

# Culinary Herbs and Spices for Promotion of Health and Wellness in Nigeria

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**Abstract:** Nigeria has several culinary herbs and spices with medicinal, pharmaceutical and industrial uses. This paper presents the importance of selected culinary herbs and spices for promotion of health and wellness in Nigeria, such as: ginger (*Zingiber officinale*), garlic (*Allium sativum*), black pepper (*Piper Nigrum*), African nutmeg (*Monodora myristica*), alligator pepper (*Aframomum melegueta*), negro pepper (*Xylopiya aethiopicum*), aidan tree (*Tetrapleura tetraptera*), African basil (*Ocimum gratissimum*), African locust bean (*Parkia biglobosa*), amaranth globe (*Gongronema latifolium* Benth), and turmeric (*Curcuma longa*). Culinary herbs and spices in Nigeria contain beneficial phytochemicals with great potentials as functional foods and nutraceuticals. They possess cholesterol-lowering and antidiabetic effects, as well as antimicrobial, antimycobacterial, antifungal, antioxidant, antibacterial, antibiotic, anti-inflammatory and antihepatotoxicity properties for treatment of diseases and for promotion of health and wellbeing of Nigerians.

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## I. INTRODUCTION

The leaf, root, bark, berry, bud, seed, stigma of a plant or flower used for the purpose of cooking or enhancing the flavor of foods including meats, sauces, vegetables and desserts are commonly referred to as herbs and spices (Opara and Chohan, 2014). Herbs are low growing plants which bear seeds and do not have wooden stems, used for culinary, medicinal and spiritual uses (Kutama *et al.* 2015). Spices are parts of plants that due to their properties are used as colorants, preservatives or medicine (Torres *et al.* 2015). According to Singab and Eldahshan (2015), the US. Food and Drug Administration (FDA) define a spice as an “aromatic vegetable substance whose significant function in food is seasoning rather than nutrition and from which no portion of any volatile oil or other flavoring principle has been removed”. But herbs are defined as leafy and green part in non-woody plants of temperate climate zone. When fresh, herbs are more fragrant, but spices are mostly stronger as dried powders. Spices and culinary herbs are economically important plants (Dawang *et al.* 2016), which have been used as food and medicinal purposes for centuries (Opara and Chohan, 2014; Jhansi and Manjula, 2015; Leja and Czaczyk, 2016), and to fortify foods throughout history as coloring, flavoring and therapeutic agents, preservatives, food additives and medicine (Ali *et al.* 2018; Sachan *et al.* 2018; El-Sayed and Youssef, 2019). From older times, spices had played a vital role in the lifestyle of people from certain parts of the world. Herbs and spices have been used for generations by humans as food and to treat ailments (Sachan *et al.* 2018). Singab and Eldahshan (2015) observed that in some cases both herb and spice may come from the same plant: Dill (*Anethum graveolens*) is an example; the seeds from the dill plant are spices, while the stalk of the plant is herb.

Spices and herbs are well known food ingredients, which enhances the flavor and aroma of the supplemented foods (Ereifej *et al.* 2015), spices have been shown to be indispensable for daily human health, besides adding flavor and taste to dishes, they help prevent and alleviate various health problems (Kunnumakkara *et al.* 2009). Spices and herbs are ubiquitous in food systems, utilized for adding culinary interest, improving quality, preserving food, and extending shelf-

