



Maximizing the Utilization of Nutraceutical Endowment of Rural Communities through Strategic and Functional Agricultural Research and Extension Services

Ifenkwe, G.E., Alocha, O.C

Department of Rural Sociology and Extension.
Michael Okpara University of Agriculture, Umudike, Nigeria.

ABSTRACT

This paper assessed the popularity and utilization of medicinal and nutritional products of plant origin in the south-east ecological zone of Nigeria. It classified some flora of African origin on the basis of their families; ascertained perception of value of these plants; identified constraints associated with use of these plant products; and recommend measures for promoting use of nutraceuticals. Secondary information sources were extensively reviewed. Findings showed a renewed interest in functional foods of plant origin in the study area. Respondents' acceptance and regular use of nutraceuticals was found to be supported by traditional belief and its economic appeal; and constrained by such factors as practice being shrouded in secrecy, non-standardization of dosage, seasonality of the herbs, and poor keeping quality of concoctions, plant extracts among others. The paper recommends focusing research and extension towards improving the efficacy and potency of the herbs, in order to drive and enhance nutraceutical uptake in rural communities in Nigeria.

Keywords: *Nutrients, Functional foods, Species diversity, Food security, Orthodox medicine, Patent rights.*

1. INTRODUCTION

Nigeria's land space of approximately 924,000 square kilometres has five well-defined agro-ecological zones: North-west, North-east, Middle belt, South-west and South-east zones. The topography of the country varies from flat to gentle slope and hilly areas. The combined effects of toposequence and natural factors like rainfall, and differences in solar radiation influence cropping and livestock management patterns, as well as the economic capability of the areas (Unamma *et al.*, 2004; Overseas Development Natural Resources Institute, 1989).

Nigeria has a profuse vegetational cover on both the dry (woodland, desert, plains) and wetlands (seas, rivers, and swamps). These plant species evolved from primitive aquatic cryptogams (flowerless plants) to advanced terrestrial phanerogams of the humid tropical environment (Nwoko, 2013). They grow and bloom; dry and wither; remain evergreen all year round; or change colour, all in response to climatic factors and change in seasons. Their parts – root, stem, leaf, fruit, and seed – contain naturally healing alkaloids and other bioactive / therapeutic elements that can be used to prepare drugs. They therefore play prominent roles in indigenous or traditional health management

The World Health Organization (2000) defined traditional or indigenous healthcare practices as a combination of knowledge and practices (explicable or not) used in diagnosing, preventing and eliminating physical, mental or social diseases; and relying exclusively on practical experience and observations handed down from generation to generation whether verbally or in writing. This practice which is different from orthodox/conventional therapy relies heavily on herbs or plants soaked in water or other solutions, or powdered.

While some serve as wound cleansing agents, purgatives or antioxidants, others have prophylactic and germicidal property. The foregoing shows that Nigeria is richly endowed with functional foods and herbal therapies for the protection of human beings and livestock.

Functional foods

Food, a basic necessity of life, derives its importance from the fact that it supplies ingredients that provide energy, induces growth and prevents diseases (Table 1). Food therapy is used in traditional medicine to promote good health. Living organisms need food to grow and function optimally every day. Fruits and vegetables for instance, have numerous benefits on the human system and so nutritionists encourage people to take them.



Table 1: Utility of Food

Class of food	Physiological action	Ultimate effect /natural effects
a. Tuber, and cereals	<ul style="list-style-type: none"> • Energy 	Acid-Alkaline balance in the body
b. Legumes	<ul style="list-style-type: none"> • Replacement of worn out tissues • Growth • Healing effect. 	
Vegetable fruits and leafy vegetables.	<ul style="list-style-type: none"> • Hydrating • Alkalinizing • Laxative • Tonic action • Mineralizing 	<ul style="list-style-type: none"> - Healthy heart - Healthy being Decent and dignified life.

Source: Bakhru, 2010, Moore, 2009; Food Security Magazine, Vol. 3, No. 6

The South-east zone appears to be the highest producer of fruits and vegetables in the country (Fig 1).

