Research Article

Diversity and ecological characteristics of plants at Sardara banda, village Ikram pur (Baizo kharki) district Mardan, Khyber Pakhtunkhwa (Pakistan)

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Abstract

Floral diversity at Ikram pur (Baizo kharki) district Mardan comprised a total of 68 plant species belonging to 63 genera and 34 families. The leading families were Poaceae and Asteraceae having 06 species each (8.82%), Lamiaceae with 05 species (7.35%), followed by Solanaceae and Moraceae having 04 species each (5.88%), Mimosaceae and Apocynaceae having 3 species each (4.41%) while Asclepiadaceae, Chenopodiaceae, Brassicaceae, Zygophyllaceae, Caryophyllaceae, Rhamnaceae, Malvaceae, Euphorbiaceae, Papilionaceae and Myrtaceae having 2 species each (2.94%). Rest of 17 families shared 01 species each (1.47%). The dominant life form was therophyte with 20 species (29.41%), followed by nanophanerophyte having 16 species (23.52%), microphanerophyte was represented by 13 species (19.11%), hemicryptophyte 9 species (13.23%), geophytes 6 species (8.82%) and chamaephytes 4 species (5.88%). Dominant leaf size was nanophylls with 36 species (52.94%), followed by microphylls 12 species (17.64%), leptophylls 8 species (11.76%), mesophylls 6 species (8.82%), megaphylls 4 species (5.88%) and aphyllous by 2 species (2.94%). Fifty five plant species (80.88%) were of dry habitate, followed by 8 species (11.76%) in wet and 6 species (8.82%) both dry and wet habitats. In the 68 plants species, 57 were non-spiny and 11 spiny.

Keywords: Ecological characteristics; Baizo Kharki; Plant diversity

Introduction

Area introduction (Ikram Pur)

Location

Ikram Pur is also represented with the name Baizo Kharki. Ikram Pur situated in 34°49'67.36" latitude and 72°01'09.41" to the

longitude. It is located in north east belt of the Mardan. On its boundary Malakand Agency is located. Maximum rain occurred during "July and August".

Flora

The flora of the Ikram pur areas are rich. The most common trees in the area are *Acacia modesta*, *Acacia nilotica*, *Morus alba*, *Morus nigra*, *Eucalyptus camaldulensis*, *Populus indica*, *Ziziphus jujuba*, *Melia azedarach* and *Dalbergia sissoo*. Shrubs are *Dodonaea viscosa*, *Datura alba*, *Justicia adhatoda*, and the most common herbs are *Cynodon dactylon*, *Cymbopogon distans*, *Fumaria indica*, *Boerhavia diffusa*, *Cyperus rotundus*, *Chenopodium album*, *Tribulus terrestris* and *Chenopodium murale* etc.

Introduction floristic diversity

Information concerning with floristic composition of a region is prerequisite for any region. Flora composition reflects the variety of plants in an area which has been affected by many factors like overgrazing, soil composition, plant cutting. Plants of an area give a detailed account for the environmental conditions of the specific area [1].

Floral record gives us a lot of information about the area like the relation of indigenous to the plant [2]. Ecologists at all times effort to know the variance in types of variety along with environmental change like altitudinal slope in mountainous biomes [1, 3]. For understanding the relationship of living and non-living component in an ecosystem need to study the diversity of an area [4]. Flora oftenly the source for botanical information about a specific area for a proper studies [5].

Categorization of natural ecosystems into possible plant communities and habitat types is important for the long term managing of natural resources [6]. The coastal plants develop morphological, physiological and metabolic character not only to grow but also complete their life cycle under salt stressed condition [7, 8].

Material and methods

Collection and identification

Survey was carried out in many spells, which was arranged in different seasons from the village for the purpose to collect the plant materials. After collection local and botanical name, family name, seasonal availability, habit, habitat, life form, leaf size, and Spinacious characters of plant species were recorded.

Preservation of plants

After collection and identification plant materials was appropriately pressed, dry out and well-kept rendering the standard method. Old newspapers were used along with naphthalene to protect from the fungal attack. Plants were accurately fixed on herbarium sheets and submitted to herbarium of Bacha Khan University, Charsadda, Khyber Pakhtunkhwa, Pakistan for further record.

