

## Floristic composition of Sahara Area in Libya

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### ABSTRACT

The present study aimed to analyze the floristic structure of Desert territory in Libya with focusing on the distribution of global important species such as medicinal, endemic and rare species. Vegetation survey was conducted in Al-Joufrah Oases (Hun, Wedan, Soknah, and Zilla). The results revealed that the Libyan Desert area harbors 244 plant species, which belong to 164 genera and 53 families (108 annual species and 136 perennial species). One hundred and twenty-seven species were recorded in Joufrah area including twenty-four species as new records, 26 medicinal plant species, 11 endemic species, and 9 rare species. The most abundant families were Poaceae (35 species), Fabaceae (27 species), Asteraceae (22 species), Brassicaceae (18 species), and Zygophyllaceae (16 species). Twenty-seven families were represented by 2-9 species and twenty-two families were represented by only one species. The most dominant life forms in the area were the annuals followed by the chamaephytes. Phytogeographically, flora of Libya belongs mainly to Arabian Sahara followed by the Arabian Sahara+ Irano-turranean Sahara, then the Arabian Sahara and Sudano-Zambesian.

**Key words:** Floristic composition, Desert territory, Al-Joufrah Oases.

### INTRODUCTION

Topographically, Libya is divided into the following territories: the coastal lowlands area; Northern mountains area; the transitional zones between mountains area and desert; and the inland area.

The inland area is a part of the Sahara that covers most of the Northern part of Africa. It extends to occupy 750,000 Km<sup>2</sup> south of the transitional areas: AlQebala-Elbult area and Surt plain, south to 30° 30' North. The region is made up of sand dunes, gravelly ridges, bare ridges, and terraces.

The base of the Libyan Desert is covered by peliose deposits made of limestone, mud and continental sandstone. The horizontal sedimentation of these layers has not been affected by the Alpine Tectonic movements though being affected by erosion, especially water erosion, which resulted in the formation of many lowlands (the present oases). As a result of wind erosion, some mountains have been created (Alqoor). These aspects are very clear near the oases where the erosion moved the fine deposits away and only the coarse deposits remained. There are some volcanic activities took place in Mt. El-Souda, Mt. Al-Harouj Al-Aswad, Mt. Wao Namos, and Mt. Uwaynate.

Despite the differing views of geologists on the climatic conditions that prevailed in the Sahara during ancient times, they agreed on the vulnerability of the region during the rainy season of the Fourth age that resulted in forming broad rivers in different directions in Sahara. The valleys skewed to the north and unloaded their cargo of flood sediments in the Mediterranean Sea. Large quantities of these sediments deposited in the bottom of these valleys. Later, during the drought season (which still prevails), these deposits formed most of the surface manifestations of the desert (Al-Hajaji, 1989).

The Libyan Desert is a plateau that raises about 600 m a.s.l at the tropic of cancer and about 100 m a.s.l

in the extreme south at Mt. Naqi. Sahara includes several mountain blocks. Some of them are at the borders such as Owaynat and Tebisti. Others are scattered in different parts of the desert such as Mt. Arcano, Xu ridge, the Great Gulf, Temo series, Alharouj, Alsouda, Acakos and Tassili.

One of the important manifestations of the desert is the Great Sand Sea in the east of the Libyan Desert and Aldahanat such as Murzak and Alshati (Ibn Mahmoud, 1995).

Oases are the most important topographic feature in the Libyan Desert. They occur in the lowlands where the level of groundwater is close to earth's surface. The Libyan oases consist of two obvious series of discontinuous depressions; northern and southern depressions.

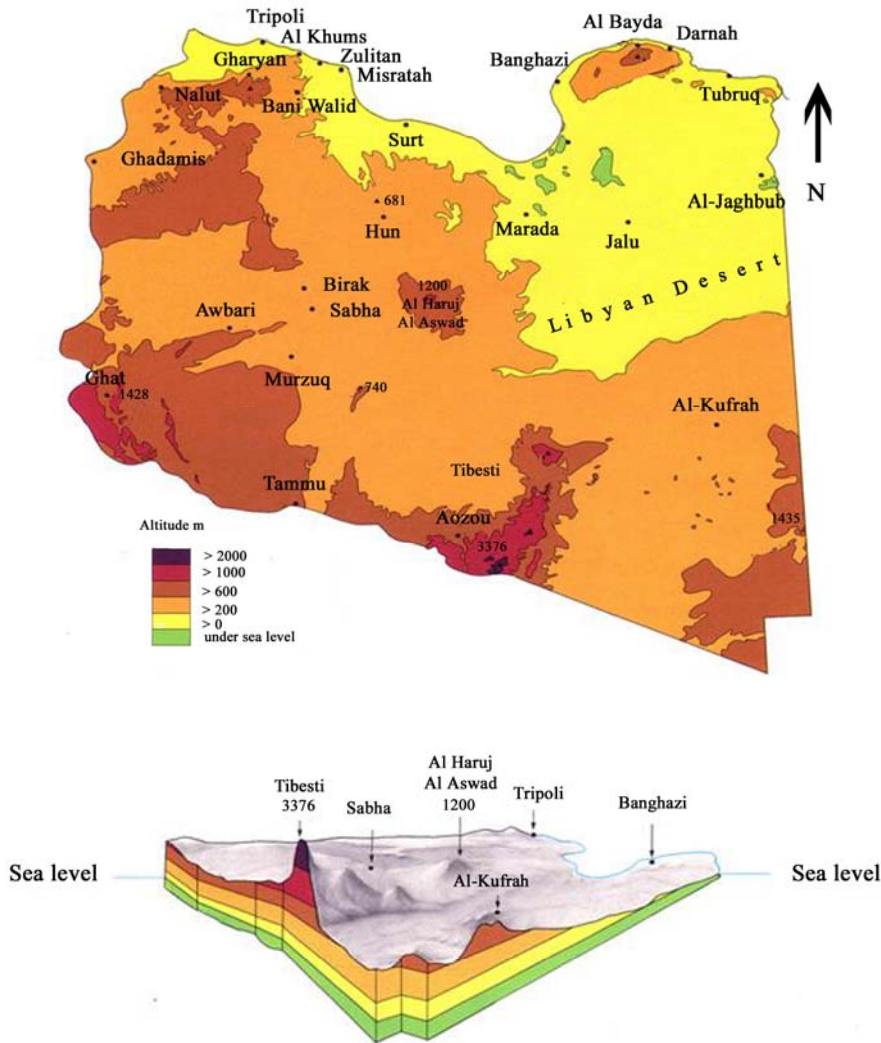
### The northern depressions series

The northern depressions are located south of 29° N, bounded by Miocene ridge at the north which extends to the southern boundary at Mt. Al-Akhdar, and east to the western coasts of the Nile valley with an elevation ranging between 100 - 200 m a.s.l. At 30° N the height start to descend to the depression which is very simple at first and gradually to the northern edge of the depressions which sharply declines forming grooves with high walls then the land surface started to be slightly raised to the south which reaches between 400 - 500 m a.s.l. at 24° N. At the sea level the northern oasis reaches elevation of the following from east to west:

Gaghoub Depression:	- 29.5 m a.s.l
Galo, Ogala, Gakhra Depression:	0 m a.s.l
Marada Depression:	41 m a.s.l
Gafra Depression:	33 - 240 m a.s.l
Ghadams:	300 m a.s.l

All of these depressions are the same in its general features except Gafra and Ghadams where all of which

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Map (1): Libyan Topography (from the Educational Atlas).

are found in the huge desert area. All of these depressions are covered by desert sandy soil. Also, the oasis found in the deeper points of these depressions form non-continuous chain of the sand dunes. In this area, there are 3 features (Sarier, Hamada, Arak or Ramla) of which Sarier is the most common feature in this area.

**The southern depressions series**

The southern depressions lie between latitudes 23 – 26° N and start from Arkno - El-Oynat Mountains at east and ends at Ghat depression at west. This chain of depressions consists mainly of Al-Joufrah and Fazan depressions.

**Al-Joufrah Depression**

Al-Joufrah Depression is sometimes known as Wadi Al-Joufrah. It includes many oases which characterize by three different levels; the first one is the deepest one and mainly covered by salt marshes, the second level is

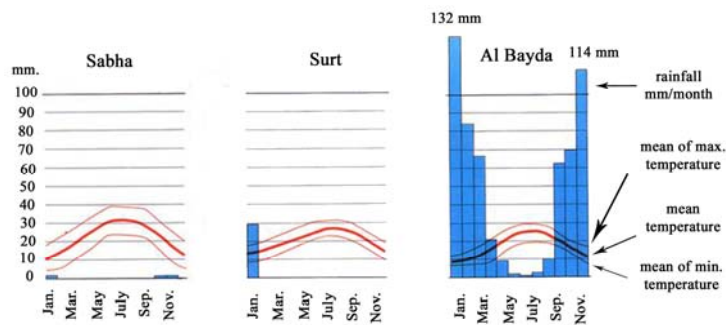
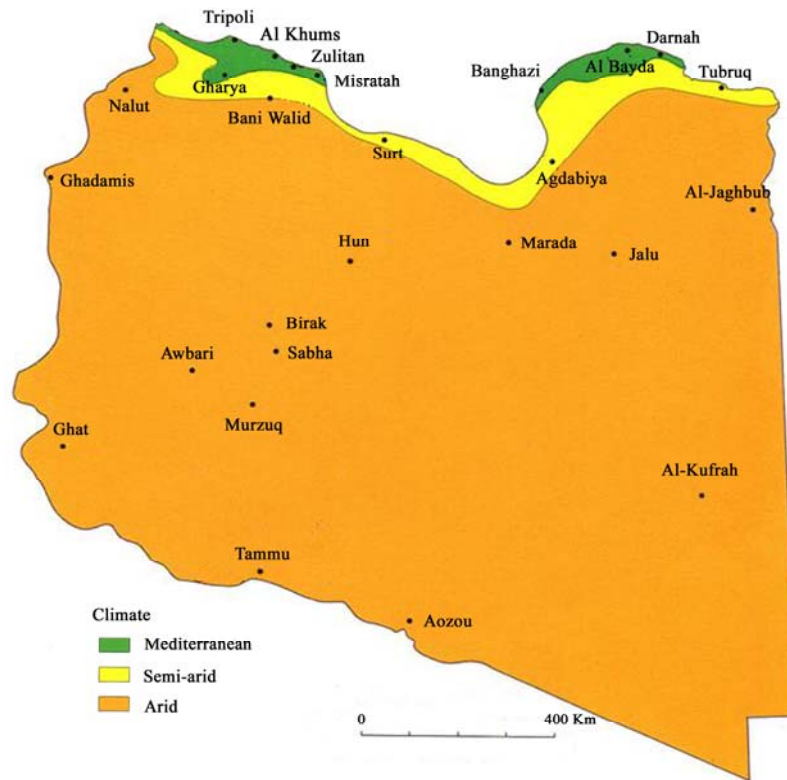
slightly raised than the first one which is covered by reddish yellow soil, and the third one is surrounding the oasis and is covered by dry sand soil.

