

ROLE OF MULTIVARIATE APPROACHES IN FLORISTIC DIVERSITY OF MANOOR VALLEY (HIMALAYAN REGION), PAKISTAN

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Abstract. The main source of botanical information of a particular area is its floristic checklists. Floristic study of any given area helps to evaluate the plant wealth and its potential values. To assess floristic diversity of an unexplored remote valley (Manoor Valley), frequent field visits were arranged in different growing seasons during 2015 to 2018. The life form classes and leaf spectra of all plant species were determined and further classified according to the Raunkiaer classification. Plant species were identified and deposited to the Herbarium at Hazara University, Mansehra. The floristic diversity consisted of 354 plant species belonging to 93 families. Herbaceous was the most representative growth form, with 259 species, followed by shrubs with 52 species, trees with 42 species and parasitic plant with one species. Asteraceae was the leading family with 36 species, followed by Lamiaceae species. Furthermore, results indicated the dominance of Therophytic plants and Nanophyllous and Microphyllous leaves. July marked the peak of flowering period and September the peak of fruiting period. This study provided the first insight of the floristic inventory in relation to multivariate approaches in this unexplored area. This regional novel launched list may serve as a vital resource for all future endeavors in the field of phytosociological, pharmacological and conservational studies of natural resources.

Keywords: *floristic checklist, Asteraceae, principal components analysis, species response curve*

Introduction

Vegetation is an umbrella term that indicates plant life of a region (Rahman et al., 2018a) or, in other words, a group of plants growing together in a particular area and may be characterized by its component species (Malik, 1990). Flora is a priceless donation of nature upon which the mankind always relies (Khan et al., 2013). Flora

comprises the total plant species of any specific geographic region, which are characteristic of a geological period or in habit a particular ecosystem (Durrani et al., 2005). According to the report of Walter and Hamiston (1993), approximately 422,000 flowering plants have been reported globally (Rahman et al., 2016a). Pakistan is blessed with diverse flora due to variability in climate (Rahman et al., 2018b) and presents about 6000 flowering plant species (Rahman et al., 2016a).

The main source of botanical information of a particular area is its floristic checklists (Safidkon et al., 2003). Floristic study of any given area helps to evaluate the plant wealth and its potential values (Shaheen et al., 2016). Local plant species documentation is very necessary to introduce specific floral species of the local area, their occurrence and finding new species (Ali, 2008). Many workers have contributed comprehensive floristic checklists of local flora in different regions (Qureshi, and Bhatti, 2008; Jabeen et al., 2009; Shaheen et al., 2011).

In these studies of floristic checklist, besides evaluating the species richness, it is also necessary to observe the plant life form, leaf size and phenology over the year (Rahman et al., 2018a). Life form is the indicator of micro and macroclimate and it is characterized by plant adaptation to certain ecological conditions (Shimwell, 1971). As the plants arranged by the Raunkiaer (1934) in order to form classes on the basis of their life form, five major classes were formed (Hussain and Perveen, 2009) which includes: Phanerophytes, Hemicryptophytes, Cryptophytes, Chamaephytes, and Therophytes. Plants are also classified on the basis of leaf sizes and this has been exceptionally helpful for association mapping of vegetation. The leaf size knowledge helps in understanding physiological processes of plants (Oosting, 1956). For instance, biotic agencies are the chief causes for changing the biological spectrum in a given floristic zone (Amjad, 2012).

Phenology demonstrates the relationship of plant development to seasonal variations as well as photoperiod to program their developmental stages and natural exercises appropriated with the normal seasonal conditions (Manske, 2006). Essentially, timings and interim of the intermittent natural occasions (biological events) among stages of plant species give a foundation of gathering and synthesizing quantitative data of plant communities, which are directly linked with phenology (Singh and Singh, 1992). There is a synchronization of phenological behavior of the plant species and the various elements of the environmental conditions that plants are discussed, the organic tickers (biological clocks). These are habitually controlled by external environmental stimuli (Zhang et al., 2006, Vilela et al., 2017). Leaf growth, leaf fall, flowering and fruiting of species occur in specific seasons of the year and the phenology of life forms varies and is associated with day length/ temperature (Rahman et al., 2018a). As reported by Ahmed (2017), the blossoming and fruiting could be connected with the climatic conditions for posterity survival. Cornejo-Tenoria and Ibarra-Manriquez (2007) recorded blossoming and fruiting behavior on month-to-month premise. Bhat and Muralli (2001) depicted the climatic factors, for example, precipitation, water accessibility, change in day length and temperature additionally triggers the phenological occasions and because of temperature contrast, there is huge variety among species in various climatic zones.

In this way, the unexplored remote valley Manoor Valley, Pakistan, has great potential for flourishing a rich plant biodiversity due to the presence of diverse microhabitats and topographic features. Since biodiversity is greatly affected by different environmental factors (Khan, 2012) and is facing serious challenges due to

sizes classes following Raunkiaer (1934); Oosting (1956); Hussain (1989). Field notebook, pen, pencil, polythene bags, tags, trowel, scissors, camera, newspaper, plants presser and twig cutter were used during survey (Ijaz, 2014). The collected plants were properly dried and pressed by using newspaper for about 2-4 weeks at normal temperature. Then plants were treated or poisoned with chemical solution for preservation and mounted on standard herbarium sheets. Then data were shifted from field notebook on herbarium label of standard herbarium sheets. This herbarium label was pasted on right side of herbarium sheets (Ijaz, 2014; Ahmed, 2017). The size of herbarium sheet was standardized (11.5 x 16.5) (Ijaz, 2014). The specimens were identified by using the Flora of Pakistan (Nasir and Ali, 1971-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1995-2017) and the identified specimens were deposited in the Herbarium of Hazara University, Mansehra, Pakistan (HUP).

Multivariate approaches

Recorded plant species data was analyzed through various multivariate approaches by using different statistical packages. CANOCO 5 version was used (Rokaya et al., 2012) for multivariate ordination analyses like 'dominance curve' (DC), 'principal components analysis' (PCA) (Rokaya et al., 2012, 1992) and species response curve (SRC). PCA was determined to examine the correlation between 354 plant species and 4 growth form categories. PC-ORD 5 was used for correlation and regression coefficient (Rahman et al., 2018c). The correlation and regression coefficient evaluates the variables behavior on different axes. Chord Diagram was made through R software using package 'circlize' (Gu et al., 2014).

Results

Floristic diversity

Flora of the study area consisted of 354 plant species belonging to 93 families. In this total, the leading plant habit was herbaceous having 259 spp., followed by shrubs with 52 spp., trees with 42 spp., and parasitic plant with one species, respectively (Fig. 2). Asteraceae was the leading families with 36 species, followed by Lamiaceae with 24 species, Rosaceae with 22 species. For a complete inventory see *Appendix*.

Based on biological spectrum, the flora was dominated by Therophytes (116 spp.) followed by Hemicryptophytes (90 spp.), Nanophanerophytes (48 spp.) and Chamaephytes (29 spp.) (Fig. 3). On the basis of leaf spectra, the study area was dominated by Nanophyll and Microphyll with 105 spp. and 100 spp., respectively, followed by Mesophyll (64 spp.), Leptophyll (58 spp.), and Megaphyll (23 spp.) (Fig. 4). Further, four species (*Cuscuta reflexa*, *Ephedra girardiana*, *Equisetum arvense* and *Periploca aphylla*) were found as Aphyllous. For a complete inventory of biological spectrum and leaf size see *Appendix*.

The flowering data showed that July marked the peak of flowering season where 90 plant species had flowers, followed by June with 80 species. In May, flowering was observed in 68 species, followed by April with 42 species. The fruiting data showed that September was the peak fruiting season for 82 plant species, followed by August for 79 species.

