PHYTODIVERSITY AND ECOLOGICAL EVALUATION OF FLORA OF RABAT DARA, LOWER DIR, PAKISTAN

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Abstract

The study was conducted during 2021-22 to enamuerates the floritic diversity and ethnoecological profile of Rabat Dara, Lower Dir, Khyber Pakhtunkhwa, Pakistan. The study aimed to explore the floristic composition, seasonality, leaf size spectra, life form, and habit of plant species in the region. A total of 282 plant species belonginging to 95 family were enlisted. Asteraceae were the leading family with **(**22 Genera; 27 Species (9.57%) followed by Poaceae **(**16 Genera; 18 Species (6.38%), Rosaceae **(** 12 Genera; 18 Species (6.38%), Papilionaceae (9 Genera; 18 Species (6.38%), Brassicaceae (12 Genera; 12 Species (4.26%), Lamiaceae (12 Genera; 12 Species (4.26 %), Solanaceae (7 Genera; 9 Species (3.19 %), Moraceae (3 Genera 7 Species (2.48 %), Umbelliferae (6 Genera; 6 Species (2.13 %), Cucurbitaceae (4 Genera; 6 Species (2.13 %), Euphorbiaceae (3 Genera; 6 Species (2.13 %), and Polygonaceae (4 Genera; 5 Species (1.77 %). The rest of families have less than 5 species. Spring was identified as the dominant season, while herbs constituted the highest number of species. The most dominant life forms were Therophytes with (115 Spp., 40.78 %) followed by Hemicryptopytes (45 Spp., 15.96%), Megaphanerophytes (44 Spp., 15.60%), Nanophanerophytes (36 Spp., 12.77%), Chemaephytes (14 Spp., 4.96 %), Geophytes (14 Spp., 4.96 %), Climbers (9 Spp., 3.19%), Epiphytes (1 Spp., 0.35 %), and Parasites (1 Spp., 0.35 %). The leaf size spectra was dominated by Microphylls (114 Spp., 25.89 %), followed by Nanophylls (114 Spp., 25.89 %), Mesophylls (52 Spp., 18.44 %), Leptophylls (32 Spp., 11.35 %), Macrophylls (10 Spp., 3.55%), and Aphyllous (1 Spp., 0.35 %).

Key words: Phytodiversity, Ecological Evaluation, Rabat Dara, Lower Dir, Pakistan

Introduction

Rabat Dara, located in the picturesque area of District Dir (Lower), is renowned for its breathtaking beauty and natural surroundings. Situated approximately 13 kilometers northeast of Timergara, it offers a serene and tranquil environment away from the bustling city life. The geographical coordinates of Rabat Dara place it between 34^0 $42^/$ to 37^0 $50^/$ north latitudes and 73^0 $50^/$ to 73^0 $63^/$ east longitudes. The area boasts an impressive altitude range, spanning from 8500 feet above sea level, which adds to its scenic charm. Rabat Dara is encompassed by various natural features that contribute to its allure. To the south, it is bordered by the bustling Rabat Bazaar and the majestic River Panjkora. The northern boundaries are defined by the captivating Laram Top and Talash, which offer stunning panoramic views. To the west lies the enchanting Siar Dara, while the eastern side is adorned by the captivating Tormang Dara. Covering an expanse of approximately 202 square kilometers, Rabat Dara is home to a vibrant community. According to the 2017 census report, the population of the area stands at 40,009. The region of Dir possesses a diverse variety of flora and shares similarities with the vegetation found in the Swat valley. According to Yasin and Rubina (1995), the presence of Sino-Japanese flora has been observed in Dir. The plant species in Dir include *Quercus ilex, Sophora mollis, Berberis spp, Artimisia maritime, Reptonia buxifolia, Pinus roxburghii, Indigofera heterantha, Isoden rugosus, Dodonaea viscose, Olea ferruginea, Daphne oleoides, Cotoneaster nummularia, Zizyphus oxyphylla, Zizyphus nummmularia, Gymnosporia royleana,* and *Rumex hastatus* (Stewart, 1982). These hills also separate the area of Lower Swat, in Nekpi Khel, and Shamozai from Dir (Hazrat *et al.* 2020).

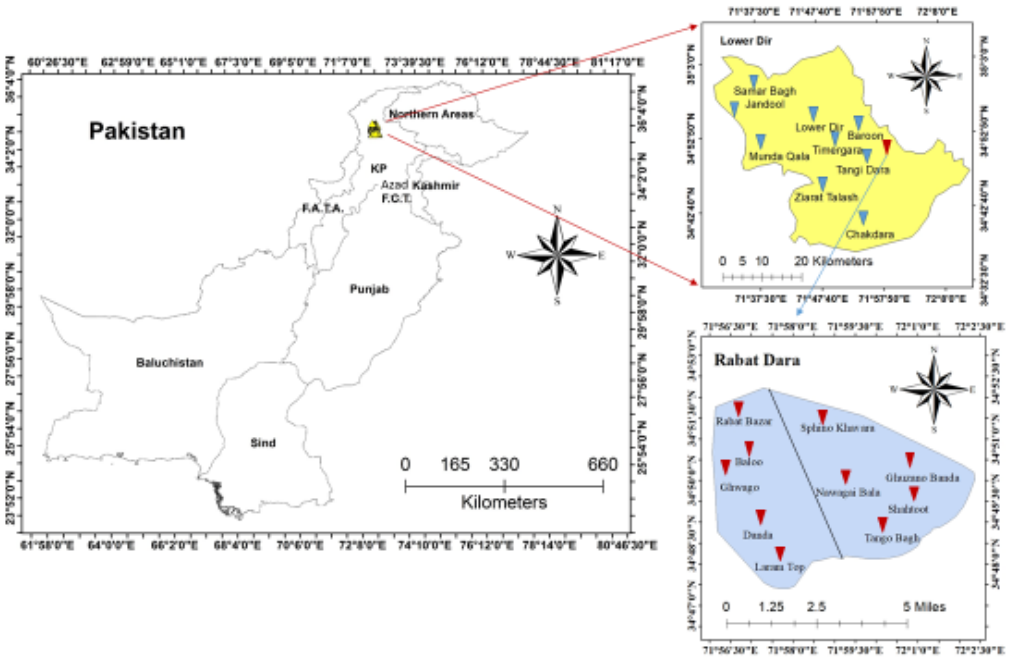

Fig: 1. Map of the research area

MATERIALS AND METHODS

Floristic diversity and Ecological Characteristics

Ecological surveys were done in the Rabat Dara during 2021-2022 in various growing seasons. Plant specimens were collected in the area from several altitudinal zones. After being gathered, they were dried and put on herbarium sheets. The plants were identified using the Pakistan Flora (Nasir& Ali, 1970-1994; Ali & Qaisar, 1995-2010) and other relevant sources. The plant species were arranged alphabetically in a floral list. These plant specimens were then labellead with voucher numbers and kept in the Herbarium of the University of Peshawar. The Raunkiaer Life-form spectrum, developed by Raunkiaer in 1934 and later expanded by Hussain in 1989, classifies plants into different categories as described below:

$$\textbf{Life form Spectrum} = \frac{\text{Number of species particular life form class}}{\text{Total number of all species in a stand}} \ 100$$

Raunkiarian leaf spectra were prepared as follows:

Raunkaiar, 1934 classified the plants on the basis of leaf size as follows.

1. Leptophyll: Leaf area up 25mm^2
2. Nanophyll: Leaf area form 25–225 mm^2
3. Microphyll: Leaf area form 225-2,025 mm^2
4. Mesophyll: Leaf area form 2,025-18,225 mm^2
5. Macrophyll: Leaf area form 18,225-164,025 mm^2
6. Megaphyll: Leaf area greater than 164,025 square mm^2

$$\textbf{Leaf Size} = \frac{\text{Number of species particular leaf size class}}{\text{Total number of all species in a stand}} \ 100$$

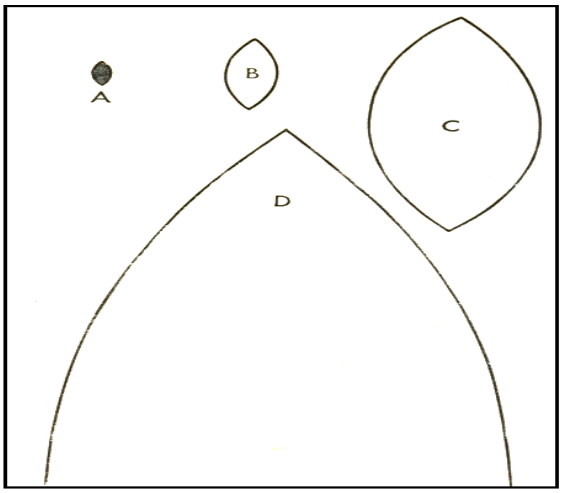

Fig: 2 Leaf size classes

RESULTS AND DISCUSSION

Floristic Composition

The floristic composition of Rabat Dara in Lower Dir, Khyber Pakhtunkhwa (KP), Pakistan is comprised of numerous species, distributed among different families. The flora of Rabat devoted 282 taxa floristically with 22 genera among 95 families in which 7 were Pteridiophytes, 3 Gymnospermic and 74 angiospermic families (9 Monocot and 76 of Dicot). The number of species per Family varies from 1 to 27.

