

Research Article

Floristic leaf-size and life form spectra of district Pishin, Balochistan, Pakistan

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Abstract

In the floristic survey of district Pishin, Balochistan a total of 270 species belonging to 65 families of spermatophytes were collected. Out of which, 62 were angiosperm and 3 were gymnosperm families. Out of the total 270 species belonging to 197 genera, 3 genera each comprised of 1 species were gymnosperms. Remaining 267 species were angiosperms, out of these 48 species were monocots and 219 species were dicots. Cupressaceae, Ephedraceae and Pinaceae were represented by 1 genus (0.507%) and 1 species (0.37%). In monocots, Poaceae was the largest family having 27 genera (13.70%) and 32 species (11.85%). In dicots Asteraceae, Papilionaceae and Brassicaceae were found to be largest families consisting of 35 (12.96%), 23 (8.51%) and 21 species (7.77%), respectively. The predominant life form was Therophyte with 144 species (53.33%). In Phanerophytes, Nannophanerophytes were predominant class with 15 species (5.55%). *Ampelopsis vitifolia* and *Vitis vinefera* were lianas or woody climbers and *Cuscuta campestris* was the only parasitic species found in the region. The leaf spectrum was dominated by Nanophylls with 103 species (38.14%). It was noted that the studied area is rich in terms of plant forms but over harvesting, overgrazing and mismanagement of flora are having hazardous effects to local biodiversity and a comprehensive idea is required to secure natural resources.

Keywords: Biodiversity; Floristic survey; Life form; Pakistan; Phenology; Pishin

Introduction

Pishin is located 45 km from the main Quetta city, the district lies between 30° 21' to 31° 13' north latitudes and 66° 46' to 67° 50' east longitudes. Geographically, it is bounded on the north by Afghanistan, on the east by Killa Saifullah and Loralai districts, on the south by Ziarat and Quetta districts and on the west by Killa Abdullah district. The total area of the district is 7819 square

kilometres inhabited by Baloch population. People rely on plants in various aspects of their life. District Pishin is rich in plant population including many medicinally important plants. Large area of land is covered by forests including both natural and man-made forests in the form of plantations. Natural forests are present in Gawal, Surghund and Surkhab while artificial forest reserves were found at Bund

Kush Dil Khan where conifers and other types of trees can be seen. These forests are the habitat for wild life; mainly consists of jackal, fox, mountain sheep, horse, markhor, ravine deer, birds including duck, chukar, bustard, see-see, Snake, wall lizard, mice and sandgrouse.

Floristic inventories are helpful to get insight of ecological conditions and various aspects of plant population of a certain area [1] few workers [2-5] paid attention to the floristic studies on the flora of various regions of Pakistan. Some workers studied the ethnobotany and floristic composition of areas near to Pishin [6, 7]. However, District Pishin remained unexplored in the past. Except few reports like, Bibi *et al*, 2017 reported 46 plants belonging to 28 families which are used in child birth and postpartum recovery from Pishin [8]. Therefore, the present study was conducted to prepare a checklist of the plant species growing in the Pishin for future research.

Materials and Methods

Study area

The climate of the district is warm in summer but very cold in winter with

irregular rainfall (Table 1). The average rain fall is 147.4mm. Snowfalls occur during the months of January and February while, the month of July is the hottest. January is the coldest month with mean maximum and minimum temperature of about 12.8°C and -3.6°C respectively. The mean maximum and minimum temperature in July is about 37.2°C and 22.7°C, respectively (Table 1). However the humidity is 32.2.

Floristic survey

Floristic survey was carried out in district Pishin in spring and summer. 10-15 specimens of each species were collected at different growth stages from entire study area to ensure correct identification. Data regarding the plant specimens including family, locality, sub locality, vegetative, reproductive stage, life-form classification and leaf size [9] was noted in the field note book. The plants were identified with the help of available literature [5, 10, 11]. The specimens were then mounted on standard herbarium sheet and were given voucher numbers, then deposited in Peshawar university herbarium (PUP) for further study.

