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ETHNOBOTANICAL SURVEY OF PLANT SPECIES IN FOLKLORIC MEDICINE IN HAWUL LOCAL GOVERNMENT AREA, BORNO STATE

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ABSTRACT

An ethnobotanical survey of plant species used in folklore medicine in Hawul Local Government Area of Borno State was conducted with a view to document the indigenous knowledge of some medicinal plant species found in the area. The information was obtained through semi-structured questionnaire. The benefits, importance and coverage of ethnomedicine were expressed through several quantitative indices including Informant Consensus Factor (ICF), Use Value (UV) and Fidelity Level (FL). The agreement of homogeneity between the present and previous studies and among the indigenous communities was evaluated using the Jaccard Index (JI). A total of fifty-five (55) medicinal plant species, which were distributed in twenty-nine (29) families were documented from one hundred (100) informants. Majority of documented species were trees, and leaves were the most utilised plant parts for the preparation of ethnomedicines. The highest ICF value was 0.77 for digestive system disorders. The information retrieved from the questionnaires revealed that the most common ailments were pile and ulcer. Based on UVs, the two most commonly cited ethnomedicinal plant species in the study area were *Khaya senegalensis* (0.40) and *Piliostigma thonningii* (0.35) . The most common method of preparation was by decoction and the major route of administration was oral. Phytochemical profiles showed that flavonoids, alkaloids, phenols, saponins and tannins were the major phytochemical components in *Khaya senegalensis* and *Piliostigma thonningii* leaves. This justified the frequent use of these plants in folklore medicine by the traditional herbal practitioners to treat different illnesses.

Key words: Ethnobotany; medicinal plants; folkloric medicine; phytochemical; plant extracts
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INTRODUCTION

Recent advances in ethnobotanical research have given rise to the documentation of medicinally beneficial plants as well as information on their conservation status (Muhammad *et al.,* 2020). Because a sizable portion of the global population relies on medicinal plants to address a variety of health issues, medicinal plants are recognised as a significant natural resource (Gurib-Fakim, 2006). Despite the fact that these plants are widely available and valuable for healthcare, over-exploitation could endanger the medicinal flora (Khan *et al.,* 2018).

Many diseases are routinely treated using plants (Jeddi *et al*., 2021). Approximately 80 % of Africans use flora to meet essential medicinal needs (Salhi *et al.,* 2010). Despite the advancement of religious enlightenment and western civilisation in the field of contemporary technology and orthodox medicine, traditional medicine continues to be the primary source of providing healthcare in many developing nations, particularly in Africa. Experts claim that the primary healthcare needs of 80 % of the populations of Asia, Latin America and Africa are met by traditional medicine, which is documented by the World Health Organisation. Traditional remedies are the only readily accessible options for many people in these nations, especially those who reside in rural areas (Ekeopara *et al.,* 2017).

Phytochemicals are naturally occurring chemical substances that are physiologically active and are found in plants. They are beneficial to human health as food and medicine (Hasler and Blumberg, 2018). They build up in various plant sections, including the roots, stems, leaves, flowers, fruits and seeds (Coasta *et al.,* 2018). They treat illnesses without endangering people, making them what are known as "man-friendly medications" (Banu and Cathrine, 2015). There has been a significant loss of folkloric knowledge, which depended on oral tradition for its transmission to successive generations. This loss was mainly caused by migration, urbanisation, modernisation and the acceptance of western medicine over the last century. It is, therefore, imperative that a concerted effort be made to document and preserve this residual knowledge, because many traditional healers do not keep enough written records for future use. Medicinal plants have been observed to be very effective in the treatment of ailments in both rural and urban areas in developing countries. Nevertheless, only few people value the plants around them due to inadequate knowledge of their usefulness (Salisu *et al*., 2015). The traditional knowledge of these plants was developed gradually as it passed from generation to generation. This traditional healing system will become extinct as old people who possess the knowledge might die without transferring this vital information to the future generations. To ensure that future generations in Borno State, Northern Nigeria, have access to at least some of this traditional healing system, this research was undertaken to document information on the plants used traditionally as medicine by the indigenous people of Hawul Local Government Area of Borno State. This could help in promoting, uplifting and enriching the world of herbalism in Nigeria. The study was aimed to identify medicinal plants used by traditional healers in the study area and to document the relevant indigenous information on commonly used herbs and to undertake phytochemical screening of frequently used plant species.