The family with the most representation in this region is the Asteraceae, contributing 27 species, which makes up 9.57% of the total recorded species. Following closely are the families Poaceae, Papilionaceae, and Rosaceae, each represented by 18 species or 6.38% of the total. Other families with a significant number of species include Brassicaceae and Lamiaceae with 12 species each (4.26% each), Solanaceae with 9 species (3.19%), and Moraceae with 7 species (2.48%). Several families such as Alliaceae, Cucurbitaceae, Euphorbiaceae, and Umbelliferae are represented by 6 species (2.13% each). Families like Polygonaceae, Amaranthaceae, Plantaginaceae, Ranunculaceae, and Rhamnaceae have 4 species each, contributing 1.42% each to the total flora. Many families are represented by either 3 species (1.06% each), 2 species (0.71% each), or a single species (0.35% each), demonstrating a high degree of floral diversity in this region (Table.2). The current finding show similarity with result of Zaman, A. and L. Badshah (2021), Anwar *et al*. (2022), Shah *et al*. (2021). Asif *et al*. (2020) explored the floristic composition of Balakot, District Mansehra, Pakistan. Similar result report that Asteraceae were the dominant family Rosaceae Lamiaceae and Papilionaceae. Similar study result was reported by Khan *et al*. (2022) Marghuzar Valley of Swat, Pakistan; Khan *et al*. (2021) from tehsil Sarai Naurang. Nafeesa *et al*. (2021) from Bhimber mountain of Kashmir Pakistan. Zeb *et al*. (2017) from Mohmand Agency. Khyber Pakhtunkhawa and Hussain *et al*. (2020) from Koh-e-Safaid Range, Pak-Afghan, Borders.

Table 1. Floristic Composition, Habit condition, life form, life size and seasonal variation of vegetation of Rabat Dara Dir (Lower)

S. No	Division /Family/Species	Voucher No	Seasonality				1	2	3
			A	B	C	D			
PTERIODOPHYTES									
Adiantaceae									
1.	*Adiantum capillus –veneris* L.	Zamir. Bot. 01 (PUP)	+	+	+	+	H	He	Na
2.	*Adiantum incisum* Forsak.	Zamir. Bot. 02 (PUP)	+	+	+	+	H	He	Na
3.	*Adiantum venustum* D. Don.	Zamir. Bot. 03 (PUP)	+	+	+	+	H	He	Na
Aspleniaceae									
4.	*Asplenium ceterach* L.	Zamir. Bot. 04 (PUP)	+	+	+	+	H	He	Na
5.	*Cystopteris fragilis* (L.) Bernh	Zamir. Bot. 05 (PUP)	+	+	+	+	H	G	Mic
Dryopteridaceae									
6.	*Dryopteris serrato-dentata* (Bedd.) Hay	Zamir. Bot. 06 (PUP)	+	+	+	+	H	He	Mes
Equisetaceae									
7.	*Equisetum arvense* L.	Zamir. Bot. 07 (PUP)	-	+	+	-	H	G	Mic
Marsileaceae									

8.	*Marsilea minuta* L.	Zamir. Bot. 08 (PUP)	+	+	+	-	H	G	Mic
Pteridaceae									
9.	*Pteris cretica* L.	Zamir. Bot. 09 (PUP)	+	+	+	+	H	He	Na
Sinopteridaceae									
10.	*Cheilanthes albomarginata* L.	Zamir. Bot. 10 (PUP)	+	+	+	+	H	He	Na
GYMNOSPERMS									
8. Pinaceae									
11.	*Cedrus deodara* (Roxb) G. Don.	Zamir. Bot. 11 (PUP)	+	+	+	+	T	MP	Le
12.	*Pinus roxburghii* Sarg.	Zamir. Bot. 12 (PUP)	+	+	+	+	T	MP	Le
13.	*Pinus wallichiana* A.B. Jacks.	Zamir. Bot. 13 (PUP)	+	+	+	+	T	MP	Le
Cupressaceae									
14.	*Cupressus sempervirens* L.	Zamir. Bot. 14 (PUP)	+	+	+	+	T	MP	Le
Taxaceae									
15.	*Taxus baccata* auct. Plur.	Zamir. Bot. 15 (PUP)	+	+	+	+	T	MP	Le
ANGIOSPERMS									
MONOCOTYLEDONS									
Alliaceae									
16.	*Allium griffthianum* Boiss.	Zamir. Bot. 16 (PUP)	-	+	-	-	H	G	Mic
17.	*Allium cepa* L.	Zamir. Bot. 17 (PUP)	-	+	-	-	H	G	Mic
18.	*Allium sativum* L.	Zamir. Bot. 18 (PUP)	-	+	-	-	H	G	Mic
Amaryllidaceae									
19.	*Ixiolirion tataricum* (Pall.)	Zamir. Bot. 19 (PUP)	+	-	-	-	H	G	Mic
20.	*Narcissus tezetta* L.	Zamir. Bot. 20 (PUP)	+	-	-	+	H	G	Mic
Asparagaceae									
21.	*Asparagus gracilis* Royle.	Zamir. Bot. 21 (PUP)	+	-	-	+	H	NP	Le
Convallariaceae									
22.	*Polgonatum verticillatum* L.	Zamir. Bot. 22 (PUP)	-	+	-	-	S	Th	Mic
Cyperaceae									
23.	*Cyperus niveus* Retz.	Zamir. Bot. 23 (PUP)	-	+	-	-	H	He	Na
24.	*Cyperus rotundus* L.	Zamir. Bot. 24 (PUP)	-	+	-	-	H	He	Na
25.	*Eleocharis uniglumis* (Link) S.	Zamir. Bot. 25 (PUP)	-	+	-	-	H	He	Na
Dioscoreaceae									
26.	*Dioscorea deltoidea* Wall. ex Griseb.	Zamir. Bot. 26 (PUP)	+	+	+	-	H	Cli.	Mic
27.	*Dioscorea melanophyma* Burkill and Prain	Zamir. Bot. 27 (PUP)	+	+	+	-	S	Cli.	Mic
Iridaceae									
28.	*Iris aitchisonii* (Baker) Boiss.	Zamir. Bot. 28 (PUP)	-	+	-	-	H	G	Mes
Liliaceae									
29.	*Tulipa stellata* Hook.	Zamir. Bot. 29 (PUP)	+	-	-	-	H	Th	Na
Poaceae									

30.	*Aristida cyanantha* Neses ex Steud.	Zamir. Bot. 30 (PUP)	-	+	-	-	H	He	Le
31.	*Arthraxon prionodes* Steud.	Zamir. Bot. 31 (PUP)	-	+	-	-	H	He	Le
32.	*Arundo donax* L.	Zamir. Bot. 32 (PUP)	+	+	+	+	H	G	Mes
33.	*Avena fatua* L.	Zamir. Bot. 33 (PUP)	+	+	-	-	H	Th	Na
34.	*Cymbopogon* jwarancusa Jon.	Zamir. Bot. 34 (PUP)	+	+	-	-	H	He	Le
35.	*Cynodon dactylon* L.	Zamir. Bot. 35 (PUP)	-	+	+	-	H	He	Na
36.	*Dichanthium annulatum* For.	Zamir. Bot. 36 (PUP)	+	+	+	-	H	He	Na
37.	*Hemarthria compressa* (L.f) R.	Zamir. Bot. 37 (PUP)	-	+	-	-	H	He	Mic
38.	*Heteropogon contortus* (L.) Beauv. Ex Roem. & Schult.	Zamir. Bot. 38 (PUP)	-	+	-	-	H	He	Le
39.	*Hordeum vulgare* L.	Zamir. Bot. 39 (PUP)	+	-	-	+	H	He	Na
40.	*Hordeum murinum* L.	Zamir. Bot. 40 (PUP)	+	-	-	+	H	He	Na
41.	*Melica persica* Kunth.	Zamir. Bot. 41 (PUP)	-	+	-	-	H	Th	Na
42.	*Piptatherum aeguiglume* (Duthie ex Hook.	Zamir. Bot. 42 (PUP)	-	+	-	-	H	Th	Na
43.	*Poa annua* L.	Zamir. Bot. 43 (PUP)	-	+	-	-	H	Th	Na
44.	*Poa bulbosa* L.	Zamir. Bot. 44 (PUP)	-	+	-	-	H	Th	Na
45.	*Saccharum griffithi* Mu.ex Bo.	Zamir. Bot. 45 (PUP)	-	+	-	-	H	He	Mac
46.	*Sorghum halepense* L.	Zamir. Bot. 46 (PUP)	-	+	+	-	H	He	Mic
47.	*Triticum aestivum* L.	Zamir. Bot. 47 (PUP)	+	-	-	+	H	He	Na
Dicotyledons									
Acanthaceae									
48.	*Justicia adhatoda* L.	Zamir. Bot. 48 (PUP)	+	-	+	+	S	NP	Mic
49.	*Strobilanthes glutinous* Nees in Wall.	Zamir. Bot. 49 (PUP)	+	-	+	+	H	Ch	Mes
Amaranthaceae									
50.	*Alternanthera pungens* Kunth in H.B.K.	Zamir. Bot. 50 (PUP)	+	+	-	-	H	Th	Na
51.	*Alternanthera sessilis* (L.) DC.	Zamir. Bot. 51 (PUP)	+	-	-	-	H	Th	Mic
52.	*Achyranthes aspera* L.	Zamir. Bot. 52 (PUP)	-	+	+	+	H	Th	Na
53.	*Amaranthus viridis* L.	Zamir. Bot. 53 (PUP)	-	+	-	-	H	Th	Mes
Anacardiaceae									
54.	*Pistacia integerrima* J.L.	Zamir. Bot. 54 (PUP)	+	+	+	+	T	MP	Mic
Apocynaceae									
55.	*Caralluma tuberculata* N. E. Br.	Zamir. Bot. 55 (PUP)	+	+	+	+	H	Th	Na
56.	*Nerium oleander* L.	Zamir. Bot. 56 (PUP)	+	+	+	+	S	NP	Mic
Araliaceae									
57.	*Hedera helix* auct.	Zamir. Bot. 57 (PUP)	+	+	+	+	S	Cli.	Mes
58.	*Hedera nepalensis* K.Koch.	Zamir. Bot. 58 (PUP)	+	+	+	+	S	Cli.	Mes
Asclepiadaceae									
59.	*Calotropis procera* (Ait.) f.	Zamir. Bot. 59 (PUP)	+	+	+	+	S	NP	Mes

