

FLORISTIC COMPOSITION AND ECOLOGICAL CHARACTERISTICS OF FLORA OF TEHSIL SARAI NAURANG, DISTRICT LAKKI MARWAT, PAKISTAN

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Abstract

The current study was performed to determine the floristic composition and ecological characterization of the flora of tehsil Sarai Naurang. The floristic diversity of the plant consists of 143 species belonging to 47 families including 42 dicots and 5 monocots. Poaceae was the dominant family containing 18 species followed by Brassicaceae, Fabaceae, Asteraceae and Solanaceae. Therophytes were dominant class having 89 species (62.23%) followed by Microphanerophytes with 19 species (13.28%), Hemicryptophytes with 13 species (9.09%), Chamaephytes 8 species (5.59%), Geophytes 7 species (4.89%), Nanophanerophytes with 6 species (4.19%) and Megaphanerophytes with 1 species (0.69%). Leaf size of most plant species was reduced indicating an adaptation to arid climatic conditions. Nanophylls had the largest leaves, followed by Microphylls (40 species, 27.97 %), Leptophylls (34 species, 23.77 %), Mesophylls (15 species, 10.48 %), Megaphylls (2 species, 1.39 %), and Macrophylls (1 species 0.69 %).

Keywords: Ecological characteristics, Floristic composition, Leaf size, Sarai Naurang, Vegetations.

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Introduction

District Lakki Marwat is one of the southern district of Khyber Pakhtunkhwa, Pakistan, extending from 32° 53' North Latitudes and 70°-23° to 71°-16° East Longitudes. Location of Lakki Marwat is in such a way that in the north side there is a district Bannu, southeast the Marwat range separate Lakki Marwat from D.I Khan district, while in the east the Karak niazi range separates it from Mianwali district. It is surrounded by Waziristan on the west and southwest which separate it from district Tank and the tribal area adjoining south Waziristan agency and Tank district (Ahmad *et al.* 2021; Ahmad *et al.* 2019).

Sarai Naurang is one of the tehsil of district Lakki Marwat. It is located at northern area of district Lakki Marwat. It is extending from 32° 44'2 North latitude 70°42'50 East longitude. It is 284 meters above sea level. The dominant flora of study area is *Acacia nilotica*, *Morus alba*, *Morus nigra* and *Dalbergia sisso*. The flora of a region refers to the

Materials and Methods

The field data were collected during the period 2018-19 for establishing the species composition and the extent of plants in the tehsil Sari Naurang, Lakki Marwat. Collected plants were dried, preserved in newspapers, and identified with the help of flora of Pakistan (Nasir and Ali, 1971, 2007; Ali and Qaisar, 1995-2009) and by comparing with the already identified plant specimens at

collections of plants species in a particular region. It varies from other vegetations which relates to plant size, species' population distribution, and species importance (Samad *et al.* (2018), Ahmad *et al.* (2019) studied floristic, frequency and vegetation-biological spectra which providing information about most dominant life forms (Therophytes 31.25%, and hemicryptophytes 28.13%). The floristic survey gives the information about plants importance for people which are used as drugs, oil and construction works. The identification of plants is very important because it shows and helps in counting plants species and its location in an area (Ali *et al.* 2018; Ahmad *et al.* 2020). Floristic composition and ecological characteristic of various parts of Pakistan are explored by Fazal *et al.* (2010). Nasir *et al.* (2002), Shah *et al.* (2014). Sher and Khan (2007). and Khan *et al.* (2014). From all these surveys, it is clear that no floristic survey had carried in the tehsil Sai Naurang. Therefore the present survey was conducted to analyze and show the floristic composition and ecological characteristics of plants of this area.

herbarium, Department of Botany, University of Peshawar, Pakistan. Plants were mounted over standard herbarium sheets. Floristic composition and ecological compositions list for all species was prepared. Raunkiaer (1934) and Husain (1954) categorised plant species based on leaf size and life types (1989).