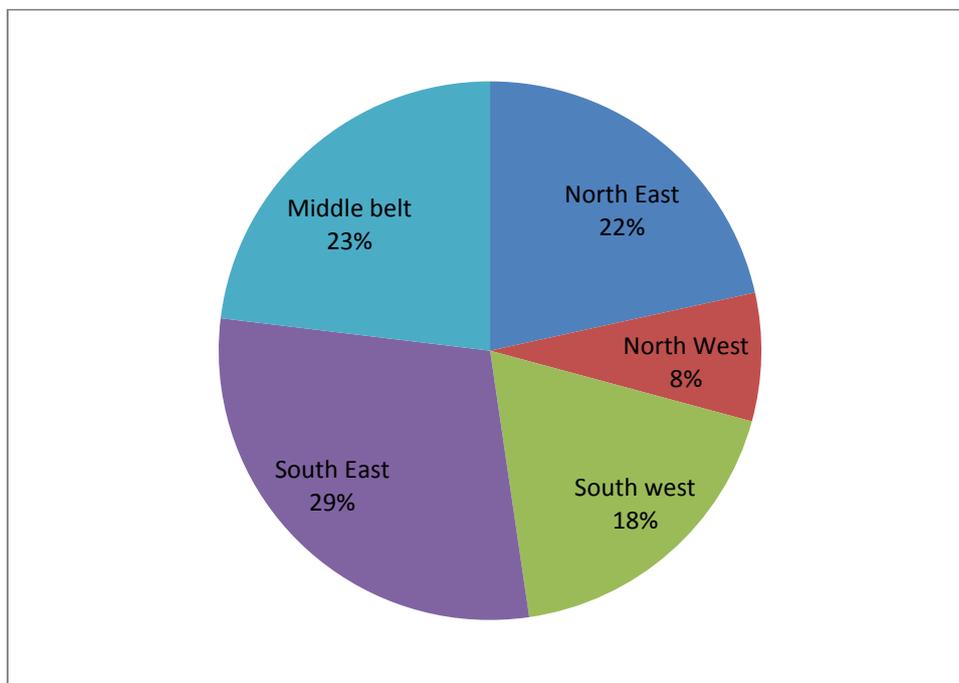


Fig. 1: Comparative advantage of fruits and vegetables production in five agro-ecological zones of Nigeria.
Source: Adedipe *et al*, (1997).



In the South-East zone, popular delicacies, such as *Ofe Onugbu*/Bitter leaf, *Ofe Owerri/Ukazi/Ugu*, *Ofe Akparata* (*Isikebere* vegetable and Akparanta seeds), Utazi and Uziza soup, *Ofe mpoto* (crushed dry cocoyam leaves), *Ofe achara*, *ofe ujuju* etc derive their names from their vegetative content. Apugo (2006) observed that every soup is enriched with green nutritious vegetables that help to build blood and rev up the body's immunity level; and that the natural spices help to enhance the taste of soups and pepper soups.

2. PURPOSE OF THE STUDY

Against the backdrop of the need for a healthy human population, based on exploitation of both the nutritional and medicinal values of plants in the different agro-ecological zones of the country, this study

- i. classified some flora of African origin on the basis of their families;
- ii. ascertained perception of value of these plants;
- iii. identified constraints associated with use of plant products; and

- iv. recommended measures for promoting use of these natural products.

3. METHODOLOGY

The study focused on the South-east ecological zone of Nigeria. Data were derived from (i) extensive review of literature and internet search (ii) field visits and observation and (iii) oral interviews. Information garnered was analyzed with percentages and frequency distribution, Tables and charts.

4. RESULTS AND DISCUSSION

Plant Species Diversity

The study confirmed plant species diversity and utility variation in Nigeria. Plant density was found to be high in the south-east rain forest zone of the country. This increased the possibility of having entangled canopies and roots as plants (including invasive species) compete for nutrients. Poly-Mbah (2008) observed that in typical rain forest area with giant forest trees, trees of medium height, shrubs, low and creeping plants, all associated plants manage to find water, light and air. Table 2 shows taxonomic classification of some common plants in the study area.

