



Ethno-botanical Survey of Plants Applied for the Treatment of Sexually Transmitted Diseases in the Sudan Savannah Region of Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study aimed at the assessment of ethno-botanical plants applied by most the rural people as a therapy for Sexually Transmitted Diseases. Ethno-botanical study of medicinal plants was carried out from January 2022 to March 5, 2022 at Dutse, Local Government Dutse, Jigawa State, Nigeria. Purposive random sampling technique was used and one hundred and forty (140) structured questionnaires were administered to the respondents which were 40% of population (350). Two major markets sampled were: Tsilliya (Kiyawa) and Shuwarin market (Dutse). Descriptive statistics was used such as table, frequency and percentage. Results showed that majority of the respondents (32.14%) were within the age brackets of 21-30 and 63.57% were married, 63.57% had non-formal education while 53.57% of the respondents' occupation was herb sellers. The prominent religion in the study area was Muslim (91.43%). A total of 26 plants observed, distributed

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into 15 families used in the management of eight (8) diseases. Combretaceae (4 species) and Legumenaceae (4 species) had the highest plants in the study area applied for various diseases treatment. *Jatropha curcas* (8) had the highest frequency followed by *Securidaca longepedunculata* (6). Gonorrhoea is the most prominent disease (8) followed by vaginal discharge (6) respectively. Result also showed that maceration had the highest percentage with the total of 68% followed by decoction method which contains 20% followed by infusion techniques which was 8%. Liquid extract was rated least with the total of 4%. Bark was mostly used (37.50%), roots (18.51%), whole plant (18.51%) and leaf (11.11%). It is therefore, necessary to recommend the preservation of the local knowledge of traditional medicine by appropriate identification, conservation, preparation application of the plant species.

Keywords: Ethno-botanical; sexually transmitted diseases; Sudan savannah; survey and plants.

1. INTRODUCTION

African countries ranked first in Sexually Transmitted Disease (STD) annually by occurrence compared to other world regions; this ailment is the major civic health problem including infertility Gerbase and Mertens [1]. The World Health Organization (WHO) has put the common ailment in Africa annually as 3.5 million occurrences of syphilis, 15 million occurrences of chlamydial, 16 million occurrences of gonorrhoea and 30 million cases trichomoniasis. STD is a high public health priority mostly because of their widespread occurrence and curing Gerbase and Mertens [1]. Human papilloma virus and Herpes Simplex Virus infection are well problem in sub-saharan Africa while STDs are the causes by more than twenty micro-organisms which are present majorly in four syndromically Wasserheit and Aral [2]. Africa must employ efficient and complete integrated activities against the STD outbreak. Strategy which include disease prevention, screening, case finding, the early diagnosis and treatment of cases are applied. African has an age history with the application of plants for medicinal purposes, up to 80% of the population employ herbal medicine for main healthcare World Health Organisation [3]. In Nigeria, ethno-botanical observations have shown that significant numbers of people make use of traditional medicine for a diversity of diseases related with reproductive health. This includes the majorly Sexually Transmitted Diseases such as low sperm count, bleeding during pregnancy, menstrual disorders, abortion and low sperm count [4,5]. Traditional medicine, through several trado-medical scientists is patronizing by all sector of societies. This obviously signifies that traditional medicine which has long been taken for granted and rejected for more than ten years has a critical role to play in making reasonable health care delivery system of people Soladoye et al. [6], Aslan et al. [7];

[8,9]. Treatment of diseases with orthodox drugs typically becomes less effective over time. Also, the few conventional drugs are characterized by substantial level of toxicity, expensive and unavailability to the people in the rural area. Therapeutic use of local plant resources for healing has been a long age practice and its roots traced to ancient civilizations Singh [10]. Tropical areas are endowed with rich source of medicinal plants which have been applied in times past for health care particularly in the local areas. Some of these indigenous trees species whose its parts could be supplementing the nutritional requirements and health care system for both man and animals in this regions are endangered and at the verge of extinction Salami et al. [11].