Result and Discussion

Floristic characteristics

Results and discussions are mentioned here for the floristic composition of species. The floristic diversity of plants consists of 143 species belonging to 47 different families. Poaceae was found to be the most dominant family having 18 species, followed by Brassicaceae 11 species, Fabaceae 10 species, Asteraceae 9 species and Solanaceae 8 species while remaining Families had 1

to 4 species in each (Fig:3, Table 1 and Table 2). The most common species are *Alhagi maurorum*, *Avena fatua*, *Convolvulus arvensis*, *Euphorbia helioscopia*, *Medicago sativa*, *Rununculus muricatus*, *Saueda fruticosa*, *Brassica campestris*, *Morus alba*, *Morus nigra*, and *Eucalyptus camaldulensis* etc. Most of the plants were annual. The primary and dominant category was dicots 42

families, followed by monocots 5 families, according to a floral research. Manhas et al., (2010) and Wariss et al. (2014) reported dicots as the dominant group in their study area and found similar results. There were 103 herbivores, 20 shrubs, and 20 trees among the 143 species). Khan et al. (2017), Durrani et al. (2005), Marwat &

Qureshi (2000), Musharaf et al. (2014;2011) and Parveen et al. (2008) also reported these plants in many other regions of the country. The finding result are online and assisted by Pakistan Flora (Nasir and Ali, 1970-1989; Ali and Nasir 1989-1992; Ali and Qaiser, (1995-2015) which also shown by the plants genus to be dominant.

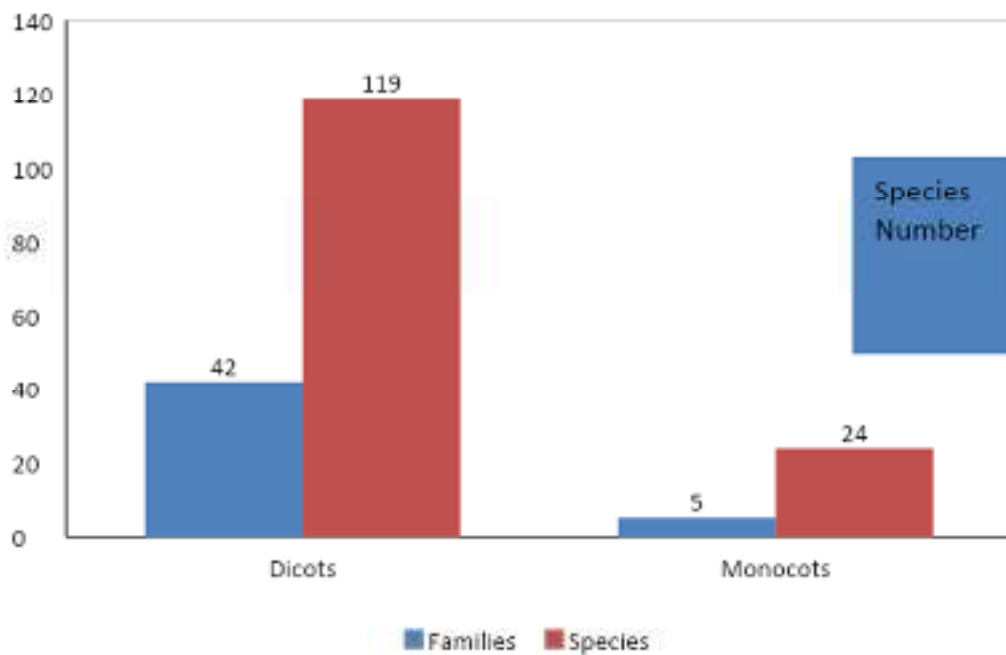


Fig. 2: Number of families and species of plant in tehsil Sari Naurang.

