Research Article

Investigating the floristic diversity indices of plant species in district Charsadda, Khyber Pakhtunkhwa, Pakistan

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Abstract

The floristic study carried out during 2017-2019 revealed that, district Charsadda comprised total of 146 plant species belonging to 58 families and 127 genera. The leading families were Asteraceae with 14 species (9.58%), Poaceae 12 species (8.21%), Solanaceae 8 species (5.47%) and Cucurbitaceae 7 species (4.79%). Apiaceae, Brassicaceae, Lamiaceae, Moraceae, Papilionaceae contribute by 5 species each (3.42%), Chenopodiaceae, Rosaceae having 4 species each (2.73%), Amaranthaceae, Euphorbiaceae, Malvaceae, Polygonaceae, Pteridaceae contributed by 3 species each (2.05%), Alliaceae, Arecaceae, Asclepiadaceae, Cyperaceae, Ebinaceae, Equisetaceae, Fabaceae, Genetaceae, Geraniaceae, Mimosaceae, Myrtaceae, Oleaceae, Pinaceae, Rhamnaceae, Rutaceae contributed by 2 species each (1.36%). The rest of the 27 families contributed by 1 species each (0.68%). The most dominant life form was therophytes having 66 species (45.20%), Microphanerophytes 22 species (15.06%), and Chaemophytes 18 species (12.32%). Hemicryptophyte 14 species (9.58%) Nanophanerophytes 10 species (6.84%), Geophytes 9 species (6.16%), Megaphanerophytes 4 species (2.75%) followed by Mesophanerophytes having 2 species (1.36%). Leaf size spectra of the flora showed that the most dominant leaf size class were microphyll having 54 species (36.98%), nanophyll 32 species (21.91%), mesophyll 29 species (19.86%), leptophylls 17 species (11.64%), megaphyll contributed by 8 species (5.47%) followed by macrophyll which represent 5 species (3.04%) and the one species is aphyllus. The dominant therophytic life form showed that the flora of the area is under severe anthropogenic activity. This study not only gives information about the flora of Charsadda but can provide a baseline for future studies and plantation of this area.

Keywords: Floristic diversity; Life forms; Leaf spectrum; District Charsadda

Introduction

A huge number of plant species are yet to be uncovered by the botanist. Therefore, the floristic report is the only source to get botanical information about the area and it may help in starting for detailed study [1].

The word floristic is derived from flora which means to list all types of plant species or plant taxa within specific geographical area [2]. To improve conservation stratagems for plants of any area, it is necessary to have a comprehensive floristic record of the area

centred on collection and correct documentation [3]. Floristic study is a very important for ecological sustainability and conservation of plants for an area. Floristic research is one of the most effective method to manage proper and protection of plants [4]. The documentation of the local plants with the description of an area is very necessary, because it can provide information throughout the time about distribution, occupancy, growing season and species rigidity of the available plants [5]. Floristic study also provide information about new species in a specific area, so by that way we can also analysis about migrated plants species [5]. Furthermore, the documentation of the plant species of the specific area is play chief role in environmental science respect to climate change [6]. Respect to climate change, Life form spectrum may also provide information about plant species, population size and their distribution over the area [7]. The life forms of plants are different in every zone on the basis of altitude. Three types of climates can be seen on earth, which includes phanerophytic in tropic, therophytic in desert and hemicryptophytic in cold temperate zone

[8]. This system of grouping of life forms is broadly accepted and it's has been globally followed.

The present study was started to report the floristic composition and its ecological characteristics of district Charsadda. District Charsadda is located in the west of Khyber Pakhtunkhwa province of Pakistan. It is bounded by district Malakand on the north, district Mardan on the east, district Peshawar on the south and district Mohmand on the west. It is situated on Latitude of 34.150N and Longitude of 71.730E (Fig. 1) [9]. The district cover an area of 996 square kilometres and it is divided into 2 tehsils and 46 Union Councils. It is situated 282 meters above sea level in elevation. The predominant language is Pashto, spoken natively by 99.4% of the total population [10]. Temperature is variable from place to place, the coldest month of year is January, in which the average temperature is 5-10 °C, while June is the hottest month in which the temperature raised up to 44 °C. The average rainfall is 82 mm per year. The most precipitation fall in the month of august [11].