life (Duncan *et al.* 2017). All processed spices have shelf lives. Flavour is maximized by storing a spice whole and grinding when needed. A whole dried spice has the longest shelf life, so it can be purchased and stored in larger amounts, making it cheaper on a per-serving basis. The shelf life of a whole spice is roughly two years; of a ground spice roughly six months (Olife *et al.* 2013). Spices are generally regarded as fresh or dried seeds, fruits or vegetative substance primarily used for flavouring, colouring or preserving food. They are available in several forms: fresh, whole dried, or pre-ground dried and usually aromatic and pungent (Achinewu *et al.* 1995; Olife *et al.* 2013). Spices not only add flavor and taste to food, but also exhibit tremendous health benefits (Kunnumakkara *et al.* 2018). Culinary herbs and spices and can be used for edible purposes (in cooking food, soups, stew, salads and drinks) or medicinally in the treatment of various ailments (Dawang *et al.* 2016). Herbs and spices are integral part of daily diet (Mann, 2011). There are several medicinal uses of spices in our daily life, many spices are used in kitchen and have certain medicinal activity like purgative, laxative, expectorant, carminative, diuretic etc. Since ancient time and till today spices are used for many purposes medicinally (Sachan *et al.* 2018). Spices, as part of diets, have holistic effects on human health (Sachan *et al.* 2018). Generally, a good number of herbs and spices have been found to possess antimicrobial properties (Billing and Sherman, 1998; Souza *et al.* 2005; Muluye *et al.* 2014; Ereifej *et al.* 2015; Torres *et al.* 2015), antimycobacterial potentials (Neha *et al.* 2017), antifungal effects (El-Mougy and Abdel-Kader, 2007), cholesterol lowering and anti-diabetic effects (Kwada and Tella, 2009), antioxidant and antibacterial properties (Eleyinmi, 2007; Nikousaleh and Prakash, 2008; Kochhar, 2008; Torres *et al.* 2015; Nugboon and Intarapichet, 2015; Słowianek and Leszczyńska, 2016), antibiotic properties (Edim *et al.* 2012), anti-inflammatory properties (Thomson *et al.* 2002; Kochhar, 2008; Muluye *et al.* 2014). Other properties of spices include: modulation of detoxification enzymes and modulation of steroid metabolism (Kochhar, 2008). The antioxidant, antimicrobial and anticancer components present in herbs could enable them to enhance the health and medical status of human being (Singab and Eldahshan, 2015; El-Sayed and Youssef, 2019). The need for new therapeutic agents is pertinent and spices are considered as promising agents (Rios and Recio, 2005). According to Olife *et al.* (2013), majority of Nigerian spices are found in the southern rainforest zone of the country, while others such as garlic (*Allium sativum*) and ginger (*Zingiber officinale*) are predominant in the northern zone. Nigeria has several indigenous spices namely: *Allium cepa* Linn and *A. Sativum* Linn, *Anona senegalensis* Pers, *Capiscum annum* L and *C. frutescens* L, *Cymbopogon citratus* L, *Gnetum africanum*, *Gongronema latifolium*, *Ocimum gratissimum* Linn, *Parkia biglobosa* Linn, *Xylopiia aethiopica*, among others. Nigerian farmers cultivate spices such as curry (*Murraya koenigii*), (*Ocimum basilicum*), (*Ocimum gratissimum*), ginger (*Zingiber officinale*), Ethiopian/guinea/negro pepper (*Xylopiia aethiopica*), black pepper (*Piper guineense*) and turmeric (*Curcuma longa*). Similarly, Muhammad and Amusa, (2005) listed some common examples of culinary herbs and spices in Nigeria such as: nutmeg (*Myristica fragans*), pepper (*Piper nigrum*), clove (*Eugenia caryophyllata*), mustard (*Brassica juncea*), garlic (*Allium sativum*), onion (*Allium cepa*), curry (*Ocimum canum*), ginger (*Zingiber officinale*), and cinnamon (*Cinnamomum burmannil*).

Nigerian culinary herbs and spices have shown high potential as functional ingredients in traditional snacks (Mann, 2011), and for becoming international commodities as pharmaceutical raw material due to their inherent health benefits and the bioactive compounds found in them. Extracts of these plants could be sources of important molecules that could be used to produce nutraceuticals (Egharevba and Gamaniel, 2017). The potentials of herbs and spices as functional food and nutraceuticals is generating renewed interest among researchers across the globe due to increasing knowledge and curiosity about their health benefits (Egharevba and Gamaniel, 2017). Culinary herbs and spices have been applied in several industries for the promotion of health and wellbeing of individuals, such as: medicine, food industry, cosmetology and pharmacy (Leja and Czaczyk, 2016), and pharmaceutical industries (Egharevba and Gamaniel, 2017). Olife *et al.* (2013) listed 23 spices processors and marketers in Nigeria, with 11 imported spice brands in Nigeria. Egharevba and Gamaniel (2017) reported that drugs such as Niprisan, Niprisan plus, Niprimune and Niprimal contain substances used as herbs or spices. Despite these potentials, culinary herbs and spices are largely underutilized in Nigeria with a dearth of information on their cultivation and uses. Although indigenous people developed different methods for collecting, processing, using and conserving culinary herbs and spices in Nigeria, Nwinuka *et al.* (2005) observed some levels of toxicants (anti-nutrients) in some spices. Hence, Olife *et al.* (2013) suggested the following strategies for optimal exploitation and utilization of spices in Nigeria: (i). protection and maintenance of wild grooves. (ii). domestication and cultivation of wild spices. (iii). discouraging over exploitation of wild species and bush burning. (iv). establishment of research and market gardens. (v). organization of spice farmers into cooperatives. (vi). supply of improved spice varieties to farmers. (vii). establishment of processing clusters. (viii). maintenance of standards. (ix). funding of research and development. Table 1 shows some common culinary herbs and spices in Nigeria.