MATERIALS AND METHODS

Study Area

The study was conducted in Hawul Local Government Area of Borno State, Nigeria. The area is located in the Southern part of the state and shares boundaries with Biu, Shani, Kwaya Kusar and Bayo Local Government areas as well as Gombi Local Government Area of Adamawa State. It has a land area of 2,098 km^2 and roughly 120,000 people according to the 2006 census. It is one of the four Local Government Areas that make up the Biu Emirate, a historical establishment in Borno State, Nigeria. Ten (10) districts, namely Bulgwi, Pama, Sakwa, Shaffa, Maramakidang, Kwajaffa, Bulatawiwi, Chata, Dlamdi and Kwaya Bura, make up the local government (Hassan *et al*., 2013).

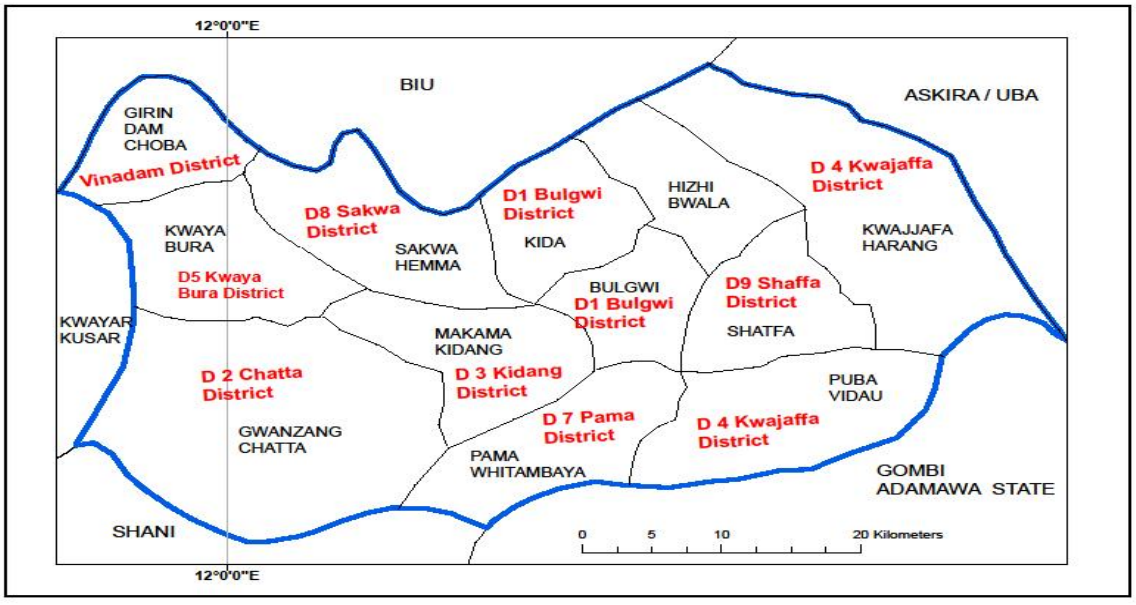

Fig. Map of Borno State showing th study area

Data Collection

Ethnobotanical data were obtained using questionnaire as adopted by Kankara *et al.* (2015). The ethnobotanical survey was carried out in April, 2022. The target groups for this study were local herbalists, traditional medical practitioners, traditional birth attendants, herb sellers, farmers and other people of advanced age who have practised and used medicinal plants. The questionnaire was divided into two parts, A and B. In part A, the demographic information of the respondents was recorded, and information on plants that are used traditionally in the management of common ailments was recorded in part B. Ten (10) respondents were selected from each district. The questionnaire was interpreted by the researcher in the local language to those who did not understand English Language.

Collection and Identification of Plant Species

A series of field trips was understaken to the study area during which the colloquial identification of the collected plants and their medicinal uses were done with the aid of local herbalists. Herbarium specimens of the fresh plants collected were prepared and taken to the Department of Biological Sciences, Nigeria Defence Academy, Kaduna for authentication and documentation. Voucher numbers were assigned to the plants as follows: (NDA/BIOH/2023/25).