Figure 1. Map of district Charsadda (study area)

The main crops of the area are wheat, sugarcane, maize, tobacco, rice and several weeds [12]. Most of the area contains sandy, loamy and salty soil [13]. The vegetation can be found i.e herb, shrub, trees, dense vegetation are the maximum in number in this area, where the most common plant species are *Xanthium strumarium*, *Cannabis sativa*, *Euphorbia helioscopia*, *Medicago denticulata*, *Withania somnifera* [14]. In tress, *Acacia nilotica*, *Ailanthus altissima*, *Broussonetia papyrifera*, *Morus alba*, *Morus nigra* and *Ziziphus jujube* can be seen [15]. The present study might be helpful for the future researchers in the field of plant taxonomy related to district Charsadda. The purpose of this study was to explore the floristic composition, life form and leaf size spectra of district Charsadda.

Materials and Methods

Floristic study of district Charsadda was carried out during session of 2018-2019. Regular trips were arranged in various seasons (spring, summer, autumn and winter) to collect plant species. The locality, sub locality, vegetation, plant stage and leaf size were recorded after collection followed by [8]. The tools used during this research work were: Map of the area, notebook, pencil, plant presser, old newspaper, polythene bags, knife, compass and digital camera. The plant specimens were dried after identification. The plant specimens were submitted to herbarium, Department of botany, University of Malakand, Pakistan. The identification was carried out with the help of available literature [8-14]. The voucher specimens were deposited in the Herbarium of Centre of Plant Biodiversity, University of Malakand, Pakistan. The plant species were classified into different classes according to [8] as follows:

Therophytes

Annual seed bearing plants, which complete their life cycle in one year and overwinter; the

unfavourable season by means of seeds or spores

Geophytes

Perennating buds located below the surface of soil including plants with deep rhizomes, bulbs, tubers and corms

Hemicryptophytes

Herbaceous perennial plants, in which the aerial portion of the plant dies at the end of the growing season, leaving a Perennating bud at or just beneath the ground surface

Chamaeophytes

Perennating buds located close to the ground surface (below the height of 25 cm). The plants include herbaceous, low woody trailing, low stem succulents and cushion plants.

Phanerophytes

Most of the species are shrubby and tree, whose perennating buds are borne on aerial shoot reaching a height of at least 25 cm or more above the ground surface.

Data analysis

The data is analysed with Microsoft excel 2019.

Results and Discussion

Floristic and ecological attributes

The flora of district Charsadda consisted of 146 plant species, which is belonging to 58 families. In this study, family Asteraceae was the dominating family having, 14 species including, *Catharanthus roseus*, *Centaurea calcitropa*, *Hyphocharis radiata*, *Launaea nudicaulis*, *Onopordum acanthium*, *Silybum marianum*, *Taraxacum officinale* and *Xanthium strumarium*. The sub-dominant families are Poaceae, Solanaceae and Cucurbitaceae with 7 species, followed by Apiaceae, Brassicaceae, Lamiaceae and Papilionaceae with 5 species. Chenopodiaceae, Rosaceae consisting 4 species, followed by Amaranthaceae, Euphorbiaceae, Malvaceae, Polygonaceae and Pteridaceae with 3 species. Alliaceae, Arecaceae, Asclepiadaceae, Cyperaceae,

Ebinaceae, Equisetaceae, Fabaceae, Genetaceae, Geraniaceae, Mimocaceae, Myrtaceae, Oleaceae, Pinaceae, Rhamnaceae and Rutaceae with 2 species. Each and the rest of 27 Families having single specie (Fig. 2). Our finding is similar with Jan *et al.*, Khan., Ali *et al.* and Qureshi *et al.* [16-19], in which the Asteraceae and Poaceae were leading families in their study work. Seasonal variation of vegetation shows that highest

numbers of species i.e. 126 species, were found in summer followed by spring i.e. 108 species and autumn 73 species. While, compare to summer, less number of species can be seen in winter season i.e. 64 species (Fig. 3). Most of the herbaceous flora has varied distribution pattern in different seasons. The summer and spring flora is high in number than autumn and winter [20-22].

Figure 2. Plant families' percentage of vegetation conclusion

Figure 3. Percentage of number of species in different season

Biological spectrum

Raunkiaer (1934) proposed the term “Biological Spectrum” to express both life-form and distribution of flora and the phytoclimate under which the prevailing life-forms evolved. The life-form study is thus an important part of vegetation description, ranking next to floristic composition. This study is an important part of the vegetation description, ranking next to floristic composition [23]. Life form and leaf size spectra indicate a climatic and human disturbance of a particular area [24]. The life form and leaf size spectra are beneficial attributes that have been broadly used in vegetation description. Furthermore, it is traditionally being used to describe world vegetation types at the community level [8]. The life form differences in various societies make up the basis of their structure. Different classification of the life forms there, but among them, Raunkiaer system is used most. Plants are divided into six main groups: Phanerophyte, Chamaephyte, Hemicryptophyte, Cryptophyte, Therophyte, and Epiphyte [25]. The percentage of life form was calculated as follows:

$$\% \text{ Life-form} = \frac{\text{Numbers of species in any life form}}{\text{Total number of species of all life forms}} \times 100$$