Table 1: Common Nigerian culinary herbs and spices

Common name	Scientific name	Hausa name	Igbo name	Yoruba name
Scent leaf (Basil), Tea bush	<i>Ocimum basilicum</i> , <i>Ocimum gratissimum</i>	Daldoya, Doddoya	Nchanwu	Efirin
Ginger	<i>Zingiber officinale</i>	Citta	Jinja	Ataile, Ataile pupa
Small chili pepper	<i>Capsicum annum</i>	Borkwono/ twassi	Osenkiri	Atawewe
Bird chilies	<i>Capsicum frutescens</i>	Borkwono	Ose	Tatase Atarodo
Curry leaf	<i>Ocimum canum</i>	Doodaya	Nchanwu	Efirinoso
Alligator pepper	<i>Aframomum melegueta</i>	Kaninfari	Oseoji	Atare
Ethiopian pepper	<i>Xylopia aethiopica</i>	Kimba	Uda	Eeru
Black pepper	<i>Piper nigrum</i>	Mosoro, Masora	Uziza	Iyere
Locust bean	<i>Parkia clappertoniana</i>	Dawadawa	Ogiri-igala	Iru, Tokoro
Garlic	<i>Allium sativum</i>	Tafarnuwa	Galiki	Aayu
Onions	<i>Allium cepa</i>	Alibasa, Albasa	Yabasi, ayo	Alubosa
Pepper fruit	<i>Dennettia tripetala</i>	Daniya	Mmimi	Ata igbere
African nutmeg	<i>Monodora myristica</i>	Gujiya dan miya, Gyadar kamshi	Ehuru	Ehir, Abo lakoshe
Amaranth globe, Bush buck, Tafel boom	<i>Gongronema latifolium</i>	-	Utazi	Madumaro, Arokeke
Aidan	<i>Tetrapleura Tetraptera</i>	Dawa	Uzaguza, Oshosho	Ariden
Turmeric	<i>Curcuma longa</i>	Kurkur, gangamau	Jinja uhe	Ataile pupa
Pepper mint	<i>Mentha piperita</i>	Na'a na'a	-	Ewe
Pepper fruit	<i>Dennettia tripetala</i>	Daniya	Mmimi	Ata igbere
Clove	<i>Syzygium aromaticum</i>	Kanumfara	Kanafuru	Kloovu
Fenugreek	<i>Trigonella foenum</i>	Kimba	Fenugrik	Eru

Figure 1 shows some selected culinary herbs and spices in Nigeria.

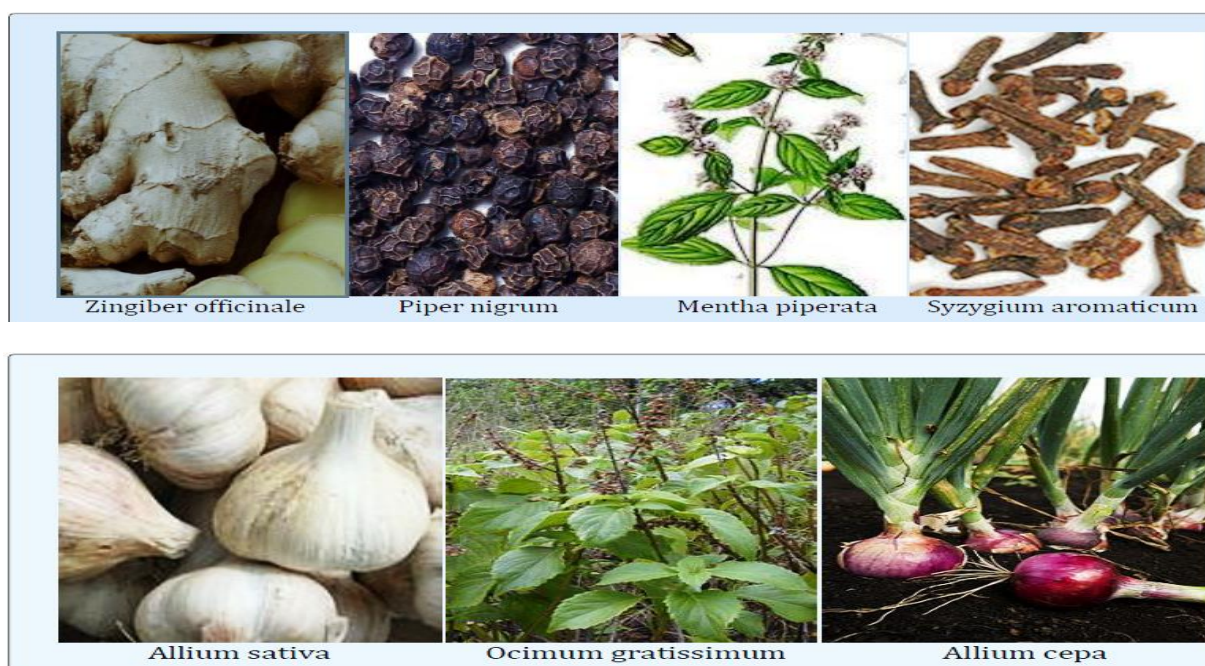


Fig. 1. Some selected culinary herbs and spices in Nigeria.

Source: Ali *et al.* (2018).



Table 2 shows spice plant classifications and major active components.