**Fazan Depression**

Fazan Depression is a huge wide depression and is longitudinal dissected by number of wadis, which run between south west and north east. These wadis include Wadi El-Shateaa and Wadi El-Haya to the north, and Wadi Tanzeft and Wadi El-Hekma to the south west (Al-Hajaji, 1989).

**Climate**

Most of the Libyan areas belong to desert climate, which is characterized by hot temperatures, extremely arid conditions and low humidity. The temperatures increase to 40°C in summer and reduce to 5 – 6°C in winter. The temperature interval between night and day and between summer and winter increases by going southward.



Map (2): Climate of Libya (form The Educational Atlas).

The rainfall in desert climate is rare and mainly falls in December and January. The annual rainfall varies from 0 to 10 mm from Sabha to south most of Libya (Educational Atlas).

**Vegetation**

The Libyan Desert harbors many of plant species which are adapted with the harsh climatic conditions. Some plants such as date palms and spiny plants have deep root system, which increases their ability to collect water from deep soils. In rainy seasons, many annual herbs grow in Oasis, depressions and desert wadis. The vegetation is also characterized by number of halophytes, which grow in some salt marshes areas. In addition, vegetation of Lybian deserts are characterized

by sand dune plants and aquatic plants, which distributed near the edges of the desert lakes found mainly in Fazan depression like Kabr Pharaoun Lake.

Flora of the Libyan deserts has been investigated through many of floristic and taxonomic studies. Richardson (1848) published his botanical survey of the area from Tripoli to Gat across Ghadamis, Marzak, Sokna. Rholfa (1871) studied the flora of Tripoli, Fazzan, Ghadamis, El-Kofra, Ogla and Barka area. His work included a list of the vernacular names. Plant species list collected by Duveyrier from Tripoli, Fazzan and Ghadamis was reported by Cosson (1826). Nachtigal (1879) presented an important knowledge about the flora of Tripoli and the areas found along the road from Tripoli to Fazzan across Sokna and Marzak.

Identification of plant collections carried out by Nachtigal and other botanists such as Taubert, Ruhmer, Petrovich and Haimann was revised by Ascherson.

There are many fruitful knowledge about the Libyan flora and vegetation made by many of the Italian botanists like Trotter, Pampanini, Beguinot & Borzi, Corti during the period between 1910 and 1942. In addition, French botanists such as Chevalier, Maire, Ozenda, Quezel and Le Houerou studied the North African plants including the Libyan ones. Keith (1965) studied the Libyan flora but its work was not a complete one.

Boulos (1967 – 1972) collected about 7000 plants from different Libyan areas. Scholz published many articles about the flora of Libya including many new records in the period between 1969 and 1979. The Libyan Encyclopedia was done from 1976 to 1986 by Ali, Jafri, & El-Gadi. This encyclopedia includes 150 families with complete revision for all of the previous studies. Faruqi and Quraish (1979 – 1980) studied the Libyan herbs and described 233 of plant species which belong to family Graminae. Gaiser and El-Gadi (1984) made statistical analyses for the Libyan flora. Siddiqi *et al.* (1986) published a species list of new records in Libyan Desert. Brullo and Furnari (1994) studied the plants of El-Gabal El-Akhdar. Leonard (1999) studied the plants in Gebel El-Oinat. This work was published in two volumes, where all the dicotyledones were described in the second volume (El-Danaa, 2006).

This study aims to analyze the floristic composition of Libyan deserts based on the available data of the previous plant collections in this area in order to find out their economic importance, life forms and the dominant geographical items in the area.

## MATERIALS AND METHODS

### Data Collection

This work was based on the botanical data recorded in the Libyan flora encyclopedia.

### Field study

Botanical survey was carried out in Al-Joufrah (Wadan, Hun, Soknh, and Zilla) during the flowering seasons of 2006. Plant species were collected, described and identified. Specimens of the collected plants were stored at the herbarium of Botany Department, Faculty of Science, Cairo University.

### Data Treatment

Floristic data including scientific and vernacular names, life forms, importance, and phytogeographical distribution were statistically described. According to the importance value, some of the collected plants were assigned as endemic, rare, or medicinal. Abundance and taxonomic diversity analysis were carried out to identify the largest families in number of species, the largest

distributed species. Life forms were identified according to Raunkiaer (1937), Hassib (1951), Shaltout (2002) (Table 1). Following to Wickens (1976) Zohary (1966-1972), Ghani, (1981 and 1985) Abd El-Khedr (1999), phytogeographical elements were calculated according to the number of plant species in each pattern and then according to the percentage number (Table 2).

**Table (1):** Terms of the Life Form.

Term	Key	Definition
Phanerophytes	Ph	Normally woody perennials - with resting buds more than 25 cm above soil level.
Nano phanerophytes	N. Ph	Small trees or shrubs.
Chamaephytes	Ch	Buds on persistent shoots near the ground – woody plants with buds borne close to the ground, no more than 25 cm above soil surface.
Geophytes	G	Herbaceous plants with an underground storage organs
Therophytes	Th	Annual plants which survive the unfavorable season in the form of seeds and completes its life-cycle during favorable seasons.
Hydrophytes	Hy	Aquatic plants (floating or submerged)
Hemicreptophytes	H	Buds at or near the soil surface
Parsits	Pa	Parasitic plants
Lins	Li	Climbing plants

**Table (2):** Terms of phytogeographical analysis.

Term	Key
Mediterranean element	MED
Sahara Arbia element	SA
Irano Toranian element	IT
Euro Siberian element	ES
Saharo sindan element	SS
Sudano Zambnizia element	SZ
Cosmpiltum element	Cosm
Palaeotropical element.	Pal

**Table (3):** Number of Plant Species Recorded in the Different Libyan Desert Areas

Area	No. of Species	%
Jaghbug	6	2.68
Joufrah (Hun, Waddan, Soknah, Zilla)	127	52.05
Ghudamis	29	11.89
Fezzan (Brach, Sabhah, Jarmah, Marzuq)	92	37.70
Ghat	63	25.82
Tibesti mountains	25	10.25
Al Uwaynat mountains	48	19.67

## RESULTS AND DISCUSSION

The results of this study revealed that there are 244 plant species (108 Annuals and 136 Perennials). These species belong to 164 genera and 53 families (Appendix 1). One hundred and thirty eight plant species of which are confined to the desert areas. The highest plant diversity is recorded in Al-Joufrah area (127 plant species representing 52.05% of the total recorded species) followed by Fazzan and Gat (92 and 63 plant

species, respectively), and El-Owinat and Tebesty areas, whereas the lowest plant diversity is recorded in Jaghub area (Table 3).

Also, the results showed that the most represented family is Poaceae (35 plant species), followed by Fabaceae (27 plant species), Astraceae (22 plant species), Brassicaceae (18 plant species), Zygophyllaceae (16 plant species), Capparaceae and Chenopodiaceae (9 plant species each), Boraginaceae, Tamaricaceae and Potamogetonaceae (8, 7 and 6 plant species respectively). There are 22 families represented by a low number of species (2-5 plant species) and 22 families with only one species (Table 4).

The largest genus is *Astragalus* (9 species) followed by *Tamarix* and *Fagonia* (7 species each), *Potamogetun*, *Cleome*, *Stipagrostis* (6 species each), and *Lotus* (4 species). There are 10 genera represented by 3 species and 22 genera represented by 2 species. The other 125 genera are represented by only one species (Table 5).

The results which collected in 2006 from El-Joufrah revealed that there are 24 newly recorded plant species in the desert areas (Appendix 1). The new records, which belong to family Astraceae are *Anthemis cvrenaica* Cosson, *Senecio glaucus* L. ssp. *coronopifolius* Maire C.Alexander, *Sonchus oleraceus* L., and *Reichardia tingitana* (L.) Roth). All of these species are annuals mainly found in the cultivated fields. The other new records are *Anchusa aegyptiaca* (L.) A.DC (Family: Boraginaceae), *Eruca sativa*, *Brassica tournefortii* Gouan L., *Lobularia libyca* (Viv.) C.F.W. Meisen, and *Sisymbrium irio* L. (Family: Brassicaceae), *Silene longipetala* Vent, *Spergularia media* (L.) C. Presl (Family: Caryophyllaceae), *Chenopodium album* L., *Salsola vermiculata* L. var. *spinescens* (Moq) Maire & Weiller, *Suaeda vera* Forssk. Ex j.f. Gmelin. (Family: Chenopodiaceae), *Astragalus hauarensis* Bois., *Lotus edulis* L., and *Lotus cytisoides* L. (Family: Fabaceae), *Frankenia hirsute* L. (Family: Frankeniaceae), *Plantago amplexicaulis* Cav. (Family: Plantaginaceae), *Bromus madritensis* L., and *Lolium rigidum* Gaud. (Family: Poaceae), *Polygonum patulum* M. Bieb. (Family: Polygonaceae), *Anagallis arvensis* L. var. *arvensis* (Family: Primulaceae), and *Fagonia taeckholmiana* Hadidi (Family: Zygophyllaceae). Most of the new records are annuals.