Table 1. Average annual temperature, humidity and rainfall

S.No.	Months	Temperature Max. (°C)	Temperature Min. (°C)	Humidity %	Precipitation (mm)
1	January	12.8	-3.6	48.7	15.0
2	February	11.5	-1.8	47.8	9.0
3	March	19.5	5.6	43.6	43.0
4	April	24.8	9.4	34.5	24.0
5	May	31.4	12.5	27.8	5.1
6	June	35.7	18.6	22.0	0.1
7	July	37.2	22.7	25.4	7.1
8	August	36.1	21.2	22.8	1.0
9	September	32.2	14.3	21.5	1.0
10	October	26.4	6.4	22.8	3.0
11	November	21.2	1.2	28.2	34.1
12	December	14.7	-3.2	41.3	5.0
	Average	25.3	8.6	32.2	147.4

Source: Pakistan Meteorological Department, Quetta

largest family having 32 species of 27 genera followed by Iridaceae and Liliaceae having 2 genera and 3 species each. Alliaceae, Asphodelaceae and Cyperaceae were monotypic in case of genera but 4 species were present in Alliaceae. While Asphodelaceae and Cyperaceae had 2 species in each. On the other hand, Amaryllidaceae and Areaceae were monogeneric and monospecific.

Whereas, maximum dicot species were found in Asteraceae i.e. 23 genera and 35 species. This was followed by Papilionaceae i.e. 11 genera and 23 species and Brassicaceae i.e. 15 genera and 21 species. Caryophyllaceae, Chenopodiaceae, Lamiaceae and Boraginaceae had 7, 7, 7 and 5 genera respectively. While the number of species in each genus were 12, 9, 8 and 8 respectively.

Amaranthaceae was pentageneric and pentaspecific. Polygonaceae, Rosaceae Euphorbiaceae, and Cucurbitaceae were tetrageneric while the numbers of species in each genus were 5, 7, 7 and 2 respectively. Asclepiadaceae, Apiaceae and Zygophyllaceae had 4 genera and 4 species in each. Ranunculaceae and Papaveraceae comprised of 3 genera and 4 species each. Moraceae, Solanaceae and Salicaceae were bigeneric but consisted of 3 species each except Salicaceae which had 4 species while Acanthaceae, Aizoaceae, Apocyanaceae, Capparidaceae, Cucurbitaceae, Mimosaceae, Oleaceae, Rubiaceae, Scrophulariaceae and Vitaceae were bigeneric and bispecific.

Plumbaginaceae was monogeneric but had 3 species each. Anacardiaceae, Convolvulaceae, Malvaceae and Rutaceae were monogeneric and bispecific. Berberidaceae, Cannabaceae, Cuscutaceae, Dipsacaceae, Fumariaceae, Geraniaceae, Leonticaceae, Meliaceae, Oxiladaceae, Plantaginaceae, Punicaceae, Resedaceae,

Rhamnaceae, Rosaceae, Sapindaceae, Simaroubaceae, Tamaricaceae, Urticaceae, Valerianaceae, Verbenaceae and Violaceae were monotypic generically and were monospecific except Tamaricaceae which had 5 species.

The predominant life form was Therophyte comprised of 144 species (53.33%) followed by Geophytes with 38 species (14.07%), Hemicryptophytes having 27 species (10%) and Chaemophytes consisting of 23 species (8.51%). In Phanerophytes, Nannophanerophytes were predominant class with 15 species (5.55%) followed by Microphanerophytes with 10 species (3.70%), Megaphanerophytes with 7 species (2.59%) and Mesophanerophytes comprising 3 species (1.11%). *Ampelopsis vitifolia* and *Vitis vinefera* were lianas or woody climbers and *Cuscuta campestris* was the only parasite. The leaf spectrum was dominated by Nanophylls with 103 species (38.14%) followed by Microphylls with 67 species (24.81%), Leptophylls with 58 species (21.48%), Mesophylls with 25 species (9.25%), Macrophylls consisting of 8 species (2.96%) and Megaphylls comprising 1 species (0.37%). On the other hand, 8 species (2.96%) i.e. *Ephedra intermedia* Schrenk and Meyer, *Caralluma tuberculata* N. E. Brown, *Calligonum crinitum* Boiss., *Tamarix aphylla* (L.) Karst, *T. dioica* Roxb. ex Roch. *T. indica* Willd. *T. karelini* Bunge and *T. kotschyi* Bunge were found to be aphyllous.

Some other reports also showed similar results from different regions of Pakistan [12-15]. Our results are well in line as therophytes and nanophylls were dominant life form and leaf size class in research area (Table 3). The flora and vegetation of district Pishin was dominated by Nanophylls due to xeric environmental conditions or subtropical type.