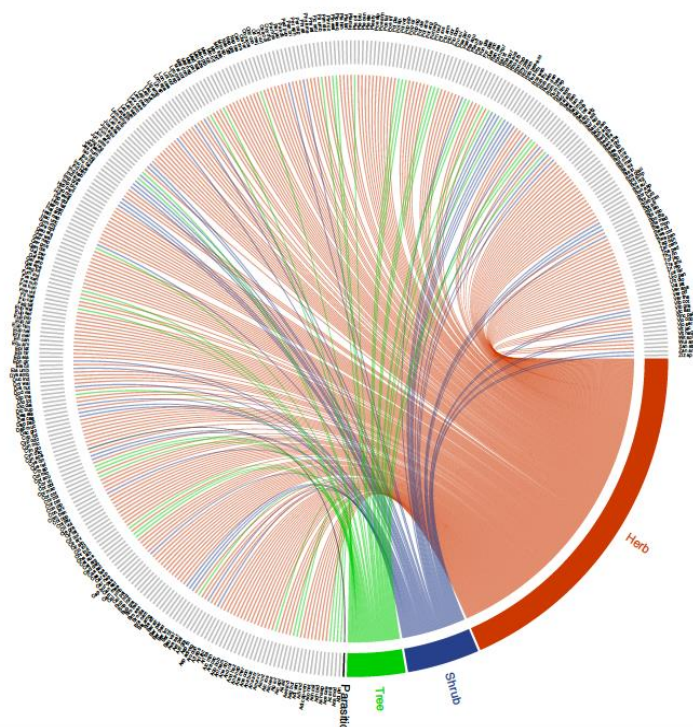


Figure 2. Distribution of the 354 species found in Manoor Valley, Pakistan, among the growth plant habit: herb (red), shrub (blue), tree (green) and parasitic plant (black). Herbs are represented by 259 species, shrubs by 52 species, trees by 42 species and parasitic plants by 1 species. The full name of species is in Appendix

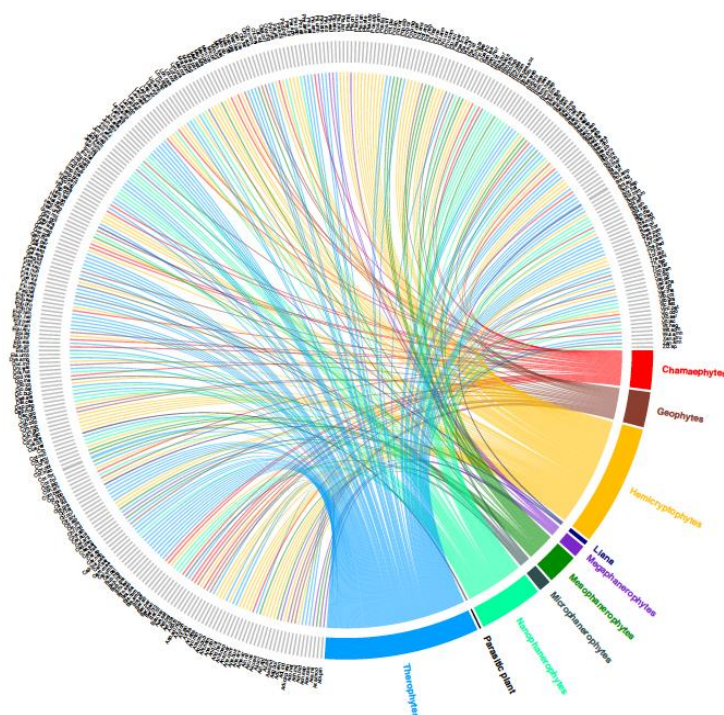


Figure 3. Distribution of the 354 species found in Manoor Valley, Pakistan, among the life form classes. The full name of species is in Appendix

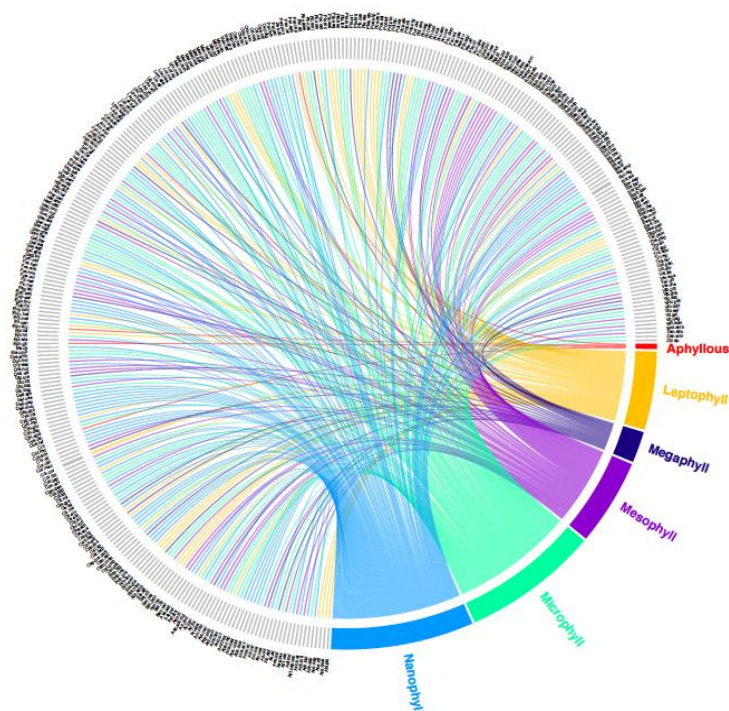


Figure 4. Distribution of the 354 species found in Manoor Valley, Pakistan, among the leaf size classes. The full name of species is in Appendix

Correlation and regression coefficient

The correlation and regression coefficient variables behaved differently on different axes. On axis 1, highly positive correlation (1.000) and highest positive tau value (0.957) was recorded for herbaceous plant habit, while on axis 2, positive correlation value was recorded (0.24) but negative tau value (-0.095) was logged for herbaceous growth form in comparison with all other growth forms (*Fig. 5A*). Moreover, on axis 1, highly negative correlation (-0.705) and highly negative tau value (-0.766) was recorded for shrubby plant habit, while on axis 2, highly positive correlation value (0.706) and highest positive tau value (0.766) was logged (*Fig. 5B*).

The correlation and regression results of tree growth form showed negative correlation (-0.586) and positive tau value (-0.464) on axis 1 and highly negative correlation value (-0.807) and highest negative tau value (-0.696) was logged on axis 2 (*Fig. 5C*). Further, the parasitic growth form on axis 1 showed minimum negative correlation (-0.74) and minimum negative tau value (-0.055) and similarly, minimum negative correlation value (-0.014) and minimum positive tau value (-0.089) was logged on axis 2 in comparison with all other growth forms (*Fig. 5D*). Axis 1 was dominated by herbaceous growth form, while axis 2 by shrubby plant habit (*Fig. 5A-D*).

Principle components analysis (PCA)

The PCA results revealed that 259 plant species were most frequently cited positively and significantly correlated with herbaceous growth form (*Fig. 6*). Fifty-two plant species indicates positive influence towards the direction of shrubby growth form. Tree growth habit was most frequently cited and positively correlated with 40 plant

species. *Cuscuta reflexa* was the only species assigned to parasitic growth form category (Fig. 6).

