

# Studies on the flora of Jordan : 11. On the flora of Wadi Araba (Araba Valley)

Autor(en): **Al-Eisawi, Dawud**

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# Studies on the flora of Jordan. 11. On the flora of Wadi Araba (Araba Valley)

DAWUD AL-EISAWI

## RÉSUMÉ

AL-EISAWI, D. (1983). Etude sur la flore de Jordanie. 11. La flore de Wadi Araba (Araba Valley). *Candollea* 38: 365-385. En anglais, résumé français.

290 espèces de végétaux vasculaires ont été repérées au cours de cette étude dans la région de Wadi Araba. Ce nombre est fondé sur les récoltes abondantes effectuées depuis 1978 dans diverses localités. Wadi Araba constitue l'habitat principal des éléments tropicaux de la végétation de Jordanie. L'endroit est caractérisé par un été sec et chaud et une pluviosité réduite. C'est donc un désert dépourvu d'agriculture sauf dans les rares endroits où de l'eau ruisselle dans certaines vallées. La plupart des rudérales de ce site sont comprises dans cette étude. De brèves notes phytogéographiques sont ajoutées.

## ABSTRACT

AL-EISAWI, D. (1983). Studies on the flora of Jordan. 11. On the flora of Wadi Araba (Araba Valley). *Candollea* 38: 365-385. In English, French abstract.

290 species of vascular plants were recorded during this study from the area of Wadi Araba. This number of species is based on the extensive collections which were made from different localities since 1978. Wadi Araba represents the major habitat of the tropical vegetation elements in Jordan. It is characterised by a dry, hot summer and a scarce rainfall, therefore it is classified as a desert with no agriculture except for very limited places where water is running in some of the valleys. However most of the weeds which occur within the studied area are included in this study. Brief geobotanical notes are indicated.

BOULOS (1977), BOULOS & LAHHAM (1977) and BOULOS & AL-EISAWI (1977), have studied the flora of certain areas in Jordan and enumerated the species which occur in these places with additional notes on their ecology. The present study is a continuation of such work on a new geographical

part which extends from Al-Lisan at the southern end of the Dead Sea in the north, down to the Gulf of Aqaba in the south and from the borders with Palestine in the west to the bases of the mountains in the east (Fig. 1).

Before 1978 there were no specimens collected and deposited in the Herbarium of the University of Jordan from the area between Ghor As-Safi and Aqaba, which spans about 180 km. That was mainly due to the difficulty of reaching that area. But since the establishment of the new road in 1978 which connected Ghor As-Safi with Aqaba, extensive collections were made mainly by myself, sometimes accompanied with Mr. R. Jarrar.

The studied area is about 180 km long and lies between the longitudes 35°W.-35°30' E. and the latitudes 31°20' N.-29°20' S.

Wadi Araba is a part of the Reft Valley in Jordan, hence the elevations vary from about 200 m or more below the sea level up to 100 m or more above the sea level. The temperature varies from 0°C at night in winter up to over 40°C during summer days. But the mean maximum temperature during the summer is 39°C while the mean minimum temperature in winter is 11°C. The annual rain fall ranges from 0-50 mm or rarely more. According to ZOHARY (1962), three major soil types are present in Wadi Araba and these are: *a*) saline soils, *b*) sandy soils with some places of sand dunes, *c*) hammada especially in the elevated areas. Usually the soils in the eastern side of the wadi are mixed with granite gravels. The ratio of the gravels will increase as we move towards the mountains, which are mainly of granite.

The vegetation accordingly can be subdivided into the following groups:

1. Saline vegetation mainly dominated by *Arthrocnemum*, *Sueada*, *Juncus* and *Nitraria*. Such vegetation is present in Ghor As-Safi, Ghor Faifa and in the southern end of Wadi Araba, about 40 km N. of Aqaba.
2. Tropical vegetation dominated by *Calotropis*, *Acacia*, *Ziziphus*, *Maerua*, *Balanites*, *Salvadora*, *Calligonum* and *Ocradenus*. This type is highly affected by man either through the grazing of goats and camels or direct by cutting of trees for fire. If this vegetation is protected it will reach the climax within about 10 years. This vegetation is present in Ghor Faifa and Wadi Khnaizera.
3. Sand dune fixatives dominated by *Haloxylon persicum* associated with *Retama* and *Calligonum*. The shrubs of *Haloxylon* in some localities are about 3-4 m high and about 5 m in diameter. With such sizes this vegetation has reached its climax. The best locality of such vegetation is about 60-70 km N. of Aqaba along the road to Gharandal.
4. Hammada soils vegetation usually dominated by bushes and low shrubs. The leading elements are *Anabasis syriaca*, *Traganum nudatum*, *Halocnemum strobilaceum*, and *Zygophyllum dumosum*. This type is present in most of the elevated rocky grounds in the wadi.

5. The vegetation associated with granite or granite mixed soils is dominated by *Acacia* which occurs mostly on firm hard soils. This leading element will be associated with other bushes or low shrubs like *Anabasis* and *Hammada*. The best habitat of such a vegetation type is the eastern side of the wadi especially