Plant Preparation

Khaya senegalensis and *Piliostigma thonningii* leaves were collected, cleaned, washed and air-dried (at room temperature (28±2 ^{0}C)) and ground into powder separately with a clean mortar and pestle. Methanol was employed as a solvent for the extraction (cold extraction), which involved soaking 30 g of the dry leaves from *K. senegalensis* and *P. thonningii* in 300 ml of methanol for seven days at room temperature while being vigorously agitated for about 30 minutes each day. The leaf extracts were then filtered using a Whatman filter paper (No. 42) and dried out by evaporating them for a week in an exposed plastic container (Banu and Cathrine, 2015).

Data analysis

The descriptive statistical method, using frequencies and percentages, was used to analyse the socio-demographic data of the respondents while the results of the ethnobotanical survey were analysed using different quantitative ethnobotany. Relative Frequency of Citation (RFC), Fidelity Level (FL), Use Value (UV), Informant Concensus Factor (ICF), Jaccard Index (JI), Simpson Index (D) and Shannom Weiner Index (H) were calculated.

RESULTS AND DISCUSSION

Socio-demographic information from the Respondents

Table 1 shows the results obtained from the ethnobotanical survey carried out in Hawul Local Government Area. Demographic information showed that most of the respondents were males (81 %). This could be because most herbal practitioners are by tradition males. Mudansiru *et al.* (2016) reported that majority of the traditional medical practitioners in Biu Local Government Area of Borno State and Gumel town, Jigawa State, were males. Majority of the respondents didn't have basic education. This could contribute to the loss of important information because majority of them could not document information. Most of the respondents were between ages 31 and 40. This was unlike the olden days when most herbal practitioners were old people.

Table 1: Demographic information of the respondents in the study area

Bio data	Frequency (n)	Percentage (%)
Sex		
Male	81	81
Female	19	19
Age		
20-30	31	31
31-40	20	20
41-50	21	21
51-60	15	15
Above 61	13	13
Education		
None	41	41
Basic	27	27
Secondary	22	22
Tertiary	10	10
Occupation		
Local herbalists	32	32
TBAs	8	8
Herb Sellers	35	35
Farmers	20	20
Civil servants	4	4
House wife	1	1

TBAs = Traditional Birth Attendants

Medicinal Plant Species Found in Hawul Local Government Area, Borno State

Table 2 shows the list of some medicinal plant species found in the study area, local name (in Hausa and Babur language), common name, scientific name, family, habitat and the relative frequency of citation. Majority of them were trees, a few were herbs and shrubs while some were climbers. *Khaya senegalensis* and *Piliostigma thonningii* had the highest relative frequency of citation of 0.4 and 0.35, respectively. Fifty-five (55) species of medicinal plants were surveyed and identified, majority of which were trees. This could be because trees are usually available all-year round and are not affected by seasonal variations (Albuqueque *et al.,* (2007). Majority of the plant species belong to the family Fabaceae. Mudansiru *et al.* (2016) reported the family Fabaceae as the dominant family with twenty-five (25) species out of forty-three (43) species used in the treatment of common ailments by the people of Gumel town, Jigawa State, Nigeria. During the field trips carried out in the surveyed area, a total of fifty-five (55) medicinal plant species were collected, colloquially identified, authenticated, pressed, mounted and properly documented in the herbarium for future use.

Table 2: List of medicinal plant species found in Hawul Local Government Area, Borno State

S/No.	Local Name	Common Name	Scientific Name	Family	Habit	RFC
1	Dogon yaro	Neem	*Azardirachta indica* A. Juss	Meliaceae	Tree	0.11
2	Kuka /Hiva	Baobab	*Adansonia digitata*	Malvaceae	Tree	0.04
3	Sobo/Gwamblam	Roselle	*Hibiscuss sabdariffa*	Malvaceae	Shrub	0.02
4	Kubewa/Misha	Okra	*Abelmoschus esculentus*	Malvaceae	Shrub	0.02
5	Yadiya /Thlara	Leptadenia	*Laptadenia hastate* (Pers.)	Asclepiadaceae	Climber	0.01
6	Tsintsir maza/Beram	Erapo grass	*Lodatia phragmitoids*	Poaceae	Shrub	0.01
7	Tazargade	Leaving Sweet annie	*Artemisia annua* L.	Asteraceae	Tree	0.02
8	Gwanda/Gunda	Pawpaw	*Carica papaya* L.	Caricaceae	Shrub	0.05
9	Marke/Sura	African Birch	*Anogeisus leocarpa* (D.C) (Guill & Perr.)	Combretaceae	Tree	0.02
10	Sabara	Senegal tree	*Guinea senegalensis* J.F Gmel	Combretaceae	Shrub	0.01
11	Binida zugu/watha watha	Physic nut	*Jatropha curcas*	Euphorbiaceae	Shrub	0.01
12	Kanya/Washina	African Ebony	*Diospyrous mespiliformis* Hochst Ex ADC.	Ebenaceae	Tree	0.01
13	Reke/Kila'ufa	Sugarcane	*Saccharum officinarum* L	Poaceae	Shrub	0.01

