



IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY



VOLUME : 5 ISSUE : 1 Print / Issue Publication Date: 29-Jul-2020



ISSN : 2455-2143



DOI : 10.33564/IJEAST.2020.v05i01.135

Indexed In



WWW.IJEAST.COM

editor@ijeast.com



ETHNOBOTANICAL SURVEY OF MEDICINAL PLANTS USED BY THE INDIGENOUS PEOPLE OF BAYELSA STATE, NIGERIA

Ihinmikaye Samuel Olatokunbo
Department of Biology,
Federal University, Otuoke,
Bayelsa State, Nigeria

Akinjagunla Atinuke D.
Department of Biology,
Federal University, Otuoke,
Bayelsa State, Nigeria

ABSTRACT - An ethnomedicinal study was conducted in the rural communities of Bayelsa State, Nigeria to investigate and document plants used for medicinal purposes. The study was carried out in communities situated onshore, and offshore being islands. Knowledge of medicinal plants and their abundance status were investigated systematically via ecological approach. A total of 106 medicinal plants belonged to 53 families were documented. Members of the families Euphorbiaceae, Asteraceae, Acanthaceae, Annonaceae and Apocynaceae were the most prevalence for medicine. The species accessed exhibit varying growth pattern, and the local people employs different approaches (which are unsustainable) for their extraction. The botanicals are mostly administered orally to treat different kinds of ailments: leaves were the mostly utilized part for medicine. Relative frequency of citation reveals the local importance of each medicinal plant among the respondents; it ranged from 0.20 to 1.00. The abundance status of the medicinal plants (encountered and reported by the respondents in the study area) reveals that 72.6% of the species are abundant, 12.3% are frequent, and 10.4% are occasional, while 4.7% are rarely encountered in the area. Bayelsa State is an important ecological area in the Niger Delta region of Nigeria; however, as western influence gradually erodes traditional plant knowledge, it is important to document knowledge of medicinal plants in the area. The results presented here could be of great value for further researches on plant species of interest in relation to the potential use of their bioactive constituents.

Keywords: Medicinal Plants, Indigenous People, Bayelsa State

I. INTRODUCTION

Plants are gift of nature. They form an integral part of human existence globally, and provide man with raw materials for food, shelter, fuelwood, clothing, as well as fodder and forage for livestock (Obute and Ekiye, 2008; Patel and Patel 2013). Plants are not only valued for food and shelter but also to local people, they have medicinal, ritual and magical values (Bekalo *et al.*, 2009). The use of wild and cultivated plants for medicinal purposes is critical to the lifestyle of indigenous people of Africa. Hence, separating these plants from them would have a negative effect on them as their lives depend greatly on it. To this end, indigenous people throughout Africa possess vast knowledge of their surrounding flora (Rufus, 2010).

Knowledge of plants, their habitats, structural forms among other things, is the basic foundation of traditional healthcare delivery in West Africa; although, different societies and communities have their own traditional lore and significance of plants. The knowledge of medicinal plants accumulated by the indigenous people of a community came through series of long observation, trial runs promulgated by local priests and herbalists from one generation to another which were transmitted orally to their posterity. Such knowledge is closely interwoven with their cultural values (Misganaw *et al.*, 2016). Understanding of this type of knowledge is the means by which most communities survived for centuries; adapting themselves to their environment using their intrinsic knowledge of associated plant resource management (Franklin and Mearn, 2003; Arwa *et al.*, 2010).



Medicinal plants are critical for the health care system of local people. Traditionally, their usefulness is expressed in all form of folklore medicine handed down by the tradition of a community or ethnic group. A worldwide realization of the use of particular plant species in various traditional health systems of developing countries has been observed (Kayode and Kayode 2008). WHO (2017) reported that about 80% of Africans has used a form of medicinal plant or the other for primary healthcare. However, much is still unknown of an appropriate or pertinent nature of the ethnomedicine of the indigenous minority tribes in the tropical forest of Africa to the scientific community. The tropical forest of Africa is endowed with wide variety of plant species (Ihinmikaiye and Unanaonwi, 2018), that have been used for medicinal purposes. In Bayelsa State, there do exist a number of traditional healthcare systems of medicine involving plant species, yet the study of the medicinal plants used by the indigenous of the State has not been carried out as compare to other major ethnic groups in Nigeria. It is on this note that this present study is carried out. Documenting information on the medicinal plants of an indigenous people is an important approach to conservation (Ghimire *et al.*, 2006). This is so because; the preservation and enhancement of indigenous plant knowledge could actively rescue plant species extinction. Hence, this study aimed to document indigenous medicinal plants knowledge and their medicinal uses among the indigenous people of Bayelsa State, Nigeria. The study also seeks to know the abundance and diversity status of the plants.

II. MATERIALS AND METHODS

A detail description of the study area has already been provided by Ihinmikaiye *et al.* (2018a). Bayelsa State was delineated into three districts in line with Nigeria geopolitical system. Five rural communities were selected from each of the eight Local Government Areas that constituted the three geopolitical zones. Ten respondents were randomly

selected from each community, making a total of four hundred respondents. Semi-structured questionnaire matrixes were administered on the selected respondents who had maintained a continuous domicile in the study area for a minimum of ten years. The interviews were carried out between March, 2017 and October, 2019 with an objective of open framework that allowed for focus conversational and mutual communication. Secondary information was gathered from key informants consisting of herbalists, local mid-wives, and selected chieftains from each of the communities. The medicinal uses of the species identified were documented and their voucher specimens were collected, treated and subsequently deposited at the herbarium of the Department of Plant Science and Biotechnology, Ekiti-State University, Ado-Ekiti. Abundance status of the medicinal plants assessed was as determined by Ihinmikaiye *et al.* (2018b). The Relative frequency of citation (RFC) showing the local importance of each species in a study area (Umair *et al.*, 2017), was determined by using the method of Vijayakumar *et al.* (2016) thus;
 $RFC = FC/N$.

Where;
 FC is the frequency of Citation indicating the number of informants citing the use of the species N is the total number of informants in the study area. The value of RFC varies from 0 (when no respondent mentions a plant as a useful one), to1 (when all the respondents mention a plant as useful).

III. RESULTS

The socioeconomic status of the respondents is presented in Table 1. As shown in the table, some of the sampling communities in the three geopolitical zones are situated onshore, while some are offshore i.e. situated on islands. Majority of the respondents are within 20-65 years age bracket. Most of the respondents engaged in agricultural related business and Christianity is the main religion practice of the indigenous people.