Table 2. Floristic composition of District Pishin, Balochistan, Pakistan; LF (Life form), LS (Leaf size)

S. No.	Division/Families/Species	Phenology	LF	LS
A	Gymnosperms			
	Cupressaceae			
1	<i>Juniperus excelsa</i> M. Bieb.		Megp	L
	Ephedraceae			
2	<i>Ephedra intermedia</i> Schrenk & Meyer	February-March	Ch	Ap
	Pinaceae			
3	<i>Pinus halepensis</i> Mill.		Megp	N
B	Angiosperms			
	I. Monocotyledons			
	Alliaceae			
4	<i>Allium cepa</i> L.	Summer months	G	N
5	<i>Allium gillii</i> Wendelbo.	May	G	N
6	<i>Allium griffithianum</i> Boiss.	March-April	G	N
7	<i>Allium stocksianum</i> Boiss.	March-April	G	N
	Amaryllidaceae			
8	<i>Ixiolirion tataricum</i> (Pall.) Herb.	March-April	G	Mic
	Areaceae			
9	<i>Nannorrhops ritchiana</i> (Griff.) Aitchison	July-November	N	Meg
	Asphodelaceae			
10	<i>Eremurus persicus</i> (Jaub. & Spach) Boiss.	April-May	G	Mes
11	<i>Eremurus stenophyllus</i> (Boiss. & Buhse) Baker	May-July	G	Mes
	Cyperaceae			
12	<i>Cyperus rotundus</i> L.	April-October	G	N
13	<i>Cyperus niveus</i> Retz.	April – June	G	N
	Iridaceae			
14	<i>Iris aitchisonii</i> (Baker) Boiss.	March-April.	G	Mic
15	<i>Iris stocksii</i> (Baker)Boiss.	March-April.	G	Mic
16	<i>Moraea sisyrinchium</i> (L.) Ker	March-May	G	Mic
	Liliaceae			
17	<i>Fritillaria karelinii</i> Regel ex Baker	April – May	G	L
18	<i>Tulipa lehmanniana</i> Merckl. ex Bunge	April	G	L
19	<i>Tulipa chusiana</i> DC.	March-May (July)	G	L
	Poaceae			
20	<i>Agrostis viridis</i> Gouan	May-August	H	N
21	<i>Aristida adscensionis</i> L.	March-December	Th	L
22	<i>Avena barbata</i> Pott ex Link	February-May	Th	N
23	<i>Avena fatua</i> Linn.	February-May	Th	Mic
24	<i>Boissiera squarrosa</i> (Banks & Soland.) Nevski	April-June	Th	L
25	<i>Brachiaria eruciformis</i> (J.E. Smith) Griseb	July-September	Th	N
26	<i>Brachiaria ramosa</i> (Linn.) Stapf	July-October	Th	N

27	<i>Bromus danthoniae</i> Trin	April-July	Th	N
28	<i>Bromus pectinatus</i> Thunb.	April-August	Th	Mic
29	<i>Cenchrus ciliaris</i> L. Mant.	February-March	Th	N
30	<i>Cymbopogon commutatus</i> (Steud.) Stapf	April-October	H	N
31	<i>Cymbopogon jwarancusa</i> (Jones) Schult.	March-May	H	L
32	<i>Cynodon dactylon</i> (L.) Pers.	Throughout Year	H	L
33	<i>Desmostachya bipinnata</i> (Linn.) Stapf.	July- october	H	N
34	<i>Dichanthium annulatum</i> (Forssk.) Stapf.	Mar-November	H	N
35	<i>Eleusine indica</i> (L.) Gaertn.	June-August	H	N
36	<i>Enneapogon persicus</i> Boiss. Diagn	May-June	H	L
37	<i>Eragrostis minor</i> Host, Gram.	May-September	Th	N
38	<i>Eremopyrum orientale</i> (Linn.) Jaub. & Spach	March- April	Th	N
39	<i>Heteropogon contortus</i> (L.) Beauv. ex Roem. & Schult.	June-October	H	Mic
40	<i>Lolium perenne</i> Linn.	May-July	H	N
41	<i>Lolium multiflorum</i> Lam.	April-August	H	N
42	<i>Melica persica</i> Kunth	Mey- June	G	L
43	<i>Pennisetum flaccidum</i> Griseb	April –October	H	Mic
44	<i>Phalaris minor</i> Retz.	March-May	Th	N
45	<i>Poa bulbosa</i> Linn.	July-September	H	Mic
46	<i>Polypogon monspeliensis</i> (linn.) Desf.	March – July	Th	N
47	<i>Rostraria cristata</i> (Linn.) Tzvelev	April-July	Th	N
48	<i>Saccharum griffithii</i> Munro ex Boiss.	April-June	H	N
49	<i>Setaria verticillata</i> (Linn.) P. Beauv	Throughout Year	Th	Mic
50	<i>Sorghum halepense</i> (L.) Pers	May-October	H	Mes
51	<i>Triticum aestivum</i> L.	June- July	Th	Mes
II. Dicotyledons				
Amaranthaceae				
52	<i>Achyranthes aspera</i> L.	Sept-April	H	Mic
53	<i>Aerva javanica</i> (Burm. f.) Juss. ex J.A.	May-July	Ch	Mic
54	<i>Amaranthus viridis</i> L.	July-October	Th	Mic
55	<i>Celosia argentea</i> L. var. <i>cristata</i> (L.) Schinz	March- April	Th	N
56	<i>Digera muricata</i> (L.) Mart	April- May	Th	Mic
Acanthaceae				
57	<i>Dicliptera bupleuroides</i> . Nees var. <i>ciliata</i> Malik & A. Ghafoor	June-October	H	Mes
58	<i>Justicia adhatoda</i> L.	July-October	N	Mes
Anacardiaceae				
59	<i>Pistacia khinjuk</i> Stocks	March-April	N	N
60	<i>Pistacia atlantica</i> Stocks	May	Mip	N
Apiaceae				
61	<i>Bunium cylindricum</i> (Boiss. & Hohen) Drude	April- May	Th	Mic
62	<i>Foeniculum vulgare</i> Mill.	March- April	Th	N
63	<i>Trachyspermum ammi</i> Linn.	May- June	G	N