**Table 2. Spice plants classification and main active principles of the spices**

Common name	Scientific name	Family	Major active component	Extracted plant part
Anis	<i>Pimpinella anisum</i>	<i>Umbelliferae</i>	anetol	seeds
Ammi	<i>Ammi visnaga</i>	<i>Umbelliferae</i>	visnagin	florescence
Basil	<i>Ocimum basilicum</i>	<i>Lauraceae</i>	linallol	leaves
Caraway	<i>Carum carvi</i>	<i>Umbelliferae</i>	carvone	seeds
Garlic	<i>Allium sativum</i>	<i>Liliaceae</i>	allicin	cloves
Carnation	<i>Dianthus caryophyllus</i>	<i>Umbelliferae</i>	eugenol	flowers
Chamomile	<i>Matricaria chamomilla</i>	<i>Compositae</i>	isobutyle	flowers
Cinnamon	<i>Cinnamomum burmannil</i>	<i>Lauraceae</i>	cinnamic aldehyde	cortical tissues
Coriander	<i>Coriandrum sativum</i>	<i>Umbelliferae</i>	linallol	seeds
Cumin	<i>Cuminum cyminum</i>	<i>Umbelliferae</i>	phellandrene	seeds
Fennel	<i>Foeniculum vulgare</i>	<i>Umbelliferae</i>	anethol	seeds
Fenugreek	<i>Trigonella foenum</i>	<i>Fabaceae</i>	trigonelline	seeds
Halfa-Gar	<i>Cymbopogon proximus</i>	<i>Geraminae</i>	saponin	leaves
Henna	<i>Lawsonia inermis</i>	<i>Lythraceae</i>	ionone	leaves
Marjoram	<i>Origanum majorana</i>	<i>Labiatae</i>	carvacrol	leaves
Mint	<i>Mentha piperita</i>	<i>Labiatae</i>	carvone	leaves
Rosemary	<i>Rosmarinus officinalis</i>	<i>Labiatae</i>	borneol	leaves
Salvia	<i>Salvia officinalis</i>	<i>Labiatae</i>	saliva	leaves
Thyme	<i>Thymus vulgaris</i>	<i>Labiatae</i>	thymol	seeds
Wormwood	<i>Artemisia absinthium</i>	<i>Compositae</i>	thujone	leaves

Source: El-Mougy and Abdel-Kader (2007).

The functional and nutraceutical components in common herbs and spices and their health benefits are shown in Table 3.

**Table 3. Common and nutraceutical components of common herbs and spices.**

Common name	Biological name	Constituent	Health benefits
Garlic	Dried bulbs of <i>Allium sativum</i> (Liliaceae).	Alliin and allicin	Anti-inflammatory, antibacterial, antigout, nervine tonic
Maiden hair tree	Leaves of <i>Ginkgo biloba</i> (Ginkgoaceae).	Ginkgolide and bilobalide	PAF antagonist, memory enhancer, antioxidant
Ginger	Rhizomes of <i>Zingiber officinale</i> (Zingiberaceae.)	Zingiberene and gingerols	Stimulant, chronic bronchitis, hyperglycemia and throat ache
Echinacea	Dried herb of <i>Echinacea purpurea</i> (Asteraceae)	Alkylamide and echinacoside	Anti-inflammatory, immunomodulator, antiviral
Ginseng	Dried root of <i>Panax ginseng</i> (Araliaceae)	Ginsenosides and Panaxosides	Stimulating immune and nervous system and adaptogenic properties
Liquorice	Dried root of <i>Glycyrrhiza glabra</i> (leguminosae)	Glycyrrhizin and liquirtin	Anti-inflammatory and Anti-Allergic, Expectorant
St. John's wort	Dried aerial part of <i>Hypericum perforatum</i> (Hypericaceae)	Hypericin and hyperforin	Antidepressant, against HIV and hepatitis-c virus <sup>18f</sup>
Turmeric	Rhizome of <i>Curcuma Longa</i> (Zingiberaceae)	Curcumin	Anti-inflammatory, antiarthritic, anticancer and antiseptic
Onion	Dried bulb of <i>Allium cepa</i> Linn. (Liliaceae)	Allicin and alliin	Hypoglycemic activity, Antibiotic and anti-atherosclerosis
Valeriana	Dried root of <i>Valeriana officinalis</i> Linn. (Valerianaceae)	Valerenic acid and valerate	Tranquillizer, migraine and menstrual pain, intestinal cramps, bronchial spasm.
Aloes	Dried juice of leaves <i>Aloe barbadensis</i> Mill. (Liliaceae)	Aloins and aloesin	Dilates capillaries, anti-inflammatory, emollient, wound healing properties
Goldenseal	Dried root of <i>Hydrastis Canadensis</i> . (Ranunculaceae)	Hydrastine and berberine	Antimicrobial, astringent, antihemorrhagic, treatment of mucosal inflammation
Senna	Dried leaves of <i>Cassia angustifolia</i> (Leguminosae)	Sennosides	Purgative,
Asafoetida	Oleo gum resin of <i>Ferula assafoetida</i> L. (Umbelliferae)	Ferulic acid and umbellic acid	Stimulant, carminative, expectorant
Bael	Unripe fruits of <i>Aegle marmelos</i> Carr. (Rutaceae)	Marmelosin	Digestive, appetizer, treatment of diarrhea and dysentery
Brahmi	Herbs of <i>Centella asiatica</i> (Umbelliferae)	Asiaticoside and madecassoside	Nervine tonic, spasmolytic, anti-anxiety

Source: Jhansi and Manjula (2016).

