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Research Article

Ecology and Taxonomy of the Weeds of locality of Algoze (Aldobibat)-South Kordofan State-Sudan

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Abstract

This study was conducted in locality of algoze (Aldobibat) Natural Reserved Forest, South Kordofan-State-Sudan. The main objective of this research study is to assess the weeds species diversity in the study area and to identify, documents species of the native flora of the study area. Some ecological parameters such as density, frequency, abundance and the relationship between it were tested, chi-square (x^ (2)) -test used for types of association and the taxonomic studies included collection; identification and classification were done . The results documented that the forest is rich in tree species biodiversity, where 113 species were identified and recorded belong to 33families. However, the results indicated significant increase (p >0.05) in the number of trees/ha during 2019 to 2022. The most dominant families were Poaceae ,Mimosaceae and Fabaceae ,where the less dominant families' were *Aristolochiacee , Balanitaceae ,Burseraceae ,Caesalpiniaceae, Cleomaceae ,Commelinaceae ,Cyperaceae, Nyctaginaceae, Rhaminacaea, Rubiaceae.*,some families are disappears . The ecological studies cited as in table (1) and the degree of association as in table (2). During this period strong positive correlation between climate factors was observed. The study concluded that human activities were the main factors influenced diversity and regeneration of weeds.

Keywords: Flora; Vegetation of Sudan; Biodiversity; Eco Taxonomy; Aldobibat; Area

Introduction

Sudan is one of the largest countries in Africa, with a wide range of variation in climate, topography, soils and hydrology, [1]. The variation characters lead to change the ecological habitats and vegetation zones, it is limited from the desert zone in the north, semi-desert, low rainfall woodland savannah, high rainfall wood land savannah and consequently rich flora, [2-4] study area was located in wood land savannah and the vegetation of it is characterized by annual rainfall of 104-300mm [3]. The area has green cover for nearly 6 months or but for the remaining 6 months [5]. Few previous taxonomic works have dealt with weeds of cultivation in the Sudan, which included very short botanical descriptions [1-3,5-11]. The extent of biodiversity loss associated with different land use systems has seldom been considered, although many traditional land management strategies have supported biodiversity maintenance.

Location

The locality of algoze (Aldobibat) Natural Reserved Forest, extended of north of South Kordofan-State-Sudan. Between north Kordofan State and north of the Republic of South Sudan . It lies in the wood land savannah region. The area has a hot dry summer from March to June with daily temperature and relative humidity .The rainy season starts in late June and ends in December. Winter is cold and dry and it start from November to February.

Methodology

Direct observations and primary surveying were used to assess environmental conditions and plant community types. This study is composed of taxonomic and ecological studies.

Observations of weeds and identification

Plant specimens were observations from different sites of the study area and fine floral characters were examined. The synonyms of the identified species were extracted from many references such as [12-18]. Vernacular names of the collected species were recorded from local inhabitants within the study area and also extracted from [19,20] and [1].

Ecological studies

The following ecological parameters were studied: density, relative abundance, frequency, association, distribution of species and species diversity. Ecological problems caused by weeds in the study area were observed, with special emphasis on noxious herbaceous weeds and their distribution in the study area. A total of (500) quadrats were used, (1850) total number of individual's quadrats and (412) total number of occupied quadrates were used in this study.

Here is a brief description of the ecological parameters used in this study:

Density (D):

This is the number of individuals per quadrats. It is calculated as follows:

$$D = \frac{\text{total number of individuals}}{\text{total number of quadrats}}$$

The total of quadrats was estimated in square meters.

Abundance (A):

This was determined as follows :-

$$A = \frac{\text{total number of individuals}}{\text{number of occupiedquadrats}}$$

Species frequency (F):

Frequency is defined as the probability or chance of finding an individual of a particular species in a given sample area or quadrate. It is calculated as follows:

$$F\% = \frac{\text{number of occupied quadrat}}{\text{total number of quadrats}} \times 100$$

The relationship between D, A, and F

This was calculated by the following equation:

$$D = \frac{AXF}{100}$$

Degree of association

Degree of association among the dominant species was determined using chi-square (x^2) through presence or absence data entered in a 2 × 2 contingency table (as shown below) for combinations of any two species.