64	<i>Turgenia latifolia</i> Linn.	March- April	Th	N
	Apocynaceae			
65	<i>Rhazya stricta</i> Dcne.	December-March	N	Mic
66	<i>Nerium oleander</i> Linn.	April-October	N	Mes
	Asclepiadaceae			
67	<i>Calotropis procera</i> (Wild) R.Br.	Throughout Year	Ch	Mes
68	<i>Caralluma tuberculata</i> N.E. Brown	January-June	G	Ap
69	<i>Glossonema varians</i> (Stocks) Hook. <u>F.</u>	December	Ch	Mic
70	<i>Vincetoxicum arnottianum</i> (Wight) wight	April – July	Ch	Mes
	Asteraceae			
71	<i>Achillea santolina</i> L.	April – June	Th	N
72	<i>Acroptilon repens</i> (Linn.) D.	April – June	Th	Mic
73	<i>Artemisia herba-alba</i> Asso	April – June	Ch	N
74	<i>Artemesia maritima</i> Linn.	April – May	Ch	N
75	<i>Artemisia scoparia</i> Waldst.	July-November	Ch	N
76	<i>Calendula arvensis</i> L.	February-April	Th	Mic
77	<i>Carduus pycnocephalus</i> Linn.	May-June	Th	Mac
78	<i>Centaurea bruguieriana</i> (DC) Hand. Mezz.	April – June	Th	Mic
79	<i>Centaurea iberica</i> Trev.ex Spreng	April	Th	Mic
80	<i>Conyza canadensis</i> (L.) Cronquist	August-October	Th	N
81	<i>Conyza bonariensis</i> (Linn.) Cronquist	April – June	Th	N
82	<i>Cousinia bipinnata</i> Boiss.	June	Th	N
83	<i>Cousinia decurrens</i> Regel	April – June	Th	Mic
84	<i>Cousinia heterophylla</i> Boiss.	April – June	Th	Mic
85	<i>Cousinia onopordioides</i> Ledeb	April – June	Th	Mic
86	<i>Cousinia stocksii</i> C. Winkler.	June-August	Th	N
87	<i>Crepis sancta</i> (L.) Babc.	March-April	Th	N
88	<i>Echinops echinatus</i> Roxb	June-August	Th	Mic
89	<i>Echinops griffithianus</i> Boiss.	April- June	Th	Mes
90	<i>Filago arvensis</i> Linn.	April- June	Th	Mic
91	<i>Filago hurdworica</i> (DC.) Wegentz	July-September	Th	Mic
92	<i>Hertia intermedia</i> (Boiss.) O. Ktze.	March- April	Th	Mic
93	<i>Iphiona grantioides</i> Boiss.	March- April	Th	Mic
94	<i>Jurinea berardioides</i> (Boiss.) Diels	March- April	Th	Mic
95	<i>Koelpinia linearis</i> Pallas	March- April	Th	L
96	<i>Lactuca serriola</i> L.	March-April	Th	Mes
97	<i>Lactuca sativa</i> Linn.	March- April	Th	Mac
98	<i>Lactuca viminea</i> (Linn.) Schmidt.	March- April	Th	N
99	<i>Launaea procumbens</i> (Roxb.) Ram. & Rajg.	March- April	Th	N
100	<i>Matricaria aurea</i> (Loefl.) Schultz-Bip	March- April	Th	N
101	<i>Scorzonera ammophila</i> Bunge	March- April	Th	Mes
102	<i>Sonchus asper</i> L.	March-May	Th	Mic
103	<i>Taraxacum officinale</i> Weber.	February-April	H	Mic
104	<i>Tragopogon gracilis</i> D.Don	March- April	H	N
105	<i>Xanthium strumarium</i> L.	July-October	Th	Mes