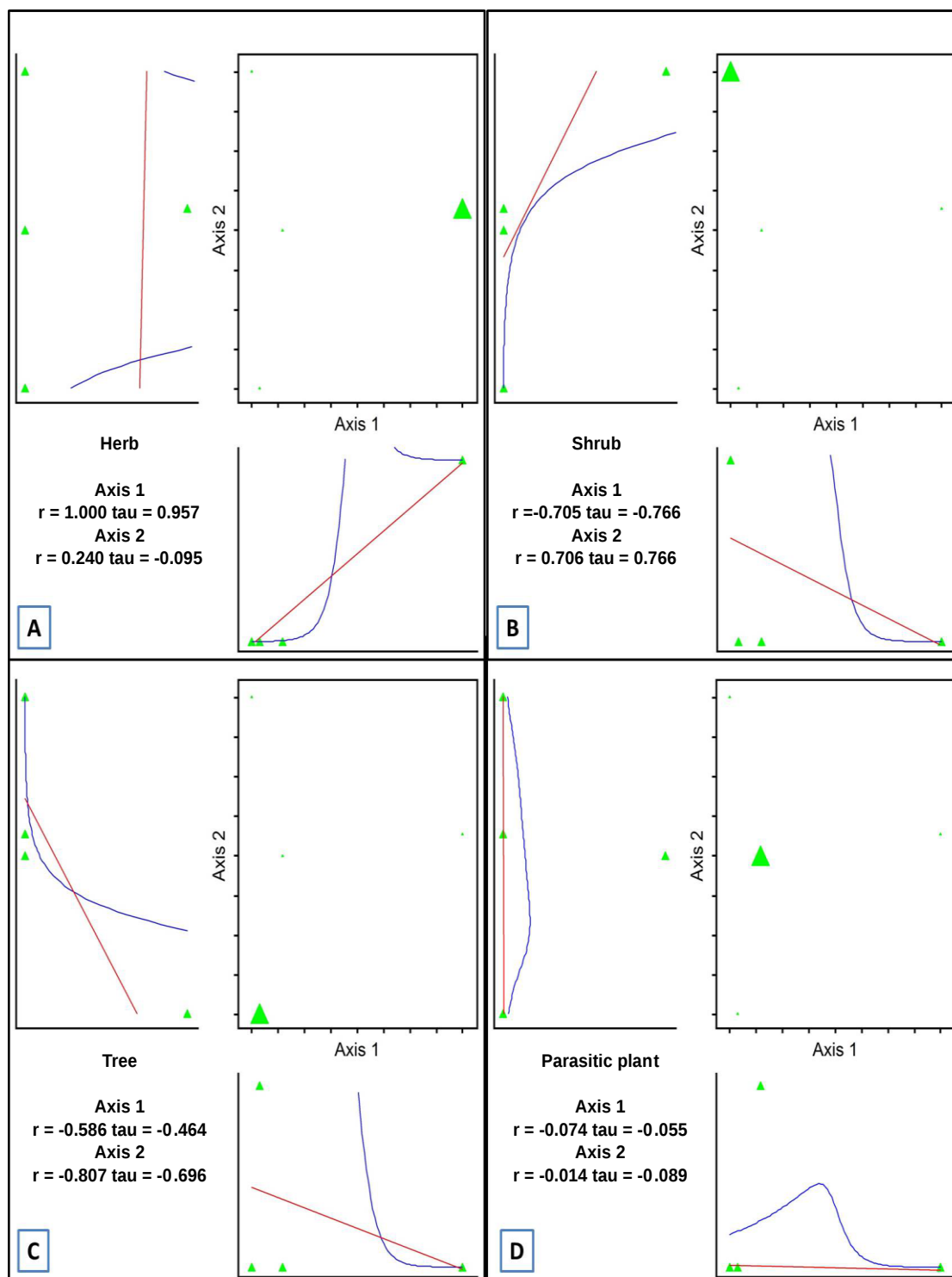


Figure 5. Correlation and regression coefficient of growth form on different axis: A) Herb, B) Shrub, C) Tree and D) Parasitic plant

Species response curve (SRC)

The analysis clearly indicates highly significant differences ($F = 451$, $p < 0.00001$; Fig. 7) for herb category in comparison with all other growth form categories due to maximum number of species (Fig. 7A). This growth form category also revealed highest response (99.3%). Nonetheless, shrub growth form also showed highly significance ($F = 415$, $p < 0.00001$) due to its number of species in comparison with tree and parasitic plant habit and presented a response percentage of 55.1%. Also tree growth form presented significant differences ($F = 142$, $p < 0.00001$) and response percentage (29.6%) in comparison with parasitic plant habit category. Parasitic plant showed non-significant differences ($F = 0.81$, $p = 0.63206$) and response percentage (0.2%) as given in the Table 1. Additionally, Figure 7B illustrates the flow of species cited within each growth form category from top to bottom as enlisted in Table 1.

Table 1. Summary of fitted generalized linear models four response variables

Response	Type	R ² [%]	F	p
Herb	linear	99.3	451	<0.00001
Shrub	linear	55.1	415	<0.00001
Tree	linear	29.6	142	<0.00001
Parasitic plant	linear	0.2	0.81	0.63347

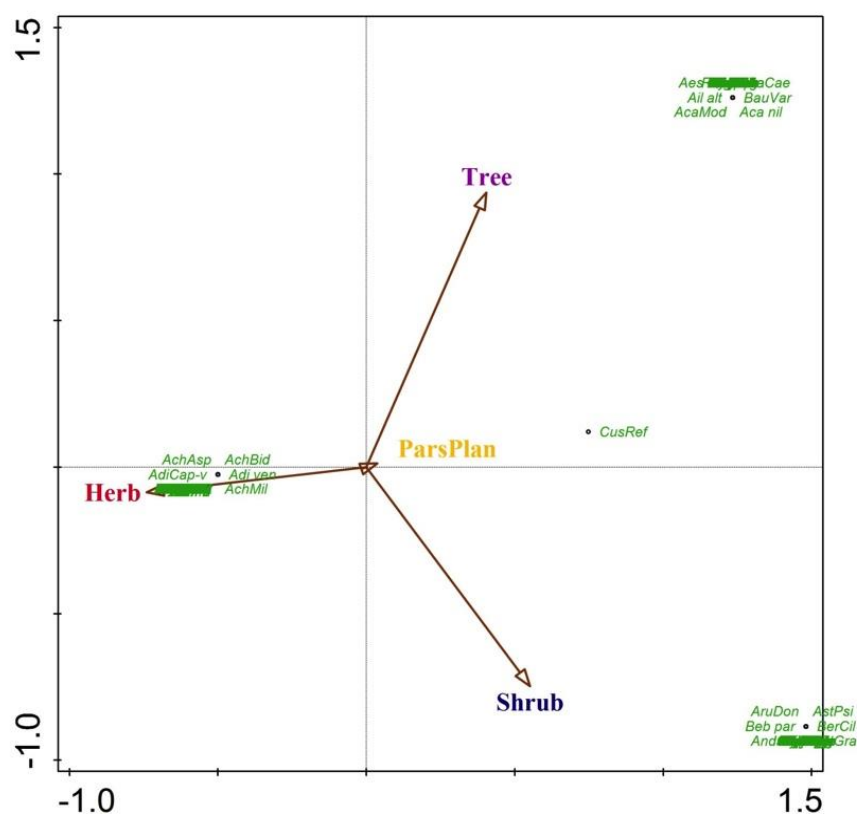


Figure 6. Principle component analysis indicating the association of plant species with their growth forms

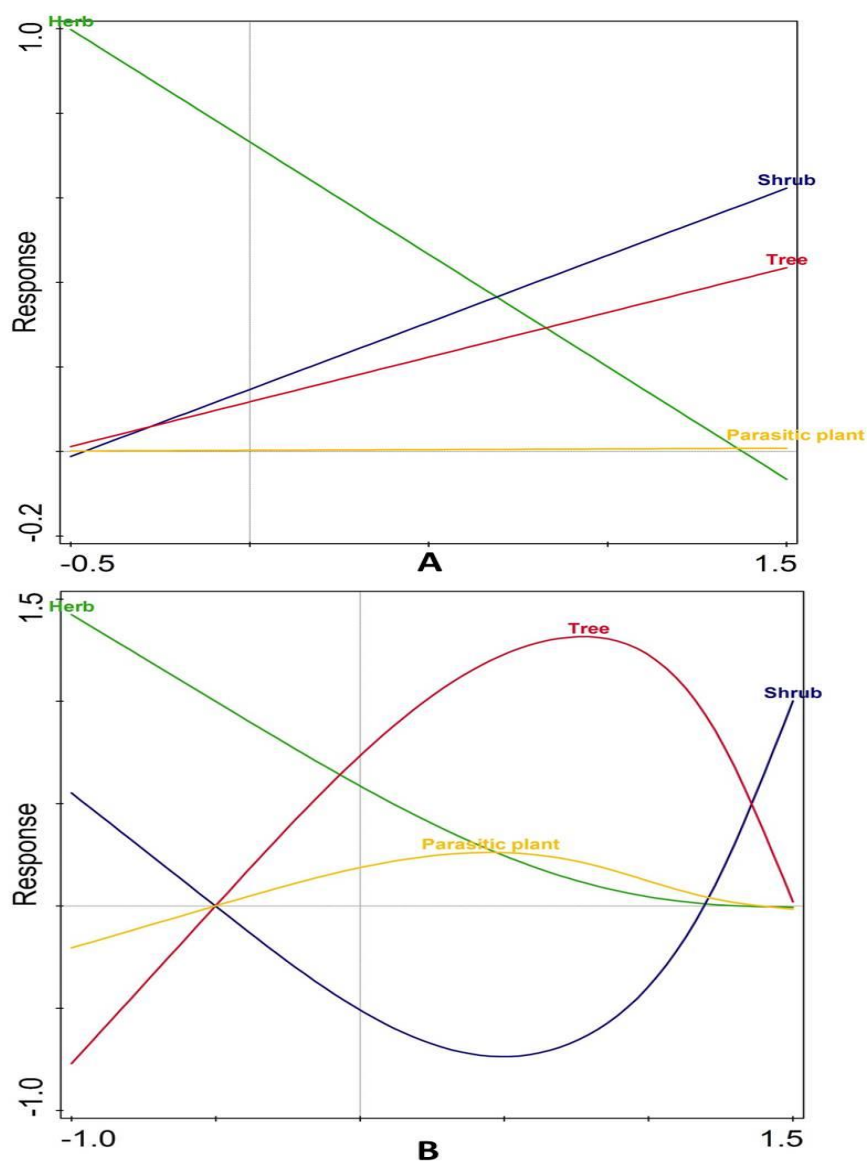


Figure 7. A) Growth form categories response curve illustrating the significance level and B) flow of species cited within each growth form category

Discussion

The results of this study showed that Manoor Valley, Pakistan, it is an area rich in plant species, presenting 354 species, being the herb habit most representative. Furthermore, it can be observed that the multivariate approaches showed significant differences, which supports the prediction and assertion that the herb habit is the principal plant habitat in this area.