Table1: Socioeconomic Status of Respondents in the Study Area

Features	†BC	††BW	†††BE
Age	<20	32	21
	20-65	85	59
	>65	33	20
Religious	Christian	113	78
	Moslem -	-	2
Other	37	22	36



Lit status	literate	108	73	96	
	Illiterate	42	27		54
Eco. Status	Small	52		36	54
	Median 84		55		86
Occupation	Large	14	9		10
	Agric 118		74		116
Location	Non agric 32		16		34
	Onshore 11		5	7	
Sex	Offshore	4	5	8	
	Male	83		47	72
	Female	77		53	78

†Bayelsa West, ††Bayelsa Central, †††Bayelsa East

A total of 106 plants species (including three vascular seedless plants) belong to 53 different families were recorded as being used for medicinal purposes in the study area (Table 2). The plant species accessed were found in different locations: some are cultivated; some are found growing freely while some are found in the wild. The table also shows that the plants exhibited different growth habits, and the local people employed different methods for their extraction and preparation for use. The extraction

pattern is annihilative and is unsustainable. The mode of preparation includes: boiling, squashing, pounding, soaking and chewing. The relative frequency of citation (RFC) which reveals the local important of each medicinal plant among the respondents ranged from 0.20 to 1.00. *A.melegueta*, *C. citrates*, *P. guineense*, *S. monbins*, *S. sparganophora*, *S. filicaulis*, *V. amygdalina* and *X. aethiopica* scored highest RFC for medicinal uses among the informants.

Table 2: Plant Species' Name, Growth Index and Mode of Preparation

S/N	Plant species	Family	+GF	++P	*RFC	Mode of Preparation
1.	<i>Acanthus montanus</i>	Acanthaceae	H	W/C	0.86	Boiling
2.	<i>Achyranthes aspera</i>	Amaranthaceae	"	W	0.82	Squashing
3.	<i>Aframomum citratum</i>	Zingiberaceae	"	"	0.80	Pounding
4.	<i>Aframomum danielii</i>	Zingiberaceae	"	"	0.86	"
5.	<i>Aframomum melegueta</i>	Zingiberaceae	"	"	0.98	"
6.	<i>Ageratum conyzoides</i>	Asteraceae	"	"	0.78	Eaten/Squashing
7.	<i>Alchornea cordifolia</i>	Euphorbiaeae	T	"	0.90	Pounding/Drying
8.	<i>Allum sativum</i>	Alliaceae	H	C	0.87	Soaking
9.	<i>Allum cepa</i>	"	"	"	0.86	Eating raw
10.	<i>Alstonia boonei</i>	Apocynaceae	T	W	0.40	Soaking
11.	<i>Amaranthus spinosus</i>	Amaranthaceae	"	"	0.70	Cooking
12.	<i>Anchomanes difformis</i>	Araceae	"	"	0.38	Soaking
13.	<i>Anthocleista vogelii</i>	Gentianaceae	T	"	0.28	"
14.	<i>Aspilia africana</i>	Asteraceae	H	"	0.90	"
15.	<i>Asystasia gangetica</i>	Acanthaceae	"	"	0.41	Boiling
16.	<i>Bridelia feruginea</i>	Phyllathaceae	S	"	0.37	Squashing
17.	<i>Brillantaisia owariensis</i>	Acanthaceae	"	"	0.65	"
18.	<i>Calopogonium muconoides</i>	Papilionaceae	V	"	0.27	"
19.	<i>Carica papaya</i>	Meliaceae	T	C	0.91	Boiling
20.	<i>Carpolobia lutea</i>	Polygalaceae	"	W/C	0.40	Soaking
21.	<i>Cassia alata</i>	Caesalpinaceae	"	W	0.64	Boiling/Squashing
22.	<i>Cathormion altissimum</i>	Mimosaceae	"	"	0.46	Squashing
23.	<i>Ceiba pentandra</i>	Malvaceae	"	"	0.37	Soaking
24.	<i>Chromolaena odorata</i>	Asteraceae	S	"	0.62	Squashing
25.	<i>Cleistopholis patens</i>	Annonaceae	T	"	0.30	Boiling
26.	<i>Cleome ciliata</i>	Capparaceae	H	"	0.86	Squashing