	Aizoaceae			
106	<i>Trianthema portulacastrum</i> L.	May-October	Th	N
107	<i>Zaleya pentandra</i> (L.) Jeffrey	April-August	H	N
	Berberidaceae			
108	<i>Berberis balochistanica</i> Beng	April-June	N	N
	Boraginaceae			
109	<i>Arnebia decumbens</i> (Vent.) Coss. & Kral	April-May	Th	N
110	<i>Arnebia euchroma</i> (Royle ex Benth.) I.M. C	June-July	G	N
111	<i>Arnebia inconspicua</i> Hemsl. & Lace	May-June	G	Mic
112	<i>Arnebia linearifolia</i> A. DC.	May	G	N
113	<i>Buglossoides arvensis</i> (L.) Johnston	March-April	Th	N
114	<i>Caccinia macranthera</i> (Banks and Soland.) Brand	March- April	Th	Mic
115	<i>Gastrocotyle hispida</i> (Forssk.) Bunge	March-May	Th	Mic
116	<i>Heliotropium europaeum</i> L	April-December	Th	Mic
	Brassicaceae			
117	<i>Alyssum desertorum</i> Stapf.	March-June	Th	L
118	<i>Alyssum dasycarpum</i> Steph. ex Willd	March-May	Th	L
119	<i>Alyssum linifolium</i> Steph. ex Willd	March June	Th	L
120	<i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande	April-August	Th	Mic
121	<i>Arabidopsis pumila</i> (Steph.) N. Busch	March-June	Th	N
122	<i>Arabidopsis wallichii</i> (Hook. f. & Thoms.) N. Busch	April-June	Th	Mic
123	<i>Cardaria chalepense</i> (L.) Hand.-Mazz	April-July	Th	Mic
124	<i>Capsella bursa-pastoris</i> (L.) Medic.	February-April	Th	Mic
125	<i>Clypeola aspera</i> (Grauer) W.B. Turrill	March-June	Th	L
126	<i>Coronopus didymus</i> (Linn.) Smith, Fl.Brit.	March-June	Th	L
127	<i>Crambe cordifolia</i> Steven	April-June	Th	N
128	<i>Descurainia sophia</i> (Linn.) Webb. & Berth.	April-June	Th	N
129	<i>Isatis minima</i> Bunge	March – June	Th	Mic
130	<i>Isatis stocksii</i> Boiss.	April-August	Th	Mic
131	<i>Malcolmia africana</i> (L.) R.Br.	March-June	Th	L
132	<i>Malcolmia cebulica</i> (Boiss.) Hook. F. & Thoms.	March-May	Th	N
133	<i>Matthiola flavida</i> Boiss.	April-July	Th	Mes
134	<i>Nasturtium officinale</i> R. Br.	April-July	G	N
135	<i>Sameraria armena</i> (L.) Desv.	April-June	Th	L
136	<i>Torularia dentata</i> (Freyn & Sint.) Kitam.	March-April	Th	N
137	<i>Torularia torulosa</i> (Desf.) Schulz	March-May	Th	N
	Capparidaceae			
138	<i>Capparis spinosa</i> L.	January-April	H	Mic
139	<i>Cleome brachycarpa</i> Vahl ex DC. Prodr.	January-July	Th	N
	Cannabaceae			
140	<i>Cannabis sativa</i> L.	April-September	Th	N

