



EXPLORATION OF EDIBLE LEAFY GREENS HABITUALLY CONSUMED IN KODAGU DISTRICT, KARNATAKA, INDIA

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Abstract:

A survey was conducted to document the information regarding leafy greens used by the agronomists residing in Kodagu. The present study includes 40 edible greens belonging to 25 families tabulated with a botanical name followed by their respective family, common name, local name, life forms, growth habits, season consumed, and mode of intake that are used by the local people and farmers. These leafy greens are highly nutritious having various health benefits by curing diet-related disorders like diabetes, obesity, high blood pressure, heart diseases, and mental decline. The current lifestyle of human health has become complicated due to changes in community ethics, depopulation of rural areas, and food habits. This leads to the erosion of traditional knowledge. Hence this investigation was carried out to document the importance of leafy greens in the study area and to extend the knowledge and benefits of using these leaves.

Key Words: Leafy Greens, Underutilized, Consumption, Nutritional

Introduction:

Plant varieties have been used as traditional medicines and a source of food as a daily requirement since ancient days from our ancestors. A rich diversity of plants comprising ethnobotanical important plants, wild plants, medicinal plants (Sushma *et al.*, 2019) have several bioactive compounds used in the form of drugs. Primitive people have inherited the rich traditional knowledge on plants available in their surroundings for medicine and food purposes (Dinesh Jadhav, 2006). Plants used as food consist of edible parts like seeds, roots, tubers, leaves, tender shoots, flowerbuds, flowers, and fruits (Nnamani *et al.*, 2010). Compare to other communal vegetables the edible leafy vegetables have high nutrition (Orechet *et al.*, 2007). Leafy vegetables are also called potherbs, greens, vegetable greens, leafy greens, or salad greens and are characterized by a high content of water, cellulose, minerals, and vitamins. Leafy greens are a rich source of many nutrients and have photosynthetic tissues, their vitamin K levels are notable because of the phyloquinone which is the common form of vitamins (A, B, C, and K) directly involved in photosynthesis. This causes the leafy greens to be the primary food that interacts significantly with the anticoagulant pharmaceutical warfarin (Nagaraj Parisara and Kiran, 2016). The nutrients in the leafy greens are packed with phytochemicals such as vitamins, carotenoids, lutein, folate, magnesium, low calories, high in proteins, fiber, minerals, iron, and calcium (Omara-Achong *et al.*, 2012). According to Oomah and Mazza (2000), phytochemicals play a major role in health benefits than basic nutrition. Epidemiological studies suggest that increased consumption of these edible greens holding intense medicinal properties afforded rich antioxidants which protect against DNA damage, cancer, diabetes (Kesari *et al.*, 2005), inflammatory, heart diseases, anti-carcinogenic and also exhibit pharmacological properties such as anti-inflammatory, anti-bacterial and anti-fungal activities (Rasinen *et al.*, 2008). Hence they are referred to as 'nature anti-aging wonders' according to Gupta *et al.*, (2005) and the main advantages of these greens are easily available and found throughout the year within inexpensive compare to other vegetables. However varieties of leafy greens have a difference in their appearance, color, texture, and odor but they share an excessive resemblance in nutrients and micro-nutrients that depends on the mode of consumption and cooking methods like raw, cooked, dried, or any suitable form for human intake. Human health has become complicated day by day due to the current lifestyle, changes in community ethics, and depopulation in rural areas leads to erosion of traditional knowledge (Maikhuri *et al.*, 2004). In the present scenario nearly 80% of adults and 56% of children's do not eat recommended vegetables (FAO/WHO, 2001) this increases diet-related disorders like diabetes, obesity, high blood pressure, heart diseases, and mental decline (Iyer *et al.*, 2012). Consumption of leafy greens comprising high bioactive compounds helps in retaining a healthy diet and can be flourished by procuring the knowledge, unfortunately, the use of green leaves has been ignored and underused (Shei 2008). Hence there is an urgent need to record and preserve all information on plants used by the native communities. According to researchers, very little literature was available on vegetables consumed by people who reside in villages in some parts of Karnataka based on this literature review, the leafy greens available in the study area had not been reported. Therefore we have attempted to collect the information and document the availability and utilization level of leafy greens in the Kodagu district.