		Species X		
Species Y	Present (+)	Present (+)	Absent (-)	Total
		a	c	a + c
	Absent (-)	b	d	b + d
	Total	a + b	c + d	N

Table 1: 2×2 contingency table.

Legend:

a = number of quadrats in which species (×) and species (Y) are both present.

b = number of quadrats in which species (X) is present but species (Y) is absent.

c = number of quadrats in which species (Y) is present but species (X) is absent.

d = number of quadrats in which both species (X) and (Y) are absent.

N: The total number of quadrants = a + b + c + d

Calculation of chi-square (x^2) for degree of association between species was determined by following formula

$$x^2 \text{ Cal} = \frac{(ad-bc-0.5N)^2 N}{(a+b)(c+d)(a+c)(b+d)}$$

Where:

0.5 = Yate's correction factor for small samples (less than 500 individuals). If there is association, then the nature of association is determined by calculating the joint occurrence (J.O.) as follows:

$$\text{J.O.} = \frac{(a+b)(a+c)}{N}$$

The J.O value then was compared with the value (a) in the contingency table.

Result and Discussion

Ecological study

Parameters	The values of parameters
Density (D)	3.7%
Frequency (F)	82.4%
Abundances (A)	4.49%
Relationship (R)	3.699%

Table 2: Summary of ecological parameters.

Species	cal	tab p < 0.05),	Association Present or none	Type of association
Pentandra and Pulicaria crispa Zaleya	0.48	3.84	None	-
Digera amuritica and *Tribulus sterrestris*	20.11	3.84	None	-
Senna alexandrina and *Ipomoea carica*	23.91	3.84	Present	Negative
Cyperus rotudus and *Cleame gynandra*	195.33	3.84	None	-
Rynchosi aminima and *Solanum nigrum*	28.16	3.84	Present	Positive
Brachiaria deflxa and *Portulaca aleracea*	0.078	3.84	None	-
Sprobolus pyramidatus and *Dinebera retroflexa*	3.00	3.84	None	-
Acacialeat and *Capparis deciduas*	17.26	3.84	None	-
Ocimum canum and *Euphorbiahirta*	0.76	3.84	None	-
Zizphus spina and *Balanites aegyptiaca (L.)*	861.96	3.84	Present	Negative

Table 3: Summary results of degree of association between deferent species.

Taxonomic study

The present study reported that there was variation between the species, the data recorded during this study were compared with the related literature and also published reports on the flora. Some families have never been described in the literature of study area and the other was reported as the table (4). The data provided by our informants and analyzed in the present paper clearly show that folk knowledge on medicinal plants still alive in the studied region.