All the plant species are classified into life forms and their ratio is expressed in number or percentage [26]. Furthermore, the biological spectrum was formed which showed that therophytes (66 spp., 45.20%), microphanerophytes (22 spp., 15.06%) (Fig. 4), chamaephytes (18 spp., 12.32%), hemicryptophytes (14 spp., 9.58%), nanophanerophytes (10 spp., 18.5%),

geophytes (9 spp., 6.16%), megaphanerophytes (4 spp., 2.75%), mesophanerophytes (2 spp., 1.36%) and parasite (1 spp., 0.68%) had occurrence in the studied area (Table 1). The therophytes and chaemophytes dominance showed that our study is similar to Durrani *et al.* Cain *et al.* Cain & Castro [27-30] in which the therophytes, chaemophytes, hemicryptophytes were in dominant phase. The results of seasonal variation in different life classes revealed that in spring the therophytes (38 spp., 35.51%) were dominant followed by microphanerophytes (22 spp., 20.56%), chaemophytes (14 spp., 13.08%), nanophanerophytes (10 spp., 9.34%) and geophytes (9 spp., 8.41%). Similar to spring, the dominant in summer the maximum numbers of species (52 spp., 41.6%) were therophytes followed by Microphanerophytes (22 spp., 17.6%), chaemophytes and hemicryptophytes (14 spp., 11.2%), followed by nanophanerophytes (10 spp., 8%), while in autumn, the dominant species were microphanerophytes (22 spp., 30.55%) followed by therophytes (15 spp., 20.83%), nanophanerophytes (10 spp., 13.88%), chameophytes (9 spp., 12.5%). The winter is the same as autumn the dominant species were microphaneophytes (22 spp., 34.37%) followed by therophytes (11 spp., 17.18%), nanophaneophytes (10 spp., 15.62%), chaemophytes (9 spp., 14.06%) (Fig. 5). Our result is similar regarding the dominance of therophytes in spring and summer with Saxina *et al.* [31].

Figure 4(a,b). Microphanerophytes (MP)

Table 1. Seasonal variation in Life form spectra of vegetation of District Charsadda

Life form classes		Spring		Summer		Autumn		Winter	
		No	%age	No	% age	No	% age	No	% age
1	Therophytes	38	35.51	52	41.93	16	21.91	11	17.18
2	Hemicryptophytes	8	7.47	13	10.48	7	9.58	4	6.25
3	Geophytes	9	8.41	7	5.64	3	4.10	2	3.12
4	Chaemophytes	14	13.08	14	11.29	9	12.32	9	14.06
5	Nanophanerophytes	10	9.34	10	8.06	10	13.69	10	15.62
6	Microphanerophytes	22	20.56	22	17.74	22	30.13	22	34.37
7	Mesophanerophytes	2	1.86	2	1.61	2	2.73	2	3.12
8	Megaphanerophytes	4	3.73	4	3.22	4	5.47	4	6.25
sum		107	100	124	100	73	100	64	100

Figure 5. Seasonal variation in life form of vegetation

Leaf spectrum

Life form and leaf size spectra indicate climatic and creature fracas of a particular area [24]. Leaf size classes have been found to be very useful for plant associations. Leaf size plays an important role in the physiological processes of plant and plant community in any area. The plant is also classified on the basis of leaf sizes [32]. In our study the leaf area of the species was calculated according to Ilyas *et al.* [24]. In our study, the dominant plant as regards leaf spectra was microphylls (54 spp., 36.98%) followed by nanophylls (32 spp., 21.91%), mesophylls (29 spp., 19.86 %), leptophylls (17 spp., 11.64%), megaphylls (8 spp.,

5.47%) and macrophyll (5 spp., 3.04%). While aphyllus represent only 1 specie (Fig. 5, 6, 7 & 9; Table 2 & 3). Our present findings agreed with [33-42], in which microphylls and nanophylls were the dominant leaf-size classes.

Habitat

Habit is the general appearance, growth form and architecture of the plant species. In our study habit of species showed discrepancy, the main class was herbs having 95 species (65.06%), followed by tree and shrub with 32 species (21.91%) and 19 species (13.01%) respectively. Our result showed low percentage of shrubs and trees species, which indicate severe deforestation in the area.