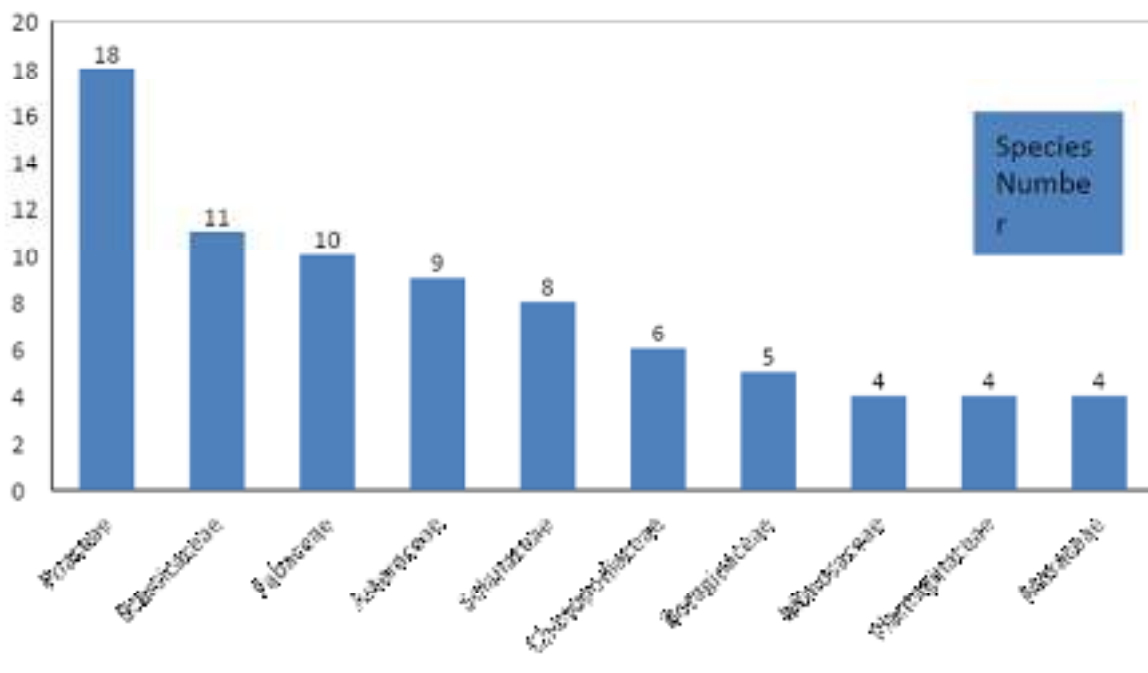


Fig. 3: Leading families showing number of species in tehsil Sari Naurang.

Plant habit

Based on plant habit 103 (72.02%) species were herbs, 20 species (13.98%) shrubs and 20 species (13.98%) were considered as trees (Fig: 4). Shuaib *et al.* (2014) and Qureshi *et al.* (2014) also reported herbs as the most dominant plant habit while studying spring flora of District Dir and Kanpur Dam, Respectively.