N	Family	Species	Local name	Habit	Location
1	*Acanthaceae*	*Justicia palustris (Hochst.)*	Tamatim elkilab	An., He.	All the locality areas
		Thunber giaannua (Hochst.)	Um Rikebat	An., He.	Awlad yonis
2	*Aizoaceae*	*Zaleya pentandra(L)*	Al-Rabaa	An., He.	Elhagez
		Mullugo nudicaulis (Lam.)	Shamar kazeb	An., He	Manago
3	*Amaranthaceae*	*Aerva javanica (Burm.f)*	Raselshaib	Per.,He	Kurkura bagar
		Amaranthus graecizans (L)	Lissan tair saghir	An.,He.	All the locality
		Celosia argentea (L)	DanabEkalib	An., He.	
		Digera muritica (L)	Lablab Ahmr	An., He.	Khor abuhabil
		Alternanther anodiflora (Forssk).	Abuturma	An., He.	Khor abuhabil
4	*Aristolochiacee*	*Aristolochia bracteolae (Lam)*	Um Galagil	Per.,He.	Elbuglti
	Asclepiadaceae	*Leptadenia pyrotechnica(Forssk*	Marekh	shurb	Elsalheen
		(L).Leptadenia arborea	Marekh	shurb	Elsalheen
5	*Asteraceae*	*Sonchus oleraceous (L.)*	Moleita	An., He.	Elsalheen, umseda
		Xanthium brasilicum (Waller.)	Ramtouk	An., He.	Elfinger, eldobibat
		Sonchus cornutus (Hochst.)	Malota	An., He.	Khortiba, eltongero
		Pulicaria crispa (Forssk.)	Tugur	An., He.	Shoshi,elhagez,musabaat
		Eclipa prostrate (L.)	Biltik	An., He.	kajar
6	*Balanitaceae*	*Balanites aegyptiaca (L.)*	Hegleg.lalob	Tree.	All the locality areas
7	*Boraginaceae*	*Heliotropium supinum (L.)*	DanabElagrab	An., He.	All the locality areas
		Heliotropium ovalifolium (Forssk.)	Danab Elagrab	An., He.	All the locality areas
		Heliotropium sudancium (F.W.)	Danab Elagrab	An., He.	All the locality areas
8	*Brassicaceae*	*Farsetia hamiltonii (Royle.)*		An., He.	All the locality areas
		Farsetia longsiliqua (Dence.)	Um Adafir	An., He.	All the localityareas
9	*Burseraceae*	*Commiphora africana (A.Ric.)*	Gafal	Tr	All the locality areas
10	*Caesalpiniaceae*	*Senna alexandrina (Mill.)*	Senna Makah	Per.,He.	All the locality areas
11	*Capperidaceae*	*Capparis deciduas(Forssk.)*	Tundub	Tr	All the locality areas
		Boscia senegalensis (Pers.)	Kursan	Tr	All the locality areas
		Maeruacras sifolia(Forssk)	Sareh	Tr	All the locality areas
12	*Cleomaceae*	*Cleome gynandra (L.)*	Tamalaika	An., He.	All the locality areas
13	*Convolvulaceae*	*Ipomoea cordofan (Choisy.)*	Tabr	An., He.	All the locality areas
		Ipomoea carica (L.)	Hamool	Twin.,He	All the locality areas
		Ipomoea carnea (L.)	ELaweer	An., He.	All the locality areas
		Ipomoea aquatic (Forssk.)	Abu Halageem	Trai.,He	All the locality areas
14	*Commelinaceae*	*Commelina kotschyi (Hassk.)*	Ibrig el Faki	Per.,He.	All the locality areas
15	*Cyperaceae*	*Cyperus rotundus (L.)*	Seida	Per.,He.	All the locality areas