Floristic structure is the main reflection of vegetation of any area (Rahman et al., 2018a). Plant species has its own ecological amplitude and interaction with its environment and also with other species (Giustiet al., 1995). The flora of Pakistan is diverse due to different ecological zones, diverse climatic and soil condition. In the present study, flora consisted of 354 species, where the dominating growth form was

herbaceous with 259 species. In Pakistan, many researchers from different areas also mentioned herbaceous growth form as the leading one from their study areas (Ijaz et al., 2015; Khan et al., 2015a; Ijaz et al., 2016), which shows a predominance of herbaceous growth form in Pakistan.

Asteraceae was the leading family with 36 species, followed by Lamiaceae with 24 species and Rosaceae with 22 species. Due to wide ecological amplitude, Asteraceae family are very diverse in habitat (Badshah et al., 2013). Khattak et al. (2015) found similar results in Karak, Pakistan and in addition Iqbal et al. (2015) also reported Asteraceae as the most predominant group in Malakand, Pakistan. On the other hand, Khan et al. (2015b) showed in a study made in Kabal (Swat), Pakistan, that Lamiaceae was the dominant family. Regardless of the family, Asteraceae and Lamiaceae appear to be the main plant families present in Pakistan's vegetation.

The flora of Manoor Valley was dominated by Therophytes, followed by Hemicryptophytes. Similarly, Badshah et al. (2013) observed Therophytes as the leading life form in Tank region, Pakistan. For various physiological processes of plants and plant communities leaf size plays a vital role (Oosting, 1956). On the basis of leaf spectra, Nanophyll and Microphyll were the most representatives. The species with Microphyllous leaves are rich due to ecological variation, which shows the percentage of different leaf form classes varied with rising altitudes and according to Cain and Castro (1959) Microphyllous species are the indication of steep slopes. Similar findings were observed by Saxena et al. (1987) who stated that the percentage of Microphyllous species was completely associated with the rising altitude.

Results showed that July had the flowering peak with 80 plant species, followed by June with 77 species (*Fig. 8*). These results are in agreement with those of Shrestha et al. (1998), where the authors noticed the blooming period from May to August in Kavrepalanchok, Nepal. As indicated by Marques et al. (2004), phenological period and atmosphere are associated with each other in terms of temperature, day length and precipitation or rainfall. Fruiting phase had peak in September and August (*Fig. 9*). Similar phenological scenario was reported by Morellato (1995) who reported that the blooming period begins toward the end of the dry season and at the starting of the wet season, thus fruiting takes place in dry season and that the next rainy period will offer appropriate conditions for seed germination (Morellato et al., 1989).

Conclusion

The present study indicated that the study area has rich plant biodiversity. Flora of Manoor Valley area consisted of 354 plant species, where the leading plant habit was herbaceous with 249 species and family was Asteraceae with 36 species. We can use these inventory lists as a vital resource for all future endeavors in the field of phytosociological, phytochemical, pharmacological and conservational studies of natural resources. Regarding the multivariate approaches, we can observe that these analyses are extremely useful to show us significant differences in certain floristic survey studies, providing support and veracity in the discussions and conclusions found. Studies like this present are necessary to evaluate the plant richness and its potential value.

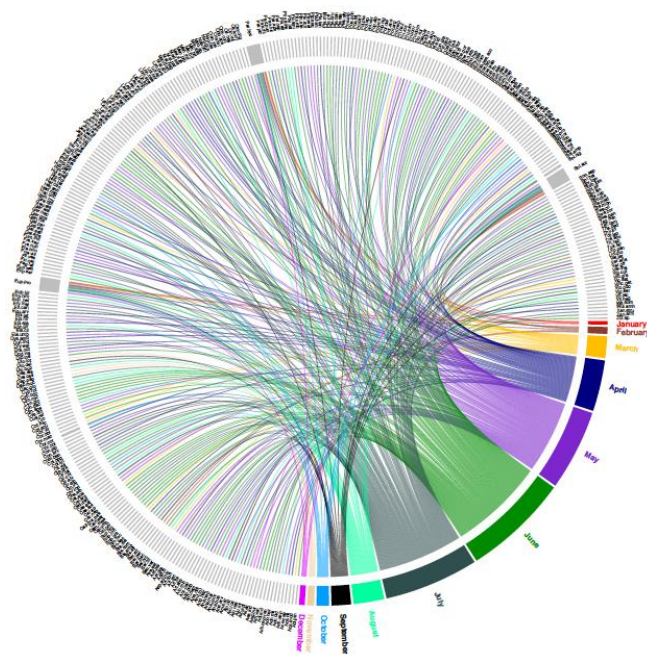


Figure 8. Distribution of the 354 species found in Manoor Valley, Pakistan, according to flowering period. The full name of species is in Appendix

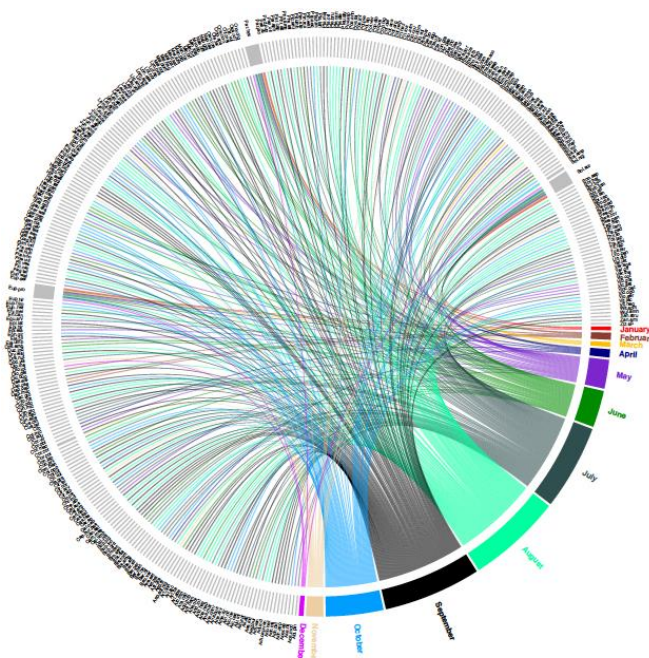


Figure 9. Distribution of the 354 species found in Manoor Valley, Pakistan, according to fruiting period. The full name of species is in Appendix

Author's Contributions. IUR conducted the fieldwork, collected data and plant species, and designed the map, FI helped in the herbarium work. IUR drafted the manuscript and ESC helped in analysis of the data, NA helped in organizing the data. AA and ZI supervised the work. EFA, AA and ZI critically reviewed the manuscript. IUR, ESC, EFA and NA revised the manuscript, AAA, MSA, RK, MS and MI helped in revision. All the authors have read and approved the final manuscript.

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APPENDIX

Floristic composition, biological and leaf spectra, and phenological behaviour of the plant species of Manoor Valley, Pakistan

S. No	Family name/ Scientific name	Habit	Biological spectrum		Phenology	
			Life form	Leaf size	Flowering	Fruiting
	Acanthaceae					
1	<i>Dicliptera bupleuroides</i> Nees	H	Th	N	Sept	Feb
2	<i>Justicia adhatoda</i> L.	S	NanP	Me	March	May
	Adiantaceae					
3	<i>Adiantum capillus-veneris</i> L.	H	G	N	July	Sept
4	<i>Adiantum indicum</i> J. Ghatak	H	G	Me	July	Aug
5	<i>Adiantum venustum</i> D. Don	H	G	N	June	Aug
6	<i>Asplenium adiantum-nigrum</i> L.	H	HemC	N	July	Sept
	Adoxaceae					
7	<i>Viburnum cotinifolium</i> D. Don	S	NanP	Ma	March	May
8	<i>Viburnum grandiflorum</i> Wall. ex DC.	S	NanP	Ma	March	May
	Amaranthaceae					
9	<i>Achyranthes aspera</i> L.	H	Th	N	May	July
10	<i>Achyranthes bidentata</i> Blume	H	Th	Mi	Aug	Sept
11	<i>Amaranthus viridis</i> L.	H	Th	Mi	Aug	Sept
12	<i>Celosia argentea</i> L.	H	Th	N	Aug	Sept
	Apiaceae					
13	<i>Aegopodium burtii</i> Nasir	H	HemC	Mi	June	July
14	<i>Anthriscus nemorosa</i> (M.Bieb.) Spreng.	H	Th	Mi	April	Aug
15	<i>Bupleurum nigrescens</i> E. Nasir	H	Th	N	June	Sept
16	<i>Bupleurum gracillimum</i> Klotzsch	H	Th	N	June	Sept
17	<i>Bupleurum longicaule</i> Wall. ex DC.	H	Th	N	June	Sept
18	<i>Foeniculum vulgare</i> Mill.	H	Th	N	July	Sept
19	<i>Heracleum candicans</i> Wall. ex DC.	H	HemC	L	April	June
20	<i>Pimpinella stewartii</i> (Dunn) Nasir	H	Th	N	July	Sept
21	<i>Pleurospermum brunonis</i> Benth. ex C.B.Clarke	H	HemC	L	June	Aug