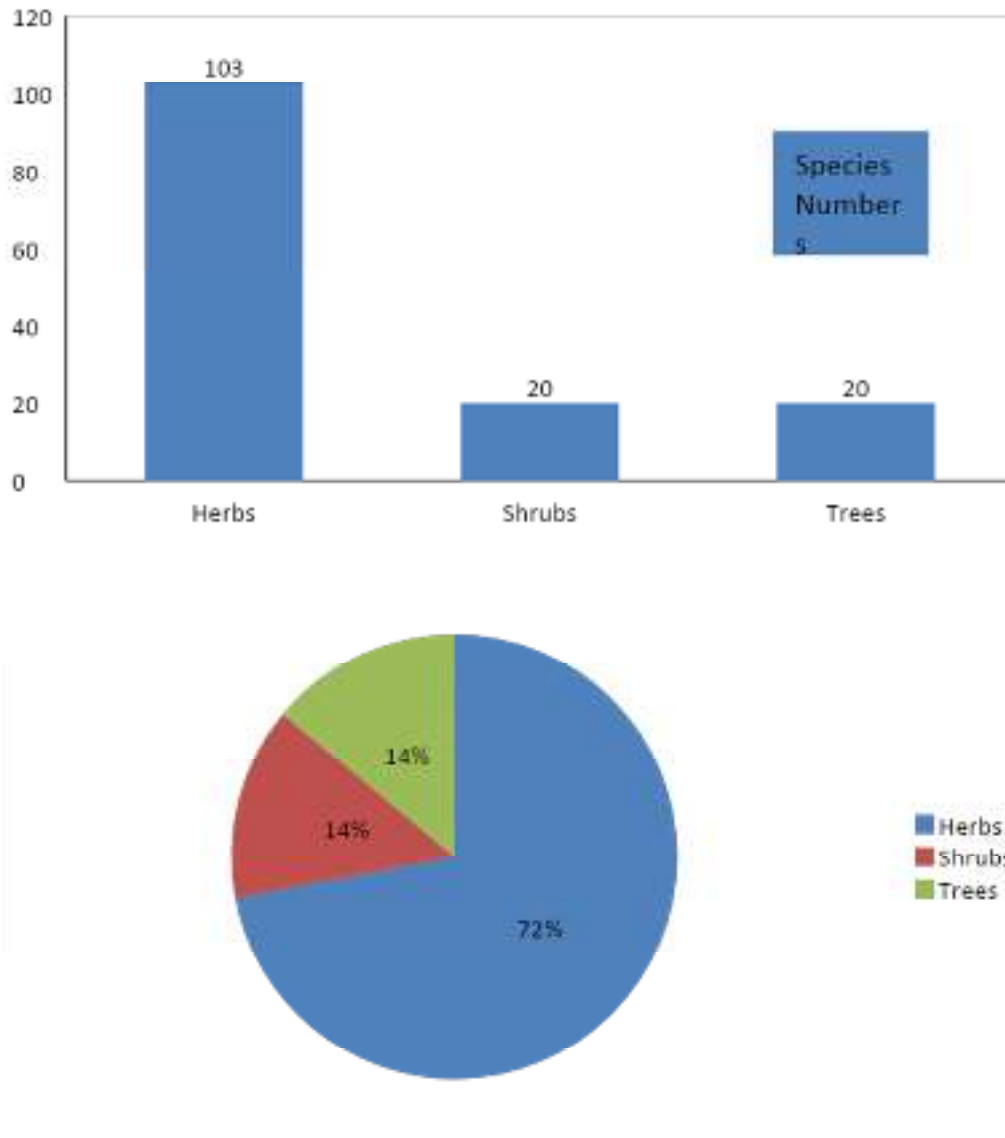


Fig.4: Bar and Pie diagram showing numbers and percentage of various plant habits.

LIFE FORM SPECTRUM:

The life form spectrum study declares the plants adaptability to climatic conditions. Accordingly to different ecosystem and various plants localities the life form of species is different with each other. Raunkiaer prepared life form classification based upon variation in plant structure during unfavorable climatic conditions. After studying

Raunkiaer classification, it was concluded that therophytes (89 spp., 62.23%) was the most dominant life form in the district. After that microphanerophytes (19 spp., 13.28%), hemicryptophytes (13 spp., 9.09%) chamaephytes (8 Spp., 5.59%) Geophytes (7 Spp., 4.89%), nanophanerophytes (6 Spp., 4.19%) and

Megaphanerophytes (1 Sp., 0.69%) (Fig: 5). The present study have good similarities with Ahmad *et al.* (2019). According to their floristic life form spectra, Therophytes were dominant in the area (31.25%), followed by Hemicryptophytes (28.13%). The dominance of Therophytes also proved by Samadet *al.* (2018) 30 species (37.5%), Hussain and Chaudhri (2009)(55%), Hussain *et al.* (2009) (53 spp, 85.48%), Sher and Khan (2007) (86 spp. 38.56%), Durrani *et al.* (2005),

Nasir *et al.* (2002), Chain & Castro (1959), Batalha & Martins (2002), Badshah *et al.* (2013) and Musharaf *et al.* (2011). The dominance of life form in study area shows adaptation to arid and harsh climatic condition which is capable to tolerate the unfavorable conditions. Some plants life form vary in different regions due to variations in environmental conditions. Therophytic plants completely shed even a little change in climatic condition.

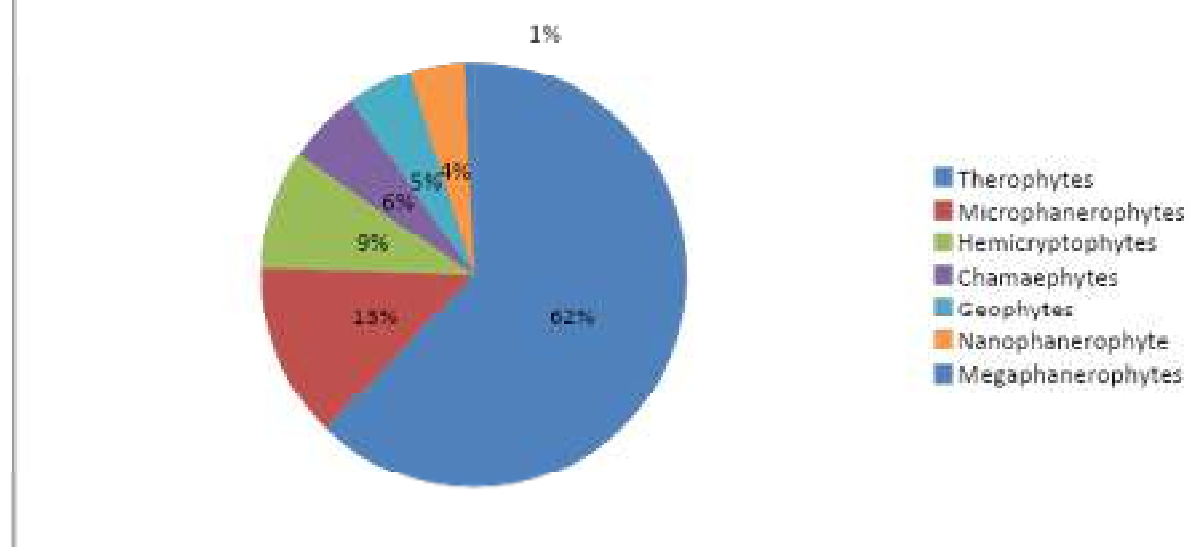


Fig. 5: Different life form classes showing percentage of species

LEAF SIZE SPECTRUM:

Leaf size classes are very important for plants associations. Leaf size spectrum also helps in determination of plant habits and their relations with climate. The leaf spectra of Sari Naurang town revealed that nanophyll (50 Spp., 34.96%) were the leading leaf size followed by Microphyll (40 Spp., 27.97%), leptophyll (34 Spp., 23.77%) mesophyll (15 spp., 10.48%) megaphyll (2 spp., 1.39%) and macrophyll (1 spp., 0.69%) (Fig: 6). Our results showed clear resemblance with Badshah *et al.* (2013) who examined floral floristic

composition, environmental variations and life form spectrum of rangeland district tank, Pakistan. Leaf spectra revealed that nanophylls were the most prevalent leaf size. Rather than Hussain *et al.* (2009), Hussain and Chaudhri (2009), Nasir and Sultan (2002). In any ecological area, leaf size is connected to environmental changes (Batalha and Martins, 2004). The size of leaf of an area reveals current climatic variations, however it cannot be used to shorten leaf zones.

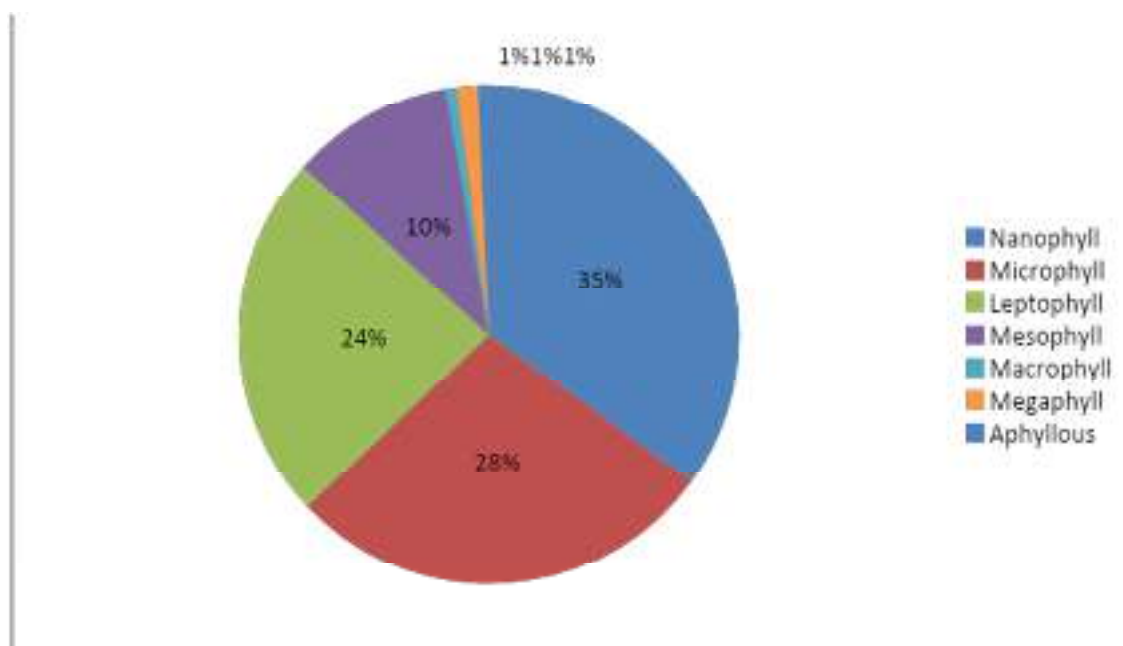


Fig.6: Different leaf size classes showing percentage of species.

Table 1. Summary of Characteristics of Flora of tehsil Sari Naurang

S. No	Ecological Characteristics	Number	Percentage
1.	Flora		
I	Total Families	47	24.74
Ii	Total Species	143	75.26
2.	Habit		
I	Herbs	103	72.02
Ii	Shrubs	20	13.98
iii	Trees	20	13.98
3.	Life form Spectra		
i	Therophytes	89	62.23
ii	Microphanerophytes	19	13.28
Iii	Hemicryptophytes	13	9.09
Iv	Chamaephytes	8	5.59
v	Geophytes	7	4.89
Vi	Nanophanerophyte	6	4.19
vii	Megaphanerophytes	1	0.66
4.	Leaf size Spectra		
i	Nanophyll	50	34.96
Ii	Microphyll	40	27.97
iii	Leptophyll	34	23.77

iv	Mesophyll	15	10.48
v	Macrophyll	1	0.69
vi	Megaphyll	2	1.39
vii	Aphyllous	1	0.69