Figure 6. Percentage of Leaf size spectra of vegetation of district Charsadda

Figure 7. Percentage of Leaf size spectra in different season of district Charsadda

Figure 8. Percentage of species Habit

A= Mic, B= Mg, C= Nan, D= Mic, E= Mic, F=Mac, G= Nan, H= Meso, I= Nano, J= Meso, K= Mic, L= Meso, M= Nano, N= Mic, O= Mac, P= Meso

Figure 9. Leaf types in selected area

Table 2. Leaf size Spectra in a different type of Season of District Charsadda

Leaf size classes		Spring		Summer		Autumn		Winter	
		No	%age	No	%age	No	%age	No	%age
1	Microphyll	37	34.57	44	35.48	22	30.13	20	31.25
2	Leptophyll	14	13.08	16	12.90	7	9.58	8	12.5
3	Nanophyll	25	23.36	29	23.38	18	24.65	14	21.87
4	Mesophyll	24	22.42	24	19.35	17	23.28	16	25
5	Megaphyll	4	3.73	8	6.45	6	8.21	3	4.68
6	Macrophyll	3	2.80	3	2.41	3	4.10	3	4.68
sum		107	100	124	100	73	100	64	100

Table 3. Floristic Composition, life Form, leaf size spectrum, habitat condition and seasonal variation of vegetation of District Charsadda KP, Pakistan

	Plant species	Family	Local name	Habit	Leaf size	Life form	Seasonality			
							Sp	Sm	W	AU
1	<i>Allium sativa</i> L.	Alliaceae	Ooga	Herb	mic	Th	+	-	-	-
2	<i>Allium cepa</i> L.	Alliaceae	Piyaz	Herb	mes	Geo	+	-	-	-
3	<i>Amaranthus viridis</i> L.	Amaranthaceae	Ghanhar	Herb	Nan	Th	-	+	-	-
4	<i>Achyranthus aspera</i> L.	Amaranthaceae	Not known	Herb	mic	Hem	-	+	-	+
5	<i>Alternanthera sessilis</i> (L.) RBr exdc	Amaranthaceae	Not known	Herb	mic	Th	-	+	-	-
6	<i>Mangifera indica</i> L.	Anacardiaceae	Aam	Tree	mes	Mesp	+	+	+	+
7	<i>Coriandrum sativum</i> L.	Apiaceae	Danya	Herb	Lep	Th	+	+	-	-
8	<i>Capsicum frutescens</i> L.	Apiaceae	Tour mrach	Tree	mic	Mp	+	+	+	+
9	<i>Ammi visnaga</i> (L.) Lam.	Apiaceae	sperkaye	Shrub	Lep	Cha	+	+	+	+
10	<i>Daucus carota</i> L.	Apiaceae	Ghajar	Herb	Mes	Geo	+	-	+	-
11	<i>Foeniculum vulgare</i> mill.	Apiaceae	Unknown	Herb	Nan	Th	-	+	-	+
12	<i>Nannorrhops ritchiana</i> (Griff.) Aitch	Arecaceae	Not known	Tree	Mg	Mp	+	+	+	+
13	<i>Phoenix dactylifera</i> L.	Arecaceae	Kajora	Tree	Mg	Mp	+	+	+	+
14	<i>Calotropis procera</i> (Aiton)w.t	Asclepiadaceae	Speen ponakay	Shrub	Mes	Cha	+	+	+	+
15	<i>Carulluma tuberculata</i> N,E Brown	Asclepiadaceae	Pamankay	Herb	Nan	Th	+	+	+	+
16	<i>Agave sisalana</i> perrineex Engelm	Asparagaceae	Unknown	Shrub	Meg	Np	+	+	+	+
17	<i>Hypocharis radiata</i> Falk	Asteraceae	Shodapay	Herb	mes	Th	+	+	-	-
18	<i>Conyza stricta</i> willd	Asteraceae	Kharboty	Herb	Mic	Cha	+	-	-	-
19	<i>Launaea nudicaulis</i> (L) Hook .f.	Asteraceae	Gora shodapay	Herb	Mes	Th	+	-	+	-
20	<i>Filago hardwaria</i> (wall. exDc) wagenitz	Asteraceae	Warkharay	Herb	Lep	Th	-	+	-	-
21	<i>Xanthium strumarium</i> L.	Asteraceae	Gheshkay	Herb	Mac	Th	+	-	-	-
22	<i>Sonchus aspher</i> L.	Asteraceae	Ghta shodapay	Herb	Nan	Hem	+	-	-	-
23	<i>Silybum marianum</i> (L) Gaertn.	Asteraceae	Unknown	Herb	Mes	Th	+	+	-	-
24	<i>Catharanthus roseus</i> (L.) G.Don	Asteraceae	Chaman gull	Herb	Mic	Th	-	+	-	-
25	<i>Calendula arvensis</i> L.	Asteraceae	Zyar gully	Herb	Mic	Th	+	-	-	-
26	<i>Carthamus oxyacantha</i> M.Bieb	Asteraceae	Ghana shodapay	Shrub	Mic	Th	-	+	-	-