### Economic Important

Based on the economic importance, the recorded plant species are classified into medicinal species (26 species, 10.1%), endemic species (11 species, 4.5%), and rare species (9 species, 3.7%) (Table 5). The rest of the recorded plant species (198 species) include many halophytes growing in salt marshes habitats, psammophytes or sand dunes plants, and weeds growing in cultivated fields.

**Table (4):** descending arrangement of families according to numbers of species in the Libyan Desert.

Family	No. of Genera	No. of species	%	
Poaceae	22	35	14.344	
Fabaceae	13	27	11.066	
Asteraceae	19	22	9.016	
Brassicaceae	18	18	7.377	
Zygophyllaceae	6	16	6.557	
Capparaceae	3	9	3.688	
Chenopodiaceae	6	9	3.688	
Boraginaceae	6	8	3.278	
Tamaricaceae	1	7	2.868	
Potamogetonaceae	1	6	2.459	
Asclepiadaceae	5	5	2.049	
Cyperaceae	3	5	2.049	
Polygonaceae	4	5	2.049	
Caryophyllaceae	3	4	1.639	
Illecebraceae	3	4	1.639	
Resedaceae	4	4	1.639	
Aizaceae	3	3	1.229	
Campanulaceae	2	3	1.229	
Euphorbiaceae	1	3	1.229	
Geranaceae	2	3	1.229	
Juncaceae	1	3	1.229	
Molluginaceae	3	3	1.229	
Amaranthaceae	2	2	0.819	
Caespliniaceae	2	2	0.819	
Convolvulaceae	1	2	0.819	
Frankeniaceae	1	2	0.819	
Lentibulariaceae	1	2	0.819	
Liliaceae	1	2	0.819	
Mimosaceae	1	2	0.819	
Plantaginaceae	1	2	0.819	
Primulaceae	2	2	0.819	
Tiluceae	1	2	0.819	
Areaceae	1	1	0.409	
Cynomoriaceae	1	1	0.409	
Cucurbitaceae	1	1	0.409	
Gentianaceae	1	1	0.409	
Lemnaceae	1	1	0.409	
Lamiaceae	1	1	0.409	
Lythraceae	1	1	0.409	
Malvaceae	1	1	0.409	
Menispermaceae	1	1	0.409	
Moraceae	1	1	0.409	
Myrtaceae	1	1	0.409	
Naijadaceae	1	1	0.409	
Nyctaginaceae	1	1	0.409	
Orobanchaceae	1	1	0.409	
Polygalaceae	1	1	0.409	
Ruppiaceae	1	1	0.409	
Salvadoraceae	1	1	0.409	
Scrophulariaceae	1	1	0.409	
Solanaceae	1	1	0.409	
Uriticaceae	1	1	0.409	
Vahliaceae	1	1	0.409	
Zannichelliaceae	1	1	0.409	
Total	54	164	244	100%

### Life Forms

Figure (1) represents the life forms of the wild plants recorded in the Libyan Desert areas. The most common life form is Therophytes (43.9%), followed by Chamaephytes (26.6%). Phanerophytes and Nanophanerophytes are represented by 8.2% each; whereas Hydrophytes and Geophytes are represented by 5.7% each. The other life forms (Lianea, Parasitica and Hemicyptophytes) are represented by very small percentage (less than 1%).

**Table (5):** Genera highly represented by number of species in the Libyan Desert.

Family	Genus	No. of species
Fabaceae	<i>Astragulus</i>	9
Tamaricaceae	<i>Tamarix</i>	7
Zygophyllaceae	<i>Fagonia</i>	7
Potamogetonaceae	<i>Potamogetuu</i>	6
Poaceae	<i>Stipagrosit</i>	5
Capparaceae	<i>Cleome</i>	5
Fabaceae	<i>Louts</i>	4
Asteraceae	<i>Launaea</i>	3
Cyperaceae	<i>Cyperus</i>	3
Euphorbiaceae	<i>Euphorbia</i>	3
Fabaceae	<i>Trigonilla</i>	3
Juncaceae	<i>Juncus</i>	3
	<i>Aristida</i>	3
Poaceae	<i>Lophochlae</i>	3
	<i>Sporobolus</i>	3
	<i>Tribulus</i>	3
Zygophyllaceae	<i>Zygophyllum</i>	3
Asteraceae	<i>Picris</i>	2
Boraginaceae	<i>Echium</i>	2
	<i>Hellotropium</i>	2
Campanulaceae	<i>Campanula</i>	2
Capparaceae	<i>Capparis</i>	2
Caryophyllaceae	<i>Silene</i>	2
	<i>Chenopodium</i>	2
Chenopodiaceae	<i>Salsola</i>	2
	<i>Suaeda</i>	2
Convolvulaceae	<i>Convolvulus</i>	2
Fabaceae	<i>Crotalaria</i>	2
Frankenaceae	<i>Frankenia</i>	2
Geraniaceae	<i>Erodium</i>	2
Illecbraceae	<i>Herniaria</i>	2
Liliaceae	<i>Asphodelus</i>	2
Mimosaceae	<i>Acacia</i>	2
Plantaginaceae	<i>Plantago</i>	2
	<i>Eragrostis</i>	2
Poaceae	<i>Lolium</i>	2
	<i>Triticum</i>	2
Polygonaceae	<i>Polygonum</i>	2
Tiluceae	<i>Corchorus</i>	2
Total		

These results are in agreement with the previous studies which indicated the dominance of the Therophytes in the arid and semi-arid areas. The great variations between different life forms may be related to the heterogeneity of topographic and edaphic conditions at different habitats.

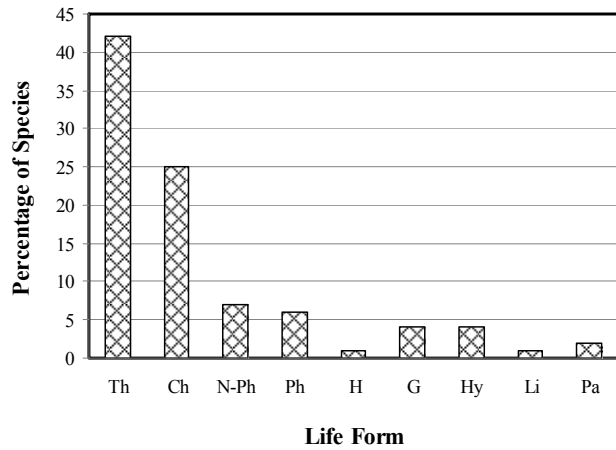
**Phytogeographical Distribution**

Figure (2) summarizes the distribution of the phytogeographical elements in the Lybian Desert. The highest percentage of the recorded species belong to Saharo Arabian phytogeographical region (24.6%), whereas the Irano-Turanian (IT) and Sudano-Zambesian (SA+SZ) are represented by (11.5 and 10.7%, respectively). The Mediterranean (MED) flora is represented by 9.4%, the Saharo Sindian elements (SS) and Palaeotropical elements (Pal) are represented by 7.8 and 7.4%, respectively, and the Med+IT elements and SZ are represented by 6.6 and 6.2%, respectively.

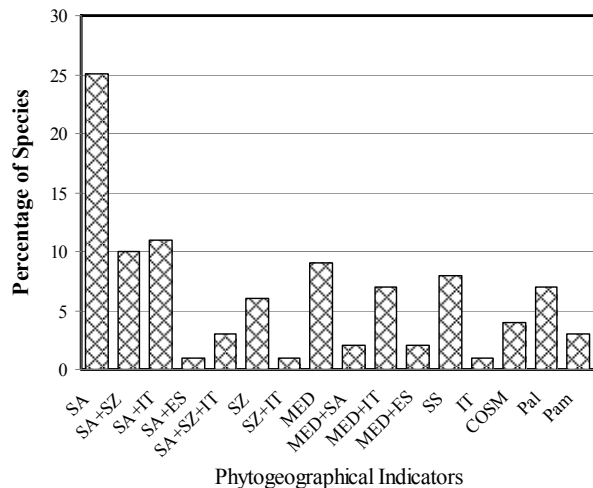
All of these results agreed with the arid climate in most of the Libyan deserts except the northern ones where the semiarid and Mediterranean climate are common, especially in the areas near the Gulf of Sert.

**Table (5):** Economic Importance for the Wild Plant Species Recorded in the Libyan Desert Areas.

Medicinal	Endemic	Rare	Other wild
26	11	9	198
10.66	4.51	3.69	81.18



**Figure (1):** Percentage of the life form of the recorded plant species recorded in the desert areas.



**Figure (2):** Phytogeographical analysis of the recorded plant species recorded in the desert areas.

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## التركيب الفلورى للمنطقة الصحراوية فى ليبيا

### خديجة بعيو

قسم البيولوجى، كلية العلوم، جامعة السابع من أكتوبر، مصراتة، الجماهيرية العربية الليبية

### الملخص العربى

هدفت هذه الدراسة إلى حصر جميع الأنواع النباتية المسجلة بالمنطقة الصحراوية جنوب خط عرض 30° شمالاً، وتحديد صور حياتها والمناطق التي سجلت بها فى ليبيا، فضلاً عن توزيعها الجغرافى العالمى وتحديد ما إذا كانت هذه الأنواع برية، طبية، متوطنة أو نادرة. كما شملت الدراسة الحقلية تسجيل الأنواع النباتية المتواجدة فى منطقة واحات الجفرة (هون - ودان - سوكنة - زلة). أظهرت نتائج هذه الدراسة وجود 244 نوع نباتى سجلت فى المنطقة الصحراوية بليبيا، تتبع 164 جنس تنتمى إلى 53 فصيلة نباتية، منها 107 نوع حولى و137 نوع معمر. و114 نوع نباتى سجلت فى منطقة الجفرة منها 35 نوع نباتى سجلت لأول مرة فى هذه المنطقة. كما سجلت هذه الدراسة وجود 26 نوع نباتى طبي، 11 نوع نباتى متوطن، 9 أنواع نباتية نادرة.