Table -2. Floristic composition and ecological characteristics of flora of tehsil Sari Naurang, district Lakki Marwat

S. No	Family	Spp. No	Species Name	Habit	Leaf Size	Life Form
A. Monocots						
1	Alliaceae	1	<i>Allium cepa</i> L.	Herb	N	G
		2	<i>Allium griffithianum</i> Boiss.	Herb	N	G
2	Arecaceae	3	<i>Nannorrhops ritchiana</i> (Griff)	Shrub	Mac	Mp
3	Asphodelaceae	4	<i>Asphodelous tennifolius</i> L.	Herb	L	Th
4	Cyperaceae	5	<i>Cyperus rotundus</i> L.	Herb	L	MP
		6	<i>Fimbristylis dichotoma</i> (L.) Vahl	Herb	L	Th
5	Poaceae	7	<i>Avena fatua</i> L.	Herb	L	Th
		8	<i>Cynodon arcuatus</i> J. Presl	Herb	L	H
		9	<i>Cenchrus ciliaris</i> L.	Herb	L	Ch
		10	<i>Cynodon dactylon</i> (L.) Pers	Herb	L	H
		11	<i>Cymbopogon jwarancusa</i> (Jones) Schult.	Herb	Mic	Th
		12	<i>Dichanthium annulatum</i> (Frossk.) Stapf.	Herb	Mic	H
		13	<i>Dectyloctenium aegyptium</i> (L.) Wild	Herb	N	Th
		14	<i>Hordeum murinum</i> L.	Herb	N	Th
		15	<i>Hardium volgare</i> L.	Herb	Mic	H
		16	<i>Imperata cylindrical</i> L.	Herb	N	G
		17	<i>Oryza sativa</i> L.	Herb	Mic	Th
18	<i>Poa annua</i> L.	Herb	L	Th		
19	<i>Polypogon monspeliensis</i> L.	Herb	Mic	H		

		20	<i>Phalaris minor</i> (Retz).	Herb	Mic	H
		21	<i>Paspalum paspalodes</i> (L.)	Herb	Mic	Th
		22	<i>Rostraria cristata</i> (L.) Tzvelev	Herb	N	Th
		23	<i>Triticum eastivum</i> L.	Herb	Mic	Th
		24	<i>Zea mays</i> L.	Herb	Mes	Th
B. Dicots						
6	Acanthaceae	25	<i>Justicia adhatoda</i> L.	Shrub	N	Mp
7	Aizoaceae	26	<i>Trianthema protulacastrum</i> L.	Herb	N	Th
8	Amaranthaceae	27	<i>Aerva lanata</i> L.	Herb	N	Th
		28	<i>Amaranthus viridis</i> (L.) Medik	Herb	N	Th
		29	<i>Amaranthus graecizans</i> L.	Herb	L	Th
9	Anacardiaceae	30	<i>Mangifera indica</i> L.	Tree	Mes	Th
		31	<i>Schinus terebinthifolius</i> Raddi.	Tree	N	Th
10	Apiaceae	32	<i>Torilis leptophylla</i> (L.) Rchb.f.	Herb	N	Th
		33	<i>Ammi visnaga</i> (L.) Lam.	Herb	N	Th
11	Apocynaceae	34	<i>Periploca aphylla</i> Dence.	Shrub	Ap	Np
		35	<i>Periploca calophylla</i> (Wight)	Herb	Mes	Th
12	Asclepiadaceae	36	<i>Calotropis procera</i> (Willd) R.Br.	Shrub	Mes	Ch
		37	<i>Caralluma tuberculata</i> N.E.Br.	Herb	N	G
13	Asteraceae	38	<i>Cirsium arvense</i> (L.) Scop.	Herb	Mic	Th
		39	<i>Conyza canadensis</i> (L.) Croquist.	Herb	Mic	Th
		40	<i>Chrysanthemum indicum</i> L.	Herb	N	H
		41	<i>Centaurea iberica</i> Trevir. & Spreng.	Herb	N	Th
		42	<i>Lactuca orientalis</i> (Boiss.) Boiss.	Herb	N	Th
		43	<i>Launaea procumbens</i> L.	Herb	Mes	Th
		44	<i>Parthenium hysterophorus</i> L.	Herb	Mes	Th
		45	<i>Sonchus asper</i> (L.) Hill	Herb	Mes	Th
		46	<i>Tragopogon gracilis</i> D.Done.	Herb	N	H
14	Boraginaceae	47	<i>Anchusa arvensis</i> L. M.Bieb.	Herb	Mic	Th
		48	<i>Cordia myxza</i> (Engl.)	Herb	Mic	Th
		49	<i>Heliotropium crispum</i> L.	Herb	N	Th
		50	<i>Heliotropium europium</i> L.	Herb	Mic	Th

