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Floristic diversity and vegetation analysis of sharis valley, hajjah governorate, West of Yemen

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Abstract
This paper presents the result of a study on the diversity of different plant species habit and their occurrence found in Sharis valley of Hajjah governorate in Yemen. This study is first of its kind conducted in the district showing current status of the plant diversity. In present study, a total of 298 plant species belonging to 219 genera under 75 families have been recorded from this area. The study also acknowledge the ecological balance is being disturbed due to the very quickly rise in the human population and their increased demand for more utilization of natural resources. Therefore the proper knowledge of plant diversity could play important role in planning for conservation and sustainable use of available resources. In the study area, there 10 dominant families according to the number of species collected are: Asteraceae is represented by the highest number of species (34 species, 28 genera) followed by Fabaceae (26 species, 17 genera), Poacese (16 species, 13 genera), Euphorbiaceae (16 species, 6 genera), Lamiaceae (14 species, 9 genera), Solanaceae (12 species, 8 genera), Acanthaceae (11 species, 9 genera), Asclepiadaceae (8 species, 7 genera), Amaranthaceae (8 species, 6 genera), and Apocynaceae (5 species, 4 genera).

Keywords: floristic survey, plant diversity, vegetation, wild plants. sharis district, yemen

1. Introduction
Recently, there is a global interest in the biodiversity in the world, since the natural resources, particularly the wild plants which regarded as a vital component of many countries natural wealth.

The floristic study of an area is considered as a cornerstone for any other biological ones particularly those of biodiversity [19, 27]. Vegetation and flora of any area are not fixed up. They change from time to time. Various ecological factors, mostly biotic, change the floristic components and the vegetation type. The total number of species may be changed; dominant species may be replaced with other species; the floristic composition, i.e. family و genus, species ratio may be changed [18].

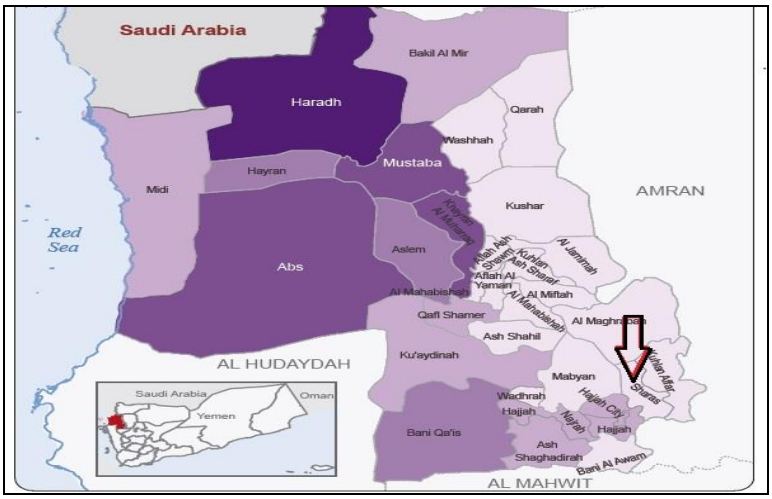
Valleys represent one of the most predominant desert landforms, exhibiting physiographic irregularities, which are responsible for the corresponding variations in species distribution [15]. Life-form distribution is significantly related to the topography and landform [28]. In addition, the vegetation of the Valley is not relatively stable and varies from year to year depending upon humidity levels [25]. Moreover, several factors such as geographical place, physiographic position, and human influence affect the establishment, growth, regeneration, and distribution pattern of the plant communities in the valleys [1, 5, 24].

Yemen occupies an area about 527,970 square kilometers in the south and southwestern part of the Arabian Peninsula. It lies between latitude "12° 40 - 17° 26" north and longitude "24° 30 - 46° 31" east. It is boarded by Saudi Arabia from the north, Sultanate Oman and Rub ´Al-Khali Desert from the east, Arabian Sea and Gulf of Aden from the south and the Red Sea from the west. Fig (1). Yemen is a generally mountainous country. The altitudinal range extends from sea level up to 3760 meters at mountain Al-Nabi Shauib, the highest point in the Arabian Peninsula. Such altitudinal variation results in a great diversity in climates and landscapes. It is characterized by a rich variety of natural habitats, species and genetic diversity, including many endemic species. These Resources are of major economic importance because of their potential for tourism and the wildlife and fisheries they support. Also, numerous plants are used in traditional medicine, in local industries, and for grazing and fuel wood. However, in recent decades human activity has transformed the landscape and over- exploited available biological resources, which resulted the deterioration of many habitats, in major reduction in plant species, and in extinction of endemic rare, and endangered species.