كما أوضحت نتائج الدراسة أن أكبر الفصائل من حيث عدد الأنواع هى Poaceae (35 نوع نباتى)، Fabaceae (27 نوع نباتى)، Asteraceae (22 نوع نباتى)، Brassicaceae (18 نوع نباتى)، Zygophyllaceae (16 نوع نباتى)، وسجلت 27 فصيلة نباتية عدد يتراوح بين 9 أنواع ونوعين نباتيين ومثلت 22 فصيلة نباتية بنوع واحد فقط. وكانت أكثر صور الحياة سيادة فى المنطقة هى الحوليات، تلتها النباتات فوق السطحية. وأكثر العناصر الجغرافية النباتية سيادة هى عنصر الصحارى العربية يليه عنصر الصحارى العربية + الإيرانى الطورانى، ثم الصحارى العربية + السودانى الزمبىزى.

Floristic composition of Sahara Area in Libya

**Appendix (1):** Distribution of plant species recorded in the Sahara area of Libya, together with their life- forms, Phytochoria, Flowering time, Distribution in Libya, and economic importance. {Life-form Abbreviations: Th = Therophytes, Ch = Chamaephytes, Hy= Hydrophytes, H = Hemicreptophytes, G =Geophytes, Pa = Parasites, N-Ph = Nano-Phanerophytes, Ph= Phanerophytes, Li= Lianes}. {Phytochoria Abbreviations: MED = Mediterranean, SA = Saharo-Arabian, IT = Irano-Turanian, SZ = Sudano-Zambeian, SS = Saharo Sindian , Pal = Palaeotropical , and Cosm = Cosmopolitan }.

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
Aizoaceae	<i>Aizoon canariense</i> L.	Th	(Fezzan), Coastal area.	SA+SZ	Nov.-June	Hadag, Sam, Koshed el Belad.	Wild
	<i>Mesembryanthemum froskahlii</i> (Hochst.)	Th	(Sawknah), Coastal area.	SA	---	---	Wild
Amaranthaceae	<i>Zaleya pentandra</i> (L.) Jeffrey	Th	(Tibesti).	Pal	Nov -Feb	-	Wild
	<i>Aerva javanica</i> (Burmf) Juss. a) var. <i>javanica</i>	Ch	(70 km from Ghat towards Algerian border, Tibesti, Al Uwaynat).	SS	Jan.-Apr.	Elgaab-Ghell.	Wild
	<i>Aerva javanica</i> (Burmf) Juss. b) var. <i>bovel</i> Webb.	Ch	(10 km before Ghat, Al Uwaynat).	SS	Nov.-March	---	Wild
	<i>Amaranthus graecizans</i> (L.) a) ssp. <i>graecizans</i>	Th	(150 km from Sabhah, Al Uwaynat), Coastal area.	Pal	March-July	---	Wild
Areaceae	<i>Hyphaene thebaice</i> (Del.) Mart.	Ph	(Tedferri Oasis south of Marzuq, Kofra).	SZ	April	Doam, Dum.	Wild, Medicinal plant
Asclepiadaceae	<i>Calotropis procera</i> (Ait). Ait.	Th	(Al Kofrah, Al Uwaynat).	SS	Almost throughout the year.	Brumbak,	Wild, Medicinal plant
	<i>Cynanchum acutum</i> L.	Ch	(Ghagbub).	MED	-	-	Wild
Asteraceae	<i>Leptadenia pyrotechnica</i> (Forsk) Decnein.	Ph	(Ghat, Marzuq, Ghudamis).	SZ+IT	Oct.-March	Anec,talenbu, tana.	Wild , Medicinal, fibres
	<i>Pergularia tomentosa</i> L	Ch	(New record in Hun, Sabhah, Al Uwaynat).	SA+IT	Feb-April	<i>Sellakha, Tackat, Taskat.</i>	Wild, Medicinal plant.
	<i>Solenostemma oleifolium</i> (Nectou) Bullock & Bruce	N-ph	(Ghat—Fezzan).	SA+SZ	Feb.-March	---	Wild, Medicinal plant.
	<i>Amberboa leucantha</i> Cosson ex Batt.	Th	(Wadi Soda 98 km south Hun, Wadi Isein).	SA	March-April	-	Wild , Endemic to Sahara (Morocco – Egypt)
	<i>Anvillea garcinii</i> (Burm. fil. DC.)	Ch	(Gudamis, Ghat,100 km north Hun, Wadi Soda), Coastal area, Gebel Gharbi	SA+IT	Feb.-Apr.	Nogud.	Wild, in dray sandy ground or sandy hammada.
	<i>Anthemis cvrenaica</i> Cosson	Th	(New record in Sahara area, Zilla Oasis), Gebl Akhder.	MED	March- June	-	Wild
	<i>Artemisia judaica</i> L.	Ch	(New record in Hun, Fezzan).	SA	-	-	Wild. Medicinal plant.
	<i>Asteriscus graveolens</i> (Forsk) Less.	Ch	(Ghudamis), Coastal area,	SA	Mar.-Apr.	Rabad-Aferna, Nogud & Tamayaut.	Wild, Waste ground, sandy ground with pebbles.
	<i>Atractylis phazaniae</i> Corti.	Ch	(Wadi Soda .Brach).	SA	March - April	-	Wild, Endemic to Fezzan, Sandy soil with loamy top at places.
	<i>Centaurea ammocyanus</i> Boiss.	Th	(Soda mountain, Bu Nagem).	SA	---	---	Wild, sandy places.
	<i>Cotula cinerea</i> Delile.	Th	(Wadi Berging, South of Bun Ngem, Hun), Gebel Gharbi.	SA+SZ	March-April	-	Wild, in Sandy soil, Medicinal plant.
	<i>Francoeuria crispa</i> (Forsk.) Cuss.	Ch	(Hun, Weshka, Al Uwaynat).	SA+SZ	Nov.-Mar.	Ashbet el Mar Nogud al Waddan.	Wild, on sandy soil, Medicinal plant.
	<i>Gnaphalium luteo-album</i> L.	Th	(Ghat, Southern part of Tibesti), Gebel Gharbi.	Cosm	June-Oct.	---	Wild, on damp, Usually sandy places.
	<i>Ifloga spicata</i> (Forsk.) Schultz.	Th	(Sabhah, Wadi Soda, Hun) ,Coastal area, Gebel Gharbi.	MED+IT	Mar.-Apr.	---	Wild, Weed flora



Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
	<i>Launaea procumbens</i> (Roxb) Amin ex Tackh..	Ch	(Wadi Soda, Barkit), Coastal area	SS	Mar.-Apr.	-	Wild, in sandy ground with pebbles.
	<i>Launaea capitata</i> (Sprengel) Dandy	Th	(Barkit, Hun, Al-Abyad, Tibesti).	SS	Feb.-Mar.	Arzetha, Aghardeli. Harchaia	Wild, in sandy ground
	<i>Launaea nudicaulis</i> (L.) Hook.	Th	(Hun), Coastal area, Gebel Gharbi, Gebel Akhder.	MED+SA	Feb- March	Aara, Aghardell. Arerrem, Arzetha, Gram, Orreem.	Wild
	<i>Prolongoa macrocarpa</i> L.	Th	(On Derj - Ghudamis Road, 17 km from Weshka).	SA	Jan.-Mar.	Aouleghs.	Wild, Endemic, in sandy soil.
	<i>Picris altissima</i> Delile.	Th	(23 km from Weshka, Wadi Zaggar).	MED+SA	March-June	-	Wild, in stones on slopes.
	<i>Picris pauciflora</i> Willd.	Th	(98 km from Hun to Sabhah).	MED	-	-	Wild, in sandy soil with loamy top at places.
	<i>Pulicarea undulata</i> (L.) C.A.Meyer	Ch	(Al Uwaynat, Fezzan and Ghat areas. Hun).	SS	March - April	Ameo	Wild, in sandy gravel soil.
	<i>Senecio glaucus</i> L. ssp. <i>coronopifolius</i> (Maire) C.Alexander	Th	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi.	MED	Jan- April	Daraita; Mourare	Wild, in sandy soil.
	<i>Sonchus oleraceus</i> L.	Th	(New record in Sahara area, Hun- Zilla Oasis), Gebel Gharbi, Gebel Akhder.	MED	Throughout the year.	Tefaf.	Wild, weed flora,
	<i>Rhanterium suaveolens</i> Desf.	Ch	(130 km from Hun towards Tripoli), Gebel Gharbi.	SA	Mar.-May	---	Wild, in sandy soil
	<i>Reichardia tingitana</i> (L.) Roth	Th	(New record in Sahara area Hun), Coastal area, Gebel Gharbi, Gebel Akhder.	MED+IT	Throughout the year.	Sahani	Wild.
<i>Boraginaceae</i>	<i>Anchusa aegyptiaca</i> (L.) A.DC.	Th	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi, Gebel Akhder.	MED+IT	Jan-April	-	Wild.
	<i>Echium plantagineum</i> L.	Th	(52 km from Bugrqin to Hun).	MED	Jan.-Mar.	---	Wild
	<i>Echium horridum</i> Batt.	Ch	(98 km from Hun to Sabhah, Wadi soda).	SA	Jan-March	-	Wild, in sandy soil with loamy top at places.
	<i>Eritrichium pusillum</i> (Coss.&Dur.)Torr.et Grey.	Th	(98 km from Hun to Sabhah, Wadi Soda).	SA	Mar.-Apr.	---	Wild
	<i>Heliotropium ramosissimum</i> (Leh.)DC.	Ch	Sabhah, Al Uwaynat), Coastal area, Gebel Gharbi.	SA+IT	Dec.-Mar.	Tahanna, Tahenna.	Wild; in sandy and stony ground.
	<i>Heliotropium bacciferum</i> Forsk.	Ch	(New record in Sawknah, Weddan, Hun, Wadi soda, Jaghbub, Gebel Uweinat). Coastal area.	SA+IT	Nov- March	Ramram, rumrum.	Wild, in sandy stony soil
	<i>Moitkiopsis ciliata</i> (Forsk.) I. M .Johnst..	Ch	(120 km before Bu Najim to Hun).	SA	Jan.-April	Aginest.	Wild; good camel forage
<i>Brassicaceae</i>	<i>Trichodesma africanum</i> (L.) R.Br.	Th	(Soda mountaine).	SS	Feb-June	Harsha - Diodio	Wild; good camel fodder.
	<i>Ammosperma vareabile</i> Nigre.	Th	(Waddan, Hun). Gebel Gharbi.	SA	Jan.-March	---	Wild, Endemic, in stony flat, sandy depression.
	<i>Anastatica hierochuntica</i> L.	Th	(Ghat, Al Uwaynat, Ghudamis, Al Kofrah).	SA+IT	March-April	Akaraba, Kif meriam.	Wild, in sandy ground
	<i>Brassica tournefortii</i> Gouan	Th	(New record in Sahara area , Hun), Coastal area, Gebel Gharbi	MED+IT	Jan- March	Shultam	Wild, in sandy reddish soil.
	<i>Carrichtera annua</i> (L.) DC.	Th	(Ghudamis, Sabhah), Gebel Gharbi, Gebel Akhder.	MED+IT	Feb.-May	Hossina, Khashaine.	Wild, in limestone hills slope.sandy and stony ground.
	<i>Diploxys harra</i> (Forssk.) Boiss.	Ch	(Confirmed record in Hun, Gebel Soda), Gebel Gharbi.	MED+IT	Oct - May	-	Wild, in clay soil, flat limestone, rocks, sandy and stony ground.
	<i>Eremophyton chevallieri</i> (Barr.) Beg.	Th	(Soda mountaine).	SS	-	-	Wild
	<i>Eremobium longisiliquum</i> (Coss.)	Ch?	(Ghat, Barkat), Coastal area, Gebel	SA	Oct.-Feb.	Lesles.	Wild, in sandy wet soil.