27	<i>Clerodendrum thomsoniae</i>	Verbanaceae	S	"	0.20	"
28	<i>Cocos nucifera</i>	Arecaceae	T	C	0.91	"
29.	<i>Combretum racemosum</i>	Combretaceae	L	W	0.24	Boiling
30	<i>Commelina diffusa</i>	Commelinaceae	H	"	0.22	Pounding
31.	<i>Corchorus olerifolius</i>	Tiliaceae	"	W/C	0.20	Boiling
32.	<i>Costus afer</i>	Costaceae	"	W	0,60	Soaking/Squashing
33.	<i>Costus lucasianus</i>	Costaceae	"	"	0.60	"
34.	<i>Cyathula prostrata</i>	Amaranthaceae	"	"	0.26	"
35.	<i>Cymbopogon citratus</i>	Poaceae	"	C	0.99	Boiling
36.	<i>Dennettia tripetala</i>	Annonaceae	T	W/C	0.64	Eating Raw
37.	<i>Diodia sarmentosa</i>	Rubiaceae	H	W	0.31	Squashing
38.	<i>Discorea minutiflora</i>	Dioscoreaceae	V	"	0.22	Soaking
39.	<i>Dissotis rotundifolia</i>	Dioscoreaceae	H	"	0.34	"
40.	<i>Eclipta alba</i>	Asteraceae	"	"	0.61	Squashing
41.	<i>Eichhornia crassipes</i>	Pontederiaceae	"	"	0.67	Boiling
42.	<i>Elaeis guineensis</i>	Arecaceae	T	W/C	0.30	Crushing/Chewing
43.	<i>Eleusine indica</i>	Poaceae	G	W	0.91	Boil/Use intact twig
44.	<i>Elytraria marginata</i>	Acanthaceae	H	"	0.24	Crushing/Chewing
45.	<i>Emilia praetermissa</i>	Asteraceae	"	"	0.28	Squashing
46.	<i>Erythrina senegalensis</i>	Papilionaceae	T	"	0.31	Soaking
47.	<i>Euphorbia hirta</i>	Euphorbiaceae	"	"	0.42	Soaking/Squashing
48.	<i>Ficus asperifolia</i>	Moraceae	T	"	0.40	"
49.	<i>Ficus exasperata</i>	Moraceae	"	"	0.38	Soaking
50.	<i>Funtumia elastica</i>	Apocynaceae	"	"	0.52	"
51.	<i>Glyphea brevis</i>	Tiliaceae	S	"	0.46	"
52.	<i>Gongronema latifolium</i>	Apocynaceae	V	"	0.68	Cooking
53.	<i>Hexalobus crispiflorus</i>	Asclepiadaceae	T	"	0.54	Soaking
54.	<i>Hyptis lanceolata</i>	Lamiaceae	H	"	0.38	Squashing
55.	<i>Impatiens irvingii</i>	Balsaminaceae	"	"	0.42	Cooking
56.	<i>Ipomoea aquatica</i>	Convolvulaceae	V	"	0.72	Cooking/Squashing
57.	<i>Jathropha tanzanensis</i>	Euphorbiaceae	S	C	0.90	Squashing & Cooking
58.	<i>Justicia secunda</i>	Acanthaceae	"	"	1.00	"
59.	<i>Kalanchoe pinnatum</i>	Crassulaceae	H	W	0.38	Squashing
60.	<i>Khaya anthotheca</i>	Meliaceae	T	"	0.46	Soaking
61.	<i>Laportea aestuans</i>	Urticaceae	H	"	0.88	"
62.	<i>Leea guineensis</i>	Leeaceae	T	"	0.30	Cooking
63.	<i>Luffa cylindrica</i>	Cucurbitaceae	V	"	0.78	Squashing & Soaking
64.	<i>Lygodium microphyllum</i>	Schizaeaceae	"	"	0.68	Cooking/Soaking
65.	<i>Macaranga heudelotii</i>	Euphorbiaceae	S	"	0.31	Squashing
66.	<i>Mallotus oppositifolius</i>	Euphorbiaceae	S	"	0.20	"
67.	<i>Mangifera indica</i>	Anacardiaceae	T	C	0.86	Cooking
68.	<i>Manihot esculenta</i>	Euphorbiaceae	S	"	0.84	Squashing
69.	<i>Melanthera scandens</i>	Asteraceae	H	W	0.56	Cooking
70.	<i>Monodora myristica</i>	Annonaceae	T	"	0.93	Squashing/Cooking
71.	<i>Musa paradisiaca</i>	Musaceae	H	C	0.83	"
72.	<i>Musanga cecropioides</i>	Cecropiaceae	T	W	0.82	Soaking
73.	<i>Nauclea diderrichii</i>	Euphorbiaceae	"	"	0.32	"
74.	<i>Newbouldia leavis</i>	Bignoniaceae	"	"	0.57	"
75.	<i>Ocimum gratissimum</i>	Lamiaceae	S	C	0.92	Squashing/Cooking
76.	<i>Oldenlandia corymbosa</i>	Rubiaceae	H	W	0.42	"
77.	<i>Panda oleosa</i>	Moraceae	T	"	0.34	Soak in Ogogoro
78.	<i>Paullinia pinnata</i>	Sapindaceae	V	"	0.36	"
79.	<i>Pentodon pentandrus</i>	Rubiaceae	H	"	0.60	Squashing/Soaking
80.	<i>Peperomia pellucida</i>	Piperaceae	H	"	0.68	"
81.	<i>Phyllanthus amarus</i>	Euphorbiaceae	"	"	0.82	Squashing& Chewing



82.	<i>Physalis angulata</i>	Solanaceae	"	"	0.56	"
83.	<i>Piper guineense</i>	Piperaceae	V	"	0.98	"
84.	<i>Pistia stratiotes</i>	Araceae	H	"	0.51	Pounding
85.	<i>Pityrogramma calomelanos</i>	Pteridaceae	F	"	0.54	Soaking/Drying
86.	<i>Portulaca oleraceae</i>	Portulacaceae	F	"	0.71	Cooking
87.	<i>Psidium guajava</i>	Myrtaceae	T	C	0.91	"
88.	<i>Rauvolfia vomitoria</i>	Apocynaceae	S	W	0.31	Soaking
89.	<i>Rhizophora racemosa</i>	Rhizophoraceae	"	"	0.50	"
90.	<i>Sacoglottis gabonensis</i>	Humiriceae	"	"	0.49	"
91.	<i>Scleria foliosa</i> hochst.	Cyperaceae	Sledge	"	0.24	"
92.	<i>Scoparia dulcis</i>	Plantaginaceae	H	"	0.37	"
93.	<i>Selaginella myosurus</i>	Selaginellaceae	Moss	"	0.52	Squashing & Cooking
94.	<i>Senna occidentalis</i>	Caesalpinaceae	S	"	0.79	Squashing
95.	<i>Solanum nigrum</i>	Solanaceae	H	"	0.68	"
96.	<i>Sparganophorus sparganophora</i>	Asteraceae	H	"	1.00	Cooking/Squashing
97.	<i>Spilanthes filicaulis</i>	Asteraceae	"	"	1.00	Cooking
98.	<i>Spondias monbini</i>	Anacardiaceae	T	"	0.98	Chewing/Cooking
99.	<i>Stachytarpheta cayenensis</i>	Verbenaceae	H	"	0.78	Squashing & Soaking
100.	<i>Syzygium guineense</i>	Myrtaceae	T	"	0.46	Pounding/Soaking
101.	<i>Tetraplura tetraptera</i>	Mimosaceae	"	"	0.69	Cooking
102.	<i>Trachypodium braunianum</i>	Marantaceae	V	"	0.35	Eat Raw/Boiling
103.	<i>Uapaca guineensis</i>	Phyllathaceae	T	"	0.23	Pound & soak in palm oil
104.	<i>Vernonia amygdalina</i>	Asteraceae	S	C	1.00	Squashing/Cooking
105.	<i>Xylopiya aethiopica</i>	Annonaceae	T	W	1.00	"
106.	<i>Zanthoxylum Gilletii</i>	Rutaceae	"	"	0.41	Soaking

+Growth Form, ++Propagation, W= Wildling, C=cultivated, H=Herb, T=Tree, S=Shrub, V=Vine, *Respondent Consensus Factor

Different sections of the accessed plants were used for medicinal purposes (Table 3). Most of the plant materials used for medicinal purposes was usually obtained fresh, except the seeds and stem barks which are generally preferred dry. Leaves are the most utilized parts for medicinal purposes. Mode of administration ranged from oral (drinking, eating and chewing) to eyes application, dermal (bathing and

topical administration) to anal applications depending on the purpose of use. Oral and dermal applications are the most popular route of administrations. The results also reveal that the botanicals are used for treating different kinds of internal and external ailments singly or in synergy. Abundant status of the plant species as encountered and reported by respondents in the study area showed that 72.6% of the species are abundant, 12.3% are frequent, and 10.4% are occasional, while 4.7% are rare (Table 4).