Results and discussion

Distribution of families

Floral diversity comprised of 68 plant species belonging to 63 taxa and 34 families. Asteraceae and Poaceae were the dominant families having 06 species each (8.82%), followed by Lamiaceae with 05 species (7.35%), Moraceae and Solanaceae having 04 species each (5.88%), Apocynaceae, Mimosaceae having 3 species each (4.41%), Asclepiadaceae, Brassicaceae, Chenopodiaceae, Caryophyllaceae, Myrtaceae, Malvaceae, Papilionaceae, Rhamnaceae, Euphorbiaceae and Zygophyllaceae, having 02 species each (2.94%). The rest of 17 families contributed 01 species each (1.47%). Total of 57 plant species (83.82%) were spiny and 11 (16.17%) were non-spiny. The herbs were found as the common fraction in the studied area represented by 40 species (58.82%), followed by trees and shrubs represented by 14 species each (20.58%). 55 species (80.88%) have dry habitat, followed by wet habitat having 8 plant species (11.76%), 5

species (7.35%) is recorded in both conditions. Poaceae and Asteraceae were the leading families [9]. [10-12] also observed that these families were leading in their individual study areas. From some other part of Pakistan the same study was noted [13].

Life form

The dominant class was therophyte having 20 species (29.41%), followed by nanophanerophyte having 16 species (23.52%), microphanerophyte represented by 13 species (19.11%), hemicryptophyte 9 species (13.23%), geophytes represented by 6 species (8.82%) and chamaephytes 4 species (5.88%). According to Shah et al. [23] the dominance of therophyte reflects an effective strategy for avoiding water losses due to moisture extremes and water insufficiency. Therophytes and chamaephytes were the dominant life form in the areas where rainfall was less [14]. According to study of Nadaf and Murtazvi [21] hemicryptophyte was the dominant life form belong to Irano-Turanian. In south eastern Brazil the Therophytic and phanerophytic vegetation were in common [15, 16].

Leaf size

The most dominant leaf size was nanophyll with 36 species (52.94%), followed by microphyll 12 species (17.64%), leptophyll

8 species (11.76%) and mesophyll 6 species (8.82%), megaphyll 4 species (5.88%) and aphyllous 2 species (2.94%). Leaf size class showed changes from season to season, while evergreen and perennials retain it. [17] observed that leaf size completely related to deficiency in the soil nutrients. [17, 18] reported microphyllous and nanophyllous as the leading leaf size from Kotli Azad Kashmir and Waziristan. Leaf spectra of plants consisted of microphyll followed by mesophyll and nanophyll from their study area [19, 20]. The results “of Kar et al. [13] are also in line with our result as they reported the dominance of therophyte and nanophanerophytes in grasslands of Odisha, India” [21].

Seasonal variation

Seasonal availability show that 54 plant species (79.41%) were present in spring, followed by 46 species (67.64%) were present in winter, 44 plant species (64.70%) were present in summer season and 32 plant species (47.05%) were present in autumn. In maximum of the season the therophytic and nanophanerophytic vegetation were dominant but in spring this case is very common [22]. Dominancy of therophytes occurs due to uncomplimentary environmental form as suggested by others [22-26], which is in conformity to our work.

Table 1. Floristic list of Sardara Banda, Ikram pur (Baizo kharki) Mardan

S. No	“Plant Botanical name”	Family name	Local name	A	W	SP	SM	Life form	Leaf size	Habitat	Habit	Spinacious
1	<i>Justicia adhatoda</i> L.	Acanthaceae	Baikerh	+	+	+	+	NP	L	D	SB	—
2	<i>Amaranthus viridis</i> L.	Amaranthaceae	Ganhar	—	+	+	+	TH	N	D	H	—
3	<i>Nerium olender</i> L.	Apocynaceae	Ganderay	+	+	+	+	NP	MIC	D	SB	—
4	<i>Dodonaea viscosa</i> (L.) Jacq.	Apocynaceae	Ghawaraskay	+	+	+	+	NP	N	D	SB	—
5	<i>Caralluma edulis</i> Edgew. Benth. ex Hook.f.	Apocynaceae	Pamunkay	—	+	—	+	G	AP	D	H	—
6	<i>Calotropis prosera</i> Acit.	Asclepiadaceae	Spalmay	+	+	+	+	CH	MES	D	SB	—
7	<i>Periploca aphylla</i> Decne.	Asclepiadaceae	Barrhara	+	+	+	+	NP	AP	D	SB	—
8	<i>Asparagus officinalis</i> L.	Asparagaceae	Tindonray	—	—	—	+	CH	L	D	SB	—
9	<i>Xanthium</i>	Asteraceae	Gishkay	—	—	+	—	TH	N	D	H	+