The basin of Sharis Valley is located in the west of Yemen, in the east and the northern-east of Hajjah governorate in Sharis district. It extends from its tributaries that are located in the north of Maswar area in Amran governorate, passing through Sharis district until its end point in Hossan area – Al-Magrabah district– Hajjah governorate the area where it joins Moore Valley. The valley is about 51 km length. It is one of the most important tributaries of Moore Valley which is one of the largest valleys in Yemen flowing into the Red Sea. Fig (2). Geographically, it is located between latitudes (15˚ 36' 36" north and 13˚ 20' 21" north) and between longitudes (33˚ 43' east, and longitude 45˚ 43' east) [7]. The study area is characterized by a topographical, climatic, and environmental contrast and diversity. From the high mountains to the Valleys located below sea level, which form typical natural shelters for the wild plants. This means that the diversity of the elements of the natural environment of the study area (topography - climate - soil - a variety of activities) is reflected on the plant biodiversity; therefore some patterns of different plant environments are resulted.

***Source*:** http://www.maphill.com/yemen/location-maps/flag-map/satellite-outside/

Fig 1: showing location of Yemen.



***Source*:** https://reliefweb.int/map/yemen/yemen-operational-presence-district-level-hajjah-governorate-november-2013).

Fig 2: showing location of Sharis district.

2. Materials and methods

This study was performed in Sharis district from September 2015 to April 2016 during active plant growth period, when most species were expected to be present. The wild vegetation was sampled in 9 localities including the different Mountain tributaries; in each locality, the present species were recorded. The collected plant specimens were identified and named according to the available taxonomic and floristic literature; [4, 6, 8, 9, 10 & 11, 12, 13, 14, 16, 17, 20, 21, 22, 23, 26]. Voucher specimens were prepared in the form of herbarium and deposited in Herbarium of Hajjah, Department of Biology, Hajjah University, Hajjah Governorate, Yemen.

3. Results and discussion

Tables 1 & 2 showed the plant species recorded in the different surveyed localities of Sharis valley, which were carried out during the period from 2015 to 2016. A total number of 298 species of plants belonging to 219 genera under 75 families have been recorded from two plant groups; these are pteridophytes with 8 species, angiosperm with 290 species; monocotyledonous represent with 37 species and dicotyledonous represent with 253 species. Figure-3.

Table 1: Distribution of plant groups in the study area.

Plant group		Families		Genera		Species	
		No. of Families	% of Total	No. of Genera	% of Total	No. of Species	% of Total
Pteridophyta		4	5.33%	7	3.2%	8	2.68%
Magnoliophyta	Dicots	60	80 %	185	84.5%	253	84.90%
	Monocots	11	14.67%	27	12.3%	37	12.42%
Total		75	100%	219	100%	29*8*	100%