Materials and Methods:

Study Area:

The present study was carried out in Kodagu, commonly known as Coorg which was established in June 1834 and is the second smallest district in the Southern part of Karnataka. It occupies an area of 4108 sq.km with a humid tropical belt 30-35 percent of the Western Ghats, one of the 8 hottest biodiversity hotspots of the world. Situated to the southwest in Karnataka 12.455° N and 75.957° E with dense forest Figure 1. The main language spoken was Kodava Takk, Tulu, Malayalam, and other Tribal languages. Climate is tropical wet during June-October with annual rainfall over 500cm. The main occupation is agriculture, coffee cultivation is major along with Timber and spices are grown in hill slopes.

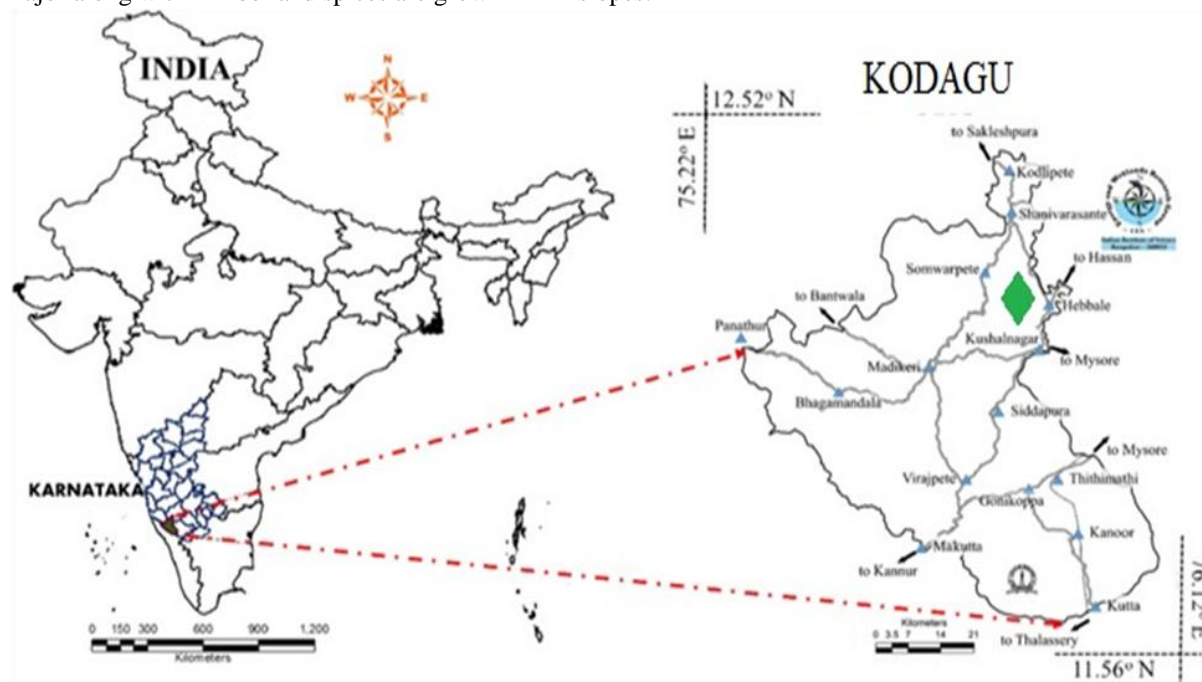


Figure 1: Map of India showing North-western from where the samples were collected

Collection of Data:

Edible leafy greens were documented in various parts of the study area Chikka Aluvara, Dodda Aluvar, Alliluguppe, Basiruguppe, Sidhlingapura, Banavara, Kinnanahalli, Seegehosur, and Karkalli estate (Somvarapettae). From these field explorations, 40 different leafy greens were collected and their information towards the usage was also noted in their local language. Detailed information relevant to leafy greens particularly the use of plants to cure various diseases, methods of collecting, processing, formulation, and extent of cultivation were collected from the literature review, by local inhabitants particularly women were consulted to elicit information; some of them were taken into the agricultural field, water lane side fields, gardening areas, and house gardens to identify the leafy greens used by them, and they were also asked to remark about the utility of those leaves as the source of food and documented. Standard methods were followed for the collection of plant species and identification using flora books with taxonomic keys (Keshava Murthy and Yoganarasimhan 1990).

Results and Discussion:

Kodagu district known for its flora and fauna has a majority of plants available during monsoon, post-monsoon, and winter season some times in summer (Vinu et al., 2017). In early times leafy greens were used more frequently, also renowned as an inexpensive and valuable source of food essential for growth, development, and active life (Okafor et al., 2004). Leafy greens are rich in high water content, Antioxidant, Vitamins like vitamin A, vitamin C, vitamin K, B₉(folic acid), riboflavin, niacin, thiamine, and minerals like Calcium, Magnesium, Potassium, iron, and other trace elements which were useful for human consumption for a healthy life. Intake of leafy greens helps to fight against many health-related problems as it contains fiber which helps to control hunger by slowing the absorption of carbohydrates into the bloodstream this lowers the risk of cholesterol, blood pressure, cardiovascular disease, and mainly type 2 diabetes. Some leafy greens offer many health benefits such as leaves rich in Calcium reduces the risk of osteoporosis, Vitamin C helps in making collagen that aids in joint flexibility, Beta-carotene contribute to the growth and repair of body tissues and also protects skin from sun damage, Folate contributes serotonin which helps in reducing the risk of memory loss and also rid of depression and improve mood.