Table 4 shows antioxidant compounds isolated from selected herbs and spices.

**Table 4. Antioxidants isolated from selected herbs and spices.**

Spice/herb	Scientific name	Antioxidant compounds	Mode of action
1	2	3	4
Rosemary	<i>Rosemarinus officinalis</i>	carnosol, carnosic acid, rosmanol, rosmadial, diterpenes (epi-rosmanol, isorosmanol, rosmaridiphenol), rosmariquinone, rosmarinic acid	scavenge superoxide radicals, lipid anti-oxidant, and metal chelator
Sage	<i>Salvia officinalis</i>	carnosol, carnosic acid, rosmanol, rosmadial, methyl and ethyl esters of carnosol, rosmarinic acid, ascorbic acid, beta carotene, beta-sitosterol, camphene, gamma-terpinene, hispidulin, labiatic acid, oleanolic acid, terpinen-4-ol, ursolic acid, selenium, salvigenin, nevadensin, apigenin, cirsoleol, cirsimaritin	free radical scavenger
Oregano	<i>Origanum vulgare</i>	rosmarinic acid, caffeic acid, protocatechuic acid, 2-caffeoyloxy-3-[2-(4-hydroxybenzyl)-4,5-dihydroxy] phenylpropionic acid; flavonoids – apigen, eriodictyol, dihydroquercetin, dihydrokaempferol; carvacrol, thymol, Camphene, gamma-terpinene, terpinen-4-ol, myricene, linalyl-acetate	free radical scavenger
Thyme	<i>Thymus vulgaris</i>	thymol, carvacrol, p-Cumene-2,3-diol, phenolic acids (gallic acid, caffeic acid, rosmarinic acid), phenolic diterpenes, flavonoids, ascorbic acid, beta carotene, isochlorogenic acid, labiatic acid, p-coumaric acid, rosmarinic acid	free radical scavenger, oxygen scavenger
Ginger	<i>Zingiber officinale</i>	gingerol, shogaol, zingerone, ascorbic acid, beta carotene, caffeic acid, camphene, gamma-terpinene, p-coumaric-acid, terpinen-4-ol	free radical scavenger, oxygen scavenger
Turmeric	<i>Curcuma domestica</i>	curcumins, 4-hydroxycinnamoyl methane	free radical scavenger
Black pepper	<i>Piper nigrum</i>	kaempferol, rhamnetin, quercetin, ascorbic acid, beta carotene, ubiquinone, camphen, carvacrol, eugenol, gamma-terpinene, methyl eugenol, piperine	free radical scavenger
Chili pepper	<i>Capsicum frutescens</i>	capsaicin, capsaicinol	free radical scavenger
Clove	<i>Eugenia caryophyllata</i>	phenolic acids (gallic acid), flavonol glucosides, phenolic volatile oils (eugenol, acetyl eugenol, isoeugenol), tannins	free radical scavenger, metal chelator
Marjoram	<i>Majorana hortensis</i>	beta-carotene, beta-sitosterol, caffeic acid, carvacrol, eugenol, hydroquinone, linalyl-acetate plant, myricene, rosmarinic acid, terpinen-4-ol, beta carotene, caffeic acid, tannin, myricene, phenol, trans-anethole, ursolic acid, oleanolic acid	free radical scavenger
Cumin	<i>Cuminum cyminum</i>	cuminal, γ-terpinene, pinocarveol, linalool, 1-methyl-2-(1-methylethyl)benzene, carotol, apigenin, luteolin, cuminaldehyde, cuminic alcohol, p-cymene, β-pinene	free radical scavenger, metal chelator
Peppermint	<i>Mentha x piperita</i>	ascorbic acid, beta-carotene, narirutin, eriodictyol, eriodictyol 7-O-β-glucoside, eriocitrin, hesperidin, isorhoifolin, luteolin 7-O-β-glucoside, luteolin 7-O-rutinoside, diosmin, rosmarinic acid, caffeic acid, piperitoside, menthoside, lithospermic acid	free radical scavenger, oxygen scavenger
Garlic	<i>Allium sativum</i>	caffeic, vanillic, p-hydroxybenzoic, and p-coumaric acids, allicin	free radical scavenger, metal chelator

Source: Leja and Czaczyk, (2016).

## II. BENEFITS OF SELECTED CULINARY HERBS AND SPICES IN NIGERIA

### 1. Ginger (*Zingiber officinale*)

Ginger is a herb whose rhizome is widely used as a medicine, or as a spice in cooking throughout the world and especially used in kitchen (Sachan *et al.* 2018). In the Nigerian market, ginger is well known and on high demand even though it is quite expensive. Kaduna state is the highest producer of the crop, Gombe, Bauchi, Benue and Nassarawa states among others are also major producers of the crop. Ginger is widely used throughout the world for treating loss of appetite, nausea and vomiting after surgery, nausea resulting from cancer, flatulence, stomach upset and morning sickness. Some people find ginger helpful in relieving the symptoms of upper respiratory tract infection, bronchitis, cough, menstrual cramps and muscle pain. Phytochemical constituents of the plants include saponins, tannins, anthraquinones, glycosides (Ajayi *et al.*, 2013). Ginger has been reported to have antibacterial (Abitogun and Badejo, 2010), antioxidant (Azeez *et al.*, 2012), anti-inflammatory and anti-ulcerogenic (Anosike *et al.*, 2009) properties.