16	*Cucurbitaceae*	*Luffa echinata (Roxb.)*	Leef	Clim.He	All the locality areas
		Cucumis melo.var.argestis (Naud.)	Seinat	Clim.He	All the locality areas
17	*Euphorbiaceae*	*Chrozophora plicata (Vahl.)*	Taroob	Per.,He.	All the locality areas
		Acalypha indica (L.)	UmEmerat;.El Mahatraba	An., He.	All the locality areas
		Euphorbia aegyptiaca (Bioss.)	Um Lebaina	An., He.	All the locality areas
		E. hetrophylla (L.)	Um laban al kabira	An., He.	All the locality areas
		E .hirta (L.)	Um el Laban	An., He.	All the locality areas
		E . indica(Lam.)	Mableben	An., He.	All the locality areas
		E . prostrata (Aiton .Hort)	umLabeinasa-ghira.	An., He.	All the locality areas
18	*Fabaceae*	*Desmodium dichotomum (Klein.)*	Abu Araida	Und. Sh.	All the locality areas
		Indigofera hochstetteri (Bak.)	Sharaia	Diff.,He.	Nurelhuda
		Indigofera oblongifolia (Forssk.)	Dahassir	Und.Sh.	kurmali
		Indigofera strobilifera (Hochst.)	"	Und.Sh.	All the locality areas
		Rynchosia minima var.minima (L.)	Adan Elfar	Twin.	Kejera
		Sesbania sesban (L.)	Sesban	Shrub	Elsonjokaia
		.) Alysicarpus vaginalis(L.	Shillini	An., He	All the locality areas
		Tephrosia uniflora (Pers.	Amoyoga	Per.,He.	Elsonjokaia
		Crotalaria pyconstachya (Benth.)	Shillini	An., He.	All the locality areas
		Indigofera hochstetteri (Bak.)	Dahassir	Und.Sh.	Elhagez
19	*Lamiaceae*	*Ocimum canum (Smis.)*	Raihan	An., He.	All the locality areas
		Ocimum basilicum (L.)	Raihan	An., He.	All the locality areas
20	*Malvaceae*	*Abutilon figarianum (Webb.)*	Ambru	Per.,He.	Elhagez
		Hibiscus vitifolius(L.)	Ambru	Per.,He.	Elhagez
21	*Mimosaceae*	*Acacia mellifera (Vahl.)*	Kitir	Tr	All the locality areas
		Acacia nilotica subsp .nilotica(L.)	Sunt	Tr	All the locality areas
		Faidherbia albida(Del.)	Haraz	Tr	All the locality areas
		Acacia oerfota (Forssk.)	Laot	Shrub.	All the locality areas
		Acacia seyalvar.Seyal (Del.)	Talih	Tr.	All the locality areas
		Acacia leat (Del.)	Shubahi	Shrub.	All the locality areas
		Acacia nilotica(L.)	Sunut	Shrub	All the locality areas
		Acacia tortilis subsp. Spirocarpa(Forssk.)	Samur	Tr	All the locality areas
		Acacia gerrardi (L.)	Salgum	Tr	All the locality areas
		Acacia Senegal(L.)	Hashab	Tr	All the locality areas
		Dichrosta chyscinerea(L.)	Kadad	Tr	All the locality areas
		Acacia polycantha(L.)	*Kakamoot*	Tr	All the locality areas
22	*Nyctaginaceae*	*Boerhavia repens var. diffusa (L.).*	*Rubaa*	An., He	All the locality areas
23	*Rhaminacaea*	*Ziziphus spina-christi (L.)*	Sidder	Tr	All the locality areas
24	*Rubiaceae*	Dobera glabra(Forssk.)	*Um Hebiag*	Tr	All the locality areas
25	*Salvadoraceae*	*Dobera glabra* (Forssk.)	*Maikah*	Tr	All the locality areas
		Physalisa ngulate(L.)	*Arak*	Tr	All the locality areas