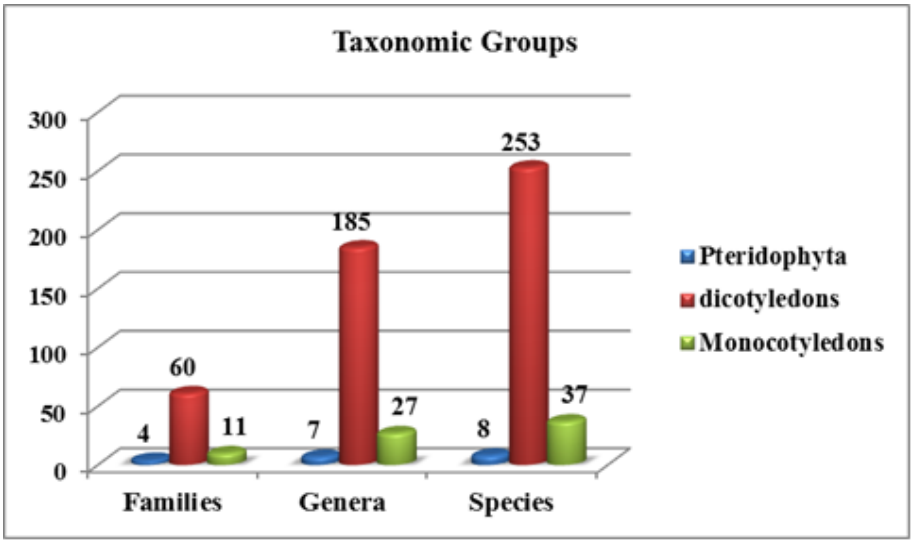


Fig 3: The main plant group in the study area (in numbers).

Table 2: A list of the species recorded in the study area with their families and number of genera and species.

	Botanical Name (Species)	Family	Genera	Species
1.	*Acanthus arboreus* Frossk.	Acanthaceae	9	11
2	*Asystasia gangetica* (L.) T. Anders.			
3	*Barleria bispinosa* (Forssk) Vahl.			
4	*Barleria trispinosa* (Forssk) Vahl.			
5	*Blepharis ciliaris* (L.) B.L.			
6	*Crossandra johanninae* Fiori.			
7	*Ecbolium viride* (Forssk.)Alston.			
7	*Hypoestes forsskaolii* (Vahl) R.Br.			
8	*Justicia flava* (Vahl)Vahl			
9	*Justicia odora* (Forssk.) Lam.			
10	*Dicliptera paniculata* (Forssk.) I. Darbysh.			
11	*Agave sisalana* Perrine.	Agavaceae	1	1
12	*Lampranthus aureus* (L.) N.E.Br.	Aizoaceae	1	1
13	*Allium cepa* L.	Alliaceae	1	3
14	*Allium ampeloprasum* L.			
15	*Allium sativum* L.			
16	*Achyranthes aspera* L.	Amaranthaceae	6	8
18	*Aerva javanica* L.			
19	*Alternanthera pungens* Kunth.			
20	*Amaranthus hybridus* L.			
21	*Amaranthus spinosus* L.			
22	*Amaranthes viridis* L.			
23	*Celosia argentea* L.			
24	*Pupalia lappacea* (L.) Juss.			
25	*Scadoxus multiflorus* (Martyn) Raf.	Amaryllidaceae	1	1
26	*Mangifera indica* L.	Anacardiaceae	2	2
27	*Ozoroa insignis* Delile.			
28	*Adenium obesum* (Forssk.)Roem.	Apocynaceae	5	5
29	*Carissa spinarum* L.			
30	*Catharanthus roseus* (L.) G. Don.			
31	*Nerium oleandar L.*			
32	*Cascabela thevetia* (L.) Lippold.			
33	*Phoenix caespitosa* Chiov.	Arecaceae	1	2
34	*Phoenix dactylifera* L.			
35	*Aristolochia bracteolate* Lam.	Aristolochiaceae	1	1
36	*Calotropis procera* (Aiton) W.T.Aiton.	Asclepiadaceae	7	8
37	*Ceropegia arabica* H.Huber.			
38	*Ceropegia rupicola* Defl.,Voy.			
39	*Caralluma penicillata* (Defl.) N.E.Br.			
40	*Glossonema varians* Benth. ex Hoold.			
41	*Gomphocarpus fruticosus* (L.)R.Br. & Ait.f.			
42	*Kanahia laniflora* (Forssk.)R.Br.			
43	*Cynanchum viminale* (L.) L., Mant.			
44	*Asparagus africanus* Lam.	Asparagaceae	3	3