Table 1: List of identified Edible Leafy Greens in the study area

S.No	Local name	Common name	Botanical name	Family	Life form	Growth Habit	Season Consumed	parts used	Mode of consumption
1	Aatisoppu	WayanadJusticia	<i>Justiciawynaadensis</i>	Acanthaceae (Acanthaceae)	All year round	Herb	Only on May	Only Leaves	Juice is prepared
2	Annesoppu	Red spinach	<i>Celosia argentea L</i>	Portulacaceae	Wet season	Herb	Aug-Oct	Young leaves and shoots	Cooked assamber
3	Nela-BasaleSoppu	Malabar spinach	<i>Basella alba L</i>	Basellaceae	All year round	Herb	Year round	Stem and leaves	Cooked assamber and tambuli
4	Habbu-Basale	Malabar climbing spinach	<i>Talinumfruticosum</i>	Basellaceae	All year round	Climber	Year round	Stem and leaves	Cooked assamber and tambuli
5	Charmaekudi	Vegetable Fern	<i>Diplazium esculentum</i>	<u>Athyriaceae</u>	All year round	Shrub	Year round	Only shoots	Cooked as curry
6	Chakramuni	sweet leaf	<i>Souropusandragynus (L)</i>	Phyllanthaceae	All year round	Shrub	Year round	Leaves	Cooked astambuli and samber
7	Doddapatare	Indian borage	<i>Plectranthusamboinicus</i>	Lamiaceae	All year round	Shrub	Year round	Stem and leaves	Cooked aschatney, tambuli and samber
8	Dantusoppu	Amaranth	<i>Amaranthusmangostanus</i>	Amaranthaceae	All year round if wet land	Herb	Year round	Leaves and young shoots	Cooked ascurry and samber along with other leaves
9	Eerullisoppu	Onion leaves	<i>Allium cepa L</i>	Amaryllidaceae	Wet season	Herb	Year round	Young leaves	Mixed with curry and used for garnishing
10	Ganikesoppu	European nightshade	<i>Solanumnigrum</i>	Solanaceae	Wet season	Herb	Aug-Oct	Tender stem and leaves	Cooked assamber
11	Gonisoppu	Pursley	<i>Portulacacoleracea</i>	Portulacaceae	Wet season	Herb	Aug-Oct	Tender stem and leaves	Cooked assamber
12	Honagonesoppu	Sessile joy weed	<i>Alternantherasessilis (L) R Br</i>	Amaranthaceae	Raining and summer	Herb	June-Sept	Tender stem and leaves	Cooked assamber and palyam
13	Handhger	purple amaranth	<i>Amaranthusblitum</i>	Amaranthaceae	Wet season	Herb	Aug-Oct	Tender stem and leaves	Cooked assamber and palyam
14	Harijanjige/Gajalige	Mysore thorn	<i>Caesalpiniaadecapetala</i>	Fabaceae	Raining and summer	Tree	June-Sept	Only shoots	Cooked ascurry
15	Huralisoppu	Horse gram	<i>Macrotylo mauniflorum</i>	Fabaceae	Raining and summer	Herb	June-Sept	Tender leaves, stem and seeds	Cooked ascurry and samber
16	Insuline	Spiral flag	<i>Chamaecostuscuspidatus</i>	Costaceae	All year round	Shrub	Year round	Leaves	Used in salads, eaten raw also in tea preparation
17	kotambari	Coriander	<i>Coriandrum sativum</i>	Apiaceae	All year round	Herb	Year round	Leaves and tender stem	Used for garnishing foods and in salads
18	Keeresoppu	Pigweed amaranth	<i>Amaranthushybridus</i>	Amaranthaceae	All year round if wet land	Herb	Year round	Tender leaves and stem	Cooked ascurry and samber
19	Kannesoppu	Benghal dayflower	<i>Commelinabenghalensis</i>	Commelinaceae	Wet season	Herb	Aug-Oct	Tender leaves and stem	Cooked ascurry and samber
20	Kadusamber	Cilantro	<i>Eryngiumfoetidum</i>	Apiaceae	All year round	Shrub	Year round	Leaves	Used for garnishing

									foods and in salads
21	Kadalesoppu	Ground nut	<i>Arachis hypogaea</i>	Fabaceae	Winter season	Herb	Oct-Nov	Tender leaves	Cooked assamber
22	Karibevu	Curry leaves	<i>Murraya koenigii</i>	Rutaceae	All year round	Tree	Year round	Leaves	Used for tempering to enhance flavour
23	kumbala	Pumpkin/ Squash	<i>Cucurbita pepo</i>	Cucurbitaceae	All year round	Climber	Year round	Leaves	Cooked ascurry and samber
24	Kommae	black pigweed/ horse purslane	<i>Trianthem portulacastrum L</i>	Aizoaceae	Wet season	Herb	Aug-Oct	Leaves	Cooked as curry and samber
25	Kempuhongane	Sessile joyweed	<i>Alternanthera versicolor</i>	Amaranthaceae	Wet season	Herb	Aug-Oct	Tender leaves and stem	Cooked ascurry and samber
26	KaduNuge	Spinous fluggea	<i>Securinegaleucopyrus (Wild) Muell-Arg</i>	Euphorbiaceae	Raining and summer	Tree	June-sept	Leaves	Cooked ascurry and samber
27	Kesa	Taro	<i>Colocasia esculenta</i>	Araceae	All year round	Shrub	Year round	Leaves	Cooked ascurry and samber
28	Mulangisoppu	Radish	<i>Raphanus raphanistrum subsp Sativus</i>	Brassicaceae	All year round if wet land	Herb	Year round	Leaves	Cooked ascurry and samber
29	Mulluharivesoppu	Spiny amaranth	<i>Amaranthus spinosus L</i>	Amaranthaceae	Wet season	Herb	Aug-Oct	Leaves and shoots	Cooked ascurry and samber
30	Madhunahini	Gymnema	<i>Gymnema sylvestre</i>	Apocynaceae	All year round	Shrub	Year round	leaves	Dried to make powder and mixed with wheat flour or ragi flour
31	Mangarvali	Adamant creeper	<i>Cissampelos grandifolia</i>	Vitaceae	All year round	Shrub	Year round	Stem	Cooked astambuli and chutney
32	Menthayasoppu	Methi	<i>Trigonella foenum-graecum (L)</i>	Apiaceae	All year round	Herb	Year round	Fresh leaves	used for palav preparation
33	Nuggesoppu	Drumstick	<i>Moringa oleifera L</i>	Moringaceae	All year round	Tree	Year round	Leaves	Eaten after frying and roasting also used in samber and curry
34	Ondelgasoppu	Indian pennywort	<i>Centella asiatica (L) Urban</i>	Apiaceae	Wet season	Herb	Aug-Oct	Young leaves and shoots	Cooked assamber and curry by roasting before use
35	Pudina	Mint	<i>Mentha piperita</i>	Lamiaceae	All year round	Herb	Year round	Leaves	Used for garnishing foods, in tea and also in some foods
36	Palaksoppu	Palak	<i>Spinacia oleracea</i>	Amaranthaceae	All year round	Herb	Year round	Young leaves	Boiled in water and mixed with flour of ragi to prepare roti
37	Palavelae	Pandan	<i>Pandanus amaryllifolius</i>	Pandanaceae	All year round	Herb	Year round	Leaves	Used for cooking palav for fragrance
38	Seegesoppu	Seege	<i>Acacia senegal</i>	Fabaceae	Wet season	Tree	Aug-Oct	Leaves	Cooked asTambuli, chatni, Samber and

