

A Review of the Potentials of some Selected Vegetables in Nigeria- Towards Eradication of Malnutrition and Food Insecurity among Vulnerable Groups

Ikeyi A. P., Onah, G.T., Ogbonna, A.O., Udedibo R.N and Ugwuanyi, R. C.

Department of Science Laboratory Technology, Institute of Management and Technology, Enugu Nigeria.

Email: adakeyi@yahoo.com

ABSTRACT

Phytochemical, antioxidant and ethno-medicinal potentials of some selected plant species in Nigeria were reviewed. The nutritional values and antioxidant properties arise from their rich phytochemical constituents, which are useful in reducing hunger and fighting diseases. In Nigeria, where diet is dominated by starch as staple food for energy and nourishment, there is the prevalence of malnutrition mostly micronutrient and protein deficiency which accounts for their food insecurity. The tropical rainforest and savannah regions of Nigeria are a reservoir of bio diversity, consisting of different indigenous vegetables with nutritious potentials. These vegetables are the cheapest and most available sources of proteins, vitamins and minerals. However, these vegetables are under cultivated and underutilized due to negligence, ignorance, deforestation, lack of good cultivation practices and use of chemical pesticides. In addition is the rural to urban migration by the younger generation as a result insurgency and internal societal crises. This work will expose the immense potentials of these vegetables, create awareness, encourage consumption, cultivation at commercial levels, preservation and documentation to curb malnutrition and improve food security.

Keywords: Phytochemicals, antioxidants, Nigeria, Vegetables, food security, Malnutrition.

INTRODUCTION

Hunger and malnutrition remain the most devastating problems facing majority of the world's poor especially women, children and the elderly. Despite general efforts towards improvements in food availability, health and social services, hunger and malnutrition still exist in some form, especially in the face of climatic changes, and regional conflicts [1]. In Nigeria where the diet is dominated by starch as staple food for energy and nourishment there is prevailing food insecurity resulting from hunger, malnutrition and micronutrient deficiency [2].

Vegetables are the fresh, leafy, succulent edible parts of herbs or plants eaten fresh, raw, cooked alone or mixed with other foods or as supplementary foods or side dishes [3]. They provide the cheapest, most available sources of vitamins, proteins, minerals, antioxidants, carbohydrates and amino acids. They

maintain alkalinity, acting as buffering agents for acidic substances produced during digestion in the body. The fiber content provides bulk necessary for digestion preventing constipation. Vegetables are also used as medicine in traditional medicinal practice in all regions of Nigeria. Their medicinal potentials lie in their bioactive phytochemical constituents that produces definite physiological changes or action in the body. These bioactive phytochemicals in some cases have been useful precursors for the synthesis of therapeutic agents and useful drugs [4]. Regional conflicts leading to massive rural to urban migration and displacement of persons, industrialization, lack of appropriate propagation practice to improve yield, quality and quantity has led to their underutilization [5]. This review will expose the phytochemical, nutritional and

ethno-medicinal potentials of some vegetables of Nigeria and their role in the

maintenance of health, prevention of diseases and improve food security.

METHODOLOGY

Experimental works done on these indigenous vegetables in Nigeria especially in the field of Biochemistry were retrieved via Google search on the

internet and studied carefully to identify their phytochemical and nutritional compositions and medicinal/therapeutic activities.

RESULTS

1. **AMARANTHUS HYBRIDUS** belongs to the family *Amaranthaceae* and commonly called 'GREEN', smooth *Amaranthus*, *amaranth* or pigweed is widely cultivated throughout Nigeria for its edible leaves and young seedlings. The leaves are eaten as steamed vegetable or in soups and stews, as blood booster, an astringent medicinal tea and as fodder/animal feed [6]. The leaves contain an appreciable amount of nutrients, minerals, vitamins, amino acids, phytochemicals and low levels of toxicants. Studies have shown that the leaf extracts showed anti-bacterial activities [7].

2. **CORCHORUS OLITORIUS** belongs to the family *Malvaceae* and commonly called Jute or wild okra (Yoruba: 'Ewedu', Hausa: 'Rama' and Igbo 'kerenkere' or 'ahihara'). It is consumed as leafy vegetables in soups and stews. The leaves of *Corchorus olitorius* contain Vitamins A, C and E, beta-carotene, potassium, iron, copper, manganese, zinc and calcium. Studies have shown that the leaves significantly demonstrated antimicrobial, anti-inflammatory, wound healing and antioxidant activities [8].