Table 3: Medicinal Plants and Modes of Administration Among the Indigenous People of Bayelsa State

Botanical name	Local name	*PU	**MOA	Medicinal Uses
<i>A. montanus</i>	Edule-imemein	L/R	Oral	Treat anemia, boil and swelling
<i>A. aspera</i>	Ipesodiri	"	"	Chew with alligator pepper to treat anemia, snake bite, pile and asthma
<i>A. citratum</i>	Fiisani, Sani	S	"	Prevent abortion & vomiting, cure epilepsy; seeds used as laxative.
<i>A. melegueta</i>	Tanwain/Ataiko	"	"	Prevent epilepsy & spontaneous abortion
<i>A. danielii</i>	Fiisani, Sain	"	"	Cures typhoid, epilepsy, prevent abortion
<i>A. conyzoides</i>	Oboye	Inf/L	"	Stimulate penis, treat rheumatism, fresh wound, pneumonia & hernia, eyes discomfort
<i>A. cordifolia</i>	Furuipain	L	Oral/Dermal	Treats malaria, eyes discomfort and heal wound
<i>A. sativum</i>	Garlic	Cl	Oral	Treats hypertension; combine with other herbs to treat erectile dysfunction
<i>A. cepa</i>	Yabasa	Bu	"	Cures typhoid, epilepsy, prevent abortion & ear ache
<i>A. spinosus</i>	Ininain	L	"	Treats swollen of any kind, prevents miscarriage
<i>A. difformis</i>	Owei-ototo	"	"	Ease child birth, antidote to poison
<i>A. vogelii</i>	Osuo	R	"	Arouse sexual desire, treats gonorrhea
<i>A. africana</i>	Iyounkori	L	"	Treats hiccup, sore throat, & facilitate child birth
<i>A. booneii</i>	Endoundou/ kigbo	B/L	"	Treats hiccup, sore throat, rheumatism, asthma, & dysentery, leaf extract/treats snake bite
<i>A. gangetica</i>	Iposodiri	L	"	Treat rheumatism, and expel worms
<i>B. owariensis</i>	Bilaberi	"	"	Treats eyes defects & pain, stop headache
<i>B. ferruginea</i>	Igbaragbara	L	"	Treats rheumatism, arthritis, boils, hernia & bone fracture
<i>C. muconoides</i>	Deweiyyau	"	"	Treats ulcer, dysentery
<i>C. papaya</i>	Indu	"	"	Infusion in combination with some other herbs treat fever
<i>C. lutea</i>	Igolongolo	L/R/B	"	Malaria, ulcer, stimulates penile erection
<i>C. alata</i>	Efendiri	L	Oral/Dermal	For diarrhea, ringworm & scabies
<i>C. altissimum</i>	Iyanyan	L/B	Dermal	Poultice used for merging broke bones
<i>C. pentandra</i>	Isaghai	L	Oral	Soft shoot is taken to initiate abortion
<i>C. odorata</i>	Furutua/ Biyenkue	"	Oral/Dermal	Heals wound, treat malaria, eye & ear ache
<i>C. patens</i>	Paa/Para	"	Oral	Treats fever
<i>C. ciliata</i>	Agbalala	"	Nasal	Treats earache, malaria & headache: apply extract in the nostril
<i>C. thomsoniae</i>	Eridei	"	Dermal	Treats rashes and wound
<i>C. nucifera</i>	Kokodia/ Beke-imbi	S	Anal	Pulp of tender coconut in combination with other herbs treats pile
<i>C. racemosum</i>	Owei-igbali	L/B	Oral	Treats convulsion in children
<i>C. diffusa</i>	Ikiribukpui	Sh	Dermal	Cures measles, heal sore



