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Studies on the flora of Yemen: Flora of Kharab AlMarashi, AlJawf, Republic of Yemen

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Abstract

The present study deals with the floristic analysis of Karab AlMarashi, Al Jawf, Yemen. Eighty six species belong to 67 genera and 36 families of the vascular plants have been recorded. The dicots are represented by 81 species, while the monocots are represented by 5 species. The family Asteraceae had the highest contributions followed by Asclepiadaceae, Solanaceae, Malvaceae, Apiaceae, Zygophyllaceae, Euphorbiaceae and Lamiaceae. Life form spectra are highly represented by chamaephytes followed by phanerophytes, therophytes, hemicryptophytes and cryptophytes. The pluri-regionals species are the highest, followed by the mono-regionals species, while the bi-regionals species were the lowest. The present results proved that the flora of Kharab AlMarashi is species rich and diverse. The generic index is 1.3. *Acacia* is the largest recorded genus in Kharab AlMarashi.

Keywords: Chorotype, Floristic analysis, Life form, Yemen, Wadis

Introduction

Flora of Yemen is rich and diverse, species diversity is a result of considerable climatic change in former period, which enable different species to survive, in the different habitats (Ministry of water and Environmental, 2010). Recent studies reported that there are about 2838 plant species belong 1068 genera and 179 families in Yemen; of these 2602 are native, 129 cultivated and 107 introduced (Al-Khulidi, 1989; 2000; 2006; 2013).

Yemen is rich in endemic plants, which are estimated to be 608, of which 307 endemic species in Socotra (Al-Khulidi 2013). Agriculture and animal husbandry are the main activities of the population. The AlJawf can be an agricultural region as the agricultural crops constitute (4.9%) of the total agricultural production in the Republic of Yemen, and the most important agricultural crops are cereals, vegetables, fruits and fodder. It is important place for and fertile valleys for Agriculture vegetables and grew wheat, barley and fruits. The terrain of AlJawf is often plain, as it interferes with the Rub Al Khali desert, and

characterized by a desert climate. Floristically, Kharab AlMarashi is one of the promising regions in Yemen with wide habitat types and poor knowledge on its flora. The aim of this study is to provide a description of the floristic composition and life form spectrum, and to prepare an annotated checklist of the flora of the studied area as a step towards understanding the flora of Yemen as a whole.

Study area

Yemen Republic extends over approximately 7° degrees of latitude. From 12° to 19° in the north and between 42 to 53 E. Longitude (Fig. 1). Al-Jawf located at latitude 16° 47′ north and longitude 45° 31′ east**.** Total area covers about 393.4 square kilometers. Al-Jawf located to the north east of the capital Sana'a, and away from it about 143 kilometers. It is located north Sa'ada province, the Empty Quarter desert from the east, parts of the provinces of Marib and Sana'a from the south and Amran province from the west (Fig. 1).

Al-Jawf was the home of the ancient Maeen kingdom. The population of the governorate accounted for (2.3%) of the total population of the Yemen Republic, and the number of its districts are twelve districts namely: Brat alanan, Alhazm, Alhumidates, Kab and Alshaf, Krab Almrashi, Alkhlq, Ragoza, Al-zaher (AlJawf)), Alghil, Almuton, Almasloband Almatamah. Hazm city is the center of the AlJawf.. Karaba Almarashi desert is located in the Eastern desert of Yemen. It is characterized by many mountains which are either single or connected with mountains series as example gable tan in wadi Amranh (Results of the general census of population and housing facilities, 2004).

Climate of the area is tropical and arid. Air temperature maximum ranged from 18.2 to 35 °C. The wind speed ranged between 11 and 22.5 K/h. The rainfalls were rarely in most months recorded in February, April and July respectively. The annual rainfall was 40 mm (Table1).

Table 1. Monthly average for eight years (from 2001 to 2008) Climate data obtained from Statistical Department Central planning Organization, Prime Minister's office, Sana'a , Yemen

Month	Temp °C Max	Min	Mean	Relative humidity%	Wind speed Km h^{-1}	Rainfall mm
January	20.3	13.7	17.8	25	13.6	0.0
February	21.3	13.8	18.0	23	11.0	11.5
March	27.1	15.4	22.9	21	11.0	0.0
April	29.5	24.0	27.1	23	14.5	26.0
May	34.1	30.2	32.2	28	16.5	0.0
June	33.0	29.8	31.6	26	19.3	0.0
July	33.5	29.9	32.3	25	21.9	2.5
August	35.0	31.0	32.9	25	22.5	0.0
September	33.9	29.7	31.8	22	14.7	0.0
October	29.4	22.1	26.3	33	13.4	0.0
November	23.7	17.7	20.4	27	12.5	0.0
December	18.2	12.7	15.9	16	12.3	0.0
Total annual						40.0

Materials and Methods

Field survey was carried out through several trips during 2011/2012. In each trip, plant samples were collected from different habitats of Kharab AlMarashi, AlJawf.