3. **CUCURBITA PEPO** belongs to the family *Cucurbitaceae* and commonly called Pumpkin or Gourd (Igbo: 'anyu' or 'ugbogulu', Yoruba: 'Elegede'). The mature and immature fruits, flowers, long leaf stalks and young leaves are used as vegetables in soups, porridge, and mixed with other foods. In ethnotherapeutics it is a natural antihelminthic, a haemoglobin booster, for rheumatism and prostate disorders. The gourds are also made into ceremonial rattles, cups, ladles, dippers and receptacles for storing precious articles. Studies showed that the leaves of *C. pepo* are rich in protein while the fruits are low in fats, carbohydrates and proteins (3%) and are very rich in carotenoids [9].

4. **GONGRONEMA LATIFOLIUM** belongs to the family *Asclepiadaceae* and commonly called bush buck, (Igbo: 'utazi', Yoruba: 'arokeke', Efik and Ibibio : 'Ursi'). It is widely grown and used as leafy vegetables and as spice for sauces, soups and salads. In traditional medicinal practice, an infusion of the leaves are used to treat cough, intestinal worms, stomach-ache, diabetes , high blood pressure, loss of appetite, a purgative and antimalarial. Lactating women also take it for controlling weight gain, stomachache and in overall postnatal health management. The latex is used to treat dental caries. The fruits are chewed as a laxative. *G. Latifolium* contains essential oils, glycoside, alkaloids, saponins and tannin, various minerals, vitamins and some essential amino acids [10].

5. **NEWBOULDIA LAEVIS** belongs to family *Bignoniaceae* and commonly called African Border Tree (Yoruba: 'Akoko' Tree, Igbo: 'Ogilisi' or 'ogirisi', Hausa: 'Aduruku', Urhobo: 'Ogiriki', Edo state: 'ikhimi', Tiv: 'Kontor', and Ibibio: 'itomö'). In the Nigerian traditional society, it is a sacred tree, a symbol for deities and a symbolic marker for sacred spots [11]. Various plant parts are used in the treatment and management of several disorders such as Arthritis, Rheumatism, Uterine Stimulant, Laxative, Epilepsy, convulsion, Cough, Analgesic, antimalarial and antimicrobial agent. The phytochemical screening of the crude methanolic leaf extracts of *N. laevis* revealed the presence of flavonoids, tannins, terpenes, steroidal and cardiac glycosides [12]; [13].

6. **OCCIMUM GRATISSIMUM** belongs to the family *Lamiaceae* and commonly called Scent leaves, African basil or Clove basil ('Efinrin' in Yoruba , 'Daidoya' in Hausa, 'Nchuanwu' in Igbo and 'Ntong' in Efik). It is cultivated for culinary and medicinal

purposes as a food spice, stimulant, antispasmodic, insects repellent, lowers fevers, colds, headaches, flatulence, post-partum problems, and worms in children. Externally, the leaves are used to treat rheumatism and lumbago. An essential oil obtained from the leaf has shown marked antibacterial activity [14]. Phytochemical screening of this plant has revealed the presence of many active ingredients, such as flavonoids, triterpenes, alkaloids, citral, saponins, eugenol, linalool, methyl cinnamate, camphor, and thymol [15]; [16].

7. *PTEROCARPUS SANTALINOIDES* belongs to the family *Fabaceae* and widely distributed in Nigeria (Igbo: 'NturuUkpa', Hausa: 'gunduru', 'gyadar kurmi', Yoruba: 'gbengbe'). The leaves are eaten as vegetables in soups. Extracts from leaves, roots and stem barks are used in medicinal practice for treating rheumatism, diarrhea, dysentery, cough, malaria, elephantiasis, and skin diseases such as eczema, candidacies, and acne. The foliage provides feeds for livestock while the bark and its exudates are locally used for dyeing textiles. The plant is rich in bioactive substances such as alkaloid, flavonoid, tannin, Saponin, terpenes, cardiac glycoside and Steroid. Studies have shown that the leaves of *P. santalinoides* have negligible anti nutrient composition and high antimicrobial activity [17].

8. *PTEROCARPUS MILDBRAEDII* belongs to the family *Fabaceae* and commonly called the *Padauk* (Igbo: 'Oha' Ibo; Efik/Ibibio : 'mkpa' or 'mkpafere'). The leaves are eaten as vegetables in soups and contains high levels of calcium, potassium, magnesium, iron, copper, manganese, zinc and essential amino acids. The timber has low commercial value. Studies revealed the presence of phytochemicals such as flavonoids, saponins, alkaloids and tannins. Traditionally, the leaves are used to treat malaria, headaches, pains, fever, convulsions, and respiratory disorders [18].