Caryophyllaceae				
141	<i>Acanthophyllum grandiflorum</i> Stocks	June-July	G	L
142	<i>Acanthophyllum laxiflorum</i> Boiss.	May-July	G	L
143	<i>Acanthophyllum sordidum</i> Bunge ex Boiss.	May- June	G	L
144	<i>Acanthophyllum squarrosum</i> Boiss.	June- July	G	L
145	<i>Bufonia oliveriana</i> Ser.	May-June	Th	L
146	<i>Gypsophila alsinoides</i> Bunge	May-June	Th	N
147	<i>Holosteum umbellatum</i> L.	June- July	Th	N
148	<i>Lepyrodiclis holosteoides</i> (C. A. Mey.) Fenzl ex Fisch	April-July	Th	N
149	<i>Silene arenosa</i> C. Koch	May-July	Th	N
150	<i>Silene brahuica</i> Boiss.	April	G	N
151	<i>Silene conoidea</i> L.	March-April	Th	Mic
152	<i>Spergula fallax</i> (Lowe) E. H. L. Krause	March-June	Th	L
Chenopodiaceae				
153	<i>Atriplex lasiantha</i> Boiss.	April-September	Th	Mic
154	<i>Ceratocarpus arenarius</i> Linn.	June-July	Th	Mic
155	<i>Chenopodium murale</i> L.	January-July (- November)	Th	N
156	<i>Chenopodium album</i> L.	Jan-September	Th	Mic
157	<i>Haloxylon griffithii</i> (Moq.) Boiss.	August-October	Ch	L
158	<i>Kochia indica</i> Wight & Icon.	July-October	Th	L
159	<i>Salsola tragus</i> L.	July-September	Th	L
160	<i>Salsola imbricata</i> Forssk.	August-October	Th	L
161	<i>Suaeda arcuata</i> Bunge	September-October	Th	L
Convolvulaceae				
162	<i>Convolvulus arvensis</i> L.	Throughout Year	Th	Mic
163	<i>Convolvulus spinosus</i> Burm. F.	April	Th	Mic
Cucurbitaceae				
164	<i>Citrullus colocynthis</i> (L.) Schrad	January-April	H	Mic
165	<i>Luffa cylindrica</i> (L.) Roem.	April-October	Th	Mac
Cuscutaceae				
166	<i>Cuscuta campestris</i> Yuncker	March- April	Parasite	L
Dipsacaceae				
167	<i>Scabiosa candolii</i> DC.	April-August	H	Mes
Euphorbiaceae				
168	<i>Andrachne telephioides</i> L.	March-July	Th	Mic
169	<i>Chrozophora tinctoria</i> (L.) Raf	Jan- Sept	Th	Mic
170	<i>Euphorbia falcata</i> L.	March – June	Th	N
171	<i>Euphorbia granulata</i> Forssk	throughout Year	Th	L
172	<i>Euphorbia helioscopia</i> L.	January-July	Th	N
173	<i>Euphorbia prostrata</i> Ait	Throughout Year	Th	L
174	<i>Ricinus communis</i> L.	at most seasons	N	Mac
Fumariaceae				
175	<i>Fumaria indica</i> (Hauskn.) Pugsley	March-June	Th	N

	Geraniaceae			
176	<i>Erodium cicutarium</i> (L.) L'Herit, ex Aiton	March-June	Th	Mic
	Lamiaceae			
177	<i>Eremostachys thyrsoflora</i> Benth.	March- April	Ch	Mic
178	<i>Hymemocrater sessilifolius</i> Benth.	March-June	Th	N
179	<i>Nepeta glomerulosa</i> Boiss.	April- May	Th	N
180	<i>Salvia bucharica</i> M.Pop.	April-June	Th	Mac
181	<i>Scutellaria petiolata</i> Hemsley & Lace	May-September	G	L
182	<i>Scutellaria stocksii</i> Boiss.	May-August	G	L
183	<i>Thuspeinanta brahuica</i> (Boiss.) Briq	March-April	Th	L
184	<i>Ziziphora tenuior</i> L.	March-June	Th	L
	Leonticaceae			
185	<i>Leontice eversmannii</i> Bunge	May- June	G	N
	Malvaceae			
186	<i>Malva neglecta</i> Waller.	July-September	Th	N
187	<i>Malva parviflora</i> L.	April- May	Th	N
	Meliaceae			
188	<i>Melia azedarach</i> L.	March-April	Mesp	Mic
	Mimosaceae			
189	<i>Acacia nilotica</i> (L.) Delile.	June-September	Mip	L
190	<i>Prosopis cineraria</i> (Linn.) Druce	Dec.-March	Mesp	N
	Moraceae			
191	<i>Ficus carica</i> L. ssp <i>carica</i>	April-December	Mip	Mes
192	<i>Ficus palmata</i> Forssk.	March-April	Mip	Mes
193	<i>Morus alba</i> L.	April-September	Mesp	Mac
	Oleaceae			
194	<i>Fraxinus xanthoxyloides</i> (G. Don) DC.	April-September	N	Mic
195	<i>Olea ferruginea</i> Royle.	March-September	Mip	Mic
	Oxalidaceae			
196	<i>Oxalis corniculata</i> L.	March-December	Th	N
	Papaveraceae			
197	<i>Papaver pavoninum</i> Fisch. & Mey	April-June	Th	Mic
198	<i>Hypecoum pendulum</i> L.	March-April	Th	N
199	<i>Roemeria hybrida</i> (Linn.) DC.	April- May	Th	N
200	<i>Papaver dubium</i> L.	March June	Th	Mes
	Papilionaceae			
201	<i>Alhagi maurorum</i> Medic	April-September	Ch	N
202	<i>Astragalus affghanus</i> Boiss.	March-April	Th	N
203	<i>Astragalus anisacanthus</i> Boiss.	September-April	Ch	L
204	<i>Astragalus auganus</i> Bunge	March	G	N
205	<i>Astragalus corrugatus</i> Bertol	March-April	Th	N
206	<i>Astragalus kahiricus</i> DC.	March-April	G	N
207	<i>Astragalus neubauerianus</i> Sirjaev & Rechinger fil	April-May	Th	L
208	<i>Astragalus squarrosus</i> Bunge	June	G	N