<i>C. olitorus</i>	Ikinrikin	Inf	Oral	Treats diabetics
<i>C. afer</i>	Ere-ogbodoi	L	Oral/Eyes	Stops hiccup treats eyes pain, cough nasal & hypertension
<i>C. lucausianus</i>	Ogbodoin	"	Oral/Nasal	Treats measles & malaria
<i>C. prostrata</i>	Oborikorigha	"	Dermal/Oral	To extract object lurking in wound, treat dysentery
<i>C. citratus</i>	Bekepiri	Inf	Oral	Treats malaria, typhoid & fever in combination of other herbs
<i>D. tripetala</i>	Ulumaa	"	"	Stops urge to vomit in pregnant woman
<i>D. sarmentosa</i>	Oboweidiri	L	Oral/Dermal	Stops migraine, for rheumatism, antidote to poison
<i>D. minutiflora</i>	Ogborodii	L/R	Oral	Arouse penis, leaves infusion in water or local-gin treat jaundice
<i>D. rotundifolia</i>	Lekerese	L	"	Cures headache & mental illness
<i>E. alba</i>	Calm-my-pain Obirima	"	Nasal/Eyes	Relief pain and chronic headache
<i>E. crassipes</i>	Lakua	"	Dermal	Treats malaria:bath leaf steep hot water
<i>E. guineensis</i>	Ipelipeli/ Lugutin	R	Oral	Seeding root treats erectile dysfunction
<i>E. indica</i>	Beresole	R/S	Oral/Eyes	Treats fever, use shoot to cleans ear drum
<i>E. marginata</i>	Keniboutein	Inf	Oral	Stops bedwetting, stomach ache, chest pain and fever
<i>E. praetermissa</i>	Kalamatorodede	L	Eyes/Nasal	Treats sore, wound & chronic headache
<i>E. senegalensis</i>	Ugurizi	B	"	Decoction treats malaria & yellow fever
<i>E. hirta</i>	Obirima	Sh	Oral/Dermal	Treats cough, catarrh, dysentery, for snake bite apply externally
<i>F. asperifolia</i>	Ifiayau	B/R	"	Decoction treats asthma & cough, use the tender leaves for ulcer
<i>F. exasperata</i>	Pou, Koronsi	L/R	"	Treats cough, for diarrhea & deworming
<i>F. elastica</i>	Orobatin	L	"	Stop irregular menstrual pain
<i>G. brevis</i>	Itolo	"	"	Use for man power, treats gonorrhoea
<i>G. latifolium</i>	Utazi	"	"	Treat cough, dysentery & malaria
<i>H. crispiflorus</i>	Tawain	B/Inf	"	For deworming, stomachache & venereal diseases
<i>H. lanceolata</i>	Amasediri	L	"	Cures chronic headache
<i>I. irvingii</i>	Owei-ilali	"	"	Treats stomach ache, for deworming
<i>I. aquatica</i>	Owei-ilali	"	"	Treats cough, boils, wound, used as laxative & antidote to poison
<i>J. tanjorensis</i>	Hospital-too-far	"	Oral	Replenishes blood, treats anemia
<i>J. secunda</i>	"	"	"	Replenishes blood, treats anemia, cough & fever
<i>K. pinnata</i>	Umbudiru	"	Anal/Dermal	Treats pile, swellings on the body
<i>K. anthotheca</i>	Ipelemu	B	Oral	Treats fever, cold & pneumonia
<i>L. aestuans</i>	Ere-ombi	L	"	Treats asthma, convulsion, stomachache and constipation
<i>L. guineensis</i>	Ikolo	"	"	Treat nerves, muscles pain & rheumatism
<i>L. cylindrica</i>	Elelepan	"	"	Induces labour after 9 months pregnancy
<i>L. microphyllum</i>	Owonmarei	"	Oral/Dermal	Stop cough, reduce swelling treats dysentery and gonorrhoea
<i>M. heulodetii</i>	Igbarigba	"	Oral	Treats cough & stomach upset
<i>M. oppositifolius</i>	Furu-pain	"	"	Treats ringworm, toes & finger infections
<i>M. indica</i>	Bekenogboin	"	"	Decoction in combination of other leaves treats fever & typhoid



<i>M. esculenta</i>	Baburu	T/L	Dermal	other leaves treats fever relief pain & stops bleeding
<i>M. scandens</i>	Iyunkori	L	Oral	Antidote to poison, stop hiccup, facilitate child birth
<i>M. myristica</i>	Arigogo	S	Dermal/Oral	Squish with other spices to treat broken-bone; treats stomach ache
<i>M. paradisiaca</i>	Bariba	"	"	The fresh leaf juice treats wound
<i>M. cecropiodes</i>	Fanfan/Akpwei	B/L	Oral	Treat menstrual pain
<i>N. diderrichii</i>	Owoso	L	"	Treat stomach & malaria
<i>N. leavis</i>	Ogirizi	"	"	Cures cough, diarrhea & treats infant convulsion
<i>O. gratissimum</i>	Furukana	"	Oral/Eyes	Treats stomachache, headache stop bleeding & cure convulsion
<i>O. corymbosa</i>	Dieni	"	Oral	Treats malaria, snake bite, boils & urinary tract infection
<i>P. oleosa</i>	Aku	B	"	Treats sore, rheumatism, for deworming & antidote to poison
<i>P. pinnata</i>	Edefinai	R/L	"	Use for manpower, menstrual disorder treats & ulcer
<i>P. pentandrus</i>	Okeberi	"	Eyes/Oral	Treats eyes defect, improve lactation in nursing mother
<i>P. guineense</i>	Oziza	R/L	Oral	Arouse sexual desire, treats cough
<i>P. pellucida</i>	Ukobotoru	Sh	"	Ease child birth, antidote to poison
<i>P. amarus</i>	Tunkaben	"	"	Cures anemia, malaria & typhoid
<i>P. angulata</i>	Nbutuo	L	"	Stomach upset, fever, and typhoid
<i>P. stratiotes</i>	Ekeregu	"	Anal	Treats pile apply externally
<i>P. caomelamos</i>	Oritatein	"	Oral	Stops bleeding, steep in gin for anaemia
<i>P. oleraceae</i>	Obermelei	"	"	Relief nerve pain, anemia treat
<i>P. guajava</i>	Guava	"	"	Treats malaria combine with other leaves treat female infertility
<i>R. vomitoria</i>	Burunfuru	L	"	Ease delivery, treats measles, & rheumatism
<i>R. racemosa</i>	Angala	"	"	Treats asthma, boils & ulcer
<i>S. sparganophora</i>	Bou-kiriologbo	"	"	Soften womb, treat anemia arthritis & skin infections
<i>S. gabonensis</i>	Tala	B	"	Treats malaria, diarrhoea & stomach upset
<i>S. foliosa</i>	Bouedein	L/S	"	Treats malaria, cough
<i>S. dulcis</i>	Bibiimbelema	Sh	Oral/Dermal	Foetal development, safe delivery; treat snake bite & antidote to fever
<i>S. myosurus</i>	Obribonomo	"	"	Treats rheumatism, asthma, for proper fetal development
<i>S. occidentalis</i>	Woniidiri	L	"	Treats fever, eczema, ring worm & to ward off snake
<i>S. nigrum</i>	Duwei-ikpikpi	"	L	Relief itch, bites of any kind for arthritis & convulsion
<i>S. filicaulis</i>	Kiriigina	Inf	Oral	Stop vomiting, cures stomach ache, heals womb, stabilizes temperature in infant
<i>S. monbins</i>	Ighinigha	L/Inf	"	Stops vomit, treats eyes ache in children
<i>S. cayenensis</i>	Fokotuo	L	"	Stop dysentery, toothache, induces sleep
<i>S. guineense</i>	Epemu	B	Dermal	Poultice merges broken bones, treats asthma, wounds & malaria
<i>T. tetraptera</i>	Apaupau	L	Oral	For postpartum illnesses & convulsion
<i>T. braunianum</i>	Apkarakatia	Inf/L	"	Cures asthma, cough, develops fetus
<i>U. guineensis</i>	Ile	L	Dermal	Massaging purpose against rheumatism



<i>V. amygdalina</i>	Ama-kiriologbo	"	Dermal/Oral	Massaging purpose against stomach upset
<i>X. aethiopica</i>	Enge	L/S	Oral	Treats asthma, rheumatism and bone dislocation
<i>Z. gillettii</i>	Oweikoromo	B	"	Arouse penis, treats cough, cold, sore throat & rheumatism.