		51	<i>Nonea edgworthii</i> L.	Herb	N	H
15	Brassicaceae	52	<i>Brassica campestris</i> L.	Herb	N	Th
		53	<i>Brassica juncea</i> (L.) Czern	Herb	N	Th
		54	<i>Brassica oleracea</i> L.	Herb	N	Th
		55	<i>Brassica rapa</i> L.	Shrub	L	Th
		56	<i>Cardaria halepensis</i> L.	Herb	N	Th
		57	<i>Coronopus didymus</i> (L.) Persl	Herb	N	Th
		58	<i>Eruca sativa</i> Mill.	Herb	Mic	NP
		59	<i>Malcolmia africana</i> (L.) R.Br.	Herb	N	Th
		60	<i>Malcolmia cubulica</i> L.	Herb	Mic	Th
		61	<i>Nasturtium officinale</i> R.Br	Herb	L	Np
		62	<i>Raphanus sativa</i> L.	Herb	L	Th
16	Canabaceae	63	<i>Canabis sativa</i> L.	Shrub	Mic	Th
17	Cactaceae	64	<i>Opuntia dillenii</i> L.	Shrub	Mes	Th
18	Chenopodiaceae	65	<i>Chenopodium ambrisiodes</i> L.	Herb	L	Th
		66	<i>Chenopodium album</i> L.	Herb	Mic	Th
		67	<i>Chenopodium foliosum</i> L.	Herb	N	Th
		68	<i>Chenopodium murale</i> L.	Herb	L	Th
		69	<i>Salsola imbricata</i> Forssk.	Herb	L	Th
		70	<i>Sueada fruticosa</i> L.	Shrub	N	Th
19	Caryophyllaceae	71	<i>Spergula arvensis</i> L.	Herb	Mic	Th
		72	<i>Silene conoidea</i> L.	Herb	Mic	Th
		73	<i>Stellaria media</i> (L.) Vill.	Herb	L	H
20	Combretaceae	74	<i>Conocarpus lancifolius</i> Engl.	Tree	N	G
21	Convolvulaceae	75	<i>Convolvulus arvensis</i> L.	Herb	L	Th
		76	<i>Convolvulus prostrates</i> Forssk	Herb	L	Th
		77	<i>Ipomoea carnea</i> Jace.	Herb	L	Th
22	Cucurbitaceae	78	<i>Citrullus colocynthis</i> (L.) Schard	Herb	Mic	Th
		79	<i>Cocurbita pepo</i> L.	Herb	Mg	Th
		80	<i>Luffa cylendrica</i> L.	Herb	Mg	Th
		81	<i>Silene arenosa</i> C.Koch	Herb	N	Th
23	Euphorbiaceae	82	<i>Euphorbia helioscopia</i> L.	Herb	L	Th

	aceae	83	<i>Euphorbia hirta</i> L.	Herb	L	Th
		84	<i>Euphorbia prostata</i> L.	Herb	L	Th
24	Fabaceae	85	<i>Alhagi maurorum</i> (Medik)	Herb	N	Mp
		86	<i>Dalbergia sisso</i> L.	Tree	Mic	Th
		87	<i>Leucaena leucocephala</i> (Lam.) de Wit	Tree	L	Mp
		88	<i>Melilotus indica</i> (L.) All.	Herb	L	Mp
		89	<i>Medicago polymorpha</i> L.	Herb	L	Th
		90	<i>Medicago sativa</i> L.	Shrub	N	H
		91	<i>Phaseolus vulgaris</i> L.	Herb	N	Th
		92	<i>Trifolium alexandrium</i> (L.)Dunal	Herb	N	Th
		93	<i>Trifolium repens</i> L.	Herb	N	Th
		94	<i>Trigonella incise</i> (Bth.) Ali.	Herb	L	Th
25	Lamiaceae	95	<i>Mentha longifolia</i> L.	Herb	N	G
		96	<i>Ocimum basilicum</i> L.	Herb	N	Th
		97	<i>Teucrium stocksianum</i> Boiss	Herb	Mic	Th
26	Malvaceae	98	<i>Abutilon indicum</i> (L.)Sweet	Herb	N	Ch
		99	<i>Malva neglecta</i> Wallr.	Herb	Mes	Th
27	Meliaceae	100	<i>Melia azedarach</i> L.	Tree	L	Mp
28	Mimosaceae	101	<i>Albezia labac</i> L.	Tree	Mic	Th
		102	<i>Acacia modesta</i> Wall	Tree	L	Mp
		103	<i>Acacia nilotica</i> (L.) Del	Tree	N	Th
		104	<i>Prosopis juliflora</i> (Sw.) DC.	Tree	Mic	Th
29	Moraceae	105	<i>Ficus carica</i> L.	Tree	Mes	Np
		106	<i>Ficus palmate</i> (Forsskal)	Tree	Mes	Np
		107	<i>Morus alba</i> L.	Tree	Mes	Mp
		108	<i>Morus nigra</i> L.	Tree	Mes	Mp
30	Myrtaceae	109	<i>Eucllyptus camaldulensis</i> L.	Tree	N	Mp
		110	<i>Eucllyptus maculate</i> L.	Tree	N	Mp
31	Nyctaginaceae	111	<i>Bougainvillea glabra</i> (Choisy)	Shrub	L	Th