22	<i>Pleurospermum candollei</i> Benth. ex C.B. Clarke	H	HemC	L	July	Aug
23	<i>Pleurospermum stellatum</i> (D. Don) Benth. ex C.B. Clarke	H	HemC	L	July	Aug
24	<i>Pleurospermum stylosum</i> C.B. Clarke	H	HemC	L	July	Aug
25	<i>Sanicula elata</i> Buch.-Ham. ex D. Don	H	Th	Mi	May	July
26	<i>Seseli libanotis</i> (L.) W.D.J. Koch .	H	HemC	N	April	Aug
27	<i>Torilis japonica</i> (Houtt.) DC.	H	Th	Mi	June	July
28	<i>Trachyspermum amii</i> (L.) Sprague	H	Th	L	May	July
Araceae						
29	<i>Arisaema flavum</i> (Forsk.) Schott	H	G	Ma	June	Sept
30	<i>Arisaema jacquemontii</i> Blume	H	G	Me	June	July
31	<i>Sauromatum venosum</i> (Dryand. ex Aiton) Kunth	H	G	Me	May	Aug
Araliaceae						
32	<i>Aralia cachemirica</i> Decne.	H	HemC	Me	May	June
33	<i>Hedera nepalensis</i> K. Koch	H	L	Me	Oct	April
Asclepiadaceae						
34	<i>Periploca aphylla</i> Decne.	S	NanP	Aph	May	July
35	<i>Vincetoxicum petrense</i> (Hemsl. & Lace) Rech. f.	H	Ch	Ma	June	July
Asparagaceae						
36	<i>Asparagus fiicinus</i> Buch.-Ham. ex D. Don	H	G	Mi	May	June
Asteraceae						
37	<i>Achillea millefolium</i> L.	H	Th	N	May	Sept
38	<i>Ainsliaea aptera</i> DC.	H	HemC	Ma	Dec	June
39	<i>Anaphalis margaritacea</i> (L.) Benth.	H	HemC	N	Aug	Sept
40	<i>Anaphalis busua</i> (Buch.-Ham.) DC.	H	HemC	N	Sept	Oct
41	<i>Anaphalis contorta</i> (D. Don) Hook. f.	H	HemC	N	Sept	Oct
42	<i>Anaphalis nepalensis</i> (Spreng.) Hand.-Mazz.	H	HemC	N	May	Sept
43	<i>Arctium minus</i> (Hill) Benh.	H	HemC	Me	June	Aug
44	<i>Artemisia absinthium</i> L.	H	Th	N	July	Aug
45	<i>Carpesium nepalense</i> Less.	H	Th	N	June	Sept
46	<i>Chrysanthemum indicum</i> L.	H	HemC	Mi	Oct	Nov
47	<i>Cichorium intybus</i> L.	H	Th	N	July	Aug
48	<i>Cirsium arvense</i> (L.) Scop.	H	Th	N	Aug	Oct
49	<i>Cirsium falconeri</i> (Hook. f.) Petr.	H	Th	N	July	Aug
50	<i>Conyza japonica</i> (Thunb.) Less. ex Less.	H	Th	Mi	July	Aug
51	<i>Cyanthillium cinereum</i> (L.) H. Rob.	H	HemC	Mi	June	July
52	<i>Erigeron canadensis</i> L.	H	Th	L	July	Aug
53	<i>Galinosoga parviflora</i> Cav.	H	Th	Mi	July	Sept
54	<i>Gerbera gossypina</i> (Royle) Beauverd	H	HemC	Mi	April	June
55	<i>Helianthus annuus</i> L.	H	Th	Ma	May	June
56	<i>Inula cuspidata</i> (Wall. ex DC.) C.B. Clarke	H	Th	Mi	June	Sept

57	<i>Inula falconeri</i> Hook.f.	H	Th	Me	June	Oct
58	<i>Lactuca tatarica</i> (L.) C.A.Mey	H	Th	Mi	May	July
59	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	H	Ch	Mi	March	May
60	<i>Leucanthemum vulgare</i> Lam.	H	HemC	L	June	Sept
61	<i>Ligularia amplexicaulis</i> DC.	H	HemC	Ma	May	Aug
62	<i>Onopordum acanthium</i> L.	H	G	Me	April	June
63	<i>Parthenium hysterophorus</i> L.	H	HemC	N	All the year	All the year
64	<i>Saussurea</i> sp.	H	HemC	Me	March	May
65	<i>Senecio analogus</i> DC.	H	Th	Mi	Aug	Sept
66	<i>Senecio chrysanthemoides</i> DC.	H	Th	Me	Oct	Nov
67	<i>Silybum marianum</i> (L.) Gaertn.	H	Ch	Me	March	June
68	<i>Sonchus asper</i> (L.) Hill	H	Th	Mi	July	Aug
69	<i>Tagetes minuta</i> L.	H	Th	Mi	Sept	Oct
70	<i>Taraxacum campylodes</i> G.E.Haglund	H	HemC	Mi	May	Aug
71	<i>Tussilago farfara</i> L.	H	Th	Me	Feb	May
72	<i>Xanthium strumarium</i> L.	H	Th	Me	July	Sept
Balsaminaceae						
73	<i>Impatiens bicolor</i> Royle.	H	Th	Me	July	Sept
74	<i>Impatiens brachycentra</i> Kar. & Kir.	H	Th	Mi	July	Sept
Berberidaceae						
75	<i>Berberis lycium</i> Royle	S	NanP	L	June	July
76	<i>Berberis pachyacantha</i> Bien. ex Koehne	S	NanP	L	Feb	July
77	<i>Berberis parkeriana</i> C.K.Schneid.	S	NanP	L	Feb	July
78	<i>Epimedium elatum</i> C.Morren & Decne.	H	Th	Me	April	May
Betulaceae						
79	<i>Alnus nitida</i> (Spach) Endl.	T	MesP	Me	July	Sept
80	<i>Corylus colurna</i> L.	T	MesP	Me	April	June
Boraginaceae						
81	<i>Cynoglossum apenninum</i> L.	H	HemC	N	June	Aug
82	<i>Cynoglossum glochidiatum</i> Wall. ex Benth.	H	HemC	N	June	Aug
83	<i>Cynoglossum microglochin</i> Benth.	H	HemC	N	June	Aug
84	<i>Hackelia uncinata</i> (Benth.) C.E.C.Fisch.	H	G	Mi	June	Aug
85	<i>Lindelofia</i> sp.	H	Th	N	June	Aug
86	<i>Myosotis</i> sp.	H	HemC	Mi	May	July
87	<i>Pseudomertensia parviflorum</i> (Decne.) Riedl	H	HemC	N	May	July
88	<i>Pseudomertensia trollii</i> Stewart & Kazmi	H	HemC	N	May	Aug
Brassicaceae						
89	<i>Brassica campestris</i> Dunn.	H	Th	Ma	June	July
90	<i>Capsella bursa-pastoris</i> (L.) Medik.	H	Th	N	June	Aug
91	<i>Erysimum melicentae</i> Dunn.	H	Th	Mi	July	Sept
92	<i>Sisymbrium irio</i> L.	H	Th	N	April	June
93	<i>Nasturtium officinale</i> R.Br.	H	G	Mi	May	July