9. *SOLANUM NIGURUM* belong to the family *Solanaceae* and commonly called

African or black nightshade ('Odu' in Yoruba) [19]. The leaves and seeds (berries) are commonly consumed as leafy vegetables in soups, or with Yam and cocoyam porridges and as spinach. The leaves serve as fodder for domestic animals. Phytochemical Studies revealed the presence of alkaloids, saponins, tannins flavonoids and proteins while the mineral elemental constituents include Ca, Mg, Fe, Zn, K, Na, Mn, and P. The leaves are rich in vitamin A, B, and C, in addition to significant antibacterial and antifungal properties [20].

10. *SOLANUM SPECIES* belong to the family *Solanaceae* and commonly called African eggplant or garden egg ('Afufa' or 'anara' in Igbo, 'Dauta' in Hausa and 'Igbagba' in Yoruba). About 25 species of the plant genus *Solanum* is represented in Nigeria They are cultivated for their leaves and fruits and consumed as vegetables. In ethnotherapeutics it is used for constipation, weight loss, obesity, diabetes, glaucoma, rheumatism and as blood and immunity booster [21]. Phytochemical studies revealed the presence alkaloids, flavonoids, saponins, tannins, phenolics and cyanogenic glycosides, high levels of vitamins B2, B3 and C, trace amounts of vitamins B1 and E and high mineral levels of potassium [22].

11. *TALINUM TRIANGULARE* belongs to the family *Portulacaceae* and commonly called waterleaf or spinach (Yoruba: 'gbure', 'lagos bologi', Igbo: 'gbolodi'). It is consumed as vegetables in soups and stews or mixed with other vegetables. It is rich in vitamins A and C, iron and calcium. Phytochemical studies revealed the presence of bioactive compounds namely flavonoids, alkaloids, saponins and tannins. In traditional medicinal practice, the leaves and roots extracts are used for the treatment of asthma, gastrointestinal disorders, Shistosomiasis, scabies, fresh wound cuts, high blood pressure, and anemia. It is drought resistant and can be grown all year round [23].

12. *TELFARIA OCCIDENTALIS* belongs to the family *Cucurbitaceae* and commonly called fluted pumpkin (Igbo: 'Ugu', Yoruba: 'Aporoko', Efik: 'Ubong', Urhobo: 'Umee' and in Edo: 'Umeke'). It is a popular

and staple vegetable grown for its edible green leaves and seeds. Studies reveal leaves and seeds are rich in iron, potassium, sodium, phosphorus, calcium and magnesium, antioxidants, vitamins such as thiamine, riboflavin, nicotinamide and ascorbic acid, essential oils, phytochemicals such as phenols, amino acids such as alanine, aspartate, glycine, glutamine, histidine, lysine, methionine. In traditional medicinal practice the leaf and seed extracts are useful in the management of convulsion, prostate disorders, cholesterolemia, impaired immune systems, anemia and symptoms of protein energy malnutrition [24].

13. VERONONIA AMYGDALINA belong to the family *Asteraceae* and commonly called bitter leaf due to its characteristic bitter taste (Igbo: 'Onugbo', Yoruba: 'Ewuro', Ibibio: 'Etidot', Tiv: 'Ityuna', Edo: 'Eriwo' and Hausa: 'chusar-doki'). Phytochemical studies showed the presence of alkaloids, tannins, flavonoids, saponins, triterpenoids, steroids, cardiac glycosides, reducing sugar, proteins, fats, fibres, amino acids, minerals, vitamins, and carbohydrates [25]. In ethno medicinal practice, the roots and the leaves are used to treat fever, hiccups, stomach discomfort. In addition they serve as antibacterial, antimalarial, antiparasitic, hypoglycemic and blood clotting agents [26].