60.	*Periploca aphylla* Dcne.	Zamir. Bot. 60 (PUP)	+	+	+	+	S	NP	Le
Asteraceae									
61.	*Artemisia scoparia* Waldst. And Kit.	Zamir. Bot. 61 (PUP)	-	+	+	-	H	Ch	Le
62.	*Artemisia vulgaris* L.	Zamir. Bot. 62 (PUP)	-	+	-	-	H	Ch	Le
63.	*Lactuca serriola* L.	Zamir. Bot. 63 (PUP)	+	-	-	-	H	Th	Na
64.	*Lactuca dissecta* L.	Zamir. Bot. 64 (PUP)	+	-	-	-	H	Th	Mes
65.	*Artemisia brevifolia* Wall. ex DC.	Zamir. Bot. 65 (PUP)	-		-	-	H	Ch	Le
66.	*Bidens pilosa* L.	Zamir. Bot. 66 (PUP)	+		-	-	H	Th	Mic
67.	*Calendula arvensis* (Vaill.) L.	Zamir. Bot. 67 (PUP)	+	+	-	-	H	Th	Mic
68.	*Calendula officinalis* L.	Zamir. Bot. 68 (PUP)	+		-	-	H	Th	Mic
69.	*Cirsium griffithii* Boiss.	Zamir. Bot. 69 (PUP)	-	+	-	-	H	Th	Mic
70.	*Conyza bonariensis* (L.) Cron.	Zamir. Bot. 70 (PUP)	-		-	-	H	Th	Mic
71.	*Conyza Canadensis* (L.) Cron.	Zamir. Bot. 71 (PUP)	-	+	-	-	H	Th	Na
72.	*Crepis setosa* L.	Zamir. Bot. 72 (PUP)	+	+	-	-	H	Th	Mic
73.	*Filago gallica* L.	Zamir. Bot. 73 (PUP)	+	+	-	-	H	Th	Le
74.	*Heteropappus altaicus* (Wild.) Novopokr.	Zamir. Bot. 74 (PUP)	+	-	-	-	H	Th	Na
75.	*Helianthus annuus* L.	Zamir. Bot. 75 PUP)	+	+	+	-	H	Th	Mes
76.	*Launaea procumbens* (Roxb.). Ramayya.	Zamir. Bot. 76 (PUP)	+	+	-	-	H	Th	Mic
77.	*Myriactis nepalensis* Lessing.	Zamir. Bot. 77 (PUP)	-	+	+	-	H	Th	Mic
78.	*Parthenium hysterophorus* L.	Zamir. Bot. 78 (PUP)	+	+	-	-	H	Th	Mic
79.	*Phagnalon niveum* Edgew.	Zamir. Bot. 79 (PUP)	+	+	-	-	H	Ch	Na
80.	*Pluchea lanceolata* (DC.) C.B. Clarke.	Zamir. Bot. 80 (PUP)	-	+	+	-	H	He	Mic
81.	*Senecio vulgaris* L.	Zamir. Bot. 81 (PUP)	+	+	-	-	H	Th	Mic
82.	*Silybum marianum* (L.) Garrtn.	Zamir. Bot. 82 (PUP)	+	+	-	-	H	Th	Mes
83.	*Sonchus asper* (L.) Hill.	Zamir. Bot. 83 (PUP)	-	+	-	-	H	Th	Mic
84.	*Tagetes minuta* L.	Zamir. Bot. 84 (PUP)	-	+	+	+	H	Th	Mic
85.	*Taraxacum officinale* Webb.	Zamir. Bot. 85 (PUP)	+	+	-	-	H	Th	Mic
86.	*Verbesina enceliodes* (Cavanilles) B and H.	Zamir. Bot. 86 (PUP)	+	+	+	-	H	Th	Mes
87.	*Xanthium strumarium* L.	Zamir. Bot. 87(PUP)	-	+	-	-	H	Th	Mes
Balsaminaceae									
88.	*Impatiens edgeworthii* Hook.f.	Zamir. Bot. 88 (PUP)	-	+	+	-	H	Th	Mic
Berberidaceae									
89.	*Berberis lycium* Royle.	Zamir. Bot. 89 (PUP)	+	+	+	-	S	NP	Mic
90.	*Berberis calliobotrys* Aitch.	Zamir. Bot. 90 (PUP)	+	+	+	-	S	NP	Mic
Boraginaceae									
91.	*Cynoglossum glochidium* Wall.	Zamir. Bot. 90 (PUP)	-	+	-	-	H	Th	Mic
92.	*Onosma hipsida* Wall. ex G. Don.	Zamir. Bot. 91 (PUP)	+	+	-	-	H	He	Na

Brassicaceae									
93.	*Alliaria petiolata* (M. Bieb) C., and G.	Zamir. Bot. 92 (PUP)	+	+	-	-	H	Th	Mic
94.	*Brassica rapa* L.	Zamir. Bot. 93 (PUP)	+	+	-	-	H	Th	Mic
95.	*Capsella bursa-pastoris* L.	Zamir. Bot. 94 (PUP)	+	-	-	-	H	Th	Mic
96.	*Lepidium didymus* l.	Zamir. Bot. 95 (PUP)	+	+	-	-	H	Th	Na
97.	*Chorispora tentella* (Pall.) DC.	Zamir. Bot. 96 (PUP)	+	+	-	-	H	Th	Na
98.	*Descurainia sophia* L.	Zamir. Bot. 97 (PUP)	-	+	+	-	H	Th	Na
99.	*Isatis costata* C.A.Mey.	Zamir. Bot. 98 (PUP)	+	+	+	-	H	Th	Mic
100.	*Nasturtium officinale* R.Br.	Zamir. Bot. 99 (PUP)	+	+	-	-	H	Th	Na
101.	*Neslia paniculata* auct.	Zamir. Bot. 100 (PUP)	-	+	-	-	H	Th	Mic
102.	*Raphanus raphanistrum* L.	Zamir. Bot. 101 (PUP)	-	-	+	-	H	Th	Mes
103.	*Sisymbrium irio* L.	Zamir. Bot. 102 (PUP)	+	+	-	-	H	Th	Le
104.	*Thlapsi arvense* L.	Zamir. Bot. 103 (PUP)	+	-	-	-	H	Th	Mic
Buddlejaceae									
105.	*Buddleja crispa* Benth.	Zamir. Bot. 104 (PUP)	+	+	+	-	S	Th	Mic
Buxaceae									
106.	*Sarcococca saligna* (D.Don) Muell.	Zamir. Bot. 105 (PUP)	+	+	+	+	S	NP	Mic
Cactaceae									
107.	*Opuntia dilleni* (D. Don) Muecll	Zamir. Bot. 106 (PUP)	+	+	+	+	S	NP	Ap.
Campanulaceae									
108.	*Campanula pallida* Wall.	Zamir. Bot. 107 (PUP)	+	+	-	-	H	Th	Na
Cannabaceae									
109.	*Cannabis sativa* L.	Zamir. Bot. 108 (PUP)	+	+	+	-	H	Th	Mic
Caprifoliaceae									
110.	*Viburnum cotinifolium* D. Don.	Zamir. Bot. 109 (PUP)	+	+	-	-	S	Th	Mes
Caryophyllaceae									
111.	*Arenaria serpllifolia* L.	Zamir. Bot. 110 (PUP)	+	+	-	-	H	Th	Na
112.	*Silene vulgaris* Moench.	Zamir. Bot. 111 (PUP)	+	+	-	-	H	Th	Mic
113.	Stellaria media (L.) Vill.	Zamir. Bot. 112 (PUP)	+	+	-	-	H	Th	Na
Chenopodiaceae									
114.	*Chenopodium foliosum* L.	Zamir. Bot. 113 (PUP)	+	+	-	-	H	Th	Na
115.	*Chenopodium album* L.	Zamir. Bot. 114 (PUP)	-	+	+	-	H	Th	Mic
116.	*Chenopodium murale* (L.) S.Fuentes, Uotila and Borsch.	Zamir. Bot. 115 (PUP)	-	+	+	-	H	Th	Mic
Colchicaceae									
117.	*Colchicum luteum* Barker.	Zamir. Bot. 116 (PUP)	+	-	-	-	H	G	Mic
Convolvulaceae									
118.	*Convolvulus arvensis* L.	Zamir. Bot. 117 (PUP)	+	+	-	-	H	Th	Mic
Crassulaceae									