	Buxaceae					
94	<i>Sarcococca saligna</i> Mull.Arg.	S	NanP	Mi	Dec	March
	Caesalpiniaceae					
95	<i>Bauhinia variegata</i> L.	T	MicP	Me	March	April
	Cannabaceae					
96	<i>Cannabis sativa</i> L.	H	Th	Mi	July	Sept
97	<i>Celtis australis</i> L.	T	MesP	Ma	May	Aug
	Caprifoliaceae					
98	<i>Lonicera caerulea</i> L.	S	NanP	Mi	March	May
99	<i>Valeriana jatamansi</i> Jones	H	G	Me	May	July
	Caryophyllaceae					
100	<i>Minuartia biflora</i> L.	H	HemC	L	Aug	Sept
101	<i>Minuartia kashmirica</i> (Edgew.) Mattf.	H	Ch	L	July	Sept
102	<i>Silene conoidea</i> L.	H	Th	N	April	May
103	<i>Silene vulgaris</i> (Moench) Garcke	H	Th	N	July	Sept
104	<i>Stellaria media</i> (L.) Vill.	H	Th	N	Oct	Nov
105	<i>Stellaria monosperma</i> Buch.-Ham. ex D. Don	H	Th	Mi	Sept	Oct
	Celastraceae					
106	<i>Gymnosporia royleana</i> Wall. ex M.A.Lawson	S	NanP	Mi	March	May
	Chenopodiaceae					
107	<i>Chenopodium album</i> L.	H	HemC	N	June	Sept
108	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	H	Th	Mi	May	June
	Clusiaceae					
109	<i>Hypericum perforatum</i> L.	H	Ch	N	July	Sept
	Colchicaceae					
110	<i>Colchicum luteum</i> Baker	H	G	N	July	Sept
	Commelinaceae					
111	<i>Commelina benghalensis</i> L.	H	Ch	N	Sept	Oct
	Convallariaceae					
112	<i>Polygonatum verticillatum</i> (L.) Allioni	H	Th	N	June	Aug
113	<i>Polygonatum</i> sp.	H	Th	Mi	May	July
	Convolvulaceae					
114	<i>Convolvulus arvensis</i> L.	H	HemC	N	May	July
115	<i>Ipomoea nil</i> (L.) Roth	H	Th	Mi	May	July
	Cornaceae					
116	<i>Cornus macrophylla</i> Wall.	T	MesP	Ma	March	May
117	<i>Cornus oblonga</i> Wall.	T	MesP	Me	June	Sept
	Crassulaceae					
118	<i>Sedum album</i> L.	H	Ch	N	July	Oct
119	<i>Hylotelephium ewersii</i> Ledeb.	H	Ch	Mi	Oct	Nov
120	<i>Sedum fischeri</i> Raym.-Hamet	H	Th	L	July	Sept
	Cucurbitaceae					
121	<i>Luffa</i> sp.	H	Th	Mi	June	July
122	<i>Solena amplexicaulis</i> (Lam.) Gandhi	H	Th	Mi	Aug	Oct

	Cupressaceae					
123	<i>Juniperus communis</i> L.	S	NanP	L	June	July
124	<i>Juniperus squamata</i> Buch.-Ham. ex D.Don	S	NanP	L	June	Sept
125	<i>Juniperus excelsa</i> M.Bieb.	T	NanP	L	June	Oct
	Cuscutaceae					
126	<i>Cuscuta reflexa</i> Roxb.	Pp	Pp	Aph	Aug	Sept
	Cyperaceae					
127	<i>Carex</i> sp.	H	G	N	March	May
128	<i>Cyperus rotundus</i> L.	H	G	N	Aug	Oct
129	<i>Cyperus odoratus</i> L.	H	G	N	Aug	Sept
	Dioscoreaceae					
130	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	H	HemC	Mi	Nov	Dec
	Dipsacaceae					
131	<i>Dipsacus inermis</i> Wall. in Roxb.	H	Ch	Me	May	July
	Dryopteridaceae					
132	<i>Dryopteris wallichiana</i> (Spreng.) Hyl.	H	G	Me	July	Aug
	Dennstaedtiaceae					
133	<i>Pteridium aquilinum</i> (L.) Kuhn	H	G	Ma	Aug	Nov
	Ebenaceae					
134	<i>Diospyros lotus</i> L.	T	MicP	Ma	June	Nov
	Eleagnaceae					
135	<i>Elaeagnus umbellata</i> Thunb.	S	NanP	Mi	April	May
	Ephedraceae					
136	<i>Ephedra girardiana</i> Wall. ex. Stapf	S	Ch	Aph	Aug	Oct
	Equisetaceae					
137	<i>Equisetum arvense</i> L.	H	G	Aph	April	May
	Ericaceae					
138	<i>Cassiope fastigiata</i> (Wall.) D.Don	H	Th	L	May	July
139	<i>Lyonia ovalifolia</i> (Wall.) Drude	S	NanP	Mi	May	Oct
140	<i>Rhododendron arboreum</i> Sm.	T	MicP	Me	April	May
	<i>Rhododendron hypenanthum</i> Balf. f.	S	NanP	Me	April	May
141	Euphorbiaceae					
142	<i>Euphorbia helioscopia</i> L.	H	Th	N	May	June
143	<i>Euphorbia prostrata</i> Ait.	H	Ch	N	All the year	All the year
144	<i>Euphorbia hirta</i> L.	H	Th	N	Aug	Oct
145	<i>Euphorbia serpens</i> Kunth	H	HemC	N	June	July
146	<i>Euphorbia wallichii</i> Hook. f.	H	Th	N	Aug	Oct
147	<i>Ricinus communis</i> L.	S	NanP	Me	June	Oct
	Fagaceae					
148	<i>Castanea sativa</i> Mill.	T	MesP	Ma	May	July
149	<i>Quercus incana</i> Bartram	T	MesP	Mi	May	July
	Fumaricaceae					
150	<i>Fumaria indica</i> (Hausskn) Pugsley	H	Th	N	April	June
	Gentianaceae					
151	<i>Gentianodes clarkei</i> (Kusn.) Omer	H	Th	N	Aug	Oct

152	<i>Lomatogonium spathulatum</i> (A. Kern.) Fernald	H	Th	N	April	May
153	<i>Swertia paniculata</i> Wall.	H	Th	L	July	Aug
154	<i>Swertia ciliata</i> (D. Don ex G. Don) B.L. Burt	H	Th	L	July	Aug
155	<i>Swertia cordata</i> (Wall. ex G. Don) C.B. Clarke	H	Th	L	July	Aug
Geraniaceae						
156	<i>Geranium nepalense</i> Sweet.	H	Ch	Mi	July	Oct
157	<i>Geranium wallichianum</i> D.Don ex Sweet	H	Ch	Mi	July	Oct
Hamamelidaceae						
158	<i>Parrotiopsis jacquemontiana</i> (Decne.) Rehder	S	NanP	Mi	June	Aug
Hippocastanaceae						
159	<i>Aesculus indica</i> (Wall. ex Camb.) Hook.	T	MegP	Me	July	Aug
160	<i>Hippolytia dolichophylla</i> (Kitam.) K.Bremer & Humphries	H	HemC	Me	May	Oct
Juglandaceae						
161	<i>Juglans regia</i> L.	T	MegP	Ma	July	Aug
Juncaceae						
162	<i>Juncus</i> sp.	H	G	N	Sept	Nov
Lamiaceae						
163	<i>Ajuga integrifolia</i> Buch.-Ham.	H	HemC	Mi	May	July
164	<i>Calamintha umbrosa</i> (M.Bieb.) Rchb.Benth.) Hedge	H	Th	N	July	Sept
165	<i>Clinopodium vulgare</i> L.	H	HemC	Mi	April	June
166	<i>Colebrookea oppositifolia</i> Sm.	S	NanP	L	July	Oct
167	<i>Dracocephalum nutans</i> L.	H	Th	N	July	Sept
168	<i>Elsholtzia ciliata</i> (Thunb.) Hyl.	H	Th	N	July	Sept
169	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	S	NanP	Mi	May	Oct
170	<i>Lamium album</i> L.	H	Th	Mi	July	Oct
171	<i>Lamium amplexicaule</i> L.	H	Th	Mi	July	Oct
172	<i>Mentha piperita</i> L.	H	HemC	N	June	Sept
173	<i>Mentha royleana</i> Wall. ex Benth.	H	HemC	Mi	June	Oct
174	<i>Micromeria biflora</i> (Ham.) Bth.	H	Ch	L	April	June
175	<i>Nepeta graciliflora</i> Benth.	H	Th	Mi	July	Sept
176	<i>Nepeta laevigata</i> (D. Don) Hand.- Mazz	H	Th	Mi	July	Sept
177	<i>Origanum majorana</i> L.	H	Th	N	June	Aug
178	<i>Origanum vulgare</i> L.	H	Th	N	July	Aug
179	<i>Prunella vulgaris</i> L.	H	HemC	N	Sept	Nov
180	<i>Rydingia limbata</i> (Benth.) Scheen & V.A. Albert	S	NanP	L	July	Aug
181	<i>Salvia lanata</i> Roxb.	H	Ch	Mi	April	July
182	<i>Salvia moorcroftiana</i> Wall. ex. Benth.	S	Th	Me	March	June
183	<i>Salvia nubicola</i> Wall. ex Sweet	H	Th	Me	June	Aug
184	<i>Thymus linearis</i> Benth.	H	HemC	N	July	Sept