209	<i>Astragalus stocksii</i> Bunge	April-May	Ch	L
210	<i>Astragalus tribuloides</i> Delile & Descr.	Feb-April	Th	L
211	<i>Astragalus zarghumensis</i> Rech.f.	May	Ch	L
212	<i>Caragana ambigua</i> Stocks	April-August	N	L
213	<i>Caragana brachyantha</i> Rech.f.	June	N	L
214	<i>Dalbergia sissoo</i> Roxb	March-May	Megp	Mic
215	<i>Ebenus stellata</i> Boiss.	April-May	G	N
216	<i>Glycyrrhiza glabra</i> L.	May June	G	Mes
217	<i>Medicago laciniata</i> (Linn.) Mill.	March- April	Th	N
218	<i>Medicago polymorpha</i> L.	March-May	Th	N
219	<i>Onobrychis micrantha</i> Schrenk	June	Ch	N
220	<i>Onobrychis tavernierifolia</i> Stocks ex Boiss.	March-October	Th	N
221	<i>Sophora mollis</i> (Royle) Baker	April-September	N	N
222	<i>Trigonella cachemiriana</i> Camb	May-September	Th	L
223	<i>Vicia sativa</i> L.	March-May	Th	N
	Plantaginaceae			
224	<i>Plantago ciliata</i> Desf	April	Th	N
	Plumbaginaceae			
225	<i>Acantholimon leptostachyum</i> Aitch & Hemsl.	July-September	Ch	L
226	<i>Acantholimon longiflorum</i> Boiss.	July-October	Ch	L
227	<i>Acantholimon munroanum</i> Aitch. & Hemsl.	July-September	Ch	L
	Polygonaceae			
228	<i>Calligonum crinitum</i> Boiss.	February-April	N	Ap
229	<i>Polygonum aviculare</i> L.	June-September	Th	N
230	<i>Rumex dentatus</i> L	March- April	Th	Mic
231	<i>Rumex vesicarius</i> L.	March-May	Th	Mic
232	<i>Pteropyrum olivieri</i> Jaubert & Spach	September – October	Ch	L
	Punicaceae			
233	<i>Punica granatum</i> L.	April July	N	Mes
	Ranunculaceae			
234	<i>Anemone biflora</i> DC.	March-April	G	N
235	<i>Adonis aestivalis</i> L.	March-April	Th	N
236	<i>Ranunculus falcatus</i> Linn.	March- April	Th	L
237	<i>Ranunculus sceleratus</i> L.	March-April	Th	N
	Resedaceae			
238	<i>Oligomeris linifolia</i> (Vahl.) Macbride	January-April	Th	N
	Rhamnaceae			
239	<i>Ziziphus mauritiana</i> Lam	April-July	Mip	Mes
	Rosaceae			
240	<i>Prunus eburnea</i> Aitch	March- April	N	Mes
	Rubiaceae			
241	<i>Asperula glomerata</i> (M. Bieb) Griseb.	March-July	Th	N
242	<i>Pseudogaiellonia hymenostephana</i> (Daub. & Spach) Lincz	March-Nov	Ch	L
	Rutaceae			