Floristic composition of Sahara Area in Libya

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
	<i>Boiss.</i>		Gharbi.				
	<i>Eruca sativa</i> L.	Th	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi.	MED	-	-	Wild, in limestone hill slope, sandy ground.
	<i>Farsetia aegyptia</i> Turra.	Ch	(Sokna, Hun, Ghudamis, Sebha, Ghat, Soda mountaine), Gebel Gharbi.	SA	---	---	Wild, in sandy and stony ground.
	<i>Lobularea libyca</i> (Viv.) C.F.W. Meisen	Th	(New record in Sahara area, Zilla Oasis), Coastal area	MED	Jan.-April	-	Wild, a species of waste ground and edges of cultivated fields
	<i>Matthiola glutinosa</i> Jafri.	Ch	(240km from Sabhah to Hun).	SA	---	---	Wild, Endemic to Sahara in Libya
	<i>Morettia philaeana</i> (Del.) DC.	Ch	(Soda mountains, 35 km from Weshka).	SA+SZ	Feb.-March	---	Wild, in sandy soil.
	<i>Oudneya Africana</i> R.Br.	N.Ph	(Hun, Sawknah, Weddan, 240 km from Sabhah, along Hun highway).	SA	Jan- March	Zwetena	Wild, in sandy and gravelly ground,
	<i>Pseuderucarea teretifolia</i> (Desf.) O. E.	Th	(50 km from Hun towards to Bugrain).	SA	Jan.-March	---	Wild, in sandy ground.
	<i>Savignya pariflora</i> (Delile) Webb. Subsp. <i>globosa</i> Jafri.	Th	(90 km from Sabhah to Hun).	SA	Feb	-	Wild
	<i>Schouwia purpurea</i> (Forsk.) Schweinf.	Th	(Ghat, Tibesti).	SA	March-April	Jirjeer, Alluas, Alout, Djirdjir.	Wild, Rare, grazed by cattle.
	<i>Sisymbrium irio</i> L.	Th	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi, Gebel Akhder.	MED	Feb- May	-	Wild, common weed plant, hills and plains
	<i>Zilla spinosa</i> (L.) Prantl. a) ssp. <i>spinosa</i>	N.Ph	(Confirmed record in Hun, Sabhah, Ghudamis), Coastal area, Gebel Gharbi.	SA	---	---	Wild, in sandy and stony ground.
	<i>Zillia spinosa</i> (L.) Prantl. b) ssp. <i>macroptera</i>		(Ghudamis), Gebel Gharbi, Gebel Akhder.		---	---	
Caesalpiniaceae	<i>Cassia italica</i> (Mill) L.	N.Ph	(Sabhah, Al Uwaynat).	SS	Sept.-Oct.	Agerge, Agerer, Senha.	Wild, Rare species
	<i>Tamarindus indica</i> L.	Ph	(Al Kofrah).	Pal	June-Nov.	Tammar hindi.	Wild, Rare species, the leaves are used as purgative, Medicinal plant
Campanulaceae	<i>Campanula bordesiana</i> Maire	Ch	(Tibesti).	SS	April-May	-	Wild
	<i>Campanula mondiana</i> Maire	Ch	(Tibesti)	SZ	June	-	Wild, Endemic and perhaps known from type gathering only
Capparaceae	<i>Wahlenbergia bernardi</i> Leredde	Th	(Wadi Agage, Ghat).	SS	Jan-March	-	Wild
	<i>Capparis cartilaginea</i> Dacne	N-Ph	(Ghudamis, Tibesti, Fezzan).	SZ+SA + IT	-	-	Wild
	<i>Capparis deciduas</i> (Forsk.) Edgew.	Ph	(Al Uwaynat).	SA+SZ	May - Aug	Kabbar	Rare, The wood is hard and bitter, resistant to white ants attack. The young fruits and flowers are pickled
	<i>Cleome scaposa</i> DC. Prodr.	G	(Tibesti).	SA+SZ	-	-	Wild
	<i>Cleome droserifolia</i> (Forsk.) Del.	Ch	(Al Uwaynat)	SA+SZ	Oct - Nov	-	Wild
	<i>Cleome chrysantha</i> Decne.	N-Ph	(Al Uwaynat, Tibesti).	SA +SZ	Oct - Nov	-	Wild
	<i>Cleome paradoxa</i> R.Br.	N-Ph	(Tibesti).	SZ	-	-	Wild
	<i>Cleome brachycarpa</i> Vahl ex DC.Prodr.	Ch	(Tibesti)	SA+ SZ	-	-	Wild, Rare species, growing on stony and sandy mound of Tibesti, A nauseating smelling plant sometimes grazed by sheep and goats
	<i>Cleome amblyocarpa</i> Barr.	Th	(Ghat, Barkat, Sabhah, Hun), Coastal area, Gebel Gharbi.	SA+SZ+IT	All the year round.	Ahojjarh. Arfena	Wild, in sandy ground,
	<i>Maerua crassifolia</i> Forsk.	Ph	(Wadi Washka, Al Uwaynat).	SA+SZ+IT	April - June	Azar – Sarah	Wild, one of the few shrubs in the Fezzan area, slow growing, leaves have high contents of calcium

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
<i>Caryophyllaceae</i>	<i>Silene villosa</i> Forsk.	Th	(Jarmah, Hun, Weshka, Senawan)	SA+IT	March-May	Intelmellet.	Wild, a common desert specis.
	<i>Silene longipetala</i> Vent.	Ch	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi , Gebel Akhder.	MED+IT	March-May	-	Wild
	<i>Spergularia media</i> (L.) C. Presl	Ch	(New record in Sahara area, Zilla Oasis), Gebel Gharbi.	ES+SA	Aug-Des	Busweifa	Wild. Medicinal plant.
<i>Chenopodiaceae</i>	<i>Robbairia delilana</i> Milne.	Th	(Sabhah, Ghat, Fezzan), Gebel Gharbi.	SA+SZ.	Jan-April	---	Wild, a specis of arid region.
	<i>Bassia muricata</i> (L.) Aschers.	Th	(New record in Zilla Oasis, 70 km from Ghat towerdes Algiran border), Coastal area, Gebel Gharbi.	SA	Feb.-Aug.	Chouleta, Ghabbir, Ouhas.	Wild, a species of sandy saline habitats.
	<i>Chenopodium album</i> L.	Th	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi. (Confirmed record in Hun Hun,	MED	March- Oct.	Bu – Zenzer.	Wild, a common weed, medicinal
	<i>Chenopodium murale</i> L.	Th	Weddan), Coastal area, Gebel Gharbi, Gebel Akhder.	Cosm	Feb- May	Effena, Bu-Zenzer.	Wild, useful weed, waste places.
	<i>Cornulaca monacantha</i> Del.	N-Ph	(Brach , Sabhah, Al Uwaynat).	SA+IT	Oct - Nov	Hadd – Suda -Tahara	Wild, desert species, grazed by camels
	<i>Nuclarea perrini</i> Batt	N-Ph	(Sabhah, Ghat).	SA	Feb - April	Askaf - Tassak	Wild, desert species, grazed by camels
	<i>Salsola baryosma</i> . (Roem.& Schult.) Dandy	N-Ph.	(Ghudamis, Weshka, Brach, Ghat), Coastal area	SA+IT	Sept.-Nov.	<b>Ressal, Talizza.</b>	Wild, desert species, grazed by camel and probahly by other livestock.
	<i>Salsola vermiculata</i> L. var. <i>spinescens</i> (Moq) Maire & Weiller	N-Ph	(New record in Sahara area, Zilla Oasis), Coastal area, Gebel Gharbi	MED	Sep-Oct	Gheddam, Asierwahi, Rhadam	Wild, desert species, good pasture plant.
<i>Suaeda monodiana</i> Maire	N-Ph	(Ghat).	SA	Feb - April	-	Wild, Endemic to Libya, Algiria, Morocco.	
<i>Suaeda vera</i> Forssk. Ex j.f. Gmelin.	N-Ph	(New record in Sahara area, Zilla, Hun Oasis), Coastal area, Gebel Akhder.	SA	-	-	Wild	
<b>Convolvulaceae</b>	<i>Convolvulus tricolor</i> L.	Th	(Fezzan, Sabhah), Coastal area, Gebel Akhder.	MED	March-July	---	Wild; dry open habitat
	<i>Convolvulus prostrates</i> Forsk.	Ch	(Ghat).	SA+SZ	Jan -April	-	Wild
<b>Cucurbitaceae</b>	<i>Citrullus colocynthis</i> (L.) Schard	H	(New record in Hun, Ghat, Barkat, Al Uwaynat), Coastal area, Gebel Gharbi.	SA+IT	Almost thoruqhout the year.	Handel	Wild, medicinal plant.
<b>Cynomoriaceae</b>	<i>Cynomorium coccineum</i> L.	Pa	(Ghudamis, Ghat).	MED+IT	Almost round the year	Aoukal, Tartut.	Wild
<b>Cyperaceae</b>	<i>Cyperus esculentus</i> L.	G	(Ghat) Coastal area	Pal	Apr.-Dec.	Hab Azeez.	Wild weed, Medicinal plant.
	<i>Cyperus mundtii</i> (Nees) Kunth.	G	(Ghat , El baracat).	Cosm	April-Nov	-	Wild
	<i>Cyperus conglomerates</i> Rottb.	Ch	(Sabhah).	SA+SZ	D. the year	-	Wild
	<i>Eleocharis caribaea</i> (Rottb) Blake.	Th	(Ghat).	Pal	-	-	Wild
<i>Fimbristylis ferruginea</i> (L.) Vahl.	Ch	(Ghat).	Pal	May-Nov	-	Wild, Rare Species, confined to southern parts only.	
<b>Euphorbiaceae</b>	<i>Euphorbia granulate.</i> Forsk.	Ch	(Ghat, Al Uwaynat, 80 km from Hun to sebha).	SA	All the year.	Libbana. Um Ellben	Wild, desert species, Medicinal plant.
	<i>Euphorbia retusa</i> Forsk.	Ch	(Confirmed record in Hun, Wedan, Zila, Ghudamis, Ghat), Coastal area, Gebel Gharbi,	SA	Feb.-May	Lebbana.	Wild, desert species
	<i>Euphorbia calyptrata</i> Cass et Dur. Ex Coss.	Th	(89 km from Hun to Sabhah, Wadi Soda, Ghat, Al Barkat).	SA	-	-	Wild, desert species
<b>Fabaceae</b>	<i>Alhagi graecorum</i> Boiss.	N.Ph	(New record in Hun, Zilla, Barkat, Ghat, Jaghboub).	SA	March-Aug.	Agol, Halobaa.	Wild, Medicinal plant.
	<i>Astragalus fruticosus</i> Forsk.	Ch	(Ghudamis), Gebel Gharbi.	SA	Jan.-March	---	Wild
<i>Astragalus pseudotrigonus</i> Batt.	Ch	(Fezzan).	SA	---	Ekechechekir.	Wild	