39	Sabsige	Dill leaves	<i>Anethumgraveolens</i>	Apiaceae	All year round	Herb	Year round	Tender leaves and stem	also curry Cooked assamber, curry and pakoda
40	Yelekosu	Cabbage	<i>Brassica oleracea</i>	Brassicaceae	All year round	Herb	Year round	Leaves	Cooked as curry and samber

According to Atram Seema (2015), leafy greens conquer a chief place in their diet due to their benefits and high nutritional value also some edibles are missing and unnoticed due to the lack of information Therefore, the need of awareness is most crucial for the future generation Hence, the present study provides an exploration of diversity in leafy greens, utilized by local inhabitants in the surveyed area A total of 40 leafy greens belonging to 25 families with their botanical name followed by family, common name, local name, life forms, growth habits, season eaten, parts used and mode of intake are tabulated in Table 1 Among 40 leafy greens 7 plants belonging to *Amaranthaceae*, 5 from *Apiaceae*, 4 from *Fabaceae*, 2 each from *Basellaceae*, *Brassicaceae*, *Portulacaceae* and *Lamiaceae*, one each from *Acanthaceae*, *Athvriaceae*, *Phyllanthaceae*, *Lamiaceae*, *Amaryllidaceae*, *Solanaceae*, *Fabaceae*, *Costaceae*, *Commelinaceae*, *Rutaceae*, *Cucurbitaceae*, *Aizoaceae*, *Euphorbiaceae*, *Araceae*, *Apocynaceae*, *Vitaceae*, *Moringaceae*, *Pandanaceae* are exemplified in Figure 2 As revealed in study 25 of them belongs to herbs followed by 5, 8, 2 belong to shrub, tree and creeper of these 24 leaves are accessible throughout the year, while 11 in the wet season, 4 in both summer plus rainy season and 1 in winter season only