27	<i>Centaurea calcitropa</i> L.	Asteraceae	Unknown	Herb	Mes	Th	-	-	+	+
28	<i>Onopordum acanthium</i> L.	Asteraceae	Ghana	Herb	Nan	Cha	+	+	-	-
29	<i>Parthenium hysterophorus</i> L.	Asteraceae	Lewany botay	Herb	Mes	Th	+	+	-	+
30	<i>Taraxacum officinale</i> weber	Asteraceae	Zyargul shodapy	Herb	Mic	Th	+	+	-	-
31	<i>Coronopus didymus</i> (L) Sm	Brasicaceae	Sqaboty	Herb	Lep	Th	+	+	-	-
32	<i>Raphanus raphanistrum</i> L.	Brasicaceae	Tapermoly	Herb	Mes	Th	+	+	-	-
33	<i>Eruca sativa</i> Mill.	Brasicaceae	Teparge	Herb	Mes	Cha	+	+	-	-
34	<i>Capsella bursa-pastoris</i> medic	Brasicaceae	Tour sharsham	Herb	Mic	Th	+	-	+	-
35	<i>Brassica compestris</i> L.	Brasicaceae	Sharsham	Herb	Mic	Th	+	-	+	-
36	<i>Opuntia littoralis</i> (englim.)	Cactaceae	Zuqam	Shrub	Lep	Np	+	+	+	+
37	<i>Cannabis sativa</i> L.	Cannabaceae	Bang	Herb	Mic	Th	+	+	+	-
38	<i>Stellaria media</i> (L.) cry	Cryopphyllaceae	Unknown	Herb	Nan	Th	+	+	-	-
39	<i>Chenopodium album</i> L.	Chenopodiaceae	Spensag	Herb	Mic	Th	+	-	-	+
40	<i>Spinacea oleracea</i> L.	Chenopodiaceae	Palak	Herb	Mic	Th	+	+	-	-
41	<i>Chenopodium murale</i> L.	Chenopodiaceae	Sag	Herb	Lep	Th	-	+	-	-
42	<i>Kochia indica</i> wight	Chenopodiaceae	Sqagaya	Shrub	Nan	Cha	+	+	+	+
43	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Unknown	Herb	Nan	Th	-	+	-	-
44	<i>Citrulus colocynthis</i> (L) schrad	Cucurbitaceae	Unknown	Herb	Mic	Th	-	+	-	-
45	<i>Citrulus lanatus</i> (thum.)mats	Cucurbitaceae	Hindwana	Herb	Mes	Th	-	+	-	-
46	<i>Cucurbita maxima</i> Duchesne	Cucurbitaceae	Kado	Herb	Mg	Th	-	+	-	+
47	<i>Luffa cylindrica</i> (L.) Roem	Cucurbitaceae	Tori	Herb	Mg	Th	-	+	-	+
48	<i>Momordica charantia</i> L.	Cucurbitaceae	Karela	Herb	Mes	Th	-	+	-	+
49	<i>Cucumis melo</i> L.	Cucurbitaceae	Harboza	Herb	Mac	Th	-	+	-	+
50	<i>Cucurbita pepo</i> L.	Cucurbitaceae	Harbaza	Herb	Mg	Th	-	+	-	+
51	<i>Cuscuta reflexa</i> Roxb	Cuscutaceae	Unknown	Herb	Lep	P	+	+	-	+
52	<i>Cyperus niveus</i> Retz	Cyperaceae	Unknown	Herb	Nan	Hem	-	+	-	-
53	<i>Cyperus rotundus</i> L.	Cyperaceae	Unknown	Herb	Nan	Th	-	+	-	-
54	<i>Diospyros kaki</i> L.	Ebinaceae	Amlok	Tree	Mes	Mp	+	+	+	+
55	<i>Diospyros lotus</i> L.	Ebinaceae	Amlok	Tree	Mic	megp	+	+	+	+
56	<i>Equisetum ramossimum</i> Desf	Equisetaceae	Bandaky	Herb	Ap	Geo	+	+	-	+
57	<i>Equisetum arvensis</i> L.	Equisetaceae	Bandaky	Herb	Lep	Hem	+	+	-	+
58	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	Mandaro	Herb	Nan	Th	-	+	-	-
59	<i>Euphorbia prostrata</i> Aiton	Euphorbiaceae	Unknown	Herb	Lep	Th	+	-	+	-