## Floristic composition of Sahara Area in Libya

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
	<i>Astragalus schimperi</i> Boiss.	Th	(Weshka, 80 km from Hun).	SA+IT	Feb.-April	---	Wild, desert species
	<i>Astragalus hispidulus</i> DC.	Ch	(Bou Njem, Soda mountaines), Coastal area.	SA	---	---	Wild
	<i>Astragalus intercedeus</i> Sam. Ex Rech.	Th	(52 km from Bougrain to Hun).	SA	Feb - March	-	Wild
	<i>Astragalus vogelii</i> (Webb) Bornm.	Th	(Tibesti , Ghudamis).	SZ	March - Nov	-	Wild
	<i>Astragalus eremophilus</i> Boiss	Th	(Brake).	SA	-	-	Wild
	<i>Astragalus hauarensis</i> Boiss.	Th	(Nw record in Sahara area Hun), Coastal area.	SA+IT	Jqn- March	-	Wild, desert species
	<i>Astragalus corrugatus</i> Bertol.	Th	(New record in Hun, Ghat), Coastal area.	SA+IT	-	-	Wild, desert species
	<i>Crotalaria arenarea</i> Benth.	Ch	(Tibesti).	SZ	-	-	Wild
	<i>Crotalaria thebaice</i> (Del.) DC.	Ch	(Al Uwaynat).	SZ	Sept.-Nov.	---	Wild
	<i>Dorycnium rectum</i> (L.) Ser.	N-Ph	Al Uwaynat).(	MED	-	-	Wild
	<i>Lndigofera sessiliflora</i> DC.	Th	(Al Uwaynat).	SZ	Oct.-Nov.	---	Wild
	<i>Lotononis platycarpus</i> (Viv.) P. Sermolli	Th	(95 km from Hun,Wadi Soda).	SS,	Feb - April	-	Wild
	<i>Lotus edulis</i> L.	Th	(New record in Sahara area .Zalla), Coastal area, Gebel Gharbi, Gebel Akhder.	MED	-	-	Wild
	<i>Lotus jolyi</i> Batt.	Ch	(80 km from Hun, Ghat, Tibesti).	SA	---	---	Wild
	<i>Lotus glinoides</i> Del.	Th	(Hun, Wadi Soda, 70 km from Ghat towerds Algiran border).	SA+SZ	Feb- March	-	Wild, desert species
	<i>Lotus cytisoides</i> L.	Ch	(New record in Sahara area, Hun), Coastal area; Gebel Gharbi, Gebel Akhder.	SA			Wild, species of coastal sandy area
	<i>Medicago laciniata</i> (L.) Mill.	Th	(Hun, Waden), Gebel Gharbi.	SA	Feb.-April	Aouinet el hanesh.	Wild
	<i>Melilotus indicus</i> (L.) All.	Th	(New record in Zilla, 18 km befor Brach), Coastal area, Gebel Akhder	ES+MED	Feb- May		Wild, weed, Medicinal plant.
	<i>Psoralea plicata</i> Del.	N-Ph	(Al Uwaynat).	SA+SZ	Jan - Feb	-	Wild, dried valley bed, soil sandy –gravelly.
	<i>Retama raetam</i> (Forsk.) L.	N-Ph	(Confirmed record in Hun, Weddan), Coastal area, Gebel Gharbi.	MED	---	---	Wild, Medicinal plant.
	<i>Tetragonolobus purpureus</i> Moench.	Th	(Sabhah), Coastal area, Gebel Gharbi.Gebel Akhder	MED+ES	Feb.-April	---	Wild
	<i>Trigonella anguina</i> Delile.	Th	(89 km from Hun to Sabhah, Ghat, Ghudamis), Gebel Gharbi.	SA+IT	Feb.-April	Ahazas, Nefel.	Wild, desert species
	<i>Trigonella laciniata</i> L.	Th	(Ghudamis).	SA	---	---	Wild,
	<i>Trigonella stellata</i> Forsk.	Th	(10 km from Weshka to Hun), Coastal area.	SA+IT	Jan.-April	---	Wild, desert species
<b>Frankeniaceae</b>	<i>Frankenia laevis</i> L.	Ch	(Ghadames, Brak), Gebel Gharbi, Gebel Akhder	MED	March-June	---	Wild
	<i>Frankenia hirsute</i> L.	Ch	(New record in Sahara area, Zalla), Coastal area	MED	March-June	Mellah	Wild
<b>Gentianaceae</b>	<i>Centaurium pulchellum</i> (Swartz) Druce.	Th	(Fezzan. Tibisti), Coastal area, Gebel Gharbi.	MED+IT	June-Dec.	---	Wild
<b>Geraniaceae</b>	<i>Erodium arborescens</i> (Desf.) Willd.	Ch	(Ghadames), Gebel Gharbi.	SA	Jan.-April	Marghed, Merghed.	Wild, common plant in limestone and sandy hills in N.W. Libya
	<i>Erodium glaucophyllum</i> (L.) L' Herit	Ch	(Hun, Ghadames), Coastal area, Gebel Gharbi,	SA+IT	Nov.-April	Dahma, Ragma.	Wild
	<i>Monsonia nivea</i> (Decne.) Decne.	Ch	(Ghudamis, 120 km from Bughrain to	SA+SZ+IT	Feb - May	Azren-Tazrent	Wild, Sandy soil.

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
<b>Juncaceae</b>	<i>Juncus maritimus</i> var. <i>arabicus</i> Aschers&Buchen.		Hun, 200km from Sabhah to Hun, Brack).				
	<i>Juncus maritimus</i> (Lam.) L. a) var. <i>maritimus</i>	G	(Al Uwaynat).	SA+IT	March-July	Agertil-dees	Wild
	<i>Juncus mutabilis</i> Lam.	Th	(Barck).	MED	---	Dees.	Wild
	<i>Juncus punctorius</i> L.f.	G	(Fezzan, Al Uwaynat).	SS	---	---	Wild
<b>Illecebraceae</b>	<i>Herniarea hemistemon</i> J.Gay.	Ch	(Hun), Coastal area	SA+IT	March-June	---	Wild, Saline and sandy ground.
	<i>Herniarea fontanesii</i> J.Gay.	Ch	(Ghat) Coastal area, Gebel Gharbi	MED	Feb.-April	---	Wild
	<i>Paronychia arabica</i> L.	Th	(Fezzan, Hun), Coastal area, Gebel Gharbi, Gebel Akhder	SA+IT	Feb.-July	Tifun.	Wild
<b>Lamiaceae</b>	<i>Sclerocephalus arabicus</i> Boiss.	Th	(Soda mountains, Hun).	SA+IT	March - July	-	Wild
	<i>Mentha longifolia</i> (L.) Huds	Ch	(Fezzan, Tibesti, Ghat).	Pal	May - July	Taihart - Tinhart	Wild
<b>Lemnaceae</b>	<i>Lemna minor</i> L.	Hy	(Ghat).	Cosm	June - July	-	Wild
<b>Lentibulareaceae</b>	<i>Utricularia inflexa</i> Forsk.	Hy	(Ghat).	Pal	-	-	Wild
	<i>Utricularia gibba</i> L.	Hy	(Ghat, Barkat).	Pal	-	-	Wild , sometimes used in aquaria
<b>Liliaceae</b>	<i>Asphodelus tenuifolius</i> Cav.	G	(Confirmed record in Hun, 100 km north of Hun to Sabhah), Coastal area, Gebel Gharbi, Gebel Akhder.	SA	Jan.-Mar.	Lehiat ellates, Lehiatel-toor,	Wild
	<i>Asphodelus refractus</i> Boiss.	Th	(Fezzan, Hun), Gebel Gharbi	SA	Mar.-May	Tassia hamra	Wild, Medicinal plant.

