensis* | P/A | " | " | Give food characteristic tang taste and flavour | Cultivated |
| 11 | *Cymlopogon citratus* | P/A | Abundant | " | Flavour, characteristic tang taste & aroma | Cultivated |
| 12 | *Dennettia tripetala* | NP/G | Rare | " | Gives characteristic peppery sensation. | Wild |
| 13 | *lrvingia smittii* | NP/G | " | " | Soup thickener, enhance taste | Wild |
| 14 | *Monodora myristica* | NP/G | Frequent | " | Characteristic taste | Wild |
| 15 | *Murraya koenigii* | NP/G | Abundant | " | Gives characteristic taste, and smell. | Cultivated |
| 16 | *Ocimum basilicum* | NP/G | Very abundant | " | Gives identifiable taste and flavour | Wild |
| 17 | *Pennistum purpureum* | NP/G | " | " | Give taste | Wild |
| 18 | *Piper guineense* | NP/G | Frequent | " | Gives food characteristic taste and smell. | Wild |
| 19 | *Telfairia occidentalis* | NP/G | Very abundant | " | Soup thickener, gives flavour. | Cultivated |
| 20 | *Tetrapleura tetraptera* | NP/G | Occasional | " | Gives characteristic taste and smell | Wild |
| 21 | *Vernonia amygdalina* | NP/G | Very abundant | " | Gives identifiable taste and flavour to soup. | Cultivated |
| 22 | *Xanthosoma mafaffa* | NP/G | " | " | Give additional flavour | Cultivated |

**Table 2**. Continued.

| | Botanical names | Method of harvest | Abundance status | Dose formulation | Reasons for choice | PS* |
|---|---|---|---|---|---|---|
| 23 | *Xylopia aethiopica* | P/A | Rare | " | Flavouring, give characteristic taste. | Wild |
| 24 | *Zingiber officinale* | P/A | Frequent | " | Gives identifiable taste and flavour | Wild |

Very abundant = 41.67%; Abundant = 16.67%; Frequent = 20.83%; Occasional = 8.33%; Rare = 12.5%. *Plant source, Wild = 62.5%, Cultivated = 37.5%, P/A = Predatory/Annihilation 37.5%; NP/G= Non Predatory/Gathering 62.5%.

Fruit/seed are the most utilize parts of spice plants, these account for 45.83%. While Rhizome and the entire-parts are the least utilized parts, and they account for 4.17% each (Table 3). The methods used for harvesting spicy session of the plant species in approximately 38% of the spicy plants are done predatorily and annihilatively (Table 2). Predatory/annihilative (P/A) techniques are often employed for harvest in the study area; it involves felling and or uprooting of spicy plants. Kayode and Ogundele (2008) identified the techniques as the most destructive method of harvesting spicy plants. *Xylopia aethiopica* is the main victim of such practices; it is often fell before its fruits are harvested. Also members of the Zingiberaceae, Bulb and rhizome that are sourced from the wild suffer similar fate; and their regeneration rates lag behind the rate at which they are harvested. P/A techniques lead to rarity of the spicy plants. On the other hand, 62.5% of the methods of harvesting spicy plants in the study area are Non Predatory/Gathering (NP/G) (Table 2). Despite the fact that NP/G methods are used to harvest large proportion of the spicy parts such methods are lethal, because they are done not without damages to the branches and other vital organs of the plants. Main while, a total of 12.5% of the spicy plants are found to be rare, 8.33% as occasional and 20.83% as frequent (Table 2), these might not be unconnected to over exploitation and environmental pollution. The level of familiarities with spice plants among respondents is enormous, knowledge of spicy plants transverses sex, age, literacy status, occupation, location and religion affiliates of the respondents (Table 4). Women tend to purpose much knowledge of spicy plants than their male counterpart.

**Table 3**. Part utilized in the identified spice plants in Bayelsa State, Nigeria.

| Parts utilized | Botanical species | Proportion (%) of the botanicals |
|---|---|---|
| Fruits/ seeds | *A. citratum , A. danielli, A melegueta, C. annuum, D. tripetala, l. Smittii, M. myristica, P. guineense, T. tetraptera, X aethiopica,* T. occidentalis | 45.83 |
| Leaves/shoot | *A. cordifolia, C. odoratum, O. gratissimum, C. sinensis, C. citrates, P. purpureum, V. amygdalina, X. mafaffa, M. koenigii* | 37.5 |
| Bulb | *A. cepa, A. sativum* | 8.33 |
| Rhizome | *Z. officinale* | 4.17 |
| Entire part | *Agaricus* sp. (edible mushrooms) | 4.17 |

**Table4**. Socio-economic status of respondents in the study area.

| | | BW% | BC% | BE% |
|---|---|---|---|---|
| Sex | male | 25 | 38 | 35 |
| | female | 75 | 112 | 115 |
| Age | < 20 | 29 | 42 | 34 |
| | 20- 65 | 16 | 39 | 40 |
| | > 65 | 16 | 39 | 40 |
| Religion | Christian | 87 | 131 | 118 |
| | Moslem | - | - | - |
| | Others | 13 | 19 | 32 |
| Literacy status: | Literate | 56 | 110 | 93 |
| | illiterate | 44 | 40 | 57 |
| Econ. status: | small | 48 | 69 | 61 |
| | Medium | 44 | 70 | 24 |
| | Large | 8 | 11 | 65 |
| Occupation: | Agriculture | 87 | 129 | 126 |
| | Non agriculture | 13 | 21 | 24 |
| Location: | Onshore | 70 | 110 | 60 |
| | Offshore | 30 | 40 | 90 |

In spite of the importance of NTFPs in term of their economic value: factors such as exploitation, crude oil pollution and forest timber exploitation are responsible for their constant depletion in the study area. It is important to seek for ways that will ensure their conservation. Hence, the need to harvest (spicy trees) by pruning rather than by the use of total annihilation methods being practiced in the area; moreover bunkery activities should be discourage to forestall land pollutions, a key factor responsible for deforestation in the study area. The gazetted reserves in the State should be properly managed and Forest laws should be enforced in the study area.

## Conflict of interest statement

The authors declare that they have no competing interests.

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