The study area included many wadies namely Alnel, Almaranh, masuad, dahmah, Nahyan, Alsll

and Alsakamah. The plant specimens were collected and pressed as according Fosberg (1965) and Womberley (1981).

Plants with large fleshy leaves and plants which have large leaves and inflorescence have been photographed and the inflorescence has been cut and representative, sections of the stalk, branch, flower and fruit were placed in the press. The plant specimens were pressed in the field using newspaper and woody presser. The specimens were transported to the laboratory to complete the drying process.

When the specimens were completely dried, each individual specimen was mounted on a herbarium sheet with size (16 inch × 12inch). For each species collected at least three dried specimen were mounted on herbarium sheet with label includes: the scientific name, family name, locality, altitude, GPS information (altitude, latitudes and longitudes), collecting number, collector name, collecting date, landscape and so on.

Arrangement of the families in the present work was alphabetically, within each family the genera and species were arranged alphabetically. The species was identified according to (Migahid, 1978; Chaudhary, 1989; 1999; 2000; 2001a; b & c; Chaudhary and Revri, 1983); Tackholm, 1974; Alkhulidi, 2000 & 2013; Boulos, 2002; Collenette, 1999; Wood, 1997; Omar, 2000; Zoghet and Al Alsheikh, 1999)

The life form categories were identified according to Raunkiaer's system of classification **(**Raunkier**,** 1937**).** A chorological analysis of the floristic categories of species was made to assign the recorded species to world geographical groups, according to (Zohary, 1973; Wickens, 1978).

Results

The recorded species, families, life forms and chorotypes are listed in appendix. A total of 86 species belonging to 67 genera and 36 families are recorded. The family Asteraceae have the highest contribution to the total flora (11 sp., 12.8%) followed by Fabaceae (7 sp., 8.2%), Solanaceae (6 sp., 6.9%), Asclepiadaceae (5 sp., 5.8%), Euphorbiaceae, Lamiaceae, Malvaceae, Zygophyllaceae (4 sp., 4.7% for each), and Amaranthaceae, Caesalpiniaceae, Capparaceae, Cucurbitaceae (3 sp., 3.5% for each) (Fig. 2). Two families were represented by two species and twenty two families were represented by one species.

The life forms spectra of the vegetation in the study area indicated that, chamaephytes had the highest contribution in the study area (41.9% of the total recorded species) followed by the phanerophytes (25.6%), therophytes (18.6%), hemicryptophytes (8.2%), and cryptophytes (4.7%), while parasites were the lowest with 1.2% (Fig. 3).

Fig. 1 Map of Yemen showing the study area.

Data of the chorological analysis are presented in Table 2. Thirty species constitute 34.9% of the total recorded species are mono regional, of which 12 species which constitute 13.9% are being native to the Sudano-Zambezian phytocharia. In addition to the above there are other elements of monoregional such as Saharo-Arabian-Sudano-Zambezian (9 sp., 10.5%), Saharo-Arabian and Sudano (4 sp., 4.7%), Sudano and Saharo-Arabian elements (2 sp., 2.3% for each) and Saharo-Sindian (1 species., 1.2%).

Bi-regionals elements are represented by20 species (23.3% of the total number of species). Of these the Sahrao-Sindian and Sudano-Zambezian elements together are represented by 9 species which constitute 10.5% of total species followed by

Irano-turenian and Mediterranean elements together are represented by 4 species which constitute 4.7% of the total species.

Saharo-Sindian and Irano-Turanian elements together are represented by 3 species which constitute 3.5%,of the total species, Mediterranean and Saharo –Arabian comprise two species which constitute 1.1% of the total species, Mediterranean, Saharo–Arabian and Sudano-Zambezian element together is represented (one species, 1.1%) and Saharo-Arabian and Irano-Turanian (one species, 1.1%).