119.	*Rosularia endotricha* (Boiss. and Hohen).	Zamir. Bot. 118 (PUP)	-	+	+	-	H	He	Na
120.	*Sedum hispanicum* L.	Zamir. Bot. 119 (PUP)	-	+	+	-	H	He	Na
Cuscutaceae									
121.	*Cuscuta reflexa* Roxb.	Zamir. Bot. 120 (PUP)	+	+	+	-	H	Par.	Le
Cucurbitaceae									
122.	*Cucurbita maxima* Duch ex Lam.	Zamir. Bot. 121 (PUP)	-	+	+	-	H	Th	Mac
123.	*Cucurbita pepo* L.	Zamir. Bot. 122 (PUP)	-	+	+	-	H	Th	Mac
124.	*Cucumis sativus* L.	Zamir. Bot. 123 (PUP)	-	+	+	-	H	Th	Mac
125.	*Cucumis melo* L.	Zamir. Bot. 124 (PUP)	-	+	+	-	H	Th	Mac
126.	*Lagenaria siceraria* (Molina) Stanely	Zamir. Bot. 125 (PUP)	-	-	+	-	H	Th	Mac
127.	*Luffa acutagula* (L.) Roxb.	Zamir. Bot. 126 (PUP)	-	+	+	-	H	Th	Mac
Ebenaceae									
128.	*Diospyrus kaki* Thunb.	Zamir. Bot. 127 (PUP)	+	+	-	-	T	Mp	Mes
129.	*Diospyrus lotus* L.	Zamir. Bot. 128 (PUP)	+	+	-	-	T	Mp	Mes
Euphorbiaceae									
130.	*Andrachne Crdifolia* Wall.	Zamir. Bot. 129 (PUP)	-	+	+	-	S	NP	Mic
131.	Eu*phorbia helioscopia* L.	Zamir. Bot. 130 (PUP)	-		+	-	H	Th	Na
132.	*Euphorbia hirta* Lam., Encycl.	Zamir. Bot. 131 (PUP)	-		+	-	H	Th	Na
133.	*Euphorbia prostrata* L.	Zamir. Bot. 132 (PUP)	-		+	-	H	Th	Le
134.	*Euphorbia wallichii* Hook.	Zamir. Bot. 133 (PUP)	-	+	+	-	H	Ch	Na
135.	*Ricinus communis* L.	Zamir. Bot. 134 (PUP)	-	+	+	-	S	NP	Mes
Fagaceae									
136.	*Quercus bloot* Griff.	Zamir. Bot. 135 (PUP)	+	+	+	+	T	MP	Mes
137.	*Quercus dilatata* Royle.	Zamir. Bot. 136 (PUP)	+	+	+	+	T	MP	Mes
138.	*Quercus incana* Roxb.	Zamir. Bot. 137 (PUP)	+	+	+	+	T	MP	Mes
Fumariaceae									
139.	*Fumaria indica* Hausskn.	Zamir. Bot. 138 (PUP)	+	+	-	-	H	Th	Le
Juglandaceae									
140.	*Juglans regia* L.	Zamir. Bot. 139 (PUP)	+	+	-	-	T	MP	Mes
Geraniaceae									
141.	*Geranium rotundifolium* L.	Zamir. Bot. 140 (PUP)	-	+	+	-	H	Th	Mic
142.	*Geranium ocellatum* Camb.	Zamir. Bot. 141 (PUP)	+	+	-	-	H	Th	Mic
Gentianaceae									
143.	*Gentiana argentea* Royle ex D. Don.	Zamir. Bot. 142 (PUP)	+	+	-	-	H	Th	Mic
Hippocastanceae									
144.	*Aesculus indica* Wall.	Zamir. Bot. 143 (PUP)	-	+	+	-	T	MP	Mis
Hydrangeaceae									
145.	*Deutzia staminea* R. Br. Ex Wall.	Zamir. Bot. 144 (PUP)	+	+	+	+	S	Ch	Mic
Hyperiaceae									

146.	*Hypericum perforatum* L.	Zamir. Bot. 145 (PUP)	-	+	-	-	H	Ch	Na
Lamiaceae									
147.	*Ajuga bracteosa* Wall. Ex. Benth.	Zamir. Bot. 146 (PUP)	-	+	+	-	H	He	Mic
148.	Anisomeles indica (L.) Kuntze.	Zamir. Bot. 147 (PUP)	+	+	+	-	H	Ch	Mic
149.	*Isodon rugosus* (Wall. ex Bth.) Codd.	Zamir. Bot. 148 (PUP)	+	+	+	+	S	Ch	Mic
150.	*Marrubium vulgare* L.	Zamir. Bot. 149 (PUP)	-	+	-	-	H	Th	Mic
151.	*Mentha longifolia* L.	Zamir. Bot. 150 (PUP)	+	+	-	-	H	Cr	Na
152.	*Micromeria biflora* Buch.	Zamir. Bot. 151 (PUP)	+	+	-	-	H	Ch	Le
153.	Nepeta bracteata Benth.	Zamir. Bot. 152 (PUP)	-	+	-	-	H	Th	Na
154.	*Nepeta cataria* L.	Zamir. Bot. 153 (PUP)	+	+	-	-	H	Th	Na
155.	*Origanum vulgare* L.	Zamir. Bot. 154 (PUP)	+	-	-	-	H	He	Na
156.	*Otostegia limbata* Benth.	Zamir. Bot. 155 (PUP)	+	+	-	-	S	Np	Mic
157.	*Phlomis spectabilis* Falc. ex Benth.	Zamir. Bot. 156 (PUP)	-	+	+	-	H	Th	Mes
158.	*Salvia moorcroftiana* Wall. ex Bth.	Zamir. Bot. 157 (PUP)	-	+	-	-	H	Th	Mac
Leonticaceae									
159.	*Bongardia chrysogonium* L.	Zamir. Bot. 158 (PUP)	-	+	-	-	H	G	Mic
Loranthaceae									
160.	*Viscum album* L.	Zamir. Bot. 159 (PUP)	+	+	+	+	S	Epi	Mic
Malvaceae									
161.	*Malva neglecta* Wallr.	Zamir. Bot. 160 (PUP)	-	+	-	-	H	Th	Mic
162.	*Abelmoschus esculentus* (L.)Moe.	Zamir. Bot. 161 (PUP)	+	+	-	-	H	Th	Mic
Meliaceae									
163.	*Melia azedarach* L.	Zamir. Bot. 162 (PUP)	+	+	-	-	T	MP	Mic
Mimosaceae									
164.	*Senegalia modesta* (Wall.) P.J.H. Hurter.	Zamir. Bot. 163 (PUP)	-	+	+	-	T	MP	Le
165.	*Acacia nilotica* L.	Zamir. Bot. 164 (PUP)	-	+	-	-	T	MP	Le
Moraceae									
166.	*Broussonetia papyrifera* (L.)	Zamir. Bot. 165 (PUP)	+	+	-	-	T	MP	Mes
167.	*Ficus carica* L.	Zamir. Bot. 166 (PUP)	+	+	-	-	T	MP	Mes
168.	*Ficus palmata* Forssk.	Zamir. Bot. 167 (PUP)	+	+	-	-	T	MP	Mes
169.	*Ficus samentosa* Bush: Ham.	Zamir. Bot. 168 (PUP)	-	-	+	+	S	Cli.	Mic
170.	*Morus alba* L.	Zamir. Bot. 169 (PUP)	+	+	-	-	T	MP	Mes
171.	*Morus nigra* L.	Zamir. Bot. 170 (PUP)	+	+	-	-	T	MP	Mes
172.	*Morus laevigata* L.	Zamir. Bot. 171 (PUP)	+	+	-	-	T	MP	Mes
Myrtaceae									
173.	*Eucalyptus camaldulensis* Dehnh.	Zamir. Bot. 172 (PUP)	+	+	+	+	T	MP	Mes
174.	Myr*tus communis* L.	Zamir. Bot. 173 (PUP)	+	+	-	-	T	MP	Mic
Myrsinaceae									