	<i>strumarium</i> L.											
10	<i>Sonchus asper</i> L.	Asteraceae	Shodapai	–	+	–	–	TH	MIC	W	H	–
11	<i>Parthenium hysterophorus</i> L.	Asteraceae	Lewanai Bang	+	–	+	+	MP	MIC	D&W	H	–
12	<i>Silybum marianum</i> (L.) Geartn.	Asteraceae	Mulla charchugh	–	–	+	–	TH	MEP	D	H	+
13	<i>Calendula arvensis</i> M.Bieb.	Asteraceae	Zyar gulle	+	–	+	–	TH	N	D	H	–
14	<i>Echinops echinotus</i> Roxb.	Asteraceae	Kariza	–	+	–	+	NP	MIC	D	SB	+
15	<i>Heliotropium europaeum</i> L.	Boraginaceae	Spen guley	–	–	+	–	TH	MIC	D	H	–
16	<i>Coronopus didymus</i> (L.) Sm.	Brassicaceae	Ganda botay	–	+	+	+	TH	MIC	D	H	–
17	<i>Eruca sativa</i> Mill.	Brassicaceae	Jumama	–	+	+	–	NP	MIC	D	H	–
18	<i>Cannabis sativa</i> L.	Canabaceae	Bhang	–	+	+	+	MP	N	W&D	H	–
19	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	Not known	–	–	–	+	TH	N	D	H	–
20	<i>Silene conidia</i> L.	Caryophyllaceae	Mangotay	–	+	+	+	NP	N	W	H	–
21	<i>Chenopodium album</i> L.	Chenopodiaceae	Chalwaye	–	+	+	–	TH	N	D	H	–
22	<i>C. murale</i> L.	Chenopodiaceae	Sarmey	–	+	+	–	TH	L	D	H	–
23	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Perwatye	–	+	–	–	TH	N	D	H	–
24	<i>Ricinus communis</i> L.	Euphorbiaceae	Aranda	+	+	+	+	CH	MEP	D	SB	–
25	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	Mandanro	–	–	+	–	TH	N	D	H	–
26	<i>Lathyrus aphaca</i> L.	Fabaceae	Chelu	+	–	+	–	TH	N	W	H	–
27	<i>Fumaria indica</i> (Hausskn.) Pugsley	Fumaraceae	Papra	–	+	–	–	TH	N	D	H	–
28	<i>Mentha longifolia</i> (L.) L.	Lamiaceae	Velanay	–	+	+	–	G	N	W	H	–
29	<i>Mentha spicata</i> L.	Lamiaceae	Podina	–	+	+	+	G	N	W	H	–
30	<i>Salvia moorcroftiana</i> Wall. ex Benth.	Lamiaceae	Khar Dug	–	–	–	+	NP	MES	D	H	–
31	<i>Orostegia limbata</i> (Benth.) Boiss.	Lamiaceae	Spen Azghay	+	+	+	+	NP	N	D	SB	+
32	<i>Colebrookea oppositifolia</i> Sm.	Lamiaceae	Zangali Baikerh	+	+	+	+	NP	L	D	SB	–
33	<i>Dalbergia sisso</i> Roxb.	Leguminosae	Shawa	+	+	+	+	MP	N	W&D	T	–
34	<i>Grewia optiva</i> J.R.Drumm. ex Burret	Malvaceae	Pastawoony	+	+	+	+	NP	N	D	T	–
35	<i>Malva neglecta</i> Wallr.	Malvaceae	Parenak	–	–	+	+	H	N	D	H	–
36	<i>Melia azedarech</i> L.	Meliaceae	Tora Shandai	+	+	+	+	MP	N	D	T	–
37	<i>Albizia lebbek</i> (L.) Benth.	Mimosaceae	Sareekh	+	+	+	+	MP	N	D	T	–
38	<i>Acacia modista</i> Wall.	Mimosaceae	Paloosa	+	+	+	+	MP	L	D	T	+
39	<i>Acacia nilotica</i> (L.) Delile	Mimosaceae	Keekar	+	+	+	+	MP	L	D	T	+
40	<i>Broussonetia papyrifera</i> (L.) L.	Moraceae	Gultoot	+	+	+	+	MP	MIC	D	T	–
41	<i>Morus alba</i> L.	Moraceae	Toot	+	+	+	+	MP	MES	D	T	–
42	<i>Ficus carica</i> L.	Moraceae	Inzar	+	+	+	+	NP	MES	D	T	–
43	<i>Morus nigra</i> L.	Moraceae	Toor toot	+	+	+	+	MP	MES	D	T	–