Sexually related diseases have been observed to be second most prevalent diseases World Health Organization [12]. Many sexually related ailments are being treated with locally available medicinal plants among rural populations in Africa, such as menstrual disorders, fertility problems, leucorrhoea and womb problems de Wet and Ngubane [13]. More than fifty percent of males are living with STDs in Nigeria had contacted the traditional healers for treatment Hegde et al. [14,15]. As a result of these, majority of patients seek relief from traditional healing which provides measures for the treatments of the disease Borokini et al. [16]. There an approximate 320, 000 medicinal plants in the world. Herbal medicine is applied by more than 50% of world population. Gonorrhoea is the common sexually transmitted disease (STD). In India, 65% of population has applied traditional medicine. 90% of herbal raw material is used in Ayurvedic, Siddha, Unani, homeopathy medicine and those majorly collected from wild state Pratul [17]. Natural forest is also fading at high rate in Africa due to overexploitation of the population and lack of well - coordinated conservation programmes

Oladele et al. [18]. Medicinal plants are at increasing risk from destruction of their habitats and over harvesting of known medicinal plant Cunningham [19]. According to Roberson [20] about 15,000 medicinal plants may be endangered with extinction world broadly due to habitat loss and over harvesting and it is estimated that the earth is losing one potential major drug every two years The main objective of the present study was to identify and characterized Trado-medical plants used in the treatment of (STD) Sexual Transmitted Disease in view of providing better conservation and management plan for the species.

Specific Objectives are to:

- i. Describe the socio-economic characteristics of the respondents;
- ii. Identify the trado-medicinal plants and its prominence for the treatment of STD;
- iii. Determine the method of application, major parts used and preparation methods;
- iv. To identify the major STD in the study area.

2. METHODOLOGY

2.1 Description of the Study Area

Dutse is located on the Latitude of 11.00⁰N to 13.00⁰N and longitude 8.00⁰E to 10.15 ⁰E with the altitude of 435m above sea level Salami et al. [21]; Ilu et al. [22]; Salami and Lawal [23]. Some of the settlements in the area include; Fagoji, Kaci, Limawa, Gidadubi, Danmasara, Madobi,

Zai, Kude, Takur, And Jigawar Tsada, which are made up of Hausa, Fulani, and Mangawa. The higher percentage of the rural area engaged mostly in farming and rearing of livestock (herdsmen) such as cattle, guinea fowl, sheep, short and long legged goat. The rainy season lasts from May to September with average rainfall of between 600 to 1000 mm while high temperatures are normally recorded between the months of April and September. The southern part of the state has a higher rainfall percentage than the northern part. The area has a total population of 153,000 National Population Commission [24]. Kiyawa Local Government is situated in Jigawa state, Northwest Nigeria and has its headquarters in the town of Kiyawa. The towns and villages that make up Kiyawa LGA include Andaza, Gurchiba, Katanga, Turho, Maje, Kiyawa, Karfawa, and Fake. The Estimated population of Kiyawa LGA is put at 200,845 inhabitants with the area majority population by member of the Hausa and the Fulani ethnic groups. The religion of slam is widely practiced in Kiyawa LGA while the Hausa Language is extensively spoken in the area Salami et al. [25]; Jigawa Agricultural Rural Development Agency [26].

2.2 Data Collection

Materials used for the collection of the data were published and unpublished literatures on the study conducted on ethno botanical survey of medicinal plants used for the treatment and cure of Sexually Transmitted Disease (S.T.D) in Dutse and Kiyawa Local Government area, Jigawa State, Nigeria [27].