45	*Albuca abyssinica* Jacq.			
46	*Sansevieria ehrenbergii* Schweinf. ex Bak.			
47	*Aloe rivierei* Lavr. & Newton.*	Xanthorrhoeaceae	1	4
48	*Aloe rubroviolacea* Schweinf.**			
49	*Aloe sabaea* Schweinf.**			
50	*Aloe vera* (L.)Burm.f.			
51	*Asplenium adiantum-nigrum* L.	Aspleniaceae	2	2
52	*Ceterach officinarum* Willd.			
53	*Anthemis cotula* L.	Asteraceae	28	34
54	*Artemisia abyssinica* Sch. Bip. ex Oliv. & Hiern.			
56	*Bidens biternata* (Lour.) Merr.			
57	*Calendula tripterocarpa* Rupr.			
58	*Centaurea pallescens* Del.			
59	*Centaurothamnus maximus* (Forssk.)Wagen.& Dittr.**			
60	*Glebionis coronaria* (L.) Cass. ex Spach.			
61	*Cirsium vulgare* (Savi) Ten.			
62	*Conyza pyrrhopappa* Sch. Bib.			
63	*Echinops spinosissimus* Turra.			
64	*Eclipta prostrata (L.)L*			
65	*Flaveria trinerva* (Spreng.) Mohr.			
66	*Helichrysum foetidum* L.			
67	*Kleinia odora (*Forssk.) DC.			
68	*Kleinia pendula* Forssk.			
69	*Lactuca serriola* L.			
70	*Tripteris vaillantii* Decne.			
71	*Parthenium hysterophorus* L.			
72	*Phagnalon stenolepis* Chiov.			
73	*Psiadia punctulata* (DC.) Vatke.			
74	*Pulicaria jaubertii* Gamal-Eldin.			
75	*Pulicaria petiolaris* Jaub & Spach.			
76	*Pulicaria undulata* (L.) C.A.Mey.			
77	*Senecio hadiensis* Forssk.			
78	*Senecio lyratus* Forssk			
79	*Sonchus oleraceus* L.			
80	*Tagetes minuta.* L.			
81	*Tagetes erecta* L.			
82	*Taraxacum campylodes* G.E.Haglund.			
83	*Tridax procumbens* L.			
84	*Vernonia leopoldii* Vatke.			
85	*Volutaria abyssinica* (A.Rich.) C. Jeffery.			
86	*Xanthium spinosum* L.			
87	*Xanthium strumarium* L.			
88	*Tecoma stans* (L.) H.B.K.	Bignoniaceae	1	1
89	*Alkanna orientalis* (L.) Boiss.	Boraginaceae	4	4
90	*Cordia africana* Lam.			
91	*Ehretia cymosa* Thonn.			
92	*Heliotropium longiflorum* (A.DC.) Steud. & Hochst. ex Bunge.			
93	*Capparis cartilaginea* Decne.	Capparaceae	1	2
94	*Capparis spinosa* L.			
95	*Diplotaxis erucoides* L.DC.			
96	*Diplotaxis tenuifolia* (L.) DC.	Brassicaceae	2	4
97	*Sisymbrium erysimoides* Desf.			
98	*Sisymbrium irio* L.			
99	*Commiphora habessinica* (O.Berg.) Engl.	Burseraceae	1	1
100	*Opuntia dillenii* (Ker-Gawl.) Haw.	Cactaceae	1	2
101	*Opuntia ficus-indica* (L.) Mill.			
102	*Campanula edulis* Forssk.	Campanulaceae	1	1
103	*Carica papaya* L.	Caricaceae	1	1
104	*Dianthus strictus* Banks & Soland.	Caryophyllaceae	2	2
105	*Silene colorata* Poiret.			
106	*Catha edulis* (Vahl) Forssk.	Celastraceae	2	2
107	*Maytenus senegalensis* (Lam.) Exell.			
108	*Chenopodium murale* L.	Chenopodiaceae	2	4
109	*Chenopodium opulifolium* Schrad. ex Koch & Ziz.			