14	Bagaruwa/Kuvala	Gum Arabic	*Acacia nilotica (*L.) *Del*	Fabaceae	Tree	0.05
15	Kargo/Puhi	Camel's foot	*Piliostigma thonningii* DC.	Fabaceae	Herb	0.35
16	Shuwaka	Bitter leaf	*Vernonia amygdalina* Delile	Asteraceae	Shrub	0.02
17	Taura/Gwaksa	Sweet Dattock	*Detarium microcarpum* Guill ex Perr	Fabaceae	Tree	0.01
18	Gawo/katha	Winter Torn	*Faidherbia albida* Delile	Fabaceae	Tree	0.03
19	Kesha	Cassia	*Sennia siamea* Lam	Fabaceae	Tree	0.06
20	Kirya/Mossu	African Mosquito	*Prosopis africana* (Guill. & Perr.) Taub	Fabaceae	Tree	0.02
21	Dorowa/Nona	African locust bean tree	*Parkia biglobosa* Jack	Fabaceae	Tree	0.02
22	Karkashi/Sugwi	Sesame leaf	*Sesamum radiatum*	Pedaliaceae	Shrub	0.02
23	Tsamiya/Mbula	Tamarind	*Tamarindus indica* L.	Fabaceae	Tree	0.07
24	Faru	African Grape	*Lannea acida* A. Rich	Anacardiaceae	Tree	0.01
25	Rimi	Silk cotton Tree	*Ceiba pentandra* Gaetin	Malvaceae	Tree	0.01
26	Mangwaro/Mangwala	Mango	*Mangifera indica* L.	Anarcadiaceae	Tree	0.1
27	Baure/Kamda	Fig	*Ficus trichopoda* Baker	Moraceae	Tree	0.01
28	Gamji/Bwala	Guttapercha Tree	*Ficus platyphylla* Pers.	Moraceae	Tree	0.01
29	Madobiya/Antha	Barwood Mamshi	*Pterocarpus erinaceus* Poir	Fabaceae	Tree	0.07
30	Cediya/Iza	Strangler Fig	*Ficus thonningii* Flickr	Moraceae	Tree	0.02
31	Zogala/halim	Drumstick Tree	*Moringa oleifera* Lam.	Moringaceae	Tree	0.07
32	Turare	River and Gum	*Eucalyptus camaldulensis* Dehnh	Myrtaceae	Tree	0.15
33	Gwaba	Guava	*Psidium guaiva* L.	Myrtaceae	Tree	0.08

34	Malmo/kunar	Black plum	*Syzgium guineense* DC.	Myrtaceae	Tree	0.01
35	Magarya/Huhwi	Indian Jujube	*Ziziphus mauritania* Lam	Rhamnaceae	Tree	0.1
36	Kadanya/fuma	Shea butter Tree	*Vitellaria paradoxa* Gaertn F.	Sapotaceae	Tree	0.02
37	Durimi /kwatabla	Heart leaf Fig	*Ficus palata* Vahl	Moraceae	Tree	0.02
38	Lemon tsami	Lime	*Citrus aurantifolia* Roxb.	Rutaceae	Tree	0.06
39	Adwa/dadmwa	Desert Date	*Balanites aegyptica* (L.) Delile	Balanitaceae	Tree	0.01
40	Aya/ntalwa	Tiger nut	*Cyperus esculentus* L.	Cyperaceae	Herb	0.01
41	Gwandar daji/Hibwa	Wild custard apple	*Anona senegalensis* Pers.	Annonaceae	Herb	0.02
42	Raidore	Coffee Senna	*Senna accidentalis* L.	Fabaceae	Herb	0.01
43	Arrarabi/Debiro	Frankicense Tree	*Boswellia delzielli* Hutch	Burseraceae	Tree	0.05
44	Tumfafiya/Mbwathlam	Giant milk weed	*Calotropis procera* (Aiton) W.T. Aiton	Apocynaceae	Shrub	0.02
45	Lalle	Henna	*Lawsonia innermis* L.	Lythraceae	Shrub	0.02
46	Gmelaina	Beechwood	*Gmelina arborea* Roxb	Laminaceae	Tree	0.04
47	Kurna	Christ thorn Jujube	*Zizuphus spinachrist* (L.) Desf	Rhamnaceae	Tree	0.02
48	Giginya/Mina	African fan palm	*Borassus aethiopum* Mart.	Arecaceae	Tree	0.01
48	Goruba	Domp palm	*Hyphaene thebaica* (L.) Mart.	Arecaceae	Tree	0.03
50	Madaci/Dikir	Mahogany	*Khaya senegalensis* (Desr)	Meliaceae	Tree	0.4
51	Lemon zaki	Sweet orange	*Citrus sinensis* Roxb	Rutaceae	Tree	0.03