*Part Used, ** Mode of Administration, L= leaf, R= root, S= seed, Inf=inflorescence, B=bark, Bu=bulb, Cl=clove, Sh=shoot

Table 4: Categories of Medicinal Plants Based on Abundance Scale as Reported by Respondents in the Study Area

Abundant (72.6%)	Frequent (12.3%)	Occasional (10.4%)	Rare (4.7%)
<i>A. montanus</i>	<i>A. citratum</i>	<i>C. thomsonae</i>	<i>D. tripetala</i>
<i>A. aspera</i>	<i>A. danielii</i>	<i>E. senegalensis</i>	<i>H. crispiflorus</i>
<i>A. conyzoids</i>	<i>A. melegueta</i>	<i>K. anthotheca</i>	<i>X. aethiopica</i>
<i>A. cordifloria</i>	<i>B. owariensis</i>	<i>L. aguineense</i>	<i>B. feruginea</i>
<i>A. sativum</i>	<i>C. lutea</i>	<i>M. myristica</i>	<i>M. oppositifolius</i>
<i>A. cepa</i>	<i>C. altissimum</i>	<i>N. diderrichii</i>	
<i>A. booneii</i>	<i>C. paten</i>	<i>P. guineense</i>	
<i>A. spinosus</i>	<i>D. Minutiflora</i>	<i>S. gabonensis</i>	
<i>A. difformis</i>	<i>G. brevis</i>	<i>T. tetraptera</i>	
<i>A.vogelii</i>	<i>P. oleosa</i>	<i>T. braunianum</i>	
<i>A. africana</i>	<i>S. sparganophora</i>	<i>Z. gillettii</i>	
<i>A. gangetica</i>	<i>S. guineense</i>		
<i>C. muconoides</i>	<i>M. heudelotii</i>		
<i>C. papaya</i>			
<i>C. alata</i>			
<i>C. pentandra</i>			
<i>C. odorata</i>			
<i>C. ciliate</i>			
<i>C. nucifera</i>			
<i>C. racemosa</i>			
<i>C. diffusa</i>			
<i>C. olitorus</i>			
<i>C. afer</i>			
<i>C. lucausianus</i>			
<i>C. prostrate</i>			
<i>C. citratus</i>			
<i>D. sarmentosa</i>			
<i>D. rotundifolia</i>			
<i>E. alba</i>			
<i>E. crassipes</i>			
<i>E. guineensis</i>			
<i>E. indica</i>			
<i>E. marginate</i>			
<i>E. praetermissa</i>			
<i>E. hirta</i>			
<i>F. asperifolia</i>			
<i>F. asperifolia</i>			
<i>F. elastic</i>			
<i>G. latifolium</i>			
<i>H. lanceolata</i>			
<i>I. irvingii</i>			
<i>I. aquatic</i>			
<i>J. tanjorensis</i>			



J. secunda
K. pinnata
L. aestuans
L. cylindrical
L. microphyllum
M. indica
M. esculentus
M. scandens
M. paradisiaca
M. cecropoides
N. leavis
O. gratissimum
O. corymbosa
P. pinnata
P. pentandrus
P. pellucida
P. amarus
P. angulate
P. stratiotes
P. caomelamos
P. oleraceae
P. guajava
R. vomitoria
R. racemosa
S. foliosa
S. dulcis
S. myosurus
S. occidentalis
S. nigrum
S. filicaulis
S. monbins
S. cayenensis
V. Amygdalina
U. guineensis

Table 5 shows the proportion of the medicinal plants in relation to their family. Members of Euphorbiaceae family were the most prevalent species for medicinal purposes (7.6%), followed by members of Asteraceae (6.6%), Acanthaceae (5.7%), Annonaceae (4.7%), and Apocynaceae (3.8%). Fabaceae, Leguminosae,

Malvaceae, Lamiaceae, Rubiaceae, Moraceae, Zingiberaceae and Phyllathaeae (are 2.8% each), while Amaranthaceae, Amaryllidaceae, Anacardiaceae, Araceae, Compositae, Costaceae, Meliaceae, Myrtaceae, Piperaceae, Solanaceae, Urticaceae, Poaceae (are 1.9% each), each of the other families were 0.9%.

Table 5: Plant Family, No of Medicinal Plant Species in the family and Percentage Total

S/N	Family	No of Sp. in each Family	Total percentage
1.	Euphorbiaceae (1family)	8	7.6
2.	Asteraceae (1family)	7	6.6
3.	Acanthaceae (1 family)	6	5.7
4.	Annonaceae (1 family)	5	4.7
5.	Apocynaceae (1 family)	4	3.8



6.	Fabaceae, Leguminosae, Malvaceae, Lamiaceae, Rubiaceae, Moraceae, Zingiberaceae Phyllathaceae (8 families)	3	22.6
7.	Amaranthaceae, Amaryllidaceae, Anacardiaceae, Araceae, Compositae, Costaceae, Meliaceae, Myrtaceae, Piperaceae, Solanaceae, Urticaceae, Poaceae (12 families)	2	22.6
8.	Adiantaceae, Arecaceae, Balsaminaceae, Bignoniaceae, Cleomaceae, Combretaceae, Commelinaceae, Convolvulaceae, Crassulaceae, Cucurbitaceae, Cyperaceae, Dioscoreaceae, Gentianaceae, Leeaceae, Marantaceae, Melastomataceae, Musaceae, Plantaginaceae, Polygalaceae, Pontederiaceae, Portulacaceae, Rhizophoraceae, Rutaceae, Sapindaceae, Sapotaceae, Schizaeaceae, Selaginellaceae, Verbenaceae (28 families)	1	26.4

IV. DISCUSSION

The concept on medicinal plant use among the indigenous people with respect to their geographic locations (onshore and offshore) was almost similar, as information relating to the plant species circulated along cultural line within the geographical setting. The total number of plant species (106) accessed and documented for medicinal uses in the study area validates the vast lore on medicinal plants and their useful values in the study area. A similar study by Borokini *et al.* (2013) in Oyo State reported 91 plant species for medicinal purposes, Durugbo (2013) documented 73 plants for medicinal use in Imo State, Nwauzoma *et al.* (2013) recorded 73 medicinal plants in Port Harcourt, Rivers State; while in Akwa Ibom State 114 medicinal plants were documented (Ajibesin *et al.*, 2008). Similar study carried out in Enugu State came up with 96 plant species of medicinal importance (Aiyeloja and Bello 2006), while Idu and Onyibe (2007) reported 300 medicinal plants in Edo State. Generally, ethnomedicinal researches carried out among different ethnic groups in Nigeria point to the fact that vast knowledge of medicinal plants does exist among indigenous people, and the wide spread use could be attributed to cultural acceptability, efficiency against specific diseases, physical accessibility and economic affordability (Tilahun and Mirutse, 2007).