Table 2: Most Common African Plants

S/No	Family	Examples
1.	Fabaceae	Indian tamarind, Butter bean, Alfafa, Threflower, Flame of the Forest.
2.	Graminae/Poaceae	Maize, Wheat, Guinea corn, Guinea grass, Bahama grass
3.	Euphorbiaceae	Cat's tail, Ice plant, Croton, Oil seed, Cherry, Cassava.
4.	Solanaceae	Red pepper, Tomato, Cape goosebry, Egg plant, Garden egg.
5.	Rutoceae	Wood apple, Orange, Chinese box, Curry leaf plant, Elephant apple.
6.	Malvaceae	Udo oji, Sida weed, Sida hemp, Water Fern, Okro, Hibiscus.
7.	Curcubitaceae	Fluted pumpkin, Bitter gourd, Water melon, Cucumber, Snake tomato
8.	Compositae/Asteraceae	Bitter leaf, Okpa, Lettuce, Sunflower, Jerusalem artichoke.
9.	Leguminosae	Bean, butterfly, Mucuna, Flamboyant tree, Oil bean.
10.	Verbenaceae	Black plum, Teak, yellow bush flower, White mangrove, Gymelina
11.	Sterculiaceae	African apple, Kolanut, Cocoa, Useful terretia, Looking glass tree.
12.	Papilionaeceae	Cam wood (Abosi), Coral tree, Soybean, Uhie, Uha, Ntururopa, Bambara Groundnut.
13.	Moraceae	Bread fruit (Ukwa), Umbrella tree, Mulberry, Fig tree, Banyan
14.	Convolvulaceae	Sweet potato, Water spinach, Moon flower Cypress vine, dodder.
15.	Mimosaceae	Parrot tree, Male fern, Uke, Sensitive plant, Rain tree.
16.	Apocynaceae	Alamanda, Wax plant, Rubber tree, Utazi, Frangipani.
17.	Amaranthaceae	African spinach, Amaranth, Cocks comb, Bachelor's button, Spinach
18.	Rubiaceae	Quinine plant, Iron wood, Common canthium, Coffee, Ixora.
19.	Apiaceae	Cumin, Fennel, Dill, Coriander, Lovage.
20.	Meliaceae	Carawood, Mahogamy, Persian Liliac, Neem.
21.	Araceae	Taro, Arum lily, Money plant, Water lettuce.
22.	Annonaceae	Bush banana, Masquerade tree, Chinese yam, Pepper fruit, Custard apple, Soursop.
23.	Myrtaceae	Eucalyptus Oil tree, Thunder protector, Guava, Rose apple, Clove.
24.	Rosaceae	Icheku, Japanese Plum, Apricot, Moss rose, Pear.
25.	Zingiberaceae	Bush cane (Opete), Tumaric Ginger, Cardamom Emblic myrobalam.
26.	Palmae	Coconut oil, Palm tree, Mangrove palm, Date palm, Raffia palm.
27.	Liliaceae	Glory lily, Asparagus, Onion, Garlic onion.
28.	Dioscoreaceae	Air potato (Adu), Yam,
29.	Labiatae/Lamiaceae	Mint leaf (Nchanwu), Thyme, Mint plant, Lavender.
30.	Caesalpiniaceae	Wood tree counter, Berlinia, Fever nut, Golden shower, Chakoor.

SOURCE: Adapted from Nwoko (2013)



Their varying characteristics (height, leaf shape, canopy structure, size, orientation etc) make them adapt easily to stress, including sub-optimal and/or abnormal conditions. Some of them exhibit strange, surprising and dangerous habits.

5. POPULARITY OF MEDICINAL PRODUCTS OF PLANT ORIGIN

The study also showed that medicinal products of plant origin have gained popularity, worldwide. The use of these plants and other natural substances for treatment of ailments is now being encouraged either through media advertisement, trade fairs and intervention of the National Agency for Food, Drug Administration and control (Ekong,2010) Every continent has a large store and variety of herbs bestowed on it by nature, and the knowledge of them and their healing or curative powers is passed down from generation to generation, forms the bases of modern pharmacology and pharmaceutical practice (Newswatch, 2013). In south-east zone, locally distilled gin is used for the extraction of curative essence in herbs, roots and barks of medicinal trees. Some may be boiled over a period, while others are ground (Ekong, 2010).

Nigeria market is today flooded with herbal medicine from India, China, America and other Asian countries. Further inquiries showed that the states in the western parts of the country appear to be far ahead of others, including those in South-East, in the tradomedical practice. Addressing the African Regional Forum of International Bar Association in the United States of America, Governor Babatunde Fashola of Lagos State remarked that tradomedical practice has a sizeable followership rooted in belief, its success with those who patronize it, and its economic appeal.

6. ETHNO-MEDICAL PRACTICE

Investigations revealed that ethno-medical practice is location-specific because climatic environmental and toposequence variability combine to influence vegetative endowment of different communities. They also influence vulnerability to diseases and choice of botanical treatment. It is common to find people in a specific environment gather a vast repertoire of knowledge about local ailment and medicinal resource

endowment; and this knowledge passed on from one generation to another. Such herbal therapies can only be efficacious in environments with similar circumstances.