26	*Poaceae*	*Sorghum arundinaceum (Dew.)*	Adar	An.,He.	All the locality areas
		Panicumhy grocharis (Steud.)	Ein el Igla	An.,He.	All the locality areas
		Ischaemuma frum (J. F. Gmel.)	Ancouj	Per.,Gr	All the locality areas
		Eriochloa nubica (Steud.)	Melaisa	An.,He.	All the locality areas
		Echinochloa colona (L.)	Defra	An.,He.	All the locality areas
		Digitaria ciliaris (Retz.)	shaar el banaat	An.,Gr.	All the locality areas
		Dactyloctenium aegyptium (L.)	Um Assabi	An.,Gr.	All the locality areas
		Cymbopogon nervatus (Hochst.)	Nal	An.,Gr.	All the locality areas
		Brachiaria eruciformis (Sm.)	Um Keriat	An.,Gr.	All the locality areas
		Brachiaria deflexa (Schumach.)	Um furaw	An.,Gr.	All the locality areas
		Sprobolus pyramidatus (Lam.)	Tamar el far	Per.,He.	All the locality areas
		Cenchrus biflorus (Roxb.)	Haskaneet	An.,He.	All the locality areas
		Chloris virgate(Swartz)	UmFaru	An.,He.	All the locality areas
		Cynodon dactylon (L.)	Nagil	Per.,He.	All the locality areas
		Dactyloctenium aegyptium (L.)	UmAsabiaa	An., He.	All the locality areas
		Dicanthum annulatum (Stpf.)	Lukh	Per.,He.	All the locality areas
		Dinebera retroflexa (Vahl.)	Um Maliha	An., He.	All the locality areas
		Eragrostis cilianensis (Au.)	BannuMaleh	An.,He.	All the locality areas
		Eragrostis tenella (L.)	Bannu	An.,He.	All the locality areas
		Schoenfeldia gracilis (Kunth.)	ZanabElnaga	An.,He.	All the locality areas
		Setaria verticillata (L.)	Lussaig	An.,He.	All the locality areas
27	*Pedaliaceae*	*Sesamum alatum (Thonn.)*	Simsim.Gumal	An., He.	All the locality areas
28	*Portulaceae*	*Portulaca oleracea (L.)*	Rigla	An.,He.	Elhagez ,karkaria
		Portulaca quadrifida (L.)	UmMamleeha	An.,He.	Elfinger, nabag
29	*Scrophulariacee*	*Striga hermonthica (Delile.)*	Budah	An.,He.	All the locality areas
30	*Solanaceae*	*Solanum coagulans (Forssk.)*	Gubbain	Per.,He.	All the locality areas
		Solanum nigrum (L.)	EinabEldabeeb	An.,He.	Manago, blamat
		Solanum dubium (Fresen.)	Nuda	An.,He.	All the locality areas
		Physalisa ngulata (L.)	enabelganam	An.,He.	Umseeda, elsalheen
		Datura starmonium (L.)	Sakran	An.,He.	Tyba,elhagez,elbogolti
31	*Tiliaceae*	*Corchorus depressus (Stocks.)*	Umshiteh	Per.,He.	All the locality areas
		Corchorus fascularis (Lam.)	Khudra	Per.,He.	All the locality areas
		Corchorus trilocularis(L.)	KhudraKhala	An.,He.	All the locality areas
32	*Violaceae*	*Hybanthus enneaspermus (L.)*	UmhebibaSharaya	An.,He.	Nor elhuda,manago,elkurkura kinana
33	*Zygophyllaceae*	*Fagonia cretica(L.)*	Umshoweika	An.,He.	All the locality areas
		Tribulus terrestris (L.)	Dereisa	An.,He.	All the locality areas

Table 4: Local names and Latin names of the families and species found in the study area.

Key: An.= Annual, He.= Herb, Per.= Perennial, clim.= Climber, Dif.=diffused

Trai.= Trailer, Und.sh= Under shrub., Twin: Tiwinner., Gr=Grass , Tr = tree.

Discussion

The present study cited that there are negative association between the *Senna alexandrina* and *Ipomoea carica ,Zizphus spina* and *Balanites aegyptiaca (L.)* and positive association between the *Rynchosia minima* and *Solanum nigrum* and none association between the species *Cyperus rotudus* and *Cleame gynandra, Brachia riadeflxa* and *Portulaca aleracea, Sprobolus pyramidatus* and *Dinebera retroflexa , Acacia leat* and *Capparis deciduas* and *Ocimum canum* and *Euphorbia hirta,* this results lead to the change of climatic that play big variation in the habitats with present of a few taxonomic and ecological studies in the study area and no literature review recorded before in the study area.

Conclusion

In the of locality of algoze, different ecological parameters such as density, frequency, abundance and the relationship between many species were tested and chi-square ()-test used for types of association and the taxonomic studies included collection; identification classification and documented were done. The study reported that many species had disappeared because for the climatic change, and new one were modified, also and (113) plant species belonging to (33) families (dicots, and monocots.) were absorbed at the study area.

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