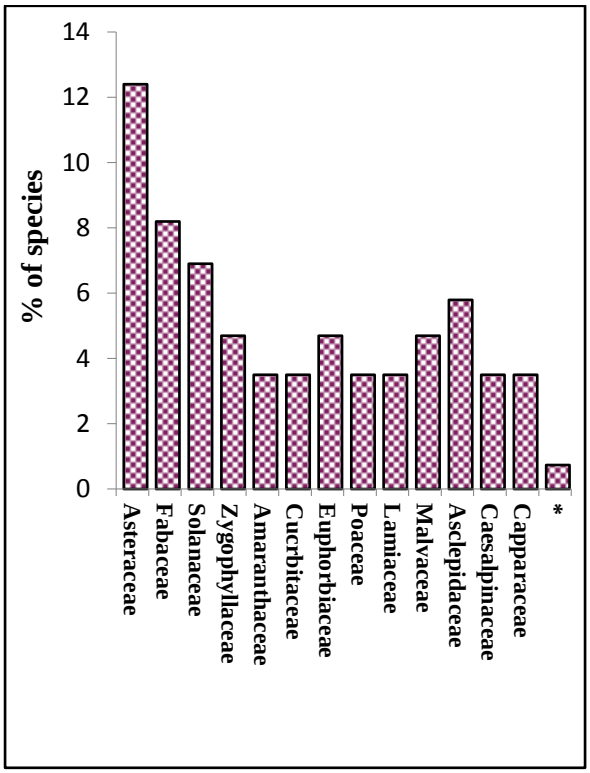

Fig. 2 Shows the percentages of plant species in each of the 36 families recorded in the study area (Kharab AlMarashi). * = 24 families are represented by one or two species.

Meanwhile pluri-reginoals elements are presented by 36 species constitute 41.9% of the total species. Tropical and Cosmopolitan of the pluri-regionals were represented by (7 species, 8.1% for each) of the total species, followed by Pantropical (4 species, 2.3%), Saharo-Sindian, Sudano-Zambezian and Irano-Turanian, Sindian-Saharo+Sudano-Zambezian and Irano-Turanian were represented by (3 species, 3.5% for each) of the total species. Most of the plu-regionals elements are comprised from Mediterranean and Irano-Turanian regions. Also, the Phytogeographical analysis of plant species in the study area showed that 3 species (3.5%) are endemic to the flora of Yemen (Table 2).

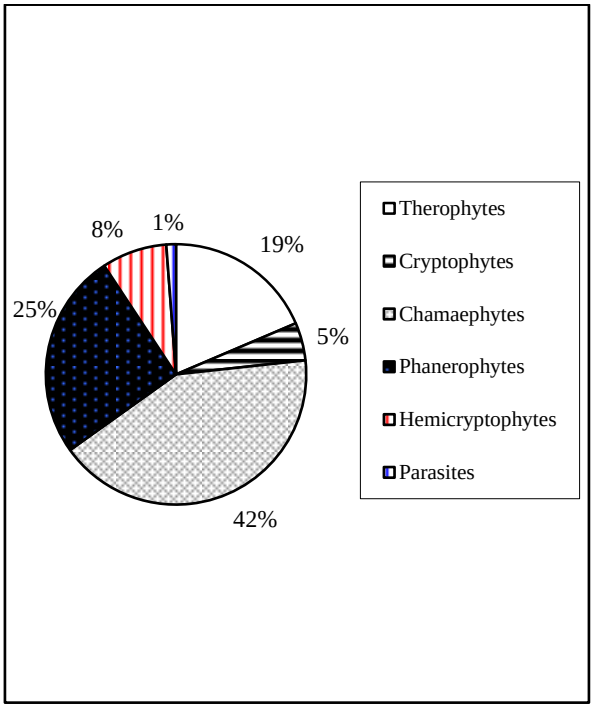

Fig. 3 Proportionate representation of life forms in the flora of Kharab AlMarashi. (as a percentage of 86 plant species).

Discussion

Despite of the intensive floristic studies in the different regions of Yemen, the flora of Arabia and Yemen, are considered to be the least known regions floristically, comparing with the other neighboring countries (Miller and Nyberg, 1991). The same words can be said about the flora of Kharab AlMarashi, comparing with the other governorates of Yemen.