60	<i>Ricinus communis</i> L.	Euphorbiaceae	Pomba	Shrub	Nan	Megp	+	+	+	+
61	<i>Medicago denticulata</i> Willd	Fabaceae	Peshtaray	Herb	Nan	Th	+	-	-	-
62	<i>Trifolium alexandrium</i> L.	Fabaceae	Riksha	Herb	Nan	Th	+	-	-	-
63	<i>Fumaric indica</i> Pugsley	Fumariaceae	Unknown	Herb	Lep	Th	-	+	-	-
64	<i>Centaurium pulchellum</i> (Sw.) Druce	Gentianaceae	Kargha mewa	Herb	Mic	Th	-	+	-	+
65	<i>Swertia ciliate</i> (G .Don) B.L Bur	Gentianaceae	Unknown	Herb	Mes	Th	-	+	-	+
66	<i>Erodium cicutarium</i> (L) L, Heritex	Geraniaceae	Unknown	Herb	Mac	Cha	+	-	+	-
67	<i>Geranium wlinum</i> sweet	Geraniaceae	Unknown	Herb	Mic	Hem	-	+	-	-
68	<i>Juglans regia</i> L.	Juglandaceae	Ghoz	Tree	Mic	Mp	+	+	+	+
69	<i>Ocimum bascillicum</i> L.	Lamiaceae	Kashmaly	Shrub	Nan	Cha	+	+	+	+
70	<i>Mentha arvensis</i> L.	Lamiaceae	Venally	Herb	Nan	Geo	+	+	-	+
71	<i>Mentha sylvestris</i> L.	Lamiaceae	Venally	Herb	Nan	Th	+	+	-	-
72	<i>Mentha longifolia</i> L.	Lamiaceae	Venally	Herb	Mic	Geo	+	+	-	-
73	<i>Salvia lanata</i> Roxb	Lamiaceae	Unknown	Herb	Mes	Th	-	+	+	+
74	<i>Malva neglecta</i> Wallr	Malvaceae	Panderak	Herb	Mic	Th	+	+	+	-
75	<i>Ablemoschus esculentus</i> L.	Malvaceae	Unknown	Herb	Mic	Th	-	+	-	-
76	<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	Ghanta boty	Herb	Mic	Th	+	-	-	-
77	<i>Melia azedarach</i> L.	Meliaceae	Bakyana	Tree	Nan	Mp	+	+	+	+
78	<i>Ficus palmate</i> Forssk	Moraceae	Waroki inzar	Tree	Mes	Mp	+	+	+	+
79	<i>Ficus carica</i> L.	Moraceae	Ghat inzar	Tree	Mes	Np	+	+	+	+
80	<i>Morus alba</i> L.	Moraceae	Speen tot	Tree	Mes	Mp	+	+	+	+
81	<i>Morus nigra</i> L.	Moraceae	Tor tot	Tree	Mes	Mp	+	+	+	+
82	<i>Broussonetia papyrifera</i> (L.) Vent	Moraceae	Shahtot	Tree	Mac	Megp	+	+	+	+
83	<i>Acacia nilotica</i> (L.) Delile	Mimosaceae	Kikar	Tree	Lep	Mp	+	+	+	+
84	<i>Acacia farnesiana</i> (L.) willd	Mimosaceae	Ghana	Tree	Lep	Mp	+	+	+	+
85	<i>Eucalyptas lanceolatus</i> –Honey	Myrtaceae	Lachi	Tree	Mic	Cha	+	+	+	+
86	<i>Psidium guajava</i> L.	Myrtaceae	Amrod	Tree	Mes	Mp	+	+	+	+
87	<i>Olea ferruginea</i> Royle	Oleaceae	Jaman	Tree	Mic	Mp	+	+	+	+
88	<i>Jasminum officinale</i> L.	Oleaceae	Unknown	Tree	Nan	Np	+	+	+	+
89	<i>Oxalis corniculata</i> L.	Oxalidaceae	Trewaky	Herb	Nan	Th	+	+	-	+
90	<i>Phaseolus vulgare</i> L.	Papilionaceae	Unknown	Shrub	Mes	Cha	-	+	-	-
91	<i>Papaver somniferum</i> L.	Papaveraceae	Bang	Herb	Mes	Th	+	+	-	-
92	<i>Abizia lebbeck</i> (L.) Benth	Papilionaceae	Emli	Tree	Lep	Mp	+	+	+	+
93	<i>Pisum sativum</i> L.	Papilionaceae	Matar	Herb	Mic	Th	+	-	-	-