175.	*Myrsine africana* L.	Zamir. Bot. 174 (PUP)	+	+	+	+	S	NP	Na
Nyctaginaceae									
176.	*Boerhavia procumbens* Banks ex Roxb.	Zamir. Bot. 175 (PUP)	-	+	+	-	H	He	Na
177.	*Mirabilis jalapa* L.	Zamir. Bot. 176 (PUP)	-	+	+	-	H	He	Mes
Oleaceae									
178.	*Jasminum humile* L.	Zamir. Bot. 177 (PUP)	+	+	-	-	S	MP	Mic
179.	*Olea europaea* L.	Zamir. Bot. 178 (PUP)	+	+	+	+	T	MP	Mic
180.	*Olea ferruginea* Royle.	Zamir. Bot. 179 (PUP)	+	+	+	+	T	MP	Mic
Onagraceae									
181.	*Oenthera rosea* L' Her.	Zamir. Bot. 180 (PUP)	+	+	+	-	H	Th	Na
Oxalidaceae									
182.	*Oxalis corniculata* L.	Zamir. Bot. 181 (PUP)	-	+	-	-	H	Th	Na
183.	*Oxilis pes-caprae* L.	Zamir. Bot. 182 (PUP)	-	+	+	-	H	Th	Na
Poeoniaceae									
184.	*Poeonia emodi* Wall. ex Royle.	Zamir. Bot. 183 (PUP)	-	+	-	-	H	Cr	Mes
Papaveraceae									
185.	*Corydalis solida* (L.) Clairv.	Zamir. Bot. 184 (PUP)	+	+	-	-	H	He	Mic
186.	*Papaver dulbium* L.	Zamir. Bot. 185 (PUP)	+	+	-	-	H	He	Mes
187.	*Papaver somniferum* L.	Zamir. Bot. 186 (PUP)	+	+	-	-	H	He	Mes
Papilionaceae									
188.	*Astragalus grahamianus* Royle ex Bth.	Zamir. Bot. 187 (PUP)	+	+	-	-	S	NP	Le
189.	*Indigofera heterantha* Wall.	Zamir. Bot. 188 (PUP)	+	+	-	-	S	NP	Le
190.	*Indigofera tinctoria* L.	Zamir. Bot. 189 (PUP)	+	+	-	-	S	NP	Le
191.	*Lathyrus aphaca* L.	Zamir. Bot. 190 (PUP)	+	+	-	-	H	Th	Na
192.	*Lathyrus cicera* L.	Zamir. Bot. 191 (PUP)	+	+	-	-	H	Th	Na
193.	*Lathyrus pratensis* L.	Zamir. Bot. 192 (PUP)	+	+	-	-	H	Th	Na
194.	*Lathyrus sphaericus* Retz.	Zamir. Bot. 193 (PUP)	+	+	-	-	H	He	Mic
195.	*Lathyrus sylvestris* L.	Zamir. Bot. 194 (PUP)	+	+	-	-	H	He	Mic
196.	*Lotus corniculatus* L.	Zamir. Bot. 195 (PUP)	-	+	-	-	H	He	Mic
197.	*Medicago lupulina* L.	Zamir. Bot. 196 (PUP)	+	+	-	-	H	He	Na
198.	*Medicago polmorpha* L.	Zamir. Bot. 197 (PUP)		+	-	-	H	He	Na
199.	*Sophora griffithii* L.	Zamir. Bot. 199 (PUP)	-	+	-	-	S	NP	Le
200.	*Trifolium repens* L.	Zamir. Bot. 200 (PUP)	+	+	-	-	H	Ch	Na
201.	*Vicia hirsuta* (L.) S. F. Gray.	Zamir. Bot. 201 (PUP)	-	+	-	-	H	Th	Na
202.	*Vicia sativa* L.	Zamir. Bot. 202 (PUP)	-	+	-	-	H	Th	Na
203.	*Trifolium alexandrium* L.	Zamir. Bot. 203 (PUP)	+	+	+	-	H	Th	Mic
204.	*Medicago minima* L.	Zamir. Bot. 204 (PUP)	+	+	-	-	H	Th	Na
Plantaginaceae									
205.	*Nanorrhinum ramosissimum* (Wall.)	Zamir. Bot. 205 (PUP)	-	+	-	-	H	Th	Le

206.	*Plantago lanceolata* L.	Zamir. Bot. 206 (PUP)	-	+	-	-	H	Th	Mic
207.	*Plantago major* L.	Zamir. Bot. 207 (PUP)	-	+	-	-	H	Th	Mic
208.	*Veronica polita* Fr.	Zamir. Bot. 208 (PUP)	-	+	-	-	H	Th	Na
Platanaceae									
209.	*Platanus orientalis* L.	Zamir. Bot. 209 (PUP)	+	+	+	+	T	Mp	Mes
Plumbaginaceae									
210.	*Limonium gilesii* (hemsl. and Aitch.) Rech.	Zamir. Bot. 210 (PUP)	-	+	+	-	H	G	Mes
Polygonaceae									
211.	*Bistorta amplexiculis* D. Don.	Zamir. Bot. 211 (PUP)	-	+	-	-	H	Th	Mic
212.	*Rumex dentatus* L.	Zamir. Bot. 212 (PUP)	-	+	-	-	H	Th	Mes
213.	*Rumex hastatus* D. Don.	Zamir. Bot. 213 (PUP)	-	+	-	-	H	Th	Na
214.	*Persicaria hydropiper* (L.) Spa.	Zamir. Bot. 214 (PUP)	-	+	-	-	H	Th	Mic
215.	*Polygonum plebeium* R.Br.	Zamir. Bot. 215 (PUP)	-	+	-	-	H	He	Na
Primulaceae									
216.	*Anagallis arvensis* L.	Zamir. Bot. 216 (PUP)	-	+	-	-	H	Th	Na
217.	*Androsace rotundifolia* Hardw.	Zamir. Bot. 217 (PUP)	-	+	-	-	H	Ch	Na
Punicaceae									
218.	*Punica granatum* L.	Zamir. Bot. 218 (PUP)	+	+	-	-	T	MP	Na
Ranunculaceae									
219.	*Adonis aestivalis* L.	Zamir. Bot. 219 (PUP)	+	+	-	-	H	Th	Mic
220.	*Aquilegia fragrans* L.	Zamir. Bot. 220 (PUP)	+	+	-	-	H	Th	Mic
221.	*Clematis grata* Wall.	Zamir. Bot. 221 (PUP)	-	+	-	-	S	Cli.	Mic
222.	*Ranunculus arvensis* L.	Zamir. Bot. 222 (PUP)	-	+	-	-	H	Th	Na
Rhamnaceae									
223.	*Sageretia thea* (Osbeck) M.C. Johnston.	Zamir. Bot. 223 (PUP)	+	+	-	-	S	NP	Na
224.	*Ziziphus oxyphylla* Edgew.	Zamir. Bot. 224 (PUP)	+	+	-	-	S	NP	Na
225.	*Ziziphus mauritiana* Lam.	Zamir. Bot. 225 (PUP)	+	+	-	-	T	NP	Na
226.	*Ziziphus nummularia* (Burn.f.) Wight and Arn.	Zamir. Bot. 226 (PUP)	+	+	-	-	S	NP	Na
Rosaceae									
227.	*Agrimonia eupatoria* L.	Zamir. Bot. 227 (PUP)	+	+	+	-	H	Th	Mes
228.	*Cotoneaster numularius* Fish. and C.A. M.	Zamir. Bot. 228 (PUP)	+	+	-	-	S	NP	Mic
229.	*Crataegus songarica* K. Koch.	Zamir. Bot. 229 (PUP)	+	+	-	-	T	MP	Mic
230.	*Duchesnea indica* (Andrews) F.	Zamir. Bot. 230 (PUP)	-	+	-	-	H	Th	Mic
231.	*Fragaria nubicola* (Hook.f.) Lindl.	Zamir. Bot. 231 (PUP)	-	+	-	-	H	He	Mic
232.	*Fragaria indica* (Hausskn.)	Zamir. Bot. 232 (PUP)	-	+	-	-	H	He	Mic
233.	*Poterium sanguisorba* L.	Zamir. Bot. 233 (PUP)	+	+	-	-	T	MP	Mes
234.	*Prunus persica* (L.) Batsch.	Zamir. Bot. 234 (PUP)	+	+	-	-	T	MP	Mes