Floristic composition of Sahara Area in Libya

Family	Species	Life form	Distribution in Libya	Phytochoria	Flowering period	Vernacular name	Importance / habitat
<i>Lythraceae</i>	<i>Ammannia senegalensis</i> Lam.	Hy	(Ghat).	Pal	-	-	Wild
<i>Malvaceae</i>	<i>Malva parviflora</i> L. var. <i>parviflora</i>	Th	(New record in Hun, Marzuq), Coastal area, Gebel Gharbi, Gebel Akhder	MED	March- May	Khobesa	Wild, Medicinal plant.
<i>Menispermaceae</i>	<i>Cocculus pendulus</i> (J.R.&G.Forsk) Diels	Li	(Soda mountains Hun).	Pal	March - June	-	Wild , medicinal as diuretic
<i>Mimosaceae</i>	<i>Acacia trottilis</i> (Forsk.) Hayne.	Ph	(Sawknah, Al –Abiad, Al Uwaynat), Coastal area, Gebel Gharbi,	SZ	Spring and Autumn.	Talha.	Wild, medicinal plant
	<i>Acacia nilotica</i> (L.) Delile <i>supsp. Astringens</i> (Schum. & Thonn.) Roberty	Ph	(New record in Zilla, Sawknah, between Sabhah and Jarmah, Ghat, Al Uwaynat),	SZ	June - Des	Ghard, Tamat.	Wild
<i>Molluginaceae</i>	<i>Corbichonia decumbens</i> (Forsk.) Exell.	Th	(Tibesti).	SS	Oct - Feb	-	Wild, desert species
	<i>Gisekia pharmaceoides</i> L.	Th	(Tibesti).	SA+SZ	Oct - March	-	Wild, highly variable desert species of sandy habitats
	<i>Limeum obovatum</i> Vicary.	Th	(Al Uwaynat, Tibesti).	SS	March -Sept	-	Wild, desert species
<i>Moraceae</i>	<i>Ficus salicifolia</i> Vahl	Ph	(S.Libya).	SA+SZ	-	Thaab-Teloukat	Wild??
<i>Myrtaceae</i>	<i>Myrtus nivellei</i> Batt.	Ph	(Fezzan).	SZ	-	-	Wild, Endemic to Sahara (Tibesti)
<i>Najadaceae</i>	<i>Najas minor</i> All.	Hy	(Fezzan, Ghat).	MED	-	-	Wild
<i>Nyctaginaceae</i>	<i>Boerhavia diffusa</i> L.	Ch	(Al Uwaynat).	Pal	D.the year	-	Wild, Medicinal plant.
<i>Orobanchaceae</i>	<i>Cistanche tubulosa</i> (Schrenk) Hook.	Pa	(S. Libya).	SA+IT	March - April	Danon	Wild, parasite on roots of <i>Tamarix aphylla</i>
<i>Plantaginaceae</i>	<i>Plantago amplexicaulis</i> Cav.	Th	(New record in Sahara area, Hun), Gebel Gharbi.	SA+IT	March - June	Alesnab	Wild
	<i>Plantago ciliate</i> Desf.	Th	(Wadi soda 95 km from Hun), Coastal area, Gebel Gharbi.	SA	March - June	---	Wild
<i>Poaceae</i>	<i>Aristida mutabilis</i> Trin.	Th	(Al Uwaynat).	SA	After rains.	---	Wild
	<i>Aristida meccana</i> Hochst.	Th	(Al Uwaynat).	SA	After Summer rains.	---	Wild
	<i>Aristida funiculate</i> Trin.	Th	(Al Uwaynat).	SA	After Summer rains.	---	Wild
	<i>Bromus madritensis</i> L.	Th	(New record in Sahara area,Zilla), Coastal area, Gebel Akhder, Gebel Gharbi	MED+IT	March - June	-	Wild
	<i>Chloris virgata</i> Swartz.	Th	(Ghat, Al Uwaynat).	Pal	Feb.-Mar.	---	Wild
	<i>Crypsis schoenoides</i> (L.) Lam.	Th	(Al Uwaynat).	SA+SZ+IT	---	---	Wild , Rare
	<i>Cutandia memphitica</i> (Spreng.) Richtet.	Th	(Zialla,Al Barkat, Ghat). Coastal area, Gebel Gharbi	MED+IT	Feb.-May	---	Wild
	<i>Cynodon dactylon</i> (L.) Pers.	G	(Zilla, Sawknah, Sabhah, Jaghbub), coastal area, Gebel Gharbi, Gebel Akhder	Cosm	July - Oct	Najem	Wild, Medicinal plant.
	<i>Dichanthium foveolatum</i> (Del.) Roberty.	G	(Hun, Sabhah. Al Uwaynat).	SA+IT	Mar.-May	---	Wild
	<i>Eleusine compressa</i> (Forsk.) Aschers. & Schw.	Ch	(Tibesti).	SA+IT?	-	-	Wild
	<i>Eragrostis aegyptiaca</i> (Willd.) Link.	Th	(Ghat).	SZ	Jun.-Mar.	---	Wild
	<i>Eragrostis cilianensis</i> (All.) Vign.	Th	(Fezzan, Al Uwaynat), coastal area.	Pal	July-Oct.	---	Wild
	<i>Lasiurus hirsutus</i> (Forsk.) Boiss.	Ch	(20 km from Washka to Hun, El - Barkat).	SA+SZ	Mar.-May	Eze rired gdom.	Wild

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	<i>Leersia hexandra</i> Swartz.	G	(Ghat, El-Barkat).	Pal	Feb.-Mar.	---	Wild
	<i>Imperata cylindrica</i> (L.) Raeuschel .	G	(New record in Zilla, Brach, Ghat), Coastal area .	MED	Mar.-May	Dees, Basto.	Wild
	<i>Lolium rigidum</i> Gaud	Th	(New record in Sahara area, Zilla), Coastal area; Gebel Gharbi	MED+ES	March - April	Bomanjor	Wild
	<i>Lolium multiflorum</i> Lam.	Th	(New record in Zilla Sabhah, Abu-Njaim, Hun, Barach, Al-Abiad, Tibesti), Coastal area	ES+SA	Mar.-May	---	Wild
	<i>Lophochloa cristata</i> (L.) Hyl.	Th	(New record in Zilla, Sabhah), Coastal area, Gebel Akhder.	Cosm	Jan-March	-	Wild
	<i>Lophochloa pumila</i> (Desf.) Bor.	Th	(Washka, Ghat). Coastal area	MED+IT	Feb.-May	Zewan.	Wild
	<i>Lophochloa rohlfii</i> (Ascherson) H. Scholzin.	Th	(Sabhah, Barach, Ghat, Sawknah), Coastal area	SA	Feb.-Apr.	---	Wild
	<i>Parapholis incurve</i> (L.) C.F. Hubbard	TH	(New record in Zilla, Sawknah, Sabhah) Coastal area, Gebel Akhder	MED+ ES	-	-	Wild
	<i>Panicum turgidum</i> Forsk.	G	(84 km from Hun to Bughrain, 37 km from Hun to Sabhah, Ghat , Al Uwaynat)	SA+SZ	Feb - March	Bu rucba - Tehaua	Wild, very good forage grass during growing season, Medicinal plant.
	<i>Polypogon monspeliensis</i> (L.) Desf.	Th	(New record in Zilla, Al Uwaynat, Hun, Brach, Ghat), Coaqstal area.	Cosm	Feb.-June	Sbul el far.	Wild
	<i>Phragmites australis</i> (Cav.) Trin.	Hy	(New record in Zella, Jaghbub, Brak, Ghat, Tibesti), Coastal area, Gebel Akhder	Cosm	June-March	Gaspa.	Wild, diureit Medicine from rhizomes
	<i>Sporobolus spicatus</i> (Vahl.) Kunth.	G	(Al Uwaynat, Hun, Al Kofrah, Ghat, Brach).	SZ	Mar.-Apr.	---	Wild
	<i>Sporobolus helvolus</i> (Trin.) Th.	G	(Fezzan).	SS	---	---	Wild
	<i>Sporobolu shelvolus</i> (Trin.)Th.Durand & Schinz	G	(Fezzan).	SS	-	-	Wild
	<i>Stipagrostis shawii</i> (H.Scholz) H.Scholz	Th	(Al Uwaynat).	SZ	March	-	Wild, Endemic to Libya (Uweinat)
	<i>Stipagrostis acutiflora</i> (Trin. Et Rupe.) de Winter ssp. <i>acutiflora</i> .	Th	(Ghudamis, Al Uwaynat, Fezzan, Kofra).		June	-	
	<i>Stipagrostis acutiflora</i> (Trin. Et Rupe.) de Winter ssp. <i>algeriensis</i> (Hernrard) H. Scholz		(Fezzan).	SA			Wild
	<i>Stipagrostis scoparea</i> Trin.	Ch	(Fezzan, Ghudamis), Gebel Gharbi	SA	Mar.-April	---	Wild
	<i>Stipagrostis rigidifolia</i> H.Scholz	Ch	(Fezzan, Al Uwaynat).	SA+SZ	Feb.-Mar.	---	Wild
	<i>Stipagrostis plumosa</i> (L.) Munro.	Ch	(Ghudamis, Hun, Brach, Sabhah). Gebel Gharbi.	SS	Feb.-June	Alemmus.	Wild
	<i>Stipa capensis</i> Thunb.	Th	(Hun), Coastal area, Gebel Gharbi.	MED+IT	Feb.-June	Behma.	Wild, This grass is very abundant in dry sandy and stony places,
	<i>Triticum spelta</i> L.	Th	(Fezzan).	IT	Mar.-Apr.	---	Wild?
	<i>Triticum spelta</i> L.	Th	(Fezzan).	IT	March - April	-	Wild, Weed
<i>Polygonaceae</i>	<i>Calligonum arich</i> LeHoureuou	Ph	(Southwest Ghudamis).	SA	-	Arise	Wild,
	<i>Emex spinosa</i> (L.) Campd.	Th	(New record Zilla, N. Brach), Coastal area, Gebel Gharbi, Gebel Akhder	MED+IT	Des- May	Dors el-azouz; henzab	Wild, in sandy soil.
	<i>Polygonum patulum</i> M. Bieb.	Th	(New record in Sahara area , Zilla), Coastal area, Gebel Akhder.	MED+IT	May-July	-	Wild