## 2. Garlic (*Allium sativum*)

The consumption of garlic has the potential to reduce arterial plaque and possess antioxidant properties on skin cancer (Das and Saha, 2008), alongside antimicrobial properties (Olusanmi and Amadi, 2010). This spice has also been used in folk medicine for diabetes and inflammation treatment (Sachan *et al.* 2018). According to Thomson *et al.*, (2002), the consumption of ginger led to reduction in blood cholesterol and also served as a potential anti-inflammatory and antithrombotic agent. The crop has been known to have several food and medicinal uses. It is used for preserving meat and meat products, used as spices in salad and for seasoning of vegetables. Garlic extracts are used in curing whooping cough, lung diseases, and stomach pain and child birth disorder. The extract could be used against ear-ache, hypertension, eye sores, an antidote against poisons as well as antibacterial. Garlic could also be used as an insecticide and could also reduce cholesterol level in human blood (Hamma *et al.*, 2013). Phytochemical constituents of the plant include alkaloids, glycosides, saponins, flavonoids, steroids, proteins, carbohydrates, oils, reducing sugars and acidic compounds (Ameh and Nwammoh, 2010).

## 3. Black Pepper (*Piper Nigrum*)

Black pepper is used for nearly all soups and all other foods especially in Eastern parts of Nigeria. The leaves and seeds of this flowering vine are used for the special taste, flavor and aroma they add to soups, stews, sauces, vegetable dishes, salads, and other dishes. Black pepper is the world's most traded spice. In Nigeria, sometimes, black pepper leaves are preserved by sun-drying while the ripe seeds are ground and bottled for use. Black pepper is mostly used for its dietary source of Vitamin C, Vitamin K and manganese other than as culinary. It has a long history of medicinal benefits with antioxidant (Gulcin, 2005), anti-microbial (Dorman and Deans, 2000), and anti-mutagenic properties (El-Hamss *et al.*, 2003). It prevents for cold and catarrh, helps to improve appetite and digestion, promotes sweating and urination. Phytochemical constituents include alkaloids, flavonoids, essential oil, terpenoids (Gupta *et al.*, 2013). Nwose (2009) reported the importance of pepper as antioxidant nutrition therapy used to treat cardiovascular diseases, diabetes, erectile dysfunction and respiratory diseases. Another variety of black pepper known as African black pepper (*Piper guineense*) is a West African spice plant with medicinal property and widely used traditionally in the treatment of various ailments (Besong *et al.* 2016). The phytochemical studies of the plant revealed the presence of proteins, carbohydrates, alkaloids, steroids, glycosides, saponins, flavonoids, tannins and phenolic compounds. It also contains vitamins, minerals and fat. Various studies have been done on the plant to determine its pharmacological and therapeutic properties such as antibacterial, antioxidant, anti-inflammatory, hepatoprotective, fertility, aphrodisiac, anticonvulsant and larvicidal properties.

## 4. African Nutmeg (*Monodora myristica*)

African nutmeg, also known as calabash nutmeg, grows naturally in evergreen forests from Liberia, Nigeria, Cameroon, to Uganda and Kenya. African nutmeg is cultivated mainly in the Southern parts of Nigeria. The seeds are economically and medicinally important and the kernel obtained from the seed is a popular condiment used as a spicing agent in both African and continental cuisines in Nigeria (Okafor, 1997). Reports on the phytochemical screening of the seeds of this plant revealed the presence of flavonoids, glycosides, saponins, cyanogenic glycosides, tannins, steroids, oxalates and phytates (Ekeanyanwu *et al.*, 2010). Like other Nigerian spices, African nutmeg is said to be highly endowed with medicinal properties. The root is chewed to relieve toothache and arthritis while the seed is used to relieve anaemia, hemorrhoids, erectile dysfunction and more. The seed is used locally in the treatment of cough, headache, fever, skin diseases and when ground to powder, helps relieve constipation and control passive uterine hemorrhage in women immediately after child birth (Kigigha and Enebi, 2012). Nutmeg essential oil possesses an excellent anti-carcinogenic protecting activity (Singab and Eldahshan, 2015). The antibacterial effect of the oily seed extracts of African nutmeg has been reported (Udoh *et al.*, 2004), and the alcoholic extracts of the seed showed the ability to reverse the toxigenic effects of aflatoxin (Oluwafemi and Taiwo, 2009). African nutmeg is used to flavor and thicken dishes and it is also a substitute for nutmeg. Traditionally, it is ground or grated and used as a seasoning. The spice is usually fried and ground and used for preparing 'native salad' (*ugba*, and *abacha*) in the southeastern part of Nigeria. In northern Nigeria, this spice is dried and ground, and then used as seasoning for virtually all sorts of dishes. The powdered form of African nutmeg is found in northern Nigeria where it is used in meat dishes including *suya* and different stews as well as pepper soups. Nutmeg is used to treat complaints of the digestive tract, such as stomach cramps and diarrhea, as well as catarrh of the respiratory tract (Mann, 2011).