235.	*Prunus armeniaca* L.S	Zamir. Bot. 235 (PUP)	+	+	-	-	T	MP	Mes
236.	*Prunus domestica* L.	Zamir. Bot. 236 (PUP)	+	+	-	-	T	MP	Mes
237.	*Pyrus communis* L.	Zamir. Bot. 237 (PUP)	+	+	-	-	T	MP	Mic
238.	*Pyrus pashia* L.	Zamir. Bot. 238 (PUP)	+	+	-	-	T	MP	Mic
239.	*Rosa brunonii* Lindl.	Zamir. Bot. 239 (PUP)	-	+	-	-	S	NP	Mic
240.	*Rosa indica* L.	Zamir. Bot. 240 (PUP)	-	+	-	-	S	NP	Mic
241.	*Rubus fruticosus* L.	Zamir. Bot. 241 (PUP)	-	+	-	-	S	NP	Mic
242.	*Sorbaria tomentosa* (Lindl.)Rehder.	Zamir. Bot. 242 (PUP)	-	+	-	-	T	MP	Mic
243.	*Spiraea corymbosa* Raf.	Zamir. Bot. 243 (PUP)	+	+	-	-	S	NP	Mac
244.	*Spiraea canescens* D. Don. Prodr.	Zamir. Bot. 244 (PUP)	+	+	-	-	S	NP	Mic
Rubiaceae									
245.	*Gallium aparine* L.	Zamir. Bot. 245 (PUP)	-	+	-	-	H	Th	Le
246.	*Rubia cordifolia* L.	Zamir. Bot. 246 (PUP)	-	+	-	-	H	Cli.	Na
Rutaceae									
247.	*Citrus sinensis* (L.) Osbeck.	Zamir. Bot. 247 (PUP)	+	+	+	+	T	NP	Mic
248.	*Zanthoxylum armatum* DC.	Zamir. Bot. 248 (PUP)	-	+	-	-	T	NP	Mic
Salicaceae									
249.	*Salix tetrasperma* Roxb.	Zamir. Bot. 249 (PUP)	-	+	-	-	T	MP	Mic
250.	*Populous alba* L.	Zamir. Bot. 250 (PUP)	+	+	-	-	T	MP	Mic
Sapindaceae									
251.	*Dodonaea viscosa* (L.) Jacq.	Zamir. Bot. 251 (PUP)	+	+	+	+	S	NP	Mic
Sapotaceae									
252.	*Sideroxylon mascatense* (A. DC.) T.D. Penn.	Zamir. Bot. 252 (PUP)	+	+	+	+	T	MP	Mic
Saxifragaceae									
253.	*Bergenia ciliata* L.	Zamir. Bot. 253 (PUP)	-	+	-	-	H	G	Mes
Scrophulariceae									
254.	*Verbascum erianthum* Benth.	Zamir. Bot. 254 (PUP)	+	+	-	-	H	Th	Mic
255.	*Verbascum Thapsus* L.	Zamir. Bot. 255 (PUP)	+	+	-	-	H	Th	Mes
Simaroubaceae									
256.	*Ailanthus altissima* (Mill.) Swi.	Zamir. Bot. 256 (PUP)	+	+	-	-	T	MP	Mic
Solanaceae									
257.	*Capsicum annum* L.	Zamir. Bot. 257 (PUP)	-	+	+	-	H	NP	Mes
258.	*Datura innoxia* Miller.	Zamir. Bot. 258 (PUP)	+	+	-	-	S	NP	Mes
259.	*Datura stramonium* L.	Zamir. Bot. 259 (PUP)	-	+	+	-	S	NP	Mes
260.	*Hyoscyamus niger* L.	Zamir. Bot. 260 (PUP)	+	+	-	-	H	Th	Na
261.	*Lycopersicon esculentum* (Mill).	Zamir. Bot. 261 (PUP)	-	+	+	-	H	Th	Mes
262.	*Physalis minima* L.	Zamir. Bot. 262 (PUP)	-	+	-	-	H	Th	Mic
263.	*Solanum nigrum* L.	Zamir. Bot. 263 (PUP)	-	+	-	-	H	Th	Mic
264.	*Solanum surattense* Burm. f.	Zamir. Bot. 264 (PUP)	-	+	-	-	H	Th	Mic

265.	*Withania somnifera* (L.) Dunal in DC.	Zamir. Bot. 265 (PUP)	-	+	-	-	H	Ch	Mes
Thymelaeaceae									
266.	*Daphne mucronata* Royle	Zamir. Bot. 266 (PUP)	+	+	-	-	S	NP	Mic
Tiliaceae									
267.	*Grewia optiva* Drum. Ex Burret.	Zamir. Bot. 267 (PUP)	-	+	-	-	T	MP	Mic
Ulmaceae									
268.	*Celtis australis* auct.	Zamir. Bot. 268 (PUP)	+	+	-	-	T	MP	Mic
269.	*Celtis caucasica* Willd.	Zamir. Bot. 269 (PUP)	+	+	-	-	T	MP	Mic
Umbelliferae									
270.	*Coriandrum sativum* L.	Zamir. Bot. 270 (PUP)	+	+	-	-	H	Th	Le
271.	*Foeniculum vulgare* Mill.	Zamir. Bot. 271 (PUP)	-	+	-	-	H	Th	Le
272.	*Ferula jaeschkeana* Vatke in Ind.	Zamir. Bot. 272 (PUP)	-		+	-	H	He	Mac
273.	*Pimpinella diversifolia* DC.	Zamir. Bot. 273 (PUP)	-		+	-	H	He	Le
274.	*Scandix pecten-veneris* L.	Zamir. Bot. 274 (PUP)	-	+	+	-	H	He	Le
275.	*Torilis leptophylla* (L.) Reichb.	Zamir. Bot. 275 (PUP)	-	+	-	-	H	Th	Mic
Urticaceae									
276.	*Debregesia salicifolia* (D.Don) Rendle.	Zamir. Bot. 276 (PUP)	+	+	+	-	S	Np	Mic
277.	*Urtica dioica* L.	Zamir. Bot. 277 (PUP)	+	+	-	-	H	Th	Mic
Valerianaceae									
278.	*Valeriana jatamansi* Jones in Asiat.	Zamir. Bot. 278 (PUP)	-	+	-	-	H	Cr	Mic
Violaceae									
279.	Viola odoranta L.	Zamir. Bot. 279 (PUP)					H	He	Mic
280.	*Viola canscene* L.	Zamir. Bot. 280 (PUP)	+	+	-	-	H	He	Mic
Vitaceae									
281.	*Vitis jacquemontii* Parker.	Zamir. Bot. 281 (PUP)	+	+	-	-	S	Cli.	Mes
282.	*Vitis vinifera* L.	Zamir. Bot. 282 (PUP)	+	+	-	-	S	Cli.	Mes

Keys:
A- Springe, B- Summer, C- Autumn, D- Winter.
1- Habit: Cli: Climbers, **Cr:** Cryptophytes, **Epi:** Epiphytes, **Para:** Parasites
2- Life Form Spectra: Th: Therophytes, **MP:** Megaphanerophytes, **He:** Hemicryptopytes, **Na:** Nanophanerophytes, **Ch:** Chemaephytes, **G:** Gphytes
3- Leaf Size Spectra: Na: Nanophylls **Mic:** Microphylls, **Mes:** Mesophylls **Le:** Leptophylls **Ma:** Macrophylls **Aphy:** Aphyllous

Table 2. Percentage wise representation of genera and species of plants of Rabat Dara Dir Lower

Division	S. No	Families	No. of Species	%	No. of Genera	%
Pteriodophytes	1	**Adiantaceae**	3	1.06	1	0.45
	2	**Aspleniaceae**	2	0.71	2	0.9

	3	**Dryopteridaceae**	1	0.35	1	0.45
	4	**Equisetaceae**	1	0.35	1	0.45
	5	**Marsileaceae**	1	0.35	1	0.45
	6	**Pteridaceae**	1	0.35	1	0.45
	7	**Sinopteridaceae**	1	0.35	1	0.45
Gymnosperms	8	**Cupressaceae**	1	0.35	1	0.45
	9	**Pinaceae**	3	1.06	2	0.9
	10	**Taxaceae**	1	0.35	1	0.45
Monocot	11	**Alliaceae**	3	1.06	1	0.45
	12	**Amaryllidaceae**	2	0.71	2	0.9
	13	**Asparagaceae**	1	0.35	1	0.45
	14	**Convallariaceae**	1	0.35	1	0.45
	15	**Cyperaceae**	3	1.06	2	0.9
	16	**Dioscoreaceae**	2	0.71	1	0.45
Dicot	17	**Iridaceae**	1	0.35	1	0.45
	18	**Liliaceae**	1	0.35	1	0.45
	19	**Poaceae**	18	6.38	16	7.21
	20	**Acanthaceae**	2	0.71	2	0.9
	21	**Amaranthaceae**	4	1.42	3	1.35
	22	**Anacardiaceae**	1	0.35	1	0.45
	23	**Apocynaceae**	2	0.71	2	0.9
	24	**Araliaceae**	2	0.71	1	0.45
	25	**Asclepiadaceae**	2	0.71	2	0.9
	26	**Asteraceae**	27	9.57	22	9.91
	27	**Balsaminaceae**	1	0.35	1	0.45
	28	**Berberidaceae**	2	0.71	1	0.45
	29	**Boraginaceae**	2	0.71	2	0.9
	30	**Brassicaceae**	12	4.26	12	5.41
	31	**Buddlejaceae**	1	0.35	1	0.45
	32	**Buxaceae**	1	0.35	1	0.45
	33	**Cactaceae**	1	0.35	1	0.45
	34	**Campanulaceae**	1	0.35	1	0.45
	35	**Cannabaceae**	1	0.35	1	0.45
	36	**Caprifoliaceae**	1	0.35	1	0.45
	37	**Caryophyllaceae**	3	1.06	3	1.35
	38	**Chenopodiaceae**	3	1.06	1	0.45
	39	**Colchicaceae**	1	0.35	1	0.45
	40	**Convolvulaceae**	1	0.35	1	0.45
	41	**Crassulaceae**	2	0.71	2	0.9
	42	**Cucurbitaceae**	6	2.13	4	1.8
	43	**Cuscutaceae**	1	0.35	1	0.45