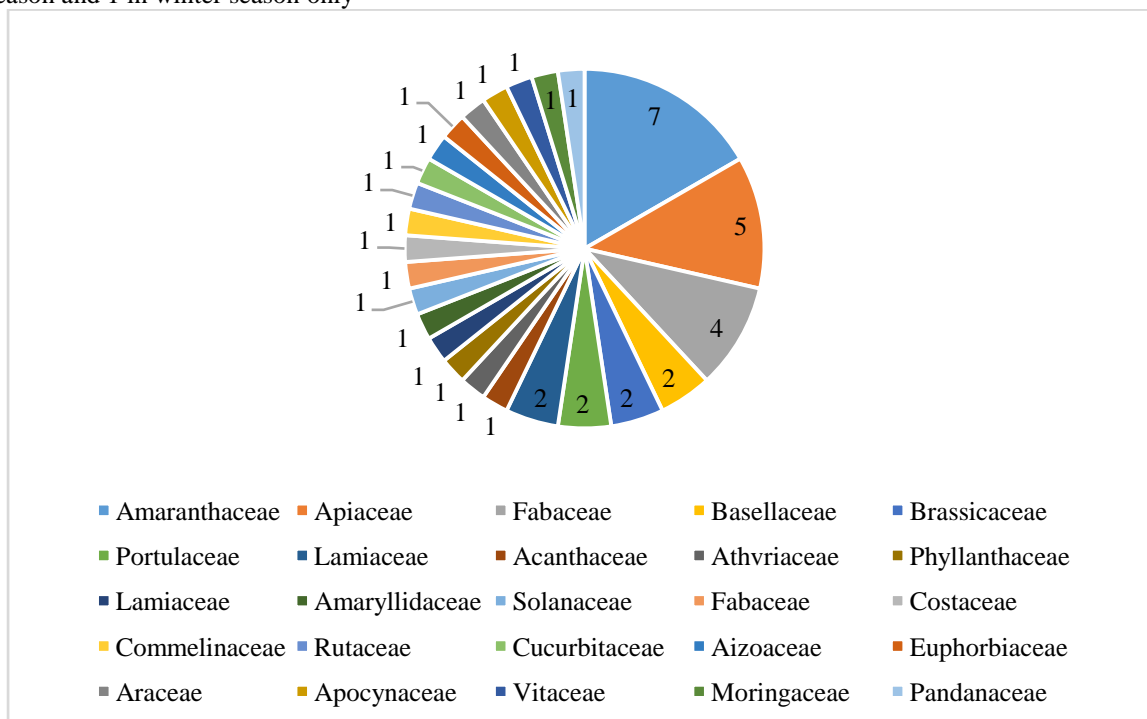


Figure 2: Edible Leafy Greens distributed in each family

The plants belong to different families were identified by local names used by local individuals and by referring to standard texts for its botanical names (Arbonnier, 2004) Leaves with tender shoot shave a various mode of consumption cooked in different varieties like frying, boiling, steamed, salad, soups, curry, samber, playa and also some leaves are eaten as raw this gives different taste, attractive appearance and odor, where these methods are done with only single leaves or along with other leaves, pulses and vegetables which enhances more nutrients In modern circumstances, people started to adopt varieties in their diet, which leads to lessening the frequency of consumption and cultivation Hence there is a need for awareness and strategies to raise the crops in available space and land Nowadays underutilized leaves are gaining more importance and 40 leafy greens mentioned here are not much known for their benefits and nutrition value, hence biochemical analysis and its properties should explore to gain more knowledge and awareness, with this concern an attempt was made to collect the information on leafy greens in Kodagu This basic study emphasizes the richness of leafy greens and their importance towards the health and conservation to sustain their medicinal value (Tapsell et al, 2006)

Conclusion:

The present study reveals a rich variety of leafy greens with immense traditional knowledge and their practice used by indigenous folks The uncultivated and rare species were disclosed are grown within their

surrounding and use them directly for their own without any form of trade, some plants are disappearing or ignorant due to ineffective knowledge, investigation and utilization hence there is a need to motivate the younger generation to acquire knowledge in assessment, preservation and in agricultural practices which must be modified and replicated in all regions to make the best use of the benefits derivable from these leafy greens. Therefore, attention should be made on the proper utilization of these edible greens for present and future generations before extinct.