#### 5. Alligator Pepper (*Aframomum melegueta*)

Generally, in Nigeria, the seed of Alligator pepper is used in different formations for nutrition and food purposes. The tiny seeds are extracted from its pods and then grounded and added to soups and stews. This is meant to produce a special tasty flavor, peppery taste and fruity undertone to the soups. For medicinal uses, those suffering from ailments like arthritis, boils, pimples and inflammatory diseases, chew alligator pepper for relief. Also, it is known for its anti-inflammatory properties, antimicrobial properties used in the treatment of related diseases like dental problem, asthma and body weakness (Echo *et al.*, 2012). The cultivation of this species is difficult and cannot be sustained through natural regeneration due to seed dormancy caused by hard seed coats. It is, however, convenient and most effective to multiply this species through seed-based means, but the seeds are tiny and require good nursery techniques (Idu, 2009). Phytochemical constituents include: alkaloids, tannins, saponins, steroids, cardiac glycosides, flavonoids, terpenoids, phenol (Doherty *et al.*, 2010). Reported pharmacological activities include antioxidant, antiglycation (Kazeem *et al.*, 2012), and antimicrobial (Doherty *et al.*, 2010) activities.

#### 6. Negro Pepper (*Xylopiya aethiopica*)

Negro pepper comes from the tropical West African rain forest tree but its seeds and leaves are widely used in all parts of Nigeria and indeed all over the world as spice and medicine. The spice is aromatic, has an intense flavor and is slightly bitter. The seeds are embedded in pods. In West Africa, the tree can flower and produce two crops of pods a year. In some food and soups, the pods are opened up and the sticky black seeds are removed and discarded because of their bitterness. In others, the pods and seeds are toasted over open fire and then crushed. Some of its pharmacological properties have been scientifically established. Some reports show that Negro pepper has blood sugar lowering effects. It is used for bronchitis, dysentery, painful febrile conditions, and as a laxative. In Eastern Nigeria, where it appears to be more used than elsewhere in Nigeria, it is the culinary herb of choice for nursing mothers. Negro pepper is used for cooking pepper soups, nsala soup for lactating mothers, as well as several other dishes. In Northern Nigeria, where it is called *kimba*, it is ground and used in seasoning meat and a variety of other dishes.

#### 7. Aidan tree (*Tetrapleura tetraptera*)

The Aidan tree, a deciduous perennial native to West Africa, has many uses. It is referred to as *apapa* in Ijaw, while the Binis call it *ighimiaka*. The fruit of the Aidan tree has its unique flavor and aroma that spices up white soup (*afia afere* in Efik or *ofe nsala* in Igbo). In Ibibio land, it is used in spicing nearly all foods. The Igbo tribe in Nigeria use it mainly for cooking pottage. Ijaw people use it to prepare pepper soups and other dishes. The plant is used as a spice, a medicine and as a dietary supplement rich in vitamins. The stem bark, fruits and pods are used for various medicinal purposes. The pods notably have an appealing culinary use for mothers from the first day of delivery to post parturition and as lactation aid (Enwere, 1998). The spice is widespread in southern Nigeria where it is used by traditional healers for the management and treatment of arthritis and other inflammatory related diseases like asthma, diabetes mellitus, hypertension, epilepsy, schistosomiasis etc.

#### 8. African Basil (*Ocimum gratissimum*)

This very important culinary herb is widely used all over the world. As an awesome multi-purpose plant, used fresh or dried, African Basil is commonly cultivated for dietary and medicinal uses. Due to its peculiar and pungent aroma, African Basil is known all over Nigeria as *scant leaf*. Its use as meat seasoning in contemporary Nigeria is almost without equal among Nigerian culinary herbs. Others put the leaves in salads. It tastes great in stews. For its taste and strong aroma, the Ijaw from south-southern part of Nigeria use the leaves in sauces, soups, and meat. It is used in the famed *ekpang nkukwo* soup of the Efik and Ibibio people. It has also been an Igbo plant for ages and tastes great with *ofe akwu*, *ukwa* and other Igbo delicacies. The plant serves as a mosquito repellent, and is used for the traditional treatment of fever, tooth and gum disorders. The pulped foliage is believed to have antiseptic properties. Phytochemical constituents include tannins, flavonoids, terpenoids, saponins and alkaloids (Mann, 2012). It has been reported to have anti-inflammatory, antibacterial, antifungal, anti-carcinogenic and antioxidant properties (Mann, 2012).