7. MEDICINAL VALUE OF PLANTS

There is an increased level of interest in the medicinal value of naturally-occurring plants in Africa. The frequency and spread of tradomedical fairs and exhibitions in Nigeria speak volumes regarding its acceptance by and support from governmental and non-governmental agencies. What is perhaps controversial today is whether tradomedical practice should play complementary or alternative roles to orthodox medicare within the healthcare system. The Nigerian Medicinal Plants Development Company, under the supervision of the Ministry of Agriculture and National Development, has successfully processed and packaged four medicinal products, namely, Artemisa tea, Artemisa tea plus, Morigvite tea and Morigvite powder for relieve of Malaria, and boosting of body immunity (FMARD, 2012). TASLY pharmaceutical business network, licensed by the Chinese government and supervised by NAFDAC, is all about using botanical drugs/natural herbal medicine to control or cure over 383 ailments and in this way sustain and maintain human health. (Moore, 2009). Furthermore, Plant Resources of Tropical Africa (PROTA), an international organization has since 2000 documented over 500 plants species with medicinal application on her website giving detailed information on use and properties, production and trades, botany, agronomy, processing and genetic resources (Siemonsma and Oyen, 2006).

8. ETHNO-VETERINARY PRACTICE

Ethno-veterinary practice has also increased in rural communities. Profitable animal production demands efficient husbandry of healthy animals (Kaikabo *et al*, 2004); and relies heavily on herbal therapies. A typical example is the experience of Bade pastoralists in Northern Nigeria who rely on indigenous herbs for the treatment and management of their livestock (Table 3). Kaikabo *et al*, (2004) in a study found out that ethno-veterinary practices were adopted by 85.7% of pastoralists in the semi-arid zone of Northern Nigeria.

Table 3: Ethno-veterinary Plants

S/No	Botanical Name/English Name	Diseases
1.	Acacia nilotica	Foot and mouth disease
2.	Striga haemonthica	Relief for Bloat (accumulation of gases in rumen).
3.	Balanite egyptica	Guinea worm parasites (deworming)
4.	Butryosperum parkii	Trypanosomiasis
5.	Khaya senegalensis/Gum arabic tree	Bark extracts used for Colic
6.	Allium sativa or Garlic	Prophylactic treatment of pneumonia



7.	Adansonia digitata/baobab	Leaves used to cure diarrhoea
8.	Tamarindus indica	Seed extract used to drench animals and cure Trypanosomiasis.
9.	Ficus synchomorus	Weakness
10.	Tobacco leaves extract	Ectoparasitism

Source: Kaikabo *et al*, (2004).

9. NEED FOR RESEARCH ON HERBAL MEDICAL PLANTS

A good number of useful plants with pleasant qualities are marginalized in the national cropping systems research. The current National Agricultural Research and Extension delivery plan (1996-2010) provided for arable crop, food and commodity-based National Agricultural Research Institutes in the country. The mandate of these institutes was specific: conduct research and develop agro-technologies on these crops for dissemination primarily by the ADPs in their zones of location. A close look at these crops shows that they form the dominant and compatible crop mixtures with full adaptation to climatic and cultural conditions of the agro-ecological zones. Unfortunately, the crops covered by research and extension appear infinitesimal when compared with over 359,425 plant species on the African continent. (Dutta, (2008) in Nwoko, 2013).

10. CONSTRAINTS TO USE OF HERBAL MEDICINES

Use of herbal therapies is still constrained by seasonality of plants, non-standardization of dosage, poor keeping quality of concoction, and trado-medical practice still cloaked in a cloud of mysticism. This element of secrecy is so strong that often times, practitioners pass on without transferring the knowledge to the next generation.

Traditionalist have, however, been encouraged to submit their drugs for toxicity analysis and classification for the purpose of establishing appropriate dosage, and to establish private gardens where they can grow medicinal plants that are facing extinction due to drought, bush burning or overine (Ekong, 2010)

11. CONCLUSION /RECOMMENDATIONS

It is incontrovertible that herbs form the foundation of pharmacology and pharmaceutical practice, and should either be taken in their natural state or processed to harness their therapeutic constituents. There is need to expand the frontiers of the cropping systems research of National Research Institutes to integrate more plants. Unamma and Edeoga (2004) recommended conducting biologically – feasible and economically – viable crop combinations. In this case, in addition to conducting research on staple crops or dominant crop mixtures of the zone, effort should be made to adapt other

valued crops, even as minor crops to abnormal conditions of new agro-ecological zones. When these naturally-occurring herbal therapies become part of our farming systems, they will become more readily available for consumption resulting in improvement of health and quality of life.

Efforts should be made to further document food and medicinal plants in Nigeria. This should be directed towards correcting erroneous impressions and claims with regards to their safety and potency. Coordinated and collaborative efforts of Universities, Research Institutions, Ministry of Health, NAFDAC and the National Association of Nigerian Traditional Medical Practitioners will produce durable therapies and provide fora where decisions on the status of trado-medical practice, preservation of drugs and patent right issues would be discussed.

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