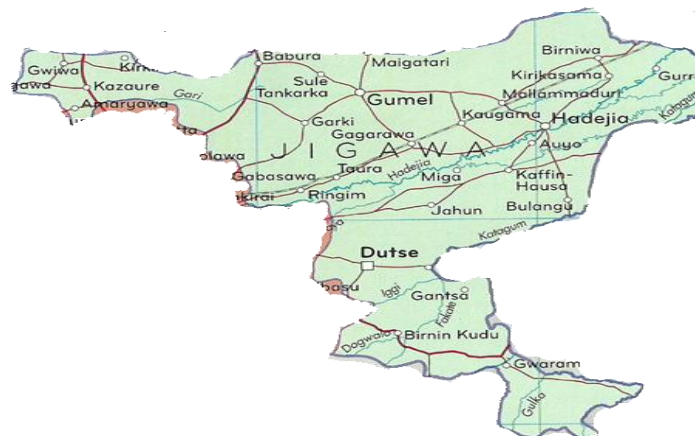


Fig. 1. Showing the map of Dutse
Adapted: Garba et al. [28]

2.3 Sampling Design

A 3 stage design was employed to collect data during this study which involved:

- i) Chosen the local government areas which were the main collection unit (Dutse and Kiyawa Local Government)
- ii) Purposive sampling was adopted in selecting two markets from each local government area and also to determine the method of application
- iii) Random selection of 70 respondents (Herbal practitioners comprising herbal

seller and herbal traditional healers) in each specific market of each local government. A total of 140 questionnaires were administered which is equivalent to 40% of the total population of herb practitioners in the area of study (Table 1).

2.4 Data Analysis

Tools of statistics such as percentage distribution, tables and bar chart were applied for analyzing and presenting results (Descriptive statistics).

3. RESULTS

Table 1. Demographic and Social Cultural Characteristics

S/N	Variables	Categories	Frequency	Percentage (%)
1.	Gender	Male	106	75.71
		Female	34	24.29
		Total	140	100
2.	Age	21-30	45	32.14
		31-40	39	27.86
		41-50	33	23.57
		51-60	23	16.43
		Total	140	100
3.	Educational Background	Non formal Education	89	63.57
		Primary education	04	2.86
		Secondary education	11	7.86
		Tertiary education	36	25.71
		Total	140	100
4.	Religion	Christianity	07	05
		Islam	128	91.43
		Traditional		3.57
		Total	140	100
5.	Marital status	Married	89	63.57
		Single	22	15.71
		Divorce	11	7.86
		Widow	08	5.71
		widower	10	7.14
		Total	140	100
6.	Primary Occupation	Livestock farming	09	6.43
		Crop husbandry	03	2.14
		Civil servant	11	7.86
		Business personnel	42	30.00
		Herb seller	75	53.57
		Total	140	100

Source: Field survey, (2022)

Table 2. Showing the Species, Diseases Curing, Part used and Mode of application

S/N	Scientific name	Family	Freq	Disease curing	Part use	Mode of application	Life form
1	<i>Prosopis africana</i> Guill & Perr	Fabaceae	01	Gonorrhea	Root	Decoction	Tree
2	<i>Ficus thonnigi</i> Joris de Wolf	Mullberry	02	Virginal discharge	Bark	Infusion	Shrub
3	<i>Securidaca longipedunculata</i> Fresen.	Polygalaceae	06	Antiseptic and serve as vasolidator	Leaf	Maceration	Tree
4	<i>Jatropha curcas</i> Linn	Euphorbiaceae	08	Gonorrhea	Root	Decoction	Shrub
5	<i>Aneilema lanceolatum</i> (Buruku)		01	Pelvic inflammatory disease	Whole plant	Infusion	Small shrub
6	<i>Mitagyne inernia</i>	Rubiaceae	02	Chlamydia	Root	Decoction	Shrub
7	<i>Combretum micrathan</i>	Combretaceae	01	Anti inflammatory	Whole plant	Infusion	Shrub
8	<i>Anogeisus leocarpus</i>	Combretaceae	03	Anti septic	Bark	Maceration	Shrub
9	<i>Moringa oleifera</i> (L.) Millsp.	Moringaceae	05	Gonorrhea	Root	Decoction	Shrub
10	<i>Plilostigma reticulates</i> (DC) Hochst	Cercidoideae	03	Syphilis	Bark	Infusion	Shrub
11	Water lily	Nymphaeaceae	01	Virginal itching	Root	Decoction	Acuat ic Plant
12	<i>Vitellaria paradoxa</i> G. Don	Sapotaceae	01	Gonorrhea	Bark	Decoction	Tree
13	<i>Cassia occidentale</i> Linn	Legumeneaceae	02	Virginal discharge	Whole seed	Infusion	Small shrub
14	<i>Cassia anglofolia</i> Mill	Legumenaceae	01	Skin disease caused by STD	Whole plant	Ointment	Small erect shrub
15	<i>Ficus anglofolia</i> Linn	Moraceae	01	Syphilis	Bark	Infusion	Tree
16	<i>Termilania indica</i> (Gaertn.) Roxb	Combretaceae	01	Pelvic inflammatory disease	Seed/bark	Infusion	Tree
17	<i>Andiva inermia</i>	Legumeneaceae	02	Pelvic inflammatory disease	Bark	Decoction	Tree