94	<i>Astragalus hamosus</i> (L) Boiss	Papilionaceae	Jamdar	Herb	Mic	Th	-	+	-	-
95	<i>Delbegia sesso</i> Roxb. ExDc	Papilionaceae	Shawa	Tree	Nan	Mp	+	+	+	+
96	<i>Vicia hirsuta</i> (L). Gray	Papilionaceae	Mompali	Herb	Nan	Th	+	+	-	-
97	<i>Pinus roxburghii</i> Sargent	Pinaceae	Nakhtr	Tree	Lep	Mesp	+	+	+	+
98	<i>Pinus wellichiana</i> A.B.Jackson	Pinaceae	Deyar	Tree	Lep	Megp	+	+	+	+
99	<i>Cynodon dictylon</i> (L) Pers	Poaceae	Kabal	Herb	Nan	Hem	+	+	+	+
100	<i>Aristida adscensions</i> L.	Poaceae	Wakha	Herb	Mic	Hem	-	+	-	-
101	<i>Bromus japonicus</i> Houtt	Poaceae	Jaodar	Herb	Mic	Hem	-	+	-	-
102	<i>Cenchrus ciliaris</i> L.	Poaceae	Kalak wakha	Herb	Lep	Hem	+	+	-	-
103	<i>Secale cereal</i> L.	Poaceae	Warbashi	Herb	Mic	Th	-	+	+	-
104	<i>Phragmites australis</i> (cav) Trinex steud	Poaceae	Makay	Shrub	Mes	Geo	+	+	-	-
105	<i>Echinochola colona</i> L.	Poaceae	Koray	Herb	Nan	Hem	-	+	-	-
106	<i>Phalaris minor</i> Retz	Poaceae	Gaya	Herb	Mic	Th	+	+	-	-
107	<i>Avena sativa</i> L.	Poaceae	Jaodar	Herb	Mic	Th	+	-	-	-
108	<i>Zea mays</i> L.	Poaceae	Jowar	Herb	Mg	Th	-	+	-	-
109	<i>Triticum estivum</i> L.	Poaceae	Ghanam	Herb	Mic	Th	-	+	-	-
110	<i>Oryza sativa</i> L.	Poaceae	Roji	Herb	Mic	Geo	+	+	-	-
111	<i>Rumix hastatus</i> L.	Polygonaceae	Shalkhy	Herb	Mes	Th	+	-	-	-
112	<i>Homalocladium platycledum</i> (F.Muell).	Polygonaceae	Unknown	Shrub	Mes	Cha	+	+	+	+
113	<i>Polygonam baratum</i> L.	Polygonaceae	Unknown	Herb	Mic	Cha	+	-	-	+
114	<i>Portulaca oleraceae</i> L.	Portulacaceae	Warkhary	Herb	Nan	Th	+	+	-	-
115	<i>Pteris vitata</i> L.	Pteridaceae	Unknown	Herb	Mic	Hem	+	+	+	+
116	<i>Pteris cretica</i> L	Pteridaceae	Unknown	Herb	Mic	Hem	+	+	+	+
117	<i>Adiantum-capillus-veneris</i> L.	Pteridaceae	Unknown	Herb	Nan	Hem	+	+	+	+
118	<i>Punica granatum</i> L.	Punicaceae	Anar	Tree	Nan	Np	+	+	+	+
119	<i>Rananculus muricatus</i> L.	Ranunculaceae	Jaghagha	Herb	Mic	Geo	+	+	-	-
121	<i>Zizphus mauritiana</i> lam.	Rhamnaceae	Sara bera	Tree	Nan	Mp	+	+	+	+
122	<i>Rosa india</i> L.	Rosaceae	Gulab	Shrub	Mic	Np	+	+	+	+
123	<i>Rosa webiana</i> L.	Rosaceae	Gulab	Shrub	Mic	Np	+	+	+	+
124	<i>Eriobotrya japonica</i> (Thunb) Lindl	Rosaceae	Loakat	Tree	Mac	Mp	+	+	+	+
125	<i>Prunus armeniaca</i> L.	Rosaceae	Khubany	Tree	Nan	Mp	+	+	+	+
126	<i>Galium aparine</i> L.	Rubiaceae	Kotriboty	Herb	Lep	Th	+	+	-	-
127	<i>Citrus indica</i> L.	Rutaceae	Naranj	Shrub	Mic	Micp	+	+	+	+