It can be inferred that vegetables are important part of our diet in the maintenance of good health and for the prevention of diseases. This has been attributed to the important bioactive phytochemical composition of these plants leading to their, nutritional, antioxidant and antimicrobial properties. These bioactive phytochemicals produce definite physiological changes in the body hence their use in ethno therapeutics and traditional medicinal practice. Some of these vegetables originated from the wilds but have been domesticated and

14. MORINGA OLEIFERA belong to family *Moringaceae* and commonly called the drum stick or Horse raddish tree ('Zogale' in Hausa, 'Okwe Oyibo' in Igbo, 'Ewelle' in Yoruba and 'Jeghel-agede' in Tiv) is a tree native to India, but has been planted and domesticated in many other countries, including Nigeria. The leaves, seeds and flowers all have good nutritional, therapeutic and medicinal value. The seeds are eaten roasted. The flowers and the leaves are eaten as vegetables in soups. The flowers and leaves are good sources of vitamins A, B group and C and minerals. The plant has been implicated in the management of many degenerative diseases such as diabetes and hypertension [5].

15. ABELMOSCHUS ESCULENTUS belong to the family *Malvaceae* and commonly called 'Okra' or ladies' finger. The immature fresh and green seedpods are consumed as vegetable in soups and stews. Sometimes the fresh leaves and green pods are cooked and eaten as salads. The different plant parts are used in traditional medicine as antidiabetic, antipyretic, a diuretic and antispasmodic. Studies have shown 'Okra' to be rich in carbohydrate, protein, fat, fiber and pectin, minerals such as K, Na, Mg, Ca, Fe, Zn, Mn and Ni, natural phenols, foliate, vitamins C and A and beta carotene [5].

CONCLUSION

cultivated in the fields where they are readily available as food crops. They are readily available, cheap, resilient, and drought resistant. They can survive in poor or marginal soil conditions and thus can be cultivated all year round [13]. It is concluded therefore that cultivation on commercial scale will reduce hunger and malnutrition and improve food security especially among the vulnerable group. In addition, an effort towards their protection through conservation and documentation is recommended.

REFERENCES

1. Agbafor, K. N and Ezeali, C. (2015). Effects of Leaf and Root Extracts of *Newbouldia laevis* on Hepatic and Renal Systems in Albino Rats. *Journal of Pharmaceutical, Chemical and Biological Sciences*; **3** (3): 367-372
2. Akubugwo, I.E., A.N. Obasi and S.C. Ginika .(2007a). Nutritional Potential of the Leaves and Seeds

- of Black Nightshade-*Solanum nigrum* L. *Var virginicum* from Afikpo-Nigeria. *Pakistan Journal of Nutrition*; **6** (4): 323-326.
3. Akubugwo, I. E., Obasi, N. A., Chinyere, G. C and Ugbogu, A. E. (2007b). Nutritional and Chemical value of *Amaranthus Hybridus* L. Leaves from Afikpo, Nigeria. *African Journal of Biotechnology*; **6** (24): 2833 - 2839.
 4. Egba, Simeon I; Sunday, Godwin I and Anaduaka, Emeka G .(2014).The effect of oral administration of aqueous extract of *Newbouldia laevis* leaves on fertility hormones of male albino rats. *IOSR-Journal of Pharmacy and Biological Sciences (IOSR-JPBS)*; **9**(Issue 3 Ver.I): 61-64.
 5. Eze S.O. and C.Q. Kanu. (2014). Phytochemical and nutritive composition analysis of *Solanum aethopicum* L. *Journal of Pharmaceutical and Scientific Innovation* ;**3** (4): 358-362
 6. Eze Sabinus O.O and Nwanguma, Bennet C .(2013). Effects of Tannin Extract from *Gongronema latifolium* Leaves on Lipoxygenase *Cucumeropsis manii* Seeds. *Journal of Chemistry*. available from: <https://www.hindawi.com/journal/s/jchem/2013/864095/> Retrieved: 17/7/18.
 7. FAO (1992). Nutrition and Development. available from: [www.fao.org/docrep.](http://www.fao.org/docrep/) Retrieved: 20/7/18.
 8. Fagbohun, E. D., Lawal, O. U and Ore, M. E (2012). The Proximate, Mineral and Phytochemical analysis of the leaves of *Ocimum gratissimum*, L. *Melanthera scandans*. A and *Leea guineensis*. L and their medicinal values. *Internal Journal of Applied Biology and pharmaceutical Technology*. **3** (1): 15 - 22
 9. Gbate, Muhammed and Abdullahi Mann. (2012). Evaluation of Nutritional value of dry sason Fadama vegetables in Bida, Nigeria. *African Journal of Bioechnology*. **6**(11): 302 - 307.
 10. Ijeomah, A.U., Ugwuona, F. U. and Abdullahi, H. (2012). Phytochemical composition and antioxidant properties of *Hibiscus sabdariffa* and *Moringa oleifera*. *Nigerian Journal of Agriculture, Food and Environment*. **8**(1):10-16.
 11. Ikewuchi, Catherine C ., Jude C. Ikewuchi and Mercy O. Ifeanacho. (2017). Bioactive phytochemicals in an aqueous extract of the leaves of *Talinum triangulare*. *Food science and nutrition*; **5**(3):696-701
 12. Kadiri, Daniel. (2014). Comparison of Nutritive Values of The Leaves And Stems Of Long -Fruited Jute (*Corchorus Olitorius*) And Local Garden Egg (*Solanum Macrocarpon*). *Science Journal of Agricultural Research and Management*; **129**: 1-3.
 13. Kayode, A.A.A. and O.T. Kayode.(2011). Some Medicinal Values of *Telfairia occidentalis*: A Review. *American Journal of Biochemistry and Molecular Biology*, **1**: 30-38.
 14. Mofunanya, A.A.J., A.T. Owolabi and A. Nkang, (2015). Reaction of *Amaranthus hybridus* L. (Green) to Telfairia Mosaic Virus (TeMV) Infection. *International Journal of Virology*, **11**: 87-95.
 15. Nnamani, C. V., Oselebe, H. O. and Agbatutu, A. (2009). Assessment of nutritional value of three underutilized indigenous leafy vegetables of Ebonyi State Nigeria. *African Journal of Bioechnology*. **8**(9):2321 - 2324.
 16. Njume, C., Goduka, N. I and George, G., (2014). Indigenous leafy vegetables (Imfino morongo and muhuro) in South Africa: A rich and unexplored source of nutrients and antioxidants. *African Journal of Biotechnology*. **13**(19):1933 - 1942.
 17. Nwokorie, C.C.,Nwachukwu, N.C., Ezeanokete,C.C and Ike,C.C. (2015). The phytochemical and antimicrobial analysis of *Pterocarpus santalinoides* plants. *Asian Journal of Science and*