S/N	Scientific name	Family	Freq	Disease curing	Part use	Mode of application	Life form
18	<i>Acacia nilotica</i> (L.) Willd. ex Delile	Legumenaceae	04	Virginal discharge	Seed	Ointment/IN fusion	Shrub
19	<i>Guiera senegalensis</i> J.F. Gmel	Combretaceae	02	Anti septic	Whole plant	Infusion	Shrub
20	<i>Ficus pohita</i>	Moraceae	02	Gonorrhea	Bark	Infusion	Tree
21	<i>Mangifera indica</i> Linn	Anarchadiaceae	02	common infection	Bark	Infusion	Tree
22	<i>Lepitadermis hestata</i>	Apolynaceae	02	Skin disease caused by STD	leaf	Ointment	Creeping Plant
23	<i>Parkia biglobos</i> (Jacq.) R. Br. ex G. Don	Fabaceae	01	pelvic inflammatory disease	Bark	Maceration	Tree
24	<i>Senna spp</i>	Fabaceae	01	Gonorrhea	Whole plant	Infusion	Shrub
25	<i>Vernonia amygdalina</i> Delile	Asteraceae	01	Gonorrhea	Leaf	Infusion	Shrub
26	<i>Citrus aurantifolia</i> Christm.	Rutaceae	01	virginal discharge	Fruit	Infusion	Shrub

Source: Field survey, (2022)

Table 3. Basic techniques of herbal preparation and mode of application

SN	Form	Frequency	Percentage (%)
1.	Powdering	00	00
2.	Liquid	02	04
3.	Maceration	34	68
4.	Infusion	04	08
5.	Decoction	10	20
Total		50	100

Source: Field survey, (2022)

Table 4. Showing the percentage parts of the plant

SN	Part of plant use	Frequency	Percentage (%)
1.	Root	5	18.51
2.	Bark	9	37.50
3.	Whole plant	5	18.51
4.	Leaf	3	11.11
5.	Seeds	3	11.11
6.	Fruits	1	3.70
	Total	27	100

Source: Field survey, (2022)

Table 5. Showing the number of Plants use to treat different Sexual Transmitted Diseases

SN	Disease	Frequency	Percentage (%)
1.	Gonorrhoea	8	30.77
2.	Virginal discharge	5	19.23
3.	Pelvic inflammatory	4	15.39
4.	Chlamydia	1	3.85
5.	Anti septic and others	4	15.39
6.	Syphilis	2	7.69
7.	Skin infection	2	7.69
Total		26	100

4. DISCUSSION

4.1 Demographic and Social Cultural Characteristics

Table 1 showed the observations of demographic features of the respondents. The study showed that age bracket of 21 -30 had the highest frequency, 63.57% had the least of non formal education. Male respondents had the highest percentage (75.71%) while 24% were female. Study on the marital status put widow at 5.71%, married at 63.57% and Divorce at 7.86% and single at 15.71%. The prominent religion in the study area was Muslim (91.43%). This supported the observations of Ilu et al. [22] and Lawal et al. [29] who reported the higher percentage of married respondents, male and muslim and non formal education in the same study area.