52	Tafasa /Nchavi	Sickle pod	*Senna obtusifolia* (L.) H.S. Irwin & Barney	Fabaceae	Shrub	0.02
53	Ambulera	Almond tree	*Terminalia catappa* L.	Combretaceae	Tree	
54	Kawari /Kutila	Red Leaved Fig	*Fig ingen* (Mig)	Moraceae	Tree	0.01
55	Garafuni/Tarku Thali	Balsam Apple horned	*Momordica balsamina*	Cucurbitaceae	Climber	0.04

RFC= Relative frequency of citation

Quantitative Phytochemical Screening

Khaya senegalensis and *Piliostigma thonningii* were the most frequently used plants in the area and quantitative phytochemical analysis showed the presence of alkaloids, saponins, tannins, phenols and flavonoids, all of which may be used for antiviral and antibacterial activity. Madu *et al*. (2023) carried out quantitative phytochemical screening of medicinal plant species for the treatment of common ailments in Hawul Local Government Area of Borno State and reported similar findings.

Table 3: Quantitative phytochemical screening of methanol extracts *of Khaya senegalensis* and *Piliostigma thonningii*

Phytochemical	***Khaya senegalensis***	***Piliostigma thonningii***
Flavonoids	4.52 ± 0.029569	6.25 ± 0.014933
Polyphenol	0.08 ± 0.064042	0.0824 ± 0.043294
Tannins	4.25 ± 0.001155	5.18 ± 0.000577
Alkaloids	1.13 ± 0.001000	1.02 ± 0.000577
Saponins	28 ± 0.000577	2.283 ± 0.004041

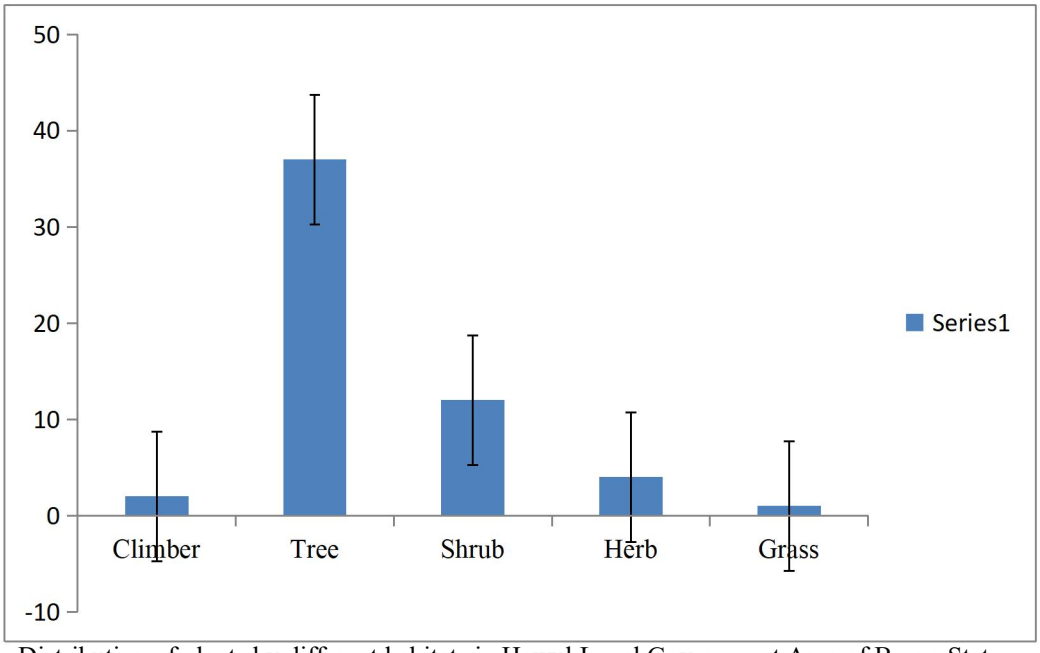

Figure 1: Distribution of plants by different habitats in Hawul Local Government Area of Borno State