- Technology*; **6** (Issue 05) :1411-1418
18. Ofem O., Ani E and Eno A. (2012). Effect of aqueous leaves extract of *Ocimum gratissimum* on hematological parameters in rats. *International Journal Applied Basic Medical Research.*; **2**(1):38-42
 19. Obembe, Olawole O., Oluwadurotimi S. Aworunse., Oluwakemi A. Bell and Abosede O. Ani. (2017). Multiple Shoots Induction from Indigenous Nigerian Pumpkin (*Cucurbita pepo*L.) *Annual Research & Review in Biology* ; no.ARRB.35756 : 2347-565X,
 20. Oseni, Kadiri and Olawoye, Babatunde.(2015). Underutilized indigenous vegetable (uiv) in Nigeria: a rich source of nutrient and antioxidants- a review *Annals. Food Science and Technology* **16** (Issue 2): 236-247.
 21. Roy, A., Shrivastava, S. L., and Mandal, S. M. (2014). Functional properties of Okra *Abelmoschus esculentus* L. (Moench): Traditional claims and scientific evidences. *Plant Science Today*, **1**(3), 121-130.
 22. Udochukwu, U., F.I. Omeje., I. S. Uloma and F. D. Oseiwe.(2015). Phytochemical analysis of *Vernonia amygdalina* and *Ocimum gratissimum* extracts and their antibacterial activity on some drug resistant bacteria. *American Journal of Research Communication*; **3**(5): 225-235
 23. Ugwoke, C. E. C., U Nzekwe, and G.I Ameh. (2010). Phytochemical constituents and ethnobotany of the leaf extract of bitter leaf (*Vernonia amygdalina*) Del. *Journal of Pharmaceutical and Allied Sciences*; **7**(3):
 24. Usunobun, Usunomena and Igwe, V. Chinwe. (2016). Phytochemical screening, mineral composition and in vitro antioxidant activities of *Pterocarpus mildbraedii* leaves. *International Journal of Scientific World*; **4**(1): 23-26
 25. Usunobun, Usunomena and Okolie, P. Ngozi .(2016). Phytochemical analysis and proximate composition of *Vernonia amygdalina*. *International Journal of Scientific World*; **4**(1): 11-14
 26. Usman H, and Osuji J. C.(2007). Phytochemical and in vitro antimicrobial assay of the leaf extract of *Newbouldia laevis*. *African Journal of Traditional, Complementary and Alternative Medicine*; **4**(4):476-80.