4.2 Basic Techniques of Herbal Preparation and Mode of Application

Result showed that maceration had the highest percentage with the total of 68 followed by decoction method which contain 20% followed by infusion techniques which contain 8% liquid show the least percentage with the total of 4%. The least method was powder without any percentage. Specifically, concoctions for the treatment of ailments were made in forms of powder, infusion and decoction from different parts of plants majorly with water and at time with mixture of other ingredients like calabash chalk and salt Oladele and Edem [30].

4.3 Identified Plant use for Treatment of STD

The result from Table 2 showed that 26 species of plant were identified and used for treating eight (8) different types of Sexually Transmitted Diseases. *Jatropha curcas* (8) had the highest frequency followed by *Securidaca longepedunculata* (6). *Moringa olifera* is also commonly used (5) other important plants used with their frequency are *Acacia nilotica* (4),

Phliostigma reticulatum (3), *Anogeisus leocarpus* (3), the least plant used are lime (1) *Velonia* species (1), *Senna italica*(1), *Cassia anglofolia* (1), Water lily(1), Buuruukuu (1), *Combretum micranthum* (1), and *Vitellaria paradoxa*(1).

4.4 Plant Parts Used in Medicine

A diverse of plant parts used for curing and reports of the active parts varied with cultural backgrounds. All the part of plants was reportedly employed in treatment in this study. Barks constitute the most used (37.50%), roots (18.51%), whole plant (18.51%) and leaf (11.11%) among the Dutse and environs people studied (Table 4). Past studies showed that flora part of plant had the most common plant parts employed in treatment of ailments Giday et al. [31]. Oladele and Edem [30] also, agreed the study through the observations that plant parts that mostly used were leaves (52.28%), root (37.54%) and barks (3.86%). The application of the roots and bark could reduce the existence of the plant compare to the flora parts of the plant due to the cases of direct damage Oladele and Edem [30]; Poffenberger et al. [32]. Some personals also reported that mostly, the bark is chosen for medicinal use in the Caatinga (Brazil) due to its incessant temporal availability Fasola, [33]. However, Togola, [34] pin pointed that the use of bark will be necessary when the leaves and fruits are out of season. Some study conducted in Mali showed that plant parts used for treating wound are roots and leaves Inngjerdigen et al. [35]. The act of exploiting tree parts such as: roots and stem barks can lead to the loss of economical and medicinal plant species, Dhillion and Amundsen [36].

4.5 Taxonomic Distribution and Growth Forms of the Medicinal Plant Species

The variety of plant species employed in the study area to treat Sexually Transmitted Diseases comprised of 26 species distributed into 15 families used in the treatment of 8 ailments.

Mostly, plant families found includes; Combretaceae (4 species), Legumenaceae (4 species), Fabaceae (3 species) Moracea (2 species) and Euphobiaceae (2 species). This disagrees with the finding among the Ogba/Egbema/Ndoni ethnics in Nigeria which revealed the use of Malvaceae and Fabaceae. Oladele and Edem [30] also observed that Malvaceae and Fabaceae are the prevalent family used for curing STD unlike Combretaceae and Legumenaceae found in the study area [36].