128	<i>Zanthoxylum armatum</i> Dc	Rutaceae	Unknown	Tree	Mic	Np	+	+	+	+
129	<i>Dodonea viscosa</i> (L.) Jacq	Sapindaceae	Ghorasky	Tree	Nan	Np	+	+	+	+
130	<i>Manilkara zapota</i> (L.) P.Royen	Sapotaceae	Cheko	Tree	Mic	Mp	+	+	+	+
131	<i>Verbascum Thapsus</i> L.	Scrophulariaceae	Harghwagh	Herb	Meg	Th	+	+	-	-
132	<i>Ailanthus altissima</i> (mill) swiingle	Simarubaceae	Paramy shandy	Tree	Mic	Mp	+	+	+	+
133	<i>Solanum nigrum</i> L.	Solanaceae	Kachmacho	Herb	Mic	Th	+	+	-	-
134	<i>Datura metel</i> L.	Solanaceae	Batura	Shrub	Mic	Th	+	+	-	-
135	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Batwa boty	Shrub	Mic	Cha	-	+	-	-
136	<i>Withania coagulans</i> (stocks) Dunal	Solanaceae	Batwa boty	Shrub	Mic	Cha	-	+	-	-
137	<i>Solanum surrattense</i> Burn .f	Solanaceae	Unknown	Herb	Nan	Hem	+	+	-	+
138	<i>Physalis minima</i> L.	Solanaceae	Unknown	Herb	Mic	Cha	-	+	-	+
139	<i>Lycopersicon esculentum</i> Mill	Solanaceae	Tamatar	Herb	Mic	Th	+	+	-	-
140	<i>Cestrum nocturnum</i> L.	Solanaceae	Rat ke rani	Herb	Mic	Cha	+	+	+	+
141	<i>Urtica dioica</i> L.	Urticaceae	Unknown	Herb	Mic	Th	+	+	-	+
142	<i>Verbena officinalis</i> L.	Verbinaceae	Unknown	Herb	Mic	Th	+	+	+	+
143	<i>Vitis vinifera</i> L.	Vitaceae	Angur	Root climber	Mes	Mp	+	+	+	+
144	<i>Aloe vera</i> (L.) Burm.f,Fl.	Xanthorrhoeaceae	Alovera	Herb	Mes	Cha	+	+	+	+
145	<i>Cucuma longa</i> L.	Zingiberaceae	Korkaman	Herb	Mes	Geo	+	+	+	+
146	<i>Peganum harmala</i> L.	Zygophyllaceae	Spelany	Shrub	Mic	Cha	+	-	-	-

Note: Lep = Leptophyll, Nan = Nanophyll, Mic = Microphyll, Mes = Mesophyll, Mac = Macrophyll, Meg = Megaphyll, Ap = Aphyllus Th = Therophytes, Geo = Geophytes, Cha = Chaemophytes, Hem = Hemicryptophytes, Nan = Nanophanerophytes, Micp = Microphanerophytes, Mesp = Mesophanerophytes, Megp = Megaphanerophytes, P = Parasite, Sp = Spring, Sm = Summer, W = Winter, Au = Autumn

Conclusion

From the present study it was concluded that flora of the area is diverse and consisted of 146 plants species distributed among 58 families and 127 genera. The dominant life form was therophytes with 66 species (45.20%) followed by Microphanerophytes having 22 species (15.06%). While, microphyll dominating the leaf size spectra. In district Charsadda harsh winter creates unfavourable conditions which resulted in the abundance of these life forms. The locality also confronting a number of threats in the form of overgrazing, soil erosion, construction and agricultural extension. These factors combined with anthropogenic pressures are a serious threat to local biodiversity. Therefore, proper conservation strategies are the need of the hour to conserve this natural wealth for the generation to come.

Authors' contributions

Conceived and designed the experiments: S Shah & S Ullah, Performed the experiments: S Shah, Analyzed the data: Y Khan & T Yaseen, Contributed reagents/materials/ analysis tools: S Ullah, MF Basit, Wrote & revised the paper: Y Khan & T Yaseen.

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