110	*Chenopodium vulvaria* L.			
111	*Salsola imbricata* Forssk.			
112	*Cleome angustifolia* Forssk..	Cleomaceae	1	1
113	*Commelina africana* L.	Commelinaceae	3	4
114	*Commelina albescens* Hassk.			
115	*Cyanotis nyctitiropa* Defl**			
116	*Tradescantia zebrine* Boiss.			
117	*Convolvulus arvensis* L.	Convolvulaceae	3	5
118	*Ipomoea eriocarpa* R.Br.			
119	*Ipomoea obscura* (L.) Ker Gawl.			
120	*Ipomoea purpurea* (L.) Roth.			
121	*Seddera arabica* (Forssk.) Choisy.			
122	*Bryophylum delagoense* (Eckl. & Zeyh.) Druce.	Crassulaceae	2	2
123	*Umbilicus horizontalis* (Guss.) DC.			
124	*Citrullus colocynthis* (L.) Schrad.	Cucurbitaceae	4	4
125	*Coccinia grandis* (L.)Voigt.			
126	*Cucumis prophetarum* L.			
127	*Cucurbita pepo* L.			
128	*Cyperus rotundus* L.	Cyperaceae	1	1
129	*Scabiosa columbaria* L.	Dipsacaceae	1	1
130	*Dryopteris schimperiana* (A.Br.) C.Chr.	Dryopteridaceae	1	1
131	*Acalypha ciliata* Forssk.	Euphorbiaceae	6	16
132	*Acalypha fruticosa* Forssk.			
134	*Acalypha indica* L.			
135	*Chrozophora oblongifolia* (Del.) Juss.			
136	*Chrozophora tinctoria* Ad. juss.			
137	*Clutia lanceolata* Forssk.			
138	*Euphorbia ammak* Schweinf. **			
139	*Euphorbia cactus* Ehrenb.			
140	*Euphorbia granulata* Forssk.			
141	*Euphorbia heterophylla* L.			
142	*Euphorbia helioscopia* L.			
143	*Euphorbia hirta* L.			
144	*Euphorbia inarticulate* Schweinf. **			
145	*Euphorbia triaculeata* Forssk.			
146	*Jatropha curcus* L.			
147	*Ricinus communis* L.			
148	*Acacia ehrenbergiana* Hayne.	Fabaceae	17	26
149	*Acacia etbaica* Schweinf.			
150	*Acacia mellifera* (Vahl)Benth.			
151	*Acacia origena* Wood.			
152	*Acacia tortilis (*Forssk.) Hayne.			
153	*Alhagi maurorum* Medik., Vorl.			
154	*Cadia purpurea* (Picc.) Ait.			
155	*Ceratonia siliqua* L.			
156	*Crotalaria emarginella* Vatke.			
157	*Crotalaria retusa* L.			
158	*Delonix regia* (Boj.) Raf.			
159	*Dolichos trilobus* L.			
160	*Indigofera arabica* Jub. Spach.			
161	*Indigofera spinosa* Forssk.			
162	*Lotus quinatus* (Forssk.) Gillent.			
163	*Parkinsonia aculeata* L.			
164	*Pterolobium stellatum* (Forssk.) Brenan.			
165	*Prosopis juliflora* (S.W.) DC.			
166	*Rhynchosia variegata* (Deflers) Wood.			
167	*Senna alexandrina* Miller, Gard.			
168	*Senna occidentalis* (L.) Link.			
169	*Senna sophera* (L.) Roxb.			
170	*Tephrosia apollinea* (Del.) DC.			
171	*Trigonella anguina* Del.			
172	*Trigonella hamosa* L.			
173	*Vigna ungiculata (*L.) Walp.			
174	*Fumaria parviflora* Lam.	Fumariaceae	1	1
175	*Erodium cicutarium* (L.) L.`Her.	Geraniaceae	2	3
176	*Erodium malacoides (*L.) Willd.			
177	*Geranium arabicum* Forssk.			
178	*Hypericum revolutum* Vahl.	Hypericaceae	1	1