	Liliaceae					
185	<i>Gagea lutea</i> (L.) Ker Gawl.	H	G	N	Mar	May
	Linaceae					
186	<i>Reinwardtia trigyna</i> Planch.	H	Ch	L	June	July
	Lythraceae					
187	<i>Punica granatum</i> L.	S	NanP	Mi	May	July
	Malvaceae					
188	<i>Alcea rosea</i> L.	H	HemC	Ma	April	July
189	<i>Grewia optiva</i> J.R.Drumm. ex Burret	T	MesP	N	April	June
190	<i>Lavatera cachemiriana</i> Camb. in Jacq.	H	HemC	Me	May	July
191	<i>Malva parviflora</i> L.	H	HemC	Mi	April	June
192	<i>Malva neglecta</i> Wallr.	H	HemC	Mi	May	July
193	<i>Malvastrum coromandelianum</i> (L.) Garcke	H	HemC	N	April	Oct
194	<i>Sida cordata</i> (Burm.f.) Borss.Waalk.	H	HemC	N	May	Sept
	Meliaceae					
195	<i>Melia azedarach</i> L.	T	MesP	Me	April	July
	Mimosaceae					
196	<i>Acacia modesta</i> Wall.	T	MicP	L	March	May
197	<i>Acacia nilotica</i> (L.) Delile	T	MesP	L	April	Oct
	Moraceae					
198	<i>Ficus carica</i> L.	T	MicP	Me	May	Aug
	Oleaceae					
199	<i>Fraxinus hookeri</i> Wenz.	T	MicP	Me	April	Oct
200	<i>Fraxinus xanthoxyloides</i> (G. Don) DC	T	MicP	Me	May	Sept
201	<i>Jasminum humile</i> L.	S	NanP	N	June	Aug
202	<i>Jasminum sambac</i> (L.) Aiton	S	NanP	N	June	Aug
203	<i>Olea ferruginea</i> Wall. ex Aitch.	T	MesP	Mi	April	June
	Onagraceae					
204	<i>Circaea cordata</i> Royle.	H	Th	Me	June	Sept
205	<i>Circaea alpina</i> L.	H	Th	Mi	June	Sept
206	<i>Epilobium hirsutum</i> L.	H	Ch	Mi	May	July
207	<i>Epilobium latifolium</i> L.	H	HemC	L	July	Sept
208	<i>Oenothera rosea</i> L. Her ex Aiton	H	Th	N	June	Aug
	Orchidaceae					
209	<i>Spiranthes sinensis</i> (Pers.) Ames	H	G	N	June	Sept
	Orobanchaceae					
210	<i>Euphrasia himalayica</i> Wetts.	H	Th	L	July	Oct
211	<i>Pedicularis punctata</i> Decne.	H	HemC	N	July	Aug
	Oxalidaceae					
212	<i>Oxalis corniculata</i> L.	H	HemC	N	May	Sept
	Papaveraceae					
213	<i>Corydalis cornuta</i> Royle	H	Th	L	Oct	Nov
214	<i>Corydalis carinata</i> Lidén & Z.Y.Su	H	Th	L	July	Sept
215	<i>Corydalis virginea</i> Lidén & Z.Y.Su	H	HemC	N	March	April
	Papilionaceae					
216	<i>Astragalus grahamianus</i> Benth.	S	Ch	L	Sept	Nov

217	<i>Astragalus psilocentros</i> Fisch.	H	Ch	N	May	Aug
218	<i>Campylotropis meeboldii</i> (Schindl.) Schindl.	S	NanP	L	June	Aug
219	<i>Crotalaria</i> sp.	H	Th	N	May	July
220	<i>Desmodium elegans</i> DC.	S	NanP	Me	July	Aug
221	<i>Indigofera heterantha</i> Brandis	S	NanP	L	July	Oct
222	<i>Indigofera australis</i> Willd.	S	NanP	N	May	Aug
223	<i>Indigofera hebeptala</i> Baker	S	NanP	N	May	Aug
224	<i>Lathyrus aphaca</i> L.	H	Th	N	April	June
225	<i>Lathyrus sativa</i> L.	H	Th	N	July	Sept
226	<i>Lathyrus odoratus</i> L.	H	Th	L	July	Sept
227	<i>Lotus corniculatus</i> L.	H	HemC	Mi	Aug	Sept
228	<i>Medicago sativa</i> L.	H	HemC	N	June	Sept
229	<i>Rhynchosia pseudo-cajan</i> Cambess.	S	NanP	Me	May	July
230	<i>Robinia pseudo-acacia</i> L.	T	MesP	Me	April	May
231	<i>Trifolium repens</i> L.	H	G	N	June	July
232	<i>Vicia sativa</i> L.	H	HemC	N	April	May
Phyllanthaceae						
233	<i>Leptopus chinensis</i> (Bunge) Pojark. [Syn. <i>Andrachne cordifolia</i> (Decne.) Mull.Avg.]	S	NanP	Me	May	July
Phytolaccaceae						
234	<i>Phytolacca americana</i> L.	H	Th	Mi	Aug	Sept
235	<i>Phytolacca latbenia</i> (Moq.) H. Walter	H	Ch	Ma	June	Aug
Pinaceae						
236	<i>Abies pindrow</i> (Royle ex D.Don) Royle	T	MegP	L	June	July
237	<i>Cedrus deodara</i> (Roxb. ex Lamb.) G. Don	T	MegP	L	Sept	Oct
238	<i>Picea smithiana</i> (Wall.) Boiss.	T	MegP	L	May	July
239	<i>Pinus roxburghii</i> Sarg	T	MegP	L	May	July
240	<i>Pinus wallichiana</i> A.B.Jacks.	T	MegP	L	May	July
Plantaginaceae						
241	<i>Plantago himalaica</i> Pilger.	H	HemC	Mi	July	Aug
242	<i>Plantago lanceolata</i> L.	H	HemC	Mi	April	July
243	<i>Plantago major</i> L.	H	HemC	Mi	July	Sept
244	<i>Veronica anagallis</i> L.	H	HemC	Mi	June	July
245	<i>Wulfeniopsis amherstiana</i> (Benth.) D.Y. Hong [Syn. <i>Wulfenia amherstiana</i> Benth.]	H	Th	N	April	July
Platanaceae						
246	<i>Platanus orientalis</i> L.	T	MegP	Ma	June	July
Poaceae						
247	<i>Arundo donax</i> L.	S	Ch	Mi	July	Sept
248	<i>Avena sativa</i> L.	H	Th	N	May	July
249	<i>Bromus diandrus</i> Roth.	H	Th	L	April	July
250	<i>Bromus secalinus</i> L.	H	Th	L	March	June
251	<i>Bromus tectorum</i> L.	H	Th	L	June	Sept
252	<i>Cynodon dactylon</i> (L.) Pers.	H	HemC	L	June	Sept

253	<i>Dactylis glomerata</i> L.	H	HemC	N	July	Sept
254	<i>Paspalum dilatatum</i> Poir.	H	HemC	N	April	Sept
255	<i>Pennisetum orientale</i> Rich.	H	HemC	L	June	Sept
256	<i>Phragmites altissimus</i> (Benth.) Mabilie	H	Th	Mi	Aug	July
257	<i>Piptatherum aequiglume</i> (Duthie ex Hook.f.) Roshev.	H	Th	L	May	Oct
258	<i>Poa alpina</i> L.	H	HemC	N	June	Sept
259	<i>Poa falconeri</i> Hook. f.	H	HemC	L	June	Sept
260	<i>Poa annua</i> L.	H	HemC	L	May	Aug
261	<i>Poa infirma</i> Kunth	H	HemC	L	April	June
262	<i>Saccharum spontaneum</i> L.	H	HemC	N	June	Aug
263	<i>Schismus arabicus</i> Nees.	H	HemC	L	June	July
264	<i>Sorghum halepense</i> (L.) Pers.	H	HemC	N	May	July
265	<i>Sporobolus diandrus</i> (Retz.) P.Beauv.	H	HemC	L	Sept	Sept
266	<i>Urochloa panicoides</i> P.Beauv.	H	HemC	N	July	June
Polygonaceae						
267	<i>Bistorta affinis</i> (D.Don) Green	H	Ch	Mi	July	Aug
268	<i>Bistorta amplexicaulis</i> (D.Don) Greene	H	Ch	Mi	July	Aug
269	<i>Fagopyrum tataricum</i> (L.) Gaertn.	H	Th	Ma	July	Sept
270	<i>Oxyria digyna</i> (L.) Hill	H	Ch	Mi	June	July
271	<i>Persicaria capitata</i> (Buch.-Ham. ex D.Don) H.Gross	H	Th	L	June	Aug
272	<i>Polygonum plebeium</i> R.Br.	H	HemC	Mi	July	Oct
273	<i>Rheum australe</i> D. Don	H	Ch	Me	June	Aug
274	<i>Rumex dentatus</i> L.	H	Th	Me	Aug	Oct
275	<i>Rumex hastatus</i> D. Don	H	Th	N	June	Sept
276	<i>Rumex nepalensis</i> Spreng	H	Th	Me	July	Oct
Portulacaceae						
277	<i>Portulaca oleracea</i> L.	H	Th	N	May	July
Primulaceae						
278	<i>Anagallis arvensis</i> L.	H	Ch	N	May	July
279	<i>Androsace hazarica</i> R.R. Stewart ex Y.Nasir	H	Th	Mi	May	July
280	<i>Androsace rotundifolia</i> Hardw.	H	Th	Mi	June	Aug
281	<i>Primula rosea</i> Y.J. Nasir	H	G	Mi	Oct	Nov
282	<i>Primula hazarica</i> Duthie	H	HemC	Mi	July	Aug
Pteridaceae						
283	<i>Onychium contiguum</i> C.Hope	H	G	Me	June	June
284	<i>Pteris vittata</i> L.	H	G	Me	June	Aug
Ranunculaceae						
285	<i>Aconitum heterophyllum</i> Wall. ex Royle	H	HemC	Me	June	Sept
286	<i>Anemone obtusiloba</i> D.Don	H	HemC	L	May	July
287	<i>Aquilegia pubiflora</i> Wall. ex Royle	H	HemC	Mi	June	Aug
288	<i>Caltha palustris</i> var. <i>alba</i> (Cambess) Hook.f. & Thomson	H	Th	Ma	July	Aug
289	<i>Clematis grata</i> Wall.	H	L	Mi	July	Sept
290	<i>Delphinium cashmerianum</i> Royle	H	Th	Mi	Aug	Sept