Floristic composition of Sahara Area in Libya

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	<i>Polygonum argyrocoleum</i> Steud.	Th	(Brach).	SA+IT	Feb - Sept	Gurdab	Wild
	<i>Rumex simpliciflorus</i> Murb.	Th	(Sabhah, Hun, 95 km from Hun – 245 km from Sabhah to Hun – 70 km from Ghat).	SA?	Feb.-Jan.	Hommada, Hammad.	Wild
<i>Polygalaceae</i>	<i>Polygala erioptera</i> DC.	Th	(Tibesti).	SA+SZ	-	-	Wild
<i>Potamogetonaceae</i>	<i>Potamogeton perfoliatus</i> L.	Hy	(Fezzan).	Pal	-	-	Wild
	<i>Potamogeton natans</i> L.	Hy	(Al Kufrah), Coastal area, Gebel Akhder.	Pal	---	---	Wild
	<i>Potamogeton nodosus</i> Poiret.	Hy	(Ghat, Al Barkat), Gebel Akhder	Cosm	Apr.-Aug.	---	Wild
	<i>Potamogeton schweinfurthii</i> A.Bennect.	Hy	(Ghat, Fezzan, Al Barkat), Gebel Akhder	SZ	---	---	Wild
	<i>Potamogeton crispus</i> L.	Hy	(Ghat).	Cosm	---	---	Wild
	<i>Potamogeton pusitilus</i> L.	Hy	(Ghat).	Pal	-	---	Wild
<i>Primulaceae</i>	<i>Anagallis arvensis</i> L. var. <i>arvensis</i>	Th	(New record in Sahara area, Zilla), Coastal area, Gebel Gharbi, Gebel Akhder	MED+IT	March-May	Auent el katos	Wild
	<i>Samolus valerandi</i> L.	Ch	(Brach), Coastal area, Gebel Gharbi, Gebel Akhder	Cosm	March-May	---	Wild, generally in wet or calcareous habitat
<i>Resedaceae</i>	<i>Caylusea hexagyna</i> (Forsk.)M.L Green.	Th	(70 km from Ghat towards Algerian border).	SA+SZ+IT	April - May	-	Wild
	<i>Oligomeris linifolia</i> (Vahl) Macbride	Th	(Conferm record in Hun, Between Bbungem and Soda mountains).	MED+SA	-	-	Wild
	<i>Randonia africana</i> Coss.	N.Ph	(Sawknah, Hun, Weddan).	SA+SZ	Jan.-April	Belbal.	Wild, a desert species.
	<i>Reseda villosa</i> Coss.	Ch?	(88 km from Sabhah, 70 km west of west Ghat, Tibesti).	SA+SZ	Feb.-March	Fattolet Elholi.	Wild, tropical desert species.
<i>Ruppiaceae</i>	<i>Ruppia maritima</i> L.	Hy	(Ghudamis, Sabhah, Jaghub), Coastal area.	Cosm	Feb.-Sept.	---	Wild
<i>Salvadoraceae</i>	<i>Salvadora persica</i> L.	Ph	(Jaghub).	IT+SA	-	Swak	Wild, very rare, Medicinall plant
<i>Scrophulariaceae</i>	<i>Kickxia acerbiana</i> (Boiss.) Tackh.& Boulos	Ch	(Wady soda, Hun, Waddan, Sabhah).	SA	-	-	Wild
<i>Solanaceae</i>	<i>Hyoscyamus muticus</i> L.	Th	(Sawknah, Ghat, Wadi Weshka), Gebel Gharbi.	SA+SZ+IT	Jan.-May	Vathim, Flazlez, Sajran.	Wild, Midecinl plant
<i>Tamaricaceae</i>	<i>Tamarix aphylla</i> (L.) Karst.	Ph	(New record in Zella, Ghat, Al Kufrah), Coastal area.	SA+IT	Agu.-Nov.	Atal, Athl, Atla.	Wild, common species and does well in sandy plains and dunes and salty desert.
	<i>Tamarix teragyna</i> Ehrenb.	Ph	(Ghudamis, Hun, Zilla, Waddan, Tazerbo, Sabhah).	SA+IT	Dec.-Apr.	---	Wild, cultivated, wind breaker.
	<i>Tamarix boveana</i> Bunge.	Ph	(Fezzan, Al Kufrah), Coastal area.	SA	---	---	Wild
	<i>Tamarix nilotica</i> (Ehrenb.) Bunge.	Ph	(New record in (Hun, Zella, Sabhah).	SA	---	---	Wild
	<i>Tamarix arborea</i> (Siech. Ex Ehrenb.) Bge.	Ph	(Ghat, Brakat, Al Kufrah), Coastal area. Gebel Gharbi.	SA	---	---	Wild
	<i>Tamarix passerinoides</i> Delile. a) var. <i>passerinoides</i>		(Ghudamis, Hun), Coastal area Gebel Gharbi.		Feb.-May	---	Wild
	<i>Tamarix passerinoides</i> Delile. b) var. <i>macrocarp</i> Ehrenb.	Ph	(Ghat, Hun, Fezzan, Brach, Tibesti),	SZ+IT	---	---	Wild
	<i>Tamarix amplexicaulis</i> Ehrenb.	Ph	(Al Kufrah).	SA+SZ	Mar.-Dec.	---	Wild
<b>Tiliaceae</b>	<i>Corchorus depressus</i> (Linn.) Stocks	Ch	(Al Uwaynat).	Pal	Feb - May	Melokhiya	Wild
	<i>Corchorus olitorius</i> Linn.	Th	(Al Uwaynat).	Pal	Oct - Dec	Melokhiya-Sheetani	Wild
<b>Urticaceae</b>	<i>Parietarea alsinaefolia</i> Delile	Th	(Hogger and Tibesti).	Pal	March-April	-	Wild
<b>Vahliaceae</b>	<i>Vahlia dichotoma</i> (Murr.) O. Ktze	Th	(70 km from Ghat).	SZ	Feb - March	-	Wild, Rare species in Libya



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<b>Zygophyllaceae</b>	<i>Balanites aegyptiaca</i> (L.) Delile	Ph	(Ghat, Tibesti).	SA	April-July	Teborak,Iboraghen, Haglig.	Wild, Medicinal plant
	<i>Fagonia arabica</i> L. var. <i>membranacea</i>		(13 from Weshka wadi Zjaz)				Wild, Endemic to Libya
	<i>Fagonia arabica</i> L. var. <i>thihoana</i> (Maire) Maire	Ch	(Al Uwaynat).	SA+SZ	March-April	-	Wild
	<i>Fagonia arabica</i> L. var. <i>viscidissima</i>		(45 km from Brach, 200 km from Hun to Sabhah, Al Uwaynat).				Wild
	<i>Fagonia bruguieri</i> DC.	Ch	(Between Sabhah and Hun).	SS	Feb - April	Afessour – Tafessort telihia	Wild
	<i>Fagonia indica</i> Burm.	N-Ph	(Conferm record in Hun, 200 km from Sabhah to Hun, Brach)	SA	Nov - April	-	Wild
	<i>Fagonia sinaica</i> Bois.var. <i>pseydoretica</i> (Pamp.) Hadidi	Ch	(Between Sawknah and Wadi Weshka), Gebel Gharbi.	SA			Wild
	<i>Fagonia schweinfurthii</i> (Hadidi) Hadidi	Ch	(23 from Weshka- 80 km from Hun, Soda mountains).	IT+SA	Almost throughout the year	-	Wild
	<i>Fagonia taeckholmiana</i> Hadidi.	Ch	(New record in Sahara area, Hun, Weddan, Sawknah), Coastal area.	SA	April - May	-	Wild
	<i>Fagonia thebaica</i> Boiss.	Ch	(Al Uwaynat).	SA	March-Nov.	---	Wild
	<i>Nitrarea retusa</i> (Forssk.) Asch.	Ph	(New record in Zillah, Sabhah, Brach, Barkat,Ghat), Cosatal area	SS	March - July	Atazzim, dumuc, rhordog	Wild, the plant is a good sand dune stabilizer, and indicatore of gypsophilous soil.
	<i>Seetzenia lanata</i> (Willd.) Bullock	Th	(98 km from Hun, Soda mountains).	SA+SZ+IT	Sept.-March	---	Wild
	<i>Tribulus longipetalus</i> Viv. a) ssp. <i>longipetalus</i>		(Al Uwaynat).		Nov.-March	---	Wild, Rare
	<i>Tribulus longipetalus</i> Viv. b) ssp. <i>macropterus</i>	Ch	(Fezzan).	SA	Oct.-March	---	Wild, Rare
	<i>Tribulus ochrleucus</i> (Maire) Ozenda & Quezel	Ch	(Al Uwaynat)	SA+SZ	Nov - April	-	Wild
	<i>Tribulus terrestris</i> L.	Th	Soda mountains, Al Uwaynat)(	Pal	Oct - March	-	Wild, weed, Medicinal plant.
<i>Zygophyllum simplex</i> L.	Th	(Wadi Soda 95 km from Hun, Al Abiad, Ghat).	Pal	March - Aug	Fezzeman - Semetut	Wild, common in sandy and stony salin habitats.	
<i>Zygophyllum gaetulum</i> Emb.	N-Ph	(9 km from Ghudamis, Between Hun and Bugren, Sabhah), Gebel Gharbi	SA	Nov - March	-	Wild, Endemic to North Africa	
<i>Zygophyllum album</i> L.	Ch	(Wadi Weshka, Sabhah, Al Uwaynat), Coastal area.,Gebel Akhder	MED+SA	Oct.-April	Belbel,	Wild	
<b>Zannichelliaceae</b>	<i>Zannichellia palustris</i> L.	Hy	(Ghat), Gebel Gharbi, Gebel Akhder	MED	May-Sept.	---	Wild