179	*Rumulea fischeri* Pax. Bot.	Iridaceae	1	1
180	*Lamium amplexicaule* L.	Lamiaceae	9	14
181	*Leucas glabrata* (Vahl) R. Br.			
182	*Leucas martinicensis* R. Br.			
183	*Leucas urticifolia* (Vahl) R. Br.			
184	*Micromeria imbricata* (Forssk.) Christ.			
185	*Mentha longifolia* (L.) Huds.			
186	*Nepeta deflersiana* (Schweinf. ex) Hedge.**			
187	*Ocimum forskolei* Benth.			
188	*Ocimum basilicum* L.			
189	*Ocimum spicatum* Defl.			
190	*Otostegia fruticosa* (Forssk.) Schweinf.			
191	*Plectranthus barbatus* Andrews.			
192	*Plectranthus scutellarioides* (L.) R. Br.			
193	*Rosmarinus officinalis* L.			
194	*Abutilon pannosum* (Forrsk.) Schlechl.	Malvaceae	5	7
195	*Alcea rosea* L.			
196	*Hibiscus deflersii* Schweinf.			
197	*Hibiscus rosa-sinensis* L.			
198	*Hibiscus vitifolius* L.			
199	*Malva parviflora* L.			
200	*Pavonia hildebrandtii* Gurke ex Ulbr.			
201	*Trichilia emetica* Vahl.	Meliaceae	1	1
202	*Ficus carica* L.	Moraceae	2	6
203	*Ficus cordata* Thunb, Diss.			
204	*Ficus microcarpa* L.			
205	*Ficus sycomorus* L.			
206	*Ficus vasta* Forssk.			
207	*Morus nigra* L.			
208	*Musa paradisiaca* L.	Musaceae	1	1
209	*Eucalyptus camaldulensis* Behnh.	Myrtaceae	1	1
210	*Boerhavia boissieri* Heimerl.	Nyctaginaceae	4	6
211	*Boerhavia diffusa* L.			
212	*Boerhavia plumbaginea* Cav. Icon.			
213	*Bougainvillea spectabilis* Willd.			
214	*Commicarpus grandiflorus* (A. Rich.) Standl.			
215	*Mirabilis jalapa* L.			
216	*Jasminum grandiflorum* L.	Oleaceae	2	2
217	*Olea europaea* L.			
218	*Oxalis corniculata* L.	Oxalidaceae	1	2
219	*Oxalis latifolia* Kunth.			
220	*Argemone mexicana* L.	Papaveraceae	2	3
221	*Argemone ochrileuca* Sweet. Brit.			
222	*Papaver somniferum* L.			
223	*Adiantum capillus-veneris* L.	Pteridaceae	3	4
224	*Adiantum incisum* Forsskal.			
225	*Pteris vittata* L.			
226	*Actiniopteris semiflabellata* Pichi-Sermolli.			
227	*Plantago afra* L.	Plantaginaceae	1	3
228	*Plantago lanceolata* L.			
229	*Plantago major* L.			
230	*Plumbago zeylanica* L.	Plumbaginaceae	1	1
231	*Arundo donax* L.	Poaceae	13	16
232	*Avena sterilis* L.			
233	*Bothriochloa insculpta* (Hochst. ex A. Rich.) Linn.			
234	*Brachiaria leersioides* (Hochst.) Stapf in Prain.			
235	*Cynodon dactylon* (L.) Pers.			
236	*Dactyloctenium aegyptium* (L.) P. Willd.			
237	*Digitaria velutina* (Forssk.) P. Beauv.			
238	*Eragrostis barrelieri* Daveau, Bull.			
239	*Helictotrichon arctum* Cope. *			
240	*Pennisetum divisum* (J.F. Gmel.) Henrard, Blumea.			
241	*Pennisetum glaucum* (L.) R. Br.			
242	*Pennisetum setaceum* (Forssk.) Chiov.			
243	*Setaria pumila* (Poir.) Roem.			