291	<i>Ranunculus laetus</i> Wall. ex Hook. f. & J.W. Thompson	H	HemC	Me	June	Sept
292	<i>Ranunculus muricatus</i> L.	H	HemC	Ma	June	July
293	<i>Thalictrum pedunculatum</i> Edgew.	H	HemC	N	June	Aug
Rhamnaceae						
294	<i>Rhamnus purpurea</i> Edgew.	T	NanP	Mi	May	July
295	<i>Ziziphus undulata</i> Reissek	S	NanP	Mi	June	Aug
Rosaceae						
296	<i>Alchemilla cashmeriana</i> Rothum.	H	HemC	N	June	Sept
297	<i>Cotoneaster acuminatus</i> Wall. ex Lindl.	S	NanP	N	June	July
298	<i>Cotoneaster microphyllus</i> Wall. ex Lindl	S	NanP	N	May	July
299	<i>Duchesnea indica</i> (Andx) Fake.	H	HemC	N	April	June
300	<i>Filipendula vestita</i> (Wall. ex G. Don.) Maxim.	H	Th	Me	June	Aug
301	<i>Fragaria nubicola</i> (Hook. f.) Lindl. ex Lacaita	H	HemC	N	May	July
302	<i>Geum elatum</i> Wall. ex G.Don	H	HemC	N	Aug	Oct
303	<i>Malus domestica</i> Borkh.	T	MicP	Me	April	June
304	<i>Potentilla anserina</i> L.	H	HemC	L	June	Aug
305	<i>Potentilla argentea</i> L.	H	HemC	L	June	Sept
306	<i>Potentilla napalensis</i> Hook.	H	HemC	Mi	June	Sept
307	<i>Prunus cornuta</i> (Wall.ex Royle) Steud	T	MesP	Me	May	July
308	<i>Prunus armeniaca</i> L.	T	MesP	Mi	March	April
309	<i>Prunus domestica</i> L.	T	MesP	Me	May	Sept
310	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don	T	MesP	Mi	April	May
311	<i>Rosa webbiana</i> Wall. ex. Royle	S	NanP	N	May	July
312	<i>Rosa brunonii</i> Lindl.	S	NanP	Mi	June	July
313	<i>Rubus fruticosus</i> Agg.	S	NanP	Mi	July	Sept
314	<i>Rubus sanctus</i> Schreber	S	NanP	Mi	July	Sept
315	<i>Sibbaldia procumbens</i> L.	H	HemC	N	Oct	Nov
316	<i>Sorbaria tomentosa</i> (Lindl.) Rehder	S	NanP	Me	June	Aug
317	<i>Sorbus tomentosa</i> Hedl.	S	NanP	Me	July	Aug
318	<i>Spiraea vacciniifolia</i> D.Don	S	NanP	Mi	April	July
319	<i>Spiraea affinis</i> R.Parker	S	NanP	Me	July	Aug
Rubiaceae						
320	<i>Galium aparine</i> L.	H	Th	L	July	Oct
321	<i>Galium asparagifolium</i> Boiss. & Heldr.	H	Th	L	May	Aug
322	<i>Galium elagans</i> Wall.	H	Th	N	July	Aug
323	<i>Himalrandia tetrasperma</i> (Wall. ex Roxb.) T.Yamaz.	H	HemC	Mi	June	Aug
324	<i>Leptodermis virgata</i> Edgew. ex Hook.f.	H	Ch	N	May	June
Rutaceae						
325	<i>Zanthoxylum armatum</i> DC.	S	MicP	Mi	July	Sept
Salicaceae						
326	<i>Populus alba</i> L.	T	MesP	Ma	June	Aug
327	<i>Populus ciliata</i> Wall. ex Royle	T	MesP	Ma	May	June

328	<i>Populus nigra</i> L.	T	MesP	Ma	June	Aug
329	<i>Salix alba</i> L.	T	MesP	Mi	June	Oct
330	<i>Salix denticulata</i> subsp. <i>hazarica</i> (R. Parker) Ali	T	MesP	Mi	June	Oct
331	<i>Salix tetrasperma</i> Roxb.	T	MesP	Mi	June	Oct
	Sambucaceae					
332	<i>Sambucus wightiana</i> Wall. ex Wight & Arn	S	Th	Me	July	Sept
	Sapindaceae					
333	<i>Acer caesium</i> Wall. ex Brandis	T	MegP	L	April	July
334	<i>Dodonaea viscosa</i> (L.) Jacq.	S	NanP	Me	April	Aug
	Saxifragaceae					
335	<i>Bergenia ciliata</i> (Haw.) Sternb.	H	Ch	Me	Aug	Oct
336	<i>Bergenia stracheyi</i> Hook.f & thomes.	H	HemC	Me	Sept	Oct
	Scrophulariaceae					
337	<i>Verbascum thapsus</i> L.	H	Th	Me	July	Aug
	Simaroubaceae					
338	<i>Ailanthus altissima</i> (Mill.) Swingle	T	MesP	Mi	May	July
	Smilacaceae					
339	<i>Smilax glaucophylla</i> Koltzsch	H	L	Mi	June	Aug
	Solanaceae					
340	<i>Hyoscyamus niger</i> L.	H	Th	Me	July	Sept
341	<i>Solanum nigrum</i> L.	H	Th	Mi	July	Oct
342	<i>Solanum surattense</i> Burm F.	H	Th	Me	All the year	All the year
343	<i>Withania somnifera</i> (L.) Dunal	H	Ch	Me	July	Oct
	Thymelaeaceae					
344	<i>Daphne mucronata</i> Royle	S	NanP	N	Nov	Feb
345	<i>Daphne papyracea</i> Wall. ex G. Don	S	NanP	N	Nov	Feb
	Urticaceae					
346	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd. Weed.	H	HemC	Mi	July	Sept
347	<i>Pilea umbrosa</i> Blume	H	Th	Mi	April	June
348	<i>Urtica dioica</i> L.	H	Th	Mi	Sept	Oct
	Verbenaceae					
349	<i>Pteracanthus urticifolius</i> (Wall. ex Kuntze) Bremek.	H	Th	Me	June	Aug
350	<i>Verbena officinalis</i> L.	H	Th	Mi	May	July
	Violaceae					
351	<i>Viola odorata</i> L.	H	Th	Mi	Sept	Oct
352	<i>Viola serpens</i> Wall. Ex Ging	H	G	Mi	Aug	Oct
	Vitaceae					
353	<i>Vitex negundo</i> L.	S	NanP	Mi	April	Aug
354	<i>Vitis Jacquemontii</i> R. Parker	S	NanP	Me	June	Aug

Abbreviations: H – Herb, Pp – Parasitic Plant, S – Shrub, T – Tree; Ch – Chamaephytes, G – Geophytes, HemC – Hemicryptophytes, L – Liana, MegP – Megaphanerophytes, MesP – Mesophanerophytes, MicP – Microphanerophytes, NanP – Nanophanerophytes, Pp – Parasitic plant, Th – Therophytes; Aph – Aphyllous, L – Leptophyll, Ma – Megaphyll, Me – Mesophyll, Mi – Microphyll, N – Nanophyll