243	<i>Haplophyllum erythraeum</i> Boiss.	April, May	Th	N
244	<i>Haplophyllum pedicellatum</i> Bunge ex Boiss.	April-May	Th	N
	Sapindaceae			
245	<i>Stocksia brahuica</i> Benth	April-May	Ch	N
	Salicaceae			
246	<i>Populus afghanica</i> (Aitch. & Hemsl.) C. K. Schneider	April-May	Megp	Mic
247	<i>Populus euphratica</i> Olivier	February	Megp	Mic
248	<i>Salix acmophylla</i> Boiss.	February-April	Mip	Mes
249	<i>Salix alba</i> L.	April-May	Mip	Mes
	Scrophulariaceae			
250	<i>Verbascum thapsus</i> L.	March- Dec	Th	Mac
251	<i>Veronica polita</i> Tenore	May	Th	L
	Simaroubaceae			
252	<i>Ailanthus altissima</i> (Mill.) Swingle	May-June	N	Mic
	Solanaceae			
253	<i>Solanum nigrum</i> Bernh. ex Wild.	Throughout Year	Th	Mes
254	<i>Withania coagulans</i> (Stocks) Dunal.	January-April	Ch	Mic
255	<i>Withania somnifera</i> (L.) Dunal.	Throughout Year	Ch	Mac
	Tamaricaceae			
256	<i>Tamarix aphylla</i> (L.) Karst	June-October	Megp	Ap
257	<i>Tamarix dioica</i> Roxb. ex Roch.	April-November	Megp	Ap
258	<i>Tamarix indica</i> Willd.	January-October	Mip	Ap
259	<i>Tamarix karelini</i> Bunge	September-October	Mip	Ap
260	<i>Tamarix kotschyi</i> Bunge	April – July	Mip	Ap
	Urticaceae			
261	<i>Forsskaolea tenacissima</i> L.	March-September	H	N
	Valerianaceae			
262	<i>Valerianella szovitsiana</i> Fisch. & C.A. Mey.	April-May	Th	N
	Verbenaceae			
263	<i>Verbena officinalis</i> L.	June-Dec	Th	Mic
	Violaceae			
264	<i>Viola cinerea</i> Boiss.	January-March	G	Mic
	Vitaceae			
265	<i>Ampelopsis vitifolia</i> (Boiss) Planch.	March- April	L*	L
266	<i>Vitis vinifera</i> L.	May –July	L*	L
	Zygophyllaceae			
267	<i>Fagonia indica</i> Burm.f.	January-August	Th	N
268	<i>Peganum harmala</i> L.	April-October	H	N
269	<i>Tetradiclis tenella</i> (Ehrenbg.) Litw.	February-August	H	L
270	<i>Tribulus terrestris</i> L.	Throughout Year	H	L

Key to Abbreviations: Life form: Ph-Phanerophytes, **G**-geophyte, **Th**-Therophyte, **H**-Hemicryptophyte, **Ch**-Chamaephyte, **N**-Nanophanerophyte, **Mip**-Microphanerophyte, **Mesp**-Mesophanerophyte, **Megp**-Megaphanerophyte, **L***- Liana, **Leaf size: Ap**-Aphyllous, **L**-Leptophyll, **N**-Nanophyll, **Mic**-Microphyll, **Mes**-Mesophyll, **Mac**-Macrophyll, **Meg**-Megaphyll

Table 3. Biological and leaf size spectra of the plants of district Pishin

S. No.	Life form	Numbers	Percentage
1	Therophytes	144	53.33
2	Geophytes	38	14.07
3	Hemicryptophytes	27	10
4	Chamaephytes	23	8.51
5	Nanophanerophytes	15	5.55
6	Microphanerophytes	10	3.70
7	Mesophanerophytes	3	1.11
8	Megaphanerophytes	7	2.59
9	Lianas	2	0.74
10	Parasite	1	0.37
Total		270	100
Sr. No	Leaf spectra	Number	Percentage
1	Aphyllous	8	2.96
2	Leptophyll	58	21.48
3	Nanophyll	103	38.14
4	Microphyll	67	24.81
5	Mesophyll	25	9.25
6	Macrophyll	8	2.96
7	Megaphyll	1	0.37
Total		270	100

Conclusion

It was observed that the flora of studied area was rich with various life forms and economically as well as medicinally important plants. It was also noted that local biodiversity is under threat due to over grazing, overharvesting and lack of management. Proper steps to conserve the biodiversity of area should be taken by competent authorities.

Authors' contributions

Conceived and designed the experiments: Sirajudin & G Jelani, Performed the experiments: Rafiqullah, Analyzed the data: Rafiqullah & MF Siddiqui, Contributed materials/ analysis/ tools: Sirajudin & G Jelani, Wrote the paper: Rafiqullah & S Riaz.

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