	44	**Ebenaceae**	2	0.71	1	0.45
	45	**Euphorbiaceae**	6	2.13	3	1.35
	46	**Fagaceae**	3	1.06	1	0.45
	47	**Fumariaceae**	1	0.35	1	0.45
	48	**Juglandaceae**	1	0.35	1	0.45
	49	**Gentianaceae**	1	0.35	1	0.45
	50	**Geraniaceae**	2	0.71	1	0.45
	51	**Hippocastanceae**	1	0.35	1	0.45
	52	**Hydrangeaceae**	1	0.35	1	0.45
	53	**Hyperiaceae**	1	0.35	1	0.45
	54	**Lamiaceae**	12	4.26	12	5.41
	55	**Leonticaceae**	1	0.35	1	0.45
	56	**Loranthaceae**	1	0.35	1	0.45
	57	**Malvaceae**	2	0.71	2	0.9
	58	**Meliaceae**	1	0.35	1	0.45
	59	**Mimosaceae**	2	0.71	1	0.45
	60	**Moraceae**	7	2.48	3	1.35
	61	**Myrsinaceae**	1	0.35	1	0.45
	62	**Myrtaceae**	2	0.71	2	0.9
	63	**Nyctaginaceae**	2	0.71	2	0.9
	64	**Oleaceae**	3	1.06	2	0.9
	65	**Onagraceae**	1	0.35	1	0.45
	66	**Oxalidaceae**	2	0.71	1	0.45
	67	**Papaveraceae**	3	1.06	2	0.9
	68	**Papilionaceae**	18	6.38	9	4.05
	69	**Plantaginaceae**	4	1.42	3	1.35
	70	**Platanaceae**	1	0.35	1	0.45
	71	**Plumbaginaceae**	1	0.35	1	0.45
	72	**Poeoniaceae**	1	0.35	1	0.45
	73	**Polygonaceae**	5	1.77	4	1.8
	74	**Primulaceae**	2	0.71	2	0.9
	75	**Punicaceae**	1	0.35	1	0.45
	76	**Ranunculaceae**	4	1.42	4	1.8
	77	**Rhamnaceae**	4	1.42	2	0.9
	78	**Rosaceae**	18	6.38	12	5.41
	79	**Rubiaceae**	2	0.71	2	0.9
	80	**Rutaceae**	2	0.71	2	0.9
	81	**Salicaceae**	2	0.71	2	0.9
	82	**Sapindaceae**	1	0.35	1	0.45
	83	**Sapotaceae**	1	0.35	1	0.45
	84	**Saxifragaceae**	1	0.35	1	0.45

	85	**Scrophulariceae**	2	0.71	1	0.45
	86	**Simaroubaceae**	1	0.35	1	0.45
	87	**Solanaceae**	9	3.19	7	3.15
	88	**Thymelaeaceae**	1	0.35	1	0.45
	89	**Tiliaceae**	1	0.35	1	0.45
	90	**Ulmaceae**	2	0.71	1	0.45
	91	**Umbelliferae**	6	2.13	6	2.7
	92	**Urticaceae**	2	0.71	2	0.9
	93	**Valerianaceae**	1	0.35	1	0.45
	94	**Violaceae**	2	0.71	1	0.45
	95	**Vitaceae**	2	0.71	1	0.45
			282		222	99.95

Seasonality

The seasonality show, spring is the most dominant season, with 213 species (75.75%) followed by summer with 150 species (54.19%. While autumn has 70 species, (24.82%) and winter is the least represented season, has 41 species, accounting for 14.53 % of the total count (Table. 3)

Table 3. Seasonal variation of plants of Rabat Dara Dir Lower

Seasonality	No. of Spp.	Percentage
Spring	213	75.75
Summer	150	53.19
Autumn	70	24.82
Winter	41	14.53

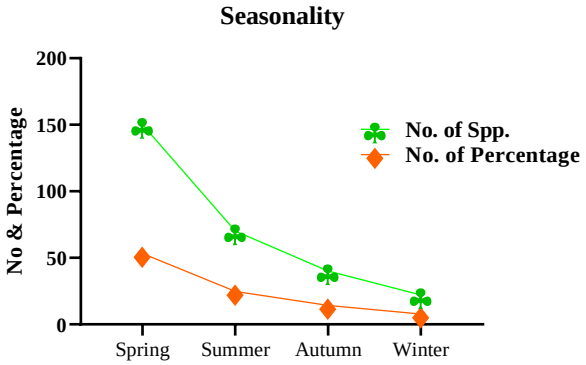

Fig 1. Seasonal variation

Habit

The habit of the flora of Rabat Dara Dir Lower. Herbs account for the highest number of species, with 191 species (67.73%) followed by Trees have 47 species (16.67%) while Shrubs consist of 44 plant species 9 15.60%) of the total (Table. 4). Similar result finding Rahman *et al.* (2022) report Herbs were the dominant plant habit in his research area and Khan *et al.* (2017) also investigated in his research work that Herb dominant Habit of plant species followed by tree and shrubs 108, 50, and 45 species respectively. The finding of Hazrat *et al.* (2020) strongly support

my result which also reported from Hindukush Range, located in Northern pakistan that 115 plant species of herb 27, of shrub, 18 plant species of trees.

Table 4. Habit of plants of Rabat Dara Dir Lower

Habit	No. of Spp.	No. of Percentage
H	191	67.73
S	44	15.60
T	47	16.67
Total	**282**	**100.00**

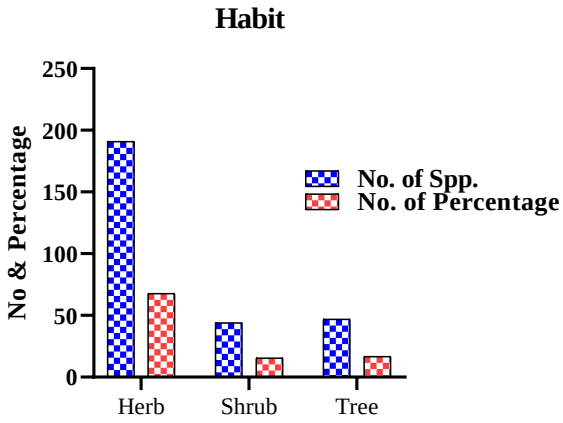

Fig 2. Plant Habit Class

Life Form

When it comes to life forms, therophytes are the most dominant, comprising 115 species or 40.78% of the total. Megaphanerophytes account for 44 species, equivalent to 15.60% of the total. Hemicryptopytes and nanophanerophytes have similar numbers, with 45 and 36 species respectively, representing 15.96% and 12.77% of the total. Chemaephytes and geophytes each have 14 species, contributing 4.96% to the total count. Climbers are represented by 9 species, accounting for 3.19%. Cryptophytes, epiphytes, and parasites have the lowest representation, with 3 species each, representing 1.06%, 0.35%, and 0.35% respectively (Table. 5). Several studies have examined the floristic diversity of various regions in Pakistan which show similarity to my finding including Babi *et al.* (2016) conducted research along the Peshawar to Charsadda Motorway and found Theorophytes and Microphyll life forms prevalent in the area. Hussain *et al.* (2020) focused on the Koh-e-Safaid Range near the Pak-Afghan border. My findings are in similar with the outcomes of Ibrahim *et al.* (2019), Idress *et al.* (2021), Hazrat *et al.* (2020), and Khan *et al*. (2019), who investigated the floristic diversity of Bannu District, Mandan, Pakistan. Their studies also revealed a dominance of Therophytes, followed by micro-phanerophytes and nanophylls in the region.

Table 5. Life form of plants of Rabat Dara Dir Lower.