5. CONCLUSION AND RECOMMENDATIONS

Plants play a crucial role in the protection of human health throughout the world and notably in the third world country such as Nigeria. Local medicine has remained the most cheapest and common source of treatment in the primary healthcare system among the countryside people in Nigeria. A rich legacy of indigenous medicinal plant use and knowledge was represented with a sample of 26 medicinal plants recorded in the 2 communities of Dutse - Kiyawa for the treatment of a range of sexual and reproductive conditions. It could be deduced from this study that Combretaceae, Legumenaceae and Fabaceae were the most main ethno-botanic families used in the treatment of sexual ailments in the study area. Results from this study showed that rural people in Jigawa state of Nigeria still support the traditional herbal medicine solely with orthodox for their health care. Cultivation of wild plants in mixed cultures and agroforestry systems need be encouraged among the rural farming population for conservation and sustainable supply. Various studies on the use of plant part could lead to development of useful drugs.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Gerbase AC, Mertens TE. Sexually transmitted diseases in Africa: time for action Afr Health. 1998;20(3):10-2.
2. Wasserheit JN, Aral SO. The Dynamic Topology of Sexually Transmitted Disease Epidemics: Implications for Prevention Strategies. Journal of Infectious Diseases. 1996;174(Suppl.2):S201–13. [PubMed]
3. World Health Organisation; 2012. Available:who.int/medicinedoes/en/jh2943e/432/html Accessed Jan. 2018
4. Okoli RI, Aigbe O, Ohaju-Obodo JO, Mensah JK. Pakistan Journal of Nutrition. 2007;6(5):490-496.
5. Ajibesin KK, Bala DN, Umoh UF. International Journal Green Pharm. 2011;5:81-91.
6. Soladaye MO, Chukomma EC, Owa FP. An `Avalanche` of plant species for the traditional cure in south-western Nigeria. Journal of Natural Product Plant; 2012.
7. Aslan M, Orhan N, DD, Ergub F. Hypoglycemic activity and antioxidant potential of some medicinal plants traditionally used in turkey for diabetes. Journal Ethno Pharmacology. 2010;128: 384-389.
8. Inanc N, Cicek B, Sahin H. Used of herbs by the patients with in kayseri, turkey. Pakistan Journal of Nutrition. 2007; 6:310:312.
9. Onal S, Okutucu B, Zihnioglu F. Inhibition of alpha-glucosidase by aqueous extracts of some potent medical herbs. Preparative Biochemistry and Biotechnology. 2005; 35:29-36.
10. Singh AP. Ethnobotanical Leaflets. 2007;11:206-207
11. Salami KD, Aminu M, Lawal AA, Ilu KJ, Folorunsho WO. Evaluation of Stem Volume, Litterfall, and Soil Fertility of *Azadirachta indica* A. Juss and *Eucalyptus camaldulensis* Dehnh at Shelterbelts in Kiyawa, Jigawa State Nigeria. International Journal of Agricultural Research, Sustainability, and Food Sufficiency (IJARSFS). 2022;V9(1):550-569.
12. World Health Organization. 2013:64. Accessed January, 2018 Available:http://apps.who.int/iris/bitstream/10665/112922/1/9789241507400_eng.pdf
13. de Wet H, Ngubane SC. South African Journal of Botany. 2014;94:129-139.
14. Hegde HV, Hedge GR, Kholkute SD. Compliment Ther Clin Pract. 2007;13: 38- 45.
15. Hossan MS, Hanif A, Agarwala B, Sarwar MS, Karim M, Rahman M.T-U, Jahan R and Rahmatullah M, Ethnobotanical Research and Application. 2010;8:61-74.
16. Borokini TI, Ighere DA, Clement M, Ajiboye TO, Alowonle AA. Survey of Medicinal Plants Used in the Treatment of "Ailments of Utmost Native Importance" in Cross