#### 9. African Locust Bean (*Parkia biglobosa*)

The African locust bean is a commonly used spice throughout the Nigerian lands and regions. Together, the trio of *iru*, *ogiri okpei* and *dawadawa* are used as local seasoning in Nigeria. This indigenous spice is developed from the seeds



which are boiled, dried and pounded to form paste and then set aside to ferment for some days. This product is used for seasoning in stew and indigenous soups, the fermented spice is rich in developing antibodies against attack by diseases. It has very high protein content and is believed to be very good in improvement of vision, digestion, in addition to other health benefits such as controlling diabetes and cholesterol level.

#### 10. Amaranth globe (*Gongronema latifolium* Benth)

*G. latifolium* is referred to as *utazi* and *madumaro* by the Igbo and Yoruba tribes of Nigeria respectively. This plant has been used in the Eastern part of Nigeria, particularly Igbo land, over the ages but has now become a regular feature in Nigerian delicacies across the country. The leaves serve as edible vegetables for soups. It is used for the bitter taste it imparts to soups and stews. Its peculiar bitter taste is believed to be its unique antidote for treatment of some stomach related ailments and management of other diseases like diabetes and high blood pressure. *G. latifolium* has a sharp-bitter and sweet taste and is widely used as a leafy vegetable and as a spice for sauces, soups, and salads. The leaves are used as a bitter tonic to treat loss of appetite and for management of diabetes. An infusion of the aerial parts is taken to treat cough, intestinal worms, dysentery, dyspepsia, and malaria. The plant is similarly used in the treatment of hypertension, muscular pains, arthritis, joint inflammation and control of cholesterol. *Gongronema latifolium* possess anti-hepatotoxicity effect against liver damage induced by paracetamol (Ozor *et al.* 2019), anti-ulcer, analgesic and anti-pyretic properties (Akuodor *et al.* 2010), with potential food and antibacterial uses (Eleyinmi, 2007). The twig and root bark extracts may be a good source of medically active phytochemicals and micronutrients relevant in human and animal nutrition (Eneji *et al.* 2011).

#### 11. Turmeric (*Curcuma longa*)

Turmeric gives a natural orange-red or reddish-brown dye and imparts yellow colour to cloth and foods. It is one of the principal ingredients of curry, to flavor various foodstuffs (Muhammad and Amusa, 2005). It is a 'golden spice' which has been recognized for its anti-inflammatory, antimicrobial, insecticidal, antimutagenic, radioprotective, and anticancer properties (Singab and Eldahshan, 2015; Kunnumakkara *et al.* 2018). Turmeric is considered as a carminative, tonic, blood purifier, vermicide and an antiseptic. It is an essential spice in curry production. It is used as an important condiment and as a dye with various applications in drug and cosmetic industries. As a traditional remedy, turmeric has also been quite extensively used for centuries to treat various disorders such as rheumatism, body ache, skin problems (e.g. wounds, burns and acne), intestinal worms, diarrhea, intermittent fevers, hepatic diseases, urinary discharges, dyspepsia, inflammations, constipation, leukoderma, amenorrhea, dental diseases, digestive disorders such as dyspepsia and acidity, indigestion, flatulence, ulcers, and colic inflammatory disorders such as arthritis, colitis and hepatitis (Kunnumakkara *et al.* 2009).

### III. ROLE OF NIGERIA NATURAL MEDICINE DEVELOPMENT AGENCY (NNMDA) IN DEVELOPMENT OF NATURAL PRODUCTS

The Agency has research and experimental farms at various vegetation regions of Nigeria for cultivation of medicinal, aromatic and pesticidal plants including culinary herbs. The Agency is poised to train individuals interested in cultivation of medicinal plants and herbs for medicinal, culinary and commercial purposes. In addition, the Agency produces and develops natural medicines and herbal products with international standard to promote safe and affordable healthcare delivery system in Nigeria. The Agency has widely conducted ethnobotanical surveys of medicinal and aromatic plants in the six geopolitical zones of Nigeria, which bring to public knowledge the benefits of medicinal plants and culinary herbs, and for onward biomedical and pharmacological research, herbal drug formulations, production and development. The focus has been the identification, documentation and usage of the medicinal and aromatic plants, culinary herbs and spices for treatment of diseases and ailments by traditional medicine practitioners (TMPs) and for further research.

### IV. CONCLUSION AND RECOMMENDATION

The contribution of spices and culinary herbs in the promotion of health and wellness is enormous with promising potentials in the area of food, medicine, industry and pharmaceuticals. The presence of secondary metabolites in spices and herbs have been a fertile ground for chemical investigation for decades driving the frontiers of chemical knowledge forward. In recent years, there has been an emphasis on secondary metabolites in relation to dietary components which may have a considerable impact on human health. The diverse biological activities exhibited by these spices and herbs can



be attributed to the presence of a wide array of secondary metabolites so there is need for their continuous availability. However, since most of Nigerian spices grow in the wild, Agronomists should provide information on spices cultivation because it is lacking. This vital in order to encourage intending entrepreneurs who want to go into large scale production, as well as for easy accessibility for traditional medicine practitioners who are interested in making drugs out of them.

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