Life Form	No. of Spp.	Percentage
Therophytes	115	40.78
Megaphanerophytes	44	15.60
Hemicryptopytes	45	15.96
Nanophanerophytes	36	12.77
Chemaephytes	14	4.96
Gphytes	14	4.96
Climbers	9	3.19
Cryptophytes	3	1.06
Epiphytes	1	0.35
Parasites	1	0.35
Total	**282**	**100.00**

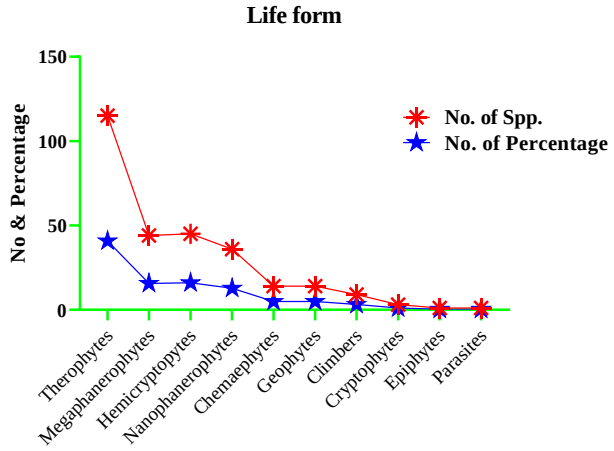

Fig 3. Raunkarian Life form class

Leaf Size Spectra

The life-size spectrum analysis revealed a clear dominance of Microphylls with 114 species, accounting for 25.89% of the total. Following closely were Nanophylls with an equal number of 114 species, also constituting 25.89%. Mesophylls accounted for 52 species, making up 18.44% of the spectrum, while Leptophylls represented 32 species, contributing 11.35%. There were 10 species of Macrophylls, making up 3.55% of the spectrum, and only 1 species of Aphyllous, representing a minor 0.35% (Table.6). Similar result investigated Shah *et al*. (2021) worked on the flora of District Charsadda and reported that dominated leaf size spectra was Microphylls follow by Megaphyll, and Mesophylls. Asif *et al*. (2020) explored the floristic composition of Balakot, District Mansehra, Pakistan. They investigated that microphyll dominant life size class in the study area. Khan *et al.* (2022) also study the flora of Marghuzar Valley of Swat, Pakistan.They reported of research areamicrophylls dominant life size. My finding strongly support by Bibi *et al*. (2019), Ibrahim *et al.* (2019), Hazrat et al. (2020), Khan *et al.* (2019) and Haq *et al.* (2021) explored the floristic composition of Pashat Valley, Bajure and investigated that Microphylls was the leading leaf size in study area.

Table 6. Leaf size of plants of Rabat Dara Dir Lower.

Leaf Spectra	No. of Spp.	Percentage
Nanophylls	73	25.89
Microphylls	114	40.43
Mesophylls	52	18.44
Leptophylls	32	11.35
Macrophylls	10	3.55
Aphyllous	1	0.35
Total	**282**	**100**

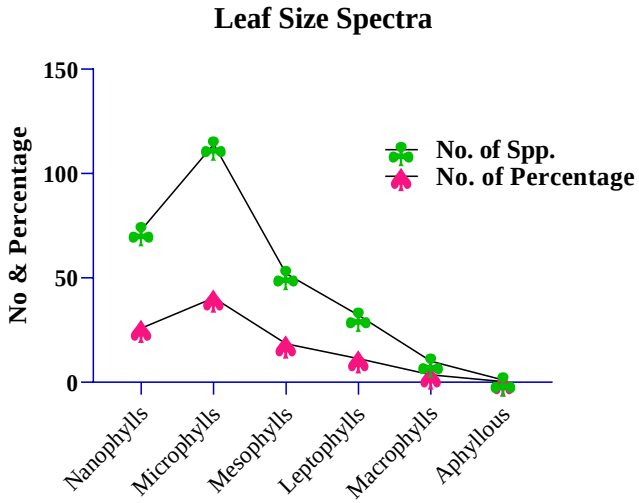

Fig 4. Life size class

Discussion

To compare and discus my current results. The results indicate that in the studied ecosystem, spring is the most dominant season for plant species, followed by summer, autumn, and winter. This pattern aligns with the seasonal variations in temperature and precipitation, which play crucial roles in the growth and reproductive cycles of plants. These findings are consistent with similar studies conducted in various regions of Pakistan. A study by Khan *et al.* (2018) conducted in a mountainous region of Pakistan found that spring had the highest species richness, with a wide range of flowering plants emerging during this season. This is attributed to the favorable climatic conditions, including moderate temperatures and increased availability of water resources. The study also reported a decline in species diversity during winter due to the harsh climatic conditions, which limited the growth and survival of many plant species. Another study by Ahmed *et al.* (2019) worked on the vegetation dynamics in the arid regions of Pakistan. The findings revealed a similar dominance of spring and summer species, highlighting the significance of these seasons for plant growth and reproduction. The researchers attributed this pattern to the intermittent rainfall during these periods, which provided the necessary moisture for plants to thrive in the arid environment. Malik *et al*. (2019) conducted in the Indus River Basin of Pakistan reported similar results, with spring having the highest species richness. The researchers attributed this dominance to the availability of water resources and favorable temperatures during this season, which promote plant growth and flowering. The study also noted that summer had a relatively high number of species, which could be attributed to the monsoonal rainfall in some regions of the

country. Another study by Ahmed *et al.* (2020) focused on the seasonality patterns of plant species in the Northern Areas of Pakistan. The findings revealed a similar trend, with spring having the highest species diversity and abundance. The researchers attributed this pattern to the melting of snow and the onset of favorable environmental conditions during this season. The study also highlighted the importance of considering seasonality in conservation planning and management strategies for plant species in the region.

The results indicate that herbs are the most rich plant habit, followed by shrubs, trees respectively. This finding is reliable with studies showed in various regions of Pakistan. For instance, a study by Akhtar *et al.* (2017) conducted in the Margalla Hills National Park found that herbs dominated the plant community, representing the highest percentage of species. The researchers attributed this dominance to the adaptability of herbs to the park's diverse habitats and climatic conditions. Khan *et al.* (2016) conducted in the Murree Hills of Pakistan found a dominance of herbaceous plants in the region. The researchers attributed this to the favorable climate and soil conditions that support the growth and proliferation of herbaceous species.

Regarding life forms, therophytes were found to be the most dominant, followed by megaphanerophytes, hemicryptophytes, and nanophanerophytes. These results align with studies conducted in different ecosystems across Pakistan. For example, a study by Hussain *et al.* (2016) conducted in the Himalayan region of Pakistan reported similar trends, with therophytes being the most abundant life form. The researchers suggested that the occurrence of therophytes in this region could be qualified to their capability to complete their life cycles rapidly during the short growing season. A study by Shah *et al.* (2018) conducted in the Swat Valley of Pakistan described a great richness of therophytes in the region. The researchers linked this to the disturbed habitats and frequent disturbances, such as agriculture and grazing, which favor the establishment of therophytic species.

In terms of leaf spectra, nanophylls and microphylls were the most common categories. Although specific studies focusing on leaf spectra in Pakistan could not be referenced, similar patterns have been observed in other studies worldwide. For example, a study by Chalcoff *et al.* (2019) conducted in the Andean Patagonian forest of Argentina found a high prevalence of nanophylls and microphylls among the plant species. The researchers associated this pattern with the adaptations of these leaf types to nutrient-poor and arid environments. Cornelissen *et al.* (2003) conducted in multiple locations worldwide found a prevalence of small-leaved species in nutrient-poor environments. This could be attributed to their efficient resource allocation and water conservation strategies. Khan *et al.* (2017) worked on the plant communities in the Kaghan Valley of Pakistan. The researchers recognized various life forms and leaf spectra categories to understand the composition and dominance of different species. Ahmed *et al.* (2019), the authors investigated the vegetation structure and diversity of the Cholistan Desert in Pakistan. They assessed different life forms and leaf spectra categories to determine the distribution patterns and dominance of plant species in the desert ecosystem. Qureshi *et al.* (2015) explored the phytosociology and ecological features of the Margalla Hills National Park in Pakistan. The researchers examined different life forms and leaf spectra categories to analyze the plant diversity and community structure within the park.

CONCLUSION

In conclusion, the data presented on the floristic composition in Rabat Dara, Lower Dir, KP, Pakistan provides a comprehensive overview of the diverse plant species found in the region and their various uses. The floristic composition analysis reveals that Rabat Dara is home to a wide range of plant species belonging to different families. The Asteraceae family has the highest representation, followed by Poaceae, Papilionaceae, and Rosaceae. Several other families also contribute significantly to the total flora, showcasing the high degree of floral diversity in the region. In terms of seasonality, spring is the dominant season, followed by summer, autumn, and winter. This indicates the importance of seasonal variations in the region's plant life and highlights the significance of spring as a period of high plant activity. Regarding habit, herbs are the most common plant type in Rabat Dara, followed by shrubs and trees. Herbs have medicinal and culinary uses, while shrubs are utilized for ornamental purposes and as a source of firewood or fodder. Trees provide various resources such as timber, fruits, shade, and habitat for wildlife, highlighting their ecological significance. The life form analysis shows that therophytes, which are annual plants with a short life cycle, are the most dominant, followed by megaphanerophytes, hemicryptopytes, and nanophanerophytes. Each life form has its own ecological characteristics and adaptations, contributing to the overall biodiversity of the region. The leaf size spectra analysis reveals that nanophylls and microphylls are the most common leaf types, followed by mesophylls and leptophylls. This information provides insights into the plant's ecological strategies and adaptation to the local environment.

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