32	Oleaceae	112	<i>Jasminium mesnii</i> L.	Shrub	Mic	Mp
		113	<i>Jasminum sambac</i> (L.) Aiton	Shrub	Mic	Mp
33	Papaveraceae	114	<i>Hypocum pendulum</i> L.	Herb	L	Th
34	Plantaginaceae	115	<i>Bacopa monnieri</i> L.	Herb	Mic	Th
		116	<i>Veronica arvensis</i> L.	Herb	Mic	Th
		117	<i>Veronica biloba</i> L.	Herb	Mic	Th
		118	<i>Plantago lanceolata</i> L.	Herb	Mes	Mp
35	Polygonaceae	119	<i>Persicaria glabra</i> (Willd.) M.Gómez	Herb	Mic	Th
36	Primulaceae	120	<i>Anagallis arvensis</i> L.	Herb	N	Th
37	Punicaceae	121	<i>Punica granatum</i> L.	Tree	Mic	Mp
38	Rhamnaceae	122	<i>Ziziphus mauritiana</i> (Lam).	Tree	N	Mp
		123	<i>Ziziphus nummlaria</i> L.	Shrub	N	MP
39	Rosaceae	124	<i>Pyrus communis</i> L.	Tree	L	Th
		125	<i>Rosa alba</i> L.	Shrub	N	Th
		126	<i>Rosa indica</i> L.	Shrub	N	Th
40	Rubiaceae	127	<i>Galium aparine</i> L.	Herb	L	Th
41	Ranunculaceae	128	<i>Rannunculus muricatus</i> L.	Herb	Mic	G
42	Salvadoraceae	129	<i>Salvadora oleoides</i> Decne.	Shrub	Mic	Mg
43	Solanaceae	130	<i>Datura metel</i> L.	Herb	Mes	Ch
		131	<i>Lycopersicum esculentum</i> L.	Herb	Mic	Th
		132	<i>Physalis divaricata</i> D. Don	Herb	N	Th
		133	<i>Solanum melongena</i> L.	Herb	Mic	H
		134	<i>Solanum nigrum</i> L.	Herb	Mic	Ch
		135	<i>Solanum suratense</i> L.	Herb	N	Th
		136	<i>Withania coagulans</i> (Stocks) Dunal	Shrub	Mic	Ch
137	<i>Withania sominifera</i> (L.) Dunal	Shrub	Mic	Ch		
44	Spindaceae	138	<i>Dodonea viscosa</i> (L.) Jacq.	Shrub	N	Np
45	Verbena	139	<i>Lantana camara</i> L.	Shrub	Mic	Mp

	ceae	140	<i>Phyla nodiflora</i> (L.) Greene	Herb	Mic	Ch
46	Vitaceae	141	<i>Vitis vinifera</i> L.	Tree	N	Th
47	Zygophyllaceae	142	<i>Fagonia indica</i> Hadidi	Herb	L	Th
		143	<i>Pegnum harmala</i> L.	Herb	L	H

Key:

Life form: Th= Therophytes, G= Geophytes, Ch= Chamaephytes,
H= Hemicryptophytes, N= Nanophanerophytes, Mp=
Microphanerophytes, Mg= Megaphanerophytes

Leaf size: N= Nanophyll, Mic= Microphyll, L= Leptophyll, Mes= Mesophyll
Mac= Macrophyll, Mg= Megaphyll, Ap= Aphyllous

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