- River State, Nigeria Journal of Medicinal Plants Studies. 2013;4(5):17-29.
17. Pratul CS. Ethno Antidiabetic plant of Assam. International Journal of Applied Biology and Pharmaceutical Technology. 2011;246-251.
 18. Oladele AT, Alade GO, Omobuwajo OR. Agriculture and Biology Journal of North America. 2011;2(3):476-487.
 19. Cunningham AB. "Wild plant use and resource management," in The Center for Biodiversity LA. Bennun RA. Aman, Crafer SA, Eds., National Museums of Kenya, Nairobi, Kenya. 1992;109–126.
 20. Roberson E. Medicinal plants at risk. A native plant conservation campaign report, Tech. Rep. Center for Biological Diversity; 2008.
Available:<http://www.scribd.com/doc/75492242/Medicinal-Plants-at-Risk>
 21. Salami KD, Jibo AU, Lawal AA, Ahmad U, Harisu S. Assessment of Pre-Sowing Treatments on the Seed Germination of *Adansonia Digitata* Linn (Baobab) in the Savannah Region of Nigeria. A proceeding of the 7th Biennial Conference of the Forest Production and Products in a Diversifying Economy for Sustainable Livelihood. April 26th-30th. 2021: 226-271.
 22. Ilu KJ, Salami KD, Gidado AH, Muhammad YK, Bello Ahmed. Household's Responses to the Roles Of Trees As Wind Breaker in Dutse Local Government Area of Jigawa State, Nigeria *Fudma Journal of Sciences (FJS)*. 2020;4(3):162-169
 23. Salami KD, Lawal AA. Tree species Diversity and Composition in the Orchard of Federal University Dutse, Jigawa State. *Journal of Forestry Research and Management*. ISSN 0189-8418, www.jfrm.org.ng, 2018;15(2):112-122
 24. National Population Commission. Projected Data on National Population; 2006.
Retrieved on 2/5/2018
Available: <https://census.jigawa.dutse.ndb>
 25. Salami KD, Shuaibu RB, Kareem AA. Ecological Survey of Medicinal Tree Species in Sudano-Sahelian Region of Nigeria. *Ethiopian Journal of Environmental Studies & Management* 2022;15(5):588 – 607.
 26. Jigawa Agricultural Rural Development Agency [JARDA]. Climatic Data. 2016;112.
 27. Khan TI, Dullalle AK, Solomon DM. Biodiversity conservation in the desert with Emphasis, on endemic and medicinal plants. *The Environmentalist*. 2003;23: 137-144.
 28. Garba A, Salami KD, Akanbi WB. Assessment of Endangered Economic Tree species and Conservation Techniques in Jigawa State, Nigeria. *FUDMA Journal of Agriculture and Agricultural Technology*. 2021;7(2):116-123
 29. Lawal AA, Jibo AU, Salami KD, Ilu KJ, Muhammad YK, Amina GH, Saidu M. Assessment of Indigenous Fodder Tree Species From Different Land-Use Types in Dutse, Jigawa, Nigeria. 2020;12(3):32-38.
 30. Oladele AT, Edem JA. Medicinal plants used to treat Sexual Diseases by Ogbe me / Ndoni Ethnics of River State Nigeria. *WNOFNS*. 2018;17:16-38.
 31. Giday M, Asfaw Z, Elmqvist T, Woldu Z, *Ethnopharmacology*. 2003;85:43- 52.
 32. Poffenberger M, McGean B, Khare S. Campbell J, *Nature*. 1992;163:688.
 33. Fasola TR. An ethnobotanical survey of plants used in the management and treatment of female reproductive health problems in Ibadan, Southwestern Nigeria. *Journal of Biology, Agriculture and Healthcare*. 2015;5(3):7-11.
 34. Togola AT, Diallo D, Basset S, Paulsen H, BS. *Ethnobiology and Ethnomedicine*. 2005;1:7-10.
 35. Inngjerdingen K, Nergard CS, Diallo D, Mounkoro PP, Paulsen BS. *Ethnopharmacology*. 2004;92:233-244.
 36. Dhillion SS, Amundsen C. Responding to Bioprospecting: From Biodiversity in the South to Medicines in the North. (eds. Savrstad H. and Dhillion SS.). *Spartacus Forlag, As, Oslo, Norway*. 2000;144.

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