Results revealed that, flora of Yemen is relatively rich and diverse, comparing with the

others arid and semi-arid regions in Yemen, such as: Ibb, Taiz, Al-Mahweet, Hadhramout, Al-Mahrah and Shabwa. A total number of the vascular plant recorded from the studied area is 86 species (species and intraspecific species) related to 67 genera and 36 families. These numbers are relatively low compared with those recorded from other regions or governorates of Yemen, even their climates are humid and arid. If we have a look at the previous results of the floristic composition in other governorates of Yemen we can note that.

Table 2. Phytogeographical analysis of plant species the study area (Kharab AlMarashi) Al Jawf, Yemen. For abbreviation see appendix.

Chorotype	Species Number	(%)
Mono-regionals		
SA-SZ	9	10.5
SA-SU	4	4.7
SU	2	2.3
SA	2	2.3
SU-ZA	12	13.9
SA-SI	1	1.2
Biregionals		
IT+ME	4	4.7
SA-SI+SU-ZA	9	10.5
ME+SA	2	2.3
ME+SA-SZ	1	1.2
SA-SI+IT	3	3.5
SA+IT	1	1.2
Pluri-regionals		
TR	7	8.1
PAN	4	4.7
NEO	1	1.2
COSMO	7	8.1
PAL	2	2.3
SA-SI+SU-ZA +ME	1	1.2
SA-SI+SU-ZA +IT	3	3.5
SA-SI+SU-ZA +ME+IT	2	2.3
TR+EU+PAN	1	1.2
SI-SA+SU-ZA +IT	3	3.5
ES+IT+ME	1	1.2
SA-SI+SU-ZA +IT+ME+TR	1	1.2
END	3	3.5
Total	86	100

Four hundred and sixteen species are recorded in Hadramout governorate (Al-Khulidi, 2006). Three hundred and eighty five species are recorded from Shabwa governorate (Al-Khulidi, 2013). Also the present results proved that the flora of Kharab AlMarashi is rich in the genera since its genera represent about 6.4% of the total genera in the whole flora of Yemen (67/1068).

The number of the families of Kharab AlMarashi is constituted about 20.1% of the total of the families in the flora of Yemen as a whole (36/179). This means that the flora of Kharab AlMarashi is relatively rich in its floristic composition. Thus, it may be owing to the biotic, climatic and topographic factors.

In the flora of Yemen the number of genera in proportion to that of species are 2.7, according to Khulidi (2013). This is very low figure compared with the global average proportion, which are about 13.6 (Good, 1947). The present study indicates that the flora of Kharab AlMarashi goes below the average level of the Yemenis flora where the number of species per genus is 1.3.

This means that the flora of Kharab AlMarashi is floristically diverse than that of Yemenis flora, as the region that has a certain numbers of species each of which belongs to a different genus is relatively more diverse than that a region with the same number of species but belong to a few number of genera (Hawksworth 1995; Khedr *et al.*, 2002).

The flora of this region is poor in the vascular non flowering plants e.g. Pteridophyta and Gymnospermae. This may be due to that hot climate. The above results agree with the global floral composition (Cronquist, 1981; AlKhuladi, 1989, Westingaan and Thalen, 1980; AlHubaishi and Muller-Hohenstein, 1984).. Thirty six families are recorded: Dicots (32 families) and Monocots (4 families). The number of dicots families represents 88.9%, while the number of the monocots represents 11.1% of the total number of the recorded families.

At the generic level of the Angiospermae comprise 67 genera. Of these dicots comprise about 63 genera (94.0 %), while the monocots are represented by 4 genera (5.9%). The largest families of the dicots are: Asteraceae (9 genera, 12 species), Asclepidaceae (5 genera, 6 species), Solanaceae (5 genera, 6 species), Poaceae (5

genera, 6 species), Malvaceae (4 genera, 4 species), Euphorbiaceae (3 genera, 4 species), Lamiaceae (3 genera, 4 species), Zygophyllaceae (3 genera, 6 species) and Mimosaceae (1 genera, 7 species). Poaceae is the largest family of the monocots (5 genera and 6 species).

Regarding the number of taxa belong the families the present results are in agreements with those of (Ghazanfar, 1992; Al-Kulaidi, 2013; Al-Yemeni, 1999; Al-Wadie, 2002). Succulent plants are of a great ecological significance, particularly in arid and semi-arid parts of Yemen or the Arabian Peninsula in general (Gazanfar, 1992; Wood, 1997)**.** They store water in their stems, leaves or roots, a characteristic feature adopted by several plants to withstand high temperature and low precipitation. Some of the families, which are rich in succulent species, are Asteraceae, Asclepiadaceae, and Euphorbiaceae. The same results are in agreement with those of McCoy (2003) and Zohary (1973).