CONCLUSION

Some important medicinal plant species used in folkloric medicine in Hawul Local Government area were surveyed, collected, identified, pressed, mounted and documented. The indigenous knowledge of these plants was written and documented for future use. The Relative Frequency of Citation (RFC), Fidelity Level (FL), Use Value (UV), Informant Concensus Factor (ICF), Jaccard Index (JI), Simpson Index (D), Shannom-Weiner Index (H) and Barger Parkers index were used to analyse the demographic data of the respondents and the results of the ethnobotanical survey. The diversity of medicinal plant species used and the associated indigenous knowledge are of great value to the local community. Their conservation and preservation are important. Phytochemical and pharmacological investigation showed the biologically active constituents. There is the need to conserve the plant species and avoid over-exploitation of trees for timber, fuel wood and for herbal purposes. There is the need for education and public awareness.

REFERENCES

Albuquerque, J. M. and Monteiro, M. A. R. (2007). Medicinal and magic plants from a public market in northeastern Brazil. *Journal of Ethnopharmacology,* 110: 76-91.

Banu, K.S. and Cathrine, L. (2015). General Techniques involved in Phytochemical Analysis. *International Journal of Advanced Research in Chemical Science* (IJARCS), 2 (4): 25-32.

Costa, M.A., Zia, Z.Q., Davin, L.B. and Lewis, N.G. (2018). Toward Engineering the Metabolic Pathways of Cancer-Preventing Lignans in Cereal Grains and other Crops. In: Recent Advances in Phytochemistry, Vol. 33, Phytochemicals in Human Health Protection, Nutrition and Plant Defense: Romeo, J.T. (ed) New York.

Hassan, T. I., Ajayi, P. A., Abdulrahman, A. S. and Fabian, M. D. (2013): Complementing water supply through rain water harvesting in some selected villages of Sahel Savannah Ecological Zone, Borno State. *Nigerian Journal of Water Resource and Production,* 3(5): 200-207.

Hasler, C. M. and Blumberg, J. B. (1999). Phytochemicals, Biochemistry and Physiology. *Journal of Nutrition*, 129: 756-757.

Jeddi, M., Ouartini, Z. B. and Fokri-Benbrahim, K. (2021). Ethnobotanical study of medicinal plants in northern Morocco (Taounate): case of Mernissa. *Ethnobotany Research and Applications,* 21:1-23.

Kankara, S. S., Mohd, H. I., Muskhazli, M. and Rusea, G. (2015). Ethnobotanical survey of Medicinal plants used for traditional maternal healthcare in Katsina State, Nigeria. *South African Journal of Botany*, 165–175.

Madu, A.H., Ajibade, G.A. and Vantsawa, P. A. (2023). Ethnobotanical survey of medicinal plant species in folkloric medicine for the treatment of common ailments in Hawul Local Government Area of Borno State. M.Sc. Dissertation. Nigeria Defence Academy, Kaduna, Nigeria.

Mudansiru, A., Zaharaddeen, U., Haidara, A.M. and Ibrahim, S. (2016). Ethnomedicinal Survey of some Plants used for the Treatment of various Ailments in Gumel Town, Jigawa State, Nigeria. *Journal of Biology, Agriculture and Healthcare,* 6 (7): 137-142.

Muhammad, S. and Shinkafi, M.A. (2020). Ethnobotanical survey of some medically important leafy vegetables in North-Western Nigeria. *Journal of Medicinal Plants Research,* 14(1): 6-8.

Salhi, S., Fadli, M., Zidane, L. and Douira, A. (2010). Etudes floristique et ethnobotanique des plantes médicinales de la ville de Kénitra (Maroc). Lazaroa, 31:133-146.

Salisu, M., Muhammad, N. D. and Ishaq, A. A. (2015). Ethnobotanical Survey of Medicinal Plants in Metropolitan Kano, Nigeria. *International Journal of Public Health Research,* 3(6): 345-351.