244	*Setaria verticillata* (L.)P. Beaur.			
245	*Sorghum bicolor* (L.) Moench.			
246	*Tragus racemosus* L.			
247	*Polygala abyssinica* R.Br.ex Fresen.	Polygalaceae	1	2
248	*Polygala tinctoria* Vahl.			
249	*Rumex nervosus* Vahl.	Polygonaceae	1	1
250	*Portulaca oleracea* L.	Portulacaceae	1	1
251	*Punica granatum* L.	Punicaceae	1	1
252	*Anagallis foemina* Miller.	Primulaceae	1	1
253	*Reseda alba* L.	Resedaceae	1	2
254	*Reseda sphenocleoides* Defl.**			
255	*Ziziphus spina-christi* (L.) Willd.	Rhamnaceae	1	1
256	*Rosa abyssinica* R.Br. ex Lindl.	Rosaceae	3	4
257	*Rosa chinensis* Jacq.			
258	*Rubus arabicus* (Defl.) Schweinf.*			
259	*Malus sylvestris* Miller.			
260	*Breonadia salicina* (Vahl) Hepper & J.R.I.Wood.	Rubiaceae	3	3
261	*Coffea arabica* L.			
262	*Pentas lanceolata* (Forssk.) Benth. & Hook.			
263	*Citrus aurantifolia* (Christum) Swingle.	Rutaceae	2	4
264	*Citrus limon* (L.) Osbeck.			
265	*Citrus sinensis* (L.) Osbeck.			
266	*Ruta chalepensis* L.			
267	*Craterostigma pumilum* Hochst.	Scrophulariaceae	3	4
268	*Striga asiatica (*L.) Kuntze, Revis.			
269	*Verbascum bottae (*Defl.) Huber-Mor.*			
270	*Verbascum sinaiticum* Benth.			
271	*Selaginella yemensis* (Swartz) Spring.	Selaginellaceae	1	1
272	*Capsicum annum* L.	Solanaceae	8	12
273	*Datura innoxia* Mill.			
274	*Datura stramonium* L.			
275	*Lycium shawii* Roem & Schult.			
276	*Lycopersicon esculentum* Mill.			
277	*Nicotiana glauca* R.C. Graham, Edinb.			
278	*Nicotiana tabacum* L.			
279	*Physalis minima* L.			
280	*Solanum incanom* L.			
281	*Solanum melongena* L.			
282	*Solanum americanum* Mill. Dict.			
283	*Withania somnifera* (L.) Dun.			
284	*Melhania velutina* Forssk.	Sterculiaceae	2	2
285	*Waltheria indica* L.			
286	*Tamarix aphylla* (L.) Karst.	Tamaricaceae	1	1
287	*Corchorus olitorius* L.	Tiliaceae	3	5
288	*Corchorus trilocularis* L.			
289	*Grewia mollis* Juss.			
290	*Grewia tenax* Forssk.			
291	*Triumfetta pentandra* A.Rich.			
292	*Forsskaolea tenacissima* L.	Urticaceae	3	3
293	*Parietaria judaica* L.			
294	*Urtica urens* L.			
295	*Lantana camara* L.	Verbenaceae	1	1
296	*Hybanthus enneaspermus* (L.) F. Mueller,Fragm.	Violaceae	1	1
297	*Cissus quadrangularis* L.	Vitaceae	1	2
298	*Cissus rotundifolia* (Forssk.) Vahl.			
299	*Fagonia indica* Burm.	Zygophyllaceae	2	2
		Tribulus terrestris L.		

- **Endemic plant species of Yemen are marked by* and in Arabia by**.**

A total 298 plant species are reported in the present investigation, of these, the habitwise break up shows maximum plants from the herb category represented (205 species; 69%) followed by shrubs represented (55 species; 18%) then tree represented (27 species; 9%) and climbers represented (11 species; 4%). The results are tabulated in Table-3 and Figure-4.

Table 3: Number of species recorded belonging to different habitats in the study area

Plant group	No of Total species	% of Total
Herbs	20*5*	69%
Shrubs	55	18%
Trees	27	9%
Climbers	11	4%
Total	298	