The succulent habit of the plants may be reflect the dominant climatic factors in this region since plants modify their parts leaves, stems and inflorescences to storage the available water in the wet rainy seasons to survive in the dry seasons. One of the most distinct features of the flora of Yemen is the high percentage of the endemic plants among its components (Al-Hubaishi and Muller-Hohenstein, 1984; McCoy, 2003; Al-Khulaidi, 2000; Al-Khulaidi, 2010). The present results of the flora of Kharab AlMarashi have revealed the importance of this region in terms of plant biodiversity**.**

Similarly vegetation is also found in other arid areas where moisture is the main limiting factors for plant growth. For example, some species that are common in the study area such as *Panicum turgidium*, *Fagonia indica*, *Rhaza stricta* and *Aerva javanica* are also restricted to wadi beds and the sands of the north-eastern and eastern desert areas of Yemen (e.g. Marib and Rada'a) and the deserts of Oman (Gazanfar, 1992).

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The life form spectra the study area (Karab AlMarashi) indicated that, Chamaephytes had the highest contribution. These results agree with Hamood (2012) and Al-Sodany *et al.* (2014)and disagree with Mosallum (2007), Abd El-Ghani et. al. (2013), Heneidy and Bidak (2001) and El Demerdash *et al.* (1995) in the rest elements of life forms. Chamaephytes life form is able to withstand water logging high salinity levels and a wide range of temperature variability (Beeftink, 1977; Zahran, 1982).

The life forms spectrum is thought to be either hereditary adjustment to environment or representing the residual effect of some historical, climatic or biotic condition on the plant population Waisel (1972). In the present study, the Chamaephytes are the most dominant life forms in the studied area. They are represented by 36 species which constitute about 40.9% of the total recorded species. These are followed by the Phanerophytes (22 species, 25.9%) and Therophytes (16 species, 18.6%) of the total recorded species. The dominance of the Chamaephytes life form and the short life cycles plants (Therophytes) may be attributed to be response to the hot dry climate, topographic variation and biotic influence.

In the neighbor countries such as Taif of Saudi Arabia Mosallum (2007) reported that the dominant life forms of that region are Therophytes and Chamarphytes while El-Ghanem *et al.* (2010)reported the same results from Hail region of Saudi Arabia. From the Mediterranean deltic Lake (Lack Burollos) of Egypt Khedr (1999) reported that the dominant life forms in the that area are Therophytes, Cryptophytes, Chamaephytes, phanerophytes and Hemicryptophytes. The Chamaephytes, Crypptophytes and Hemicryptophytes are playing an important role in the processes of sand accumulation and succession of vegetation. In the study area plants of these three life forms have the ability to act as barriers to wind and /or water borne materials which are then deposited around them. This enables is such plants to produce adventitious roots and aerial shoots from their buried organs and to replace them when they die.

Appendix List of plant species recorded in the study area with their family name, life forms and chorotype. Chorptypes: SA=Saharo-Arabian; SU-ZA=Sudano-Zambezian; SA-SZ=Saharo-Sudano-Zambezian; SU=Sudano; TR=Tropical; IT=Irano-Truranian; ME=Meditrranean; PAN=Panotrpical; NEO=Neotropical; SA-SI=Saharo-Sindian; Eu=Europian; ES= Europ – Siberian; COSMO = Cosmopoplitan; END+=Endemic.