References:

1. Atram Seema, "Medicinal properties of wild leafy vegetables available in Maharashtra state in Rainy season", *Int Jr of Recent Scientific Research*, 6, 8, 5875-5879, 2015
2. Arbonnier M, "Trees, shrubs and lianas of West African dry zones", Cirad, Margraf Publishers GmbH Mnhn, 2004
3. Dinesh Jadhav, "Ethnomedicinal plants used by Bhil tribe of Bibdod, Madhya Pradesh", *Indian J Trad Know*, 5, 2, 263-267, 2006
4. FAO/WHO, "Human Vitamin and Mineral Requirements FAO/WHO expert consultation on human vitamin and mineral requirements", Food-based approaches for meeting human vitamin and mineral needs, 2001
5. Gupta S, Lakshmi AJ, Manjunath MN, Prakash J, "Analysis of nutrient and anti-nutrient content of underutilized green leafy vegetables", *LWT*, 38,4, 339-345, 2005
6. Iyer SR, Sethi R, Abroham AA, "Analysis of nitrogen and phosphate in enriched and non-enriched vermi compost", *J Environ Res Dev*, 7, 2, 899-904, 2012
7. Kesari AN, Gupta RK, Watal G, "Hypoglycemic effects of *Murrayakoengii* on normal and alloxan-diabetic rabbits", *J Ethno pharmacol*, 97, 247-51, 2005
8. Keshava Murthy KR, Yoganarasimhan SN, "Flora of Coorg (Kodagu) District, Bangalore: Karnataka", Vimsat Publishers, 1990
9. Maikhuri RK, Rao KS, Saxena KG, "Bioprospecting of wild edibles for rural development in central Himalaya", *Mountain Research and Development*, 24, 110-113, 2004
10. Nnamani CV, Oselebe HO, Okporie EO, "Aspect of ethnobotany of traditional leafy vegetables utilized as human food in rural tropical communities", *Animal Research International*, 7, 1, 1110 - 111, 2010
11. Nagaraj P, Kiran BR, "Enumeration of Leafy vegetables of Bhadravathi Taluk, Karnataka", *International Journal of Scientific Research in Science and Technology*, 2, 32-35, 2016
12. Orech FO, Aagaard-Hansen J, Friis H, "Ethnoecology of traditional leafy vegetables of the Luo people of Bondo district, western Kenya", *Int J Food Sci Nutr*, 58, 7, 522-530, 2007
13. Omara-Achong TE, Edwin-Wosu NL, Edu EA, Nkang AE, "Survey of indigenous vegetables species in parts of Ogoja and Calabar, Cross River State, Nigeria", *European Journal of Experimental Biology*, 2, 4, 1289-1301, 2012
14. Oomah BD, Mazza G, "Functional foods In: Francis FJ (ed)", *The Wiley encyclopedia of science & technology*, 2000
15. Okafor JC, Grubben GJH, Denton OA, "Myrianthus arboreus P Beauv In: PROTA 2: Vegetables / Legumes (Eds)", PROTA Foundation, Wageningen, Netherlands, 2004
16. Rasineni GK, Siddavattam D, Reddy AR, "Free radical quenching activity and polyphenols in three species of *Coleus*", *J Med Plants Res*, 2, 285-291, 2008
17. Shei L, "An Evaluation of native West African vegetables" *Agriculture and Rural Development*, 2008
18. Sushma M, Jayashankar M, Vinu AK, "Traditional Knowledge on few Medicinal Plants of Biligirirangana Hill, Karnataka, India", *IJPBR*, 6,3, 23-29, 2018
19. Vinu A K, Jayashankar M, "Seasonality of endophytic fungi: reasoning of medicinal use", *IJCMS*, 3, 8, 794-797, 2017
20. Tapsell LC, Hemphill I, Cobiac L, "Health benefits of herbs and spices: the past, the present, the future", *Med J Aust*, 185, 4-24, 2006