44	<i>Populus indica</i> L.	Myrtaceae	Sufedad	+	+	+	+	MP	MES	D	T	—
45	<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	Lachi	+	+	+	+	MP	N	D	T	—
46	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Ensut	—	+	—	—	H	N	D	H	—
47	<i>Trifolium alexandrianum</i> L.	Papilionaceae	Shotal	—	+	+	—	TH	N	W	H	—
48	<i>Medicago polyorpha</i> L.	Papilionaceae	Peeshtare	—	—	+	—	TH	N	D	H	—
49	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Kabal	+	+	+	+	H	N	W&D	H	—
50	<i>Cymbopogon distans</i> (Nees ex Steud.) W. Watson	Poaceae	Sargaray	—	—	+	—	H	N	D	H	—
51	<i>Cyperus rotundus</i> L.	Poaceae	Dela	—	+	+	+	G	N	W	H	—
52	<i>Avena sativa</i> L.	Poaceae	Jamder	—	+	+	—	H	N	D	H	—
53	<i>Desmostachya bipinnata</i> (L.) Stapf.	Poaceae	drab	+	—	+	+	H	N	W&D	H	—
54	<i>Apluda mutica</i> L.	Poaceae	Wahoo	+	+	+	+	NP	MIC	D	H	—
55	<i>Rumex dentatus</i> L.	Polygonaceae	Shalkhy	—	—	+	—	G	MEP	W	H	—
56	<i>Portulaca oleracea</i> L.	Portulacaceae	Warharay	—	+	—	—	G	N	D	H	—
57	<i>Anagallis arvensis</i> L.	Primulaceae	Ghamay gulay	—	—	—	+	TH	N	D	H	—
58	<i>Sageretia thea</i> (Osbeck).M.C.	Rhamnaceae	Mamanra	—	+	—	+	NP	N	D	SB	—
59	<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	Baira	+	+	+	+	NP	N	D	T	+
60	<i>Monothea buxifolia</i> (Falc.) A. DC.	Sapotaceae	Gurgura	+	+	+	+	NP	N	D	SB	+
61	<i>Verbascum thapsus</i> L.	Scrophulariaceae	Khar Ghawag	—	—	+	—	TH	MEP	D	H	—
62	<i>Ailanthus altissima</i> SW.	Simaroubaceae	Dasi Shandai	+	+	+	+	MP	N	D	T	—
63	<i>Datura alba</i> Rumph ex Nees.	Solanaceae	Batora	—	—	+	—	TH	MIC	D	H	—
64	<i>Solanum surratense</i> Burm.f.	Solanaceae	Maraghonay	+	—	—	—	H	N	D	H	+
65	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Koti lal	—	—	+	+	CH	MIC	D	H	—
66	<i>Solanum nigrum</i> L.	Solanaceae	Kach machu	—	—	+	+	TH	MIC	D	H	—
67	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Merkundai	+	—	+	—	H	L	D	SB	+
68	<i>Fagonia arabica</i> L.	Zygophyllaceae	Azghakey	+	+	—	+	H	L	D	SB	+

Seasonal availability: Autumn= A, Winter =W, Summer =SM, Spring =SP.

Life form: Therophyte = TH, Hemicryptophyte = H, Chamaephytes = CH, Nanophenerophyte = NP, Geophytes =G, Microphanerophyte = MP

Leaf size: Nanophyll = N, Leptophyll = L, Microphyll = MIC, Mesophyll = M, Megaphyll = MEP, Aphyllous = AP,

Habitat: Dry = D, Wet = W

Habit: Herbs = H, Shrubs = SB, Trees = T

Conclusions

Species diversity and genetic diversity enhance largely biodiversity of an ecosystem. The study area is floristically rich which intrinsically determine the human role both as aesthetic and utilitarian

component in maintaining and creating biodiversity.

Authors' contributions

Conceived and designed the experiments: S Ali & S Ullah, Performed the experiments: M Ali & S Ali, Analyzed the data Identification of Plants: WM Khan, I Ahmad

& MH Khan, Contributed reagents/ materials/ analysis tools: S Ali & S Ullah, Wrote the paper: S Ali.

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