Family	Scientific name	Life form	Chorotype
Amaranthaceae	*Achyranthes aspera* L.	Therophytes	IT+ME
	Aerva javanica (Burn.f.) Juss.ex Schult	Chemaephytes	TR
	Aerva lanata (L.)Juss.exSchult.	Chemaephytes	TR
Apocynaceae	*Rhazya stricta* Decne	Chamaephytes	SA+SZ
Asclepiadaceae	*Calotropis procera* (Ait.) Ait.f.	Phanerophytes	SA+-SZ
	Caralluma penicellata (Defl.) N.E.Br.	Chamaephytes	END$^+$
	Monolluma quadrangula (Forssk.) N.E.Br.	Chamaephytes	END$^+$
	Desmidorchis retrospiciens Ehrenb.	Phaneraphytes	SA+SU
	Leptadenia pyrotechnica (Forssk.) Decne	Phaneraphytes	SA+SU
Boraginaceae	*Heliotropium longiflorum* (A.DC.) Steud. Hochst.ex Bunge.	Chamaephytes	SA+SZ et
Caesalpiniaceae	*Senna italica* (Mill).	Hemicryptophytes	SA+SZ
	Senna occidentalis (L.)Link.	Chamaephytes	PAN
	Tamarindus indica L.	Phnareophytes	PAL
Capparaceae	*Capparis cartilaginea* Decne.	Chamaephytes	SU
	Capparis spinosa L.	Chamaephytes	IT+ME
	Dipterygium glaucum Decne.	Therophytes	SA-SI+SU-ZA
Casuarinaceae	*Casuarina equisetifolia* L.	Phanaerophytes	TR
Celasteraceae	*Catha edulis* Forssk.	Phanaerophytes	TR
Chenopodiaceae	*Suaeda monica* Forssk.exJ.F.Gmel.	Chamaephytes	SA+SZ
Cleomaceae	*Cleome brachycarpa* Vahl.ex DC.	Chamaephytes	SA
Asteraceae	*Atractylis carduus* (Forssk.) C.Chr.	Hemicryptophytes	ME+ SA
	Conyza bonariensis (L.) Cornquist.	Therophytes	NEO
	Helianthus annus L.	Chamaephytes	SA+SZ
	Kleinia odora (Forssk,)DC.	Chamaephytes	SU+ZA
	Pulicaria jaubertii Gamal- Eldin.	Chamaephytes	SA- SI+SU-ZA
	Pulcaria crispa (Cass.)Oliv.&Hiem	Chameaphytes	SA+SZ
	Pulicaria undulata (L.)C.A.Mey.	Chamaephytes	SA+SU
	Tagetes erecta L.	Therophytes	COSM
	Tagetes minuta L.	Therophytes	COSM
	Reichardia tingitana (L.)Roth.	Therophytes	ME+SA+SZ
	Verbesina encelioides (Cav.) Benth & Hook. fil ex A.Gray.	Therophytes	TR
Convolvulacrae	*Conolvulus arvensis* L.	Hemicryptophytes	TR
Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad.	Hemicryptophytes	ME +SA
	Cucumis prophetarum Juus.	Hemicryptophytes	SA+SU
	Momordica balsamina L.	Therophytes	PAN
Brassicaceae	*Diplotaxis harra* (Forssk.)Boiss.	Therophytes	SA-SI+IT
	Schouwia purpurea (Forssk.) Schweinf.	Therophytes	SA-SI+IT
Cyperaceae	*Cyperus laevigatus* L.	Hemicryptophytes	PAN
Euphorbiaceae	*Euphorbia prostrate* Ait.	Therophytes	COSM
	Jatropha pelargoniifolia Courb.	Chameophytes	SU-ZA
	Jatropha spinosa (Forssk.)Vahl.	Chamaephytes	SU-ZA
	Ricinus communis L.	Phanerophytes	COSM
Papilionaceae	*Medicago sativa* L.	Chamaephytes	COSN
Poaceae	*Pennisetum glaucum* (L.) R.Br.	Hemicryptophytes	PAL
	Pennisetum villosum R.Br.ex Fresen.	Hemicryptophytes	TR
	Cynodon dactylon (L.) Pers.	Hemicryptophytes	COSM
Lamiaceae	*Lavandula pubescens* Decne	Chamaephytes	SA+SI+SU-ZA+ME