The predominance of the members of Euphorbiaceae, Asteraceae, Acanthaceae, Annonaceae, Apocynaceae, and Fabaceae for medicinal purposes among the indigenous people agrees with the reports on ethnomedicinal studies in other parts of Nigeria and in parts of West Africa (Ajibesin *et al.*, 2008; Jiofack *et al.*, 2010). This may not be unconnected with their prevalence, wide spread distribution in the tropical forest zones and the level of bioactive ingredients in

them. Herbs is the mostly used plant form for medicine in the study area, similar results were reported by Mahmood *et al.* (2011), Borokini *et al.* (2013) and Parthiban *et al.* (2016). The growth patterns and locations of the plant species were in consonant with the assertion of Ihinmikaiye and Okpo (2018) who reported that lowland rain forest belt is high in plant species richness and diversity. However, anthropogenic influences are the ecological drivers of plant species diversity loss and the major threats to the existence of medicinal plants in the area. Although cultivation of plants promotes availability, yet plants are cultivated mostly for food which is primary, the uses of cultivated plants for medicine in the area were for secondary or tertiary purpose, though some of the plant used primarily for food is medicinal. This agreed with the report of Arowosegbe *et al.* (2018) who reported that some plants used primarily as vegetables could also have medicinal properties. Exploitation of different parts of a plant for medicine suggests that bioactive constituents are distributed in different parts of the plants (Olanipekun *et al.*, 2016). Leaves are the plants' part mostly used in the study area for medicine concur with other researchers (Asase *et al.*, 2005; Ayyanar 2005; Ampitan, 2013 and Malanet *et al.*, 2015) who reported that leaves are the most utilized part of medicinal plant for treating ailments. Rarity of medicinal plant species in the area underscores their values for secondary purposes, while their primary uses may be largely unsustainable for ecological balance. Some of the rare species which constitute 4.7% are used for culinary; and annihilative procedure was reported as the main method of their extraction (Ihinmikaiye *et al.* 2018). Using a plant species singly for treating a specific ailment is a common mode of administration, but more often than none, synergistic use of plant species gives rise to effectiveness. This agrees with the reports of Abebe and Ayehu (1993); and Ebong *et al.* (2008) who



reported that medicinal plants therapies involving synergistic blend work together in a dynamic way to provide therapeutic efficacy with minimum side effects.

V. CONCLUSION

The most important threat to medicinal plant species in the study area is habitat destruction, an outcome of resource harvesting, deforestation and pollution. Thus, preventive measures should be taken to check the menace, driver of plant species diversity lost.

VI. ACKNOWLEDGE

The authors are thankful to the indigenous people of the communities wherein the studies were carried out for their openness to our inquiries.

VII. REFERENCES

- [1] Abebe, D. and Ayehu, A. (1993). Medicinal plants and enigmatic health practices of northern Ethiopia Berhanina Salam. Printing Press, Addis Ababa, Ethiopia, (pp. 1-35)
- [2] Aiyelaja, A.A. and Bello, O. A. (2006). Ethnobotanical potential of common herbs in Nigeria: A case study of Enugu State. *Educational research and review* Vol. 1(1), (pp. 16-22)
- [3] Ajibesin, K. K.; Ekpoa, B. A.; Bala, D. N.; Etienne, E. E.; and Adesanya, S. A. (2008). Ethnobotanical survey of Akwa Ibom State of Nigeria. *Journal of Ethnopharmacology*. 115: 387–408. doi: 10.1016/j.jep.2007.10.021.
- [4] Ampitan, T. A. (2013). Ethnobotanical survey of medicinal plants in Biu local government area of Borno State, Nigeria. *Comprehensive Journal of Herbs and Medicinal Plants* Vol. 2(1), (pp. 7 – 11).
- [5] Arowosegbe, S., Olanipekun, M.K. and Adeloje, I.A. (2018). Ethnobotanical survey of indigenous leafy vegetables consumed in Ekiti State, Nigeria. *European Journal of Biology and Medical Science Research*. 6(1): (pp. 7 – 14).
- [6] Arwa, S. P., Nyunja, R.O. and Onyango, J.C. (2010) Plant Species in the Folk medicine of Kit Mikayi Region, Western Kenya. *Ethnobotanical Leaflets*. 14: (pp. 836-40).
- [7] Asase, A., Oteng-Yeboah, A. A., Odamtten, G. T., and Simmonds, M. S. J., (2005). Ethnobotanical study of some Ghana antimalarial plants. *Journal of Ethnopharmacology*. 99(2): (pp. 273-9). Doi: 10.1016/J.jep.2005.02.020.
- [8] Ayyamar, M., and Ignacimuthus, I., (2005). Medicinal plants used by the tribals of Tirunelvel hills, Tamil Nadu to treat poisonous bites and skin diseases. *Indian J. of traditional knowledge* vol 4(3). (pp. 229-236).
- [9] Bekalo, T. H., Sebsebe, D. W. and Zemedu, A. W. (2009). An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta Special Woreda, southern nations, nationalities and peoples regional state, Ethiopia. *Journal of Ethnobiology and Ethnomedicine* 2009, (5:26) doi:10.1186/1746-4269-5-26.
- [10] Borokini, T. I.; Ighere, D.A.; Clement, M.; Ajioye, T.O., and Alowonle, A.A (2013). Ethnobotanical survey of traditional medicine practices in Oyo State. *J. of Medicinal plants studies* vol. 1 Issue 5, part A
- [11] Durugbo, E. U. (2013). Medico-Ethnobotanical inventory of Ogi, Okigwe Imo State, South Eastern Nigeria. *Global Advanced Research Journal of Medicinal Plants* Vol. 2(2) (pp. 030-044).
- [12] Ebong, P. E., Atangwho, I., Eyong, E., and Egbung, E., (2008). The antidiabetic efficacy of combined extracts from two continental plants: *Azadirachta indica* (A. Juss) (Neem) and *Vernonia amygdalina* (Del.) (African bitter leaf). *AJBB* 4(3): (pp. 239-244).
- [13] Fratkin, E. M., and Mearns, R. (2003). Sustainability and Pastoral Livelihoods: Lessons from East Africa and Mongolia. *Human Organization* 62(2): 112-122. *Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine* Vol. 2016, (pp. 24) <http://dx.doi.org/10.1155/2016/5060247>.