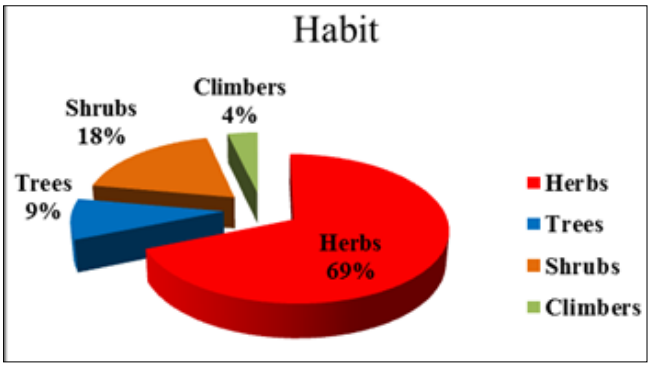


Fig 4: Number of species recorded belonging to different habitats in the study area

The dominant families according to the number of species collected from the studied area are: Asteraceae (34 species, 28 genera), Fabaceae (26 species, 17 genera), Poacese (16 species, 13 genera), Euphorbiaceae (16 species, genera 6), Lamiaceae (14 species, 9 genera), Solanaceae (12 species, 8 genera), Acanthaceae (11 species, 9 genera), Asclepiadaceae (8 species, 7 genera), Amaranthaceae (8 species, 6 genera), and Apocynaceae (5 species, 4 genera).

Table 4: The dominant 10 families in the studied area in regard to number of species and genera.

Family	Genera		Species	
	No. of genera	% of total (219)	No. of Species	% of total (298)
Asteraceae	28	12.78%	34	11.40%
Fabaceae	17	7.76%	26	8.72%
Poaceae	13	5.93%	16	5.36%
Euphorbiaceae	6	2.73%	16	5.36%
Lamiaceae	9	4.10%	14	4.69%
Solanaceae	8	3.65%	12	4.02%
Acanthaceae	9	4.10%	11	3.69%
Asclepiadaceae	7	3.19%	8	2.68%
Amaranthaceae	6	2.73%	8	2.68%
Apocynaceae	5	2.28%	5	1.67%

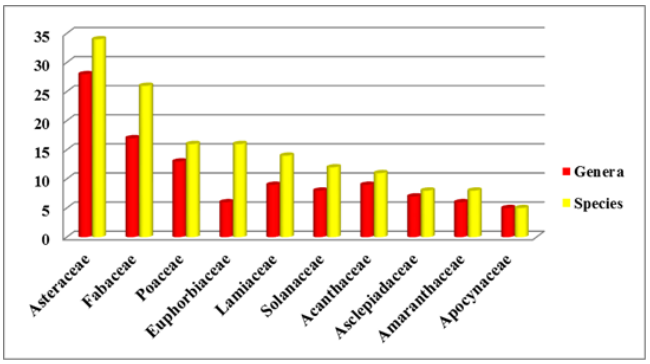


Fig 5: The dominant 10 families in the studied area in regard to number of species and genera.

The dominant genera according to the number of species are: *Euphorbia* (8), *Acacia* (5), *Ficus* (5), *Aloe* (4) and *Solanum* (4). Table-5 & Figure-6.

Table 5: The dominant genera according to the number of species

Genera	Species		
	No. of Species	% of total (219)	
1.	*Euphorbia*	8	3.65%
2.	*Acacia*	5	2.28%
3.	*Ficus*	5	2.28%
4.	*Aloe*	4	1.82%
5.	*Solanum*	4	1.82%

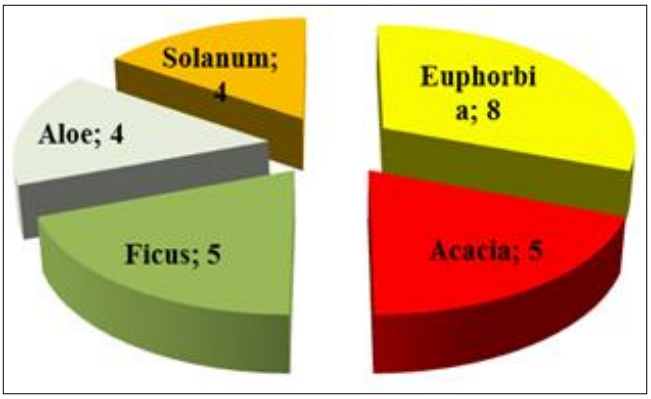


Fig 6: The dominant 5 genera in the studied area in regard to number of species and genera

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