	Leucas inflata Benth.	Chamaephytes	SA-SI+SU-ZA
	Ocimum basilicum L.	Chamaephytes	SU-ZA
	Ocimum filamentosum Forssk.	Chamaephytes	SU-ZA
Malvaceae	*Abutilon fruticosum* Guill.&Perr.	Chamaephytes	SA+SZ
	Malva parviflora L.	Therophytes	ME+ IT
	Hibiscus purpureus Forssk.	Chamaephytes	SU-ZA
	Gossypium arboretum L.	Phanerophytes	SA-SI
Fabaceae	*Acacia asak* (Forssk.)Willd.	Phanerophytes	SA-SI+SU-ZA
	Acacia ehrenbergiana Hayne.	Phanerophytes	SU-ZA
	Acacia etbaica Schweinf.	Phanerophytes	SU-ZA
	Acacia mellifera (Vahl) Benth.	Phanerophyte	SA-SI+SU-ZA
	Acacia oerfota (Forssk.) Schweinf.	Phanerophytes	SA-SI+SU-ZA
	Acacia seyal Del.	Phanerophytes	SA+SZ
	Acaia tortilis (Forssk.)Hayne.	Phanerophytes	SA-SI+SU-ZA
Moraceae	*Ficus carica* L.	Phanerophytes	IT+ME
Myrtaceae	*Eucalyptus rostorata* L.	Phanerophytes	TR+EU+PAN
Nyctaginaceae	*Commicarpus heleinae* (J.A.Schultes) Meikle.	Chamaephytes	SA-SI+SU-ZA+IT
	Commicarpus plumbagineus (Cav.) Standl.	Chamaephytes	SU-ZA
Orobanchaceae	*Cistanche phelypaea* (L.) Cout.	Parasite	SA-SI+SU-ZA+ME+IT
Palmaeae	*Phoenix dactylifera* L.	Phanerophytes	SA+SI+IT
Resedaceae	*Reseda sphenocleoides* Defl.	Chamaephytes	END^{++}
Rhamanacea	*Ziziphus spina-christi* (L.) Willd	Phanerophytes	SA-SI+SU-ZA+IT+ME
Salvadoracaeae	*Salvadora persica* (L.)	Phanerophytes	SU-ZA
Solanaceae	*Capsicum frutescens* L.	Chamaephytes	SI-SA+SU-ZA+IT
	Lycospersicum esculentum Miller.	Chamaephytes	SI-SA+SU-ZA+IT
	Lycium shawii Roem & Schult.	Phanerophytes	SI-SA+SU-ZA+IT
	Solanum incanum L.	Chamaephytes	SU-ZA
	Solanum villosum Miller	Therophytes	ES+IT+ME
	Withania somnifera (L.) Dunal.	Chamaephytes	SA-SI+SU-ZA+IT+ME+TR
Tamaricaeae	*Tamarix aphylla* (L.) G.Karst.	Phanerophytes	SA-SI+SU-ZA+ME+IT
Tiliaceae	*Grewia tenax* (Forssk.) Fiori	Phanerophytes	SA-SI+SU-ZA+IT
Typhaceae	*Typha domingensis* (Pers) Poir,ex Steud.	Chamaephytes	PAN
Apiaceae	*Anethum graveolens* L.	Therophytes	SU-ZA
Utricaceae	*Forsskaolea tenacissima* L.	Hemicryptophytes	SA-SI+SU-ZA
Zygophyllaceae	*Fagonia bruguieri* DC.	Chamaephytes	SA+IT
	Fagonia indica Burm.f.	Chamaephytes	SA-SI+SU-ZA+IT
	Peganum harmala L.	Geophytes	COSM
	Zygophyllum coccinium L.	Therophytes	SA
	Zygophyllum simplex L.	Therophytes	SA-SI+SU-ZA+ME+IT

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الملخص العربى

دراسة على فلورا اليمن. فلورا الحياة النباتية في مديرية خراب المراشي ، محافظة الجوف، اليمن

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تهدف هذه الدراسة إلى معرفة الحياة النباتية في مديرية خراب المراشي ، محافظة الجوف، اليمن. تناولت الدراسة الفلورا فى مديرية خراب المراشي (محافظة الجوف ، الجمهورية اليمنية) بالتفصيل والتحليل . تمثل منطقة الدراسة مساحة قدرها 378 كيلو متر مربع . اجريت هذه الدراسة خلال عامي 2012/2011 م ، حيث شملت الدراسة بعض وديان مديرية خراب المراشي محافظة الجوف وأسفرت هذه الدراسة عن تسجيل 86 نوعا تتبع 67 جنسا في 36 فصيلة نباتية . لم يسجل اي نوع من النباتات السرخسية. الانواع النباتية التي سجلت تتبع طائفة مغطاة البذور وتشمل 81 نوعا يتبع ذوات الفلقتين , بينما 5 انواع نباتية تتبع نباتات ذوات الفلقة الواحدة. واظهرت النتائج ان اكثر الفصائل النباتية تنوعا هي : ،المركبة، الاسكليبدية , الباذنجانية ، الخبازية , الخيمية ، الرطريطية اللبنية والشفوية. كما اظهرت النتائج ان اكثر الاجناس تنوعا هو اكاشيا. كما اظهرت الدراسة ان التوزيع الجغرافي العالمي للنباتات تتبع الاقليم السوداني الزامبيزي.