- [14] Idu, M., and Onyibe, H. L., (2007). Medicinal plants of Edo State, Nigeria. *Research J. of medicinal plants*. 1: (pp. 32-41).
- [15] Ihinmikaiye, S. and Unanaonwi, O. E., (2018). Tree species structure and diversity in the lowland- rain forest zone of Bayelsa State. *J. of ecology and natural resources*. Vol. 2 (2): 000126.
- [16] Ihinmikaiye, S. O.; S. Arowosegbe, J. Kayode and Oyedeji A. A. (2018a). Ethnobotanical survey of plant species utilised as spices among the indigenous people of Bayelsa State, Nigeria. *Brazilian Journal of Biological Sciences*, v. 5, No. 10, (pp. 461-469).
- [17] Ihinmikaiye S.O., Kayode J., Arowosegbe S., Oyedeji A. A., (2018b). Biodiversity Conservation of Plant Taxa Used for Oral and Dental Health Management among the Ethnic Ijaws of Bayelsa State Nigeria. *Haya: Saudi J. Life Sci.*, Vol-3, Iss-5: (pp. 420-428)
- [18] Jiofack, T., Fokunang, C., Guedje, N., Kemeuze, V., Fongnzossie, E., Nkongmeneck, B. A. (2010). Ethnobotanical uses of medicinal plants of two ethnoecological regions of Cameroon. *International J. of medicine and medical sciences*. Vol. 2 (3): (pp. 60- 69).
- [19] Kayode, J. and G.M. Kayode. (2008). Ethnomedicinal Survey of Botanicals Used in Treating Sexually Transmitted Diseases in Ekiti State, Nigeria. *Ethnobotanical Leaflets* 12: (pp. 44-55).
- [20] Mahmood, A., Qureshi, R. A., Mahmood, A., Sangi, Y., Shasheen, H., Ahmed, I. and Nawaz, Z., (2011). Ethnobotanical survey of common medicinal plants used by people of district Mirpur, AJK, Pakistan. *J. of medicinal plant research*. 5 (18): (pp. 4493-4498).
- [21] Malan, D. F.; Danho, F. R. N., and Kouakou, L. K. (2015). Medicinal plants and traditional healing practices in ehotile people, around the aby lagoon (eastern littoral of Côte d'Ivoire). *Journal of Ethnobiology and Ethnomedicine* (2015) (pp. 11:21). DOI 10.1186/s13002-015-0004-8.
- [22] Misganaw. M., Zemedea, A., and Mekuria, A. (2016). The Status of Ethnobotanical Knowledge of Medicinal Plants and the Impacts of Resettlement in Delanta, Northwestern Wello, Northern Ethiopia. *Evidence-based complementary and alternative medicine*. (Volume 2016). Doi:10.1155/2016/5060247.
- [23] Nwauzoma, A. B. and Dappa, Magdalene S. (2013). Ethnobotanical studies of Port Harcourt Metropolis, Nigeria. *American Journal of Research Communication*: www.usa-journals.com.
- [24] Obute, G. C., and Ekiye, E. (2008). Ethnobotanical Applications of some Floral Species in Bayelsa State, Nigeria *Ethnobotanical Leaflets* 12: (pp. 713-18).
- [25] Olanipekun M.K., Arowosegbe S., Kayode J.O and Oluwole T.R. (2016). Ethnobotanical survey of medicinal plants used in the treatment of women related diseases in Akoko Region of Ondo-State, Nigeria. *J. of Medicinal Plant Research* Vol. 10 (20), (pp. 270-277). DOI: 10.5897/JMPR2015.6040.
- [26] Parthiban, R., Vijayakumar, S., Prabhu, S., and Morvin Yabesh, J. G. E., (2016). Quantitative traditional knowledge of medicinal plants used to treat livestock diseases from Kudarasal taluk of Thiruvavarur district, Tamil Nadu India. *Brazilian J. of pharmacognosy*, vol. 26 (1): (pp.109-121).
- [27] Patel, H.R, Patel, R. S., (2013). Ethnobotanical of plant used by the tribes of R.D.F poshina forest range of sabarkantha district, north Gujarat india. *International Journal of Scientific and Research Publications*, Vol. 3 (2), (pp. 2250-3153).
- [28] Rufus M. U. (2010). Ethnobotany and Biodiversity Conservation in the Niger Delta, Nigeria. *International Journal of Botany*, 6: (pp. 310-322).



- [29] Tilahun, T. and Mirutse, G. (2007). Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. 3:12 .doi:10.1186/1746-4269-3-12.
- [30] Umair, M., Altaf, M., and Abbasi, A. M., (2017). An ethnobotanical survey of indigenous medicinal plants in Hafizabad district Punjab- Pakistan, *PLoS ONE* 12 (6): 20177912. Doi:10-1371/J. pone. 0177912.
- [31] Vijayakumar, S., Harikrishnan, J. P., Prabhu, S., Yabesh, E. M., and Manogar, P., (2016). Quantitative ethnobotanical survey of traditional siddha medicinal practitioners from Thiruvarur district with Hepato protective potential through in silico methods. *Achievements in the lifesciences* 10: (pp. 11-26).
- [32] WHO (2018). <https://afro.who.int/health-topics/traditional-medicine>. (Accessed May, 2019).

IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies



PEER REVIEWED

All submissions are rigorously peer reviewed to ensure quality.



OPEN ACCESS

Free and unrestricted access to research for all.



GLOBAL REACH

Connecting researchers and professionals worldwide.



TIMELY PUBLICATION

We ensure a swift and efficient publication process.



For more information, visit our website
www.ijeast.com



INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

✉ editor@ijeast.com

🌐 www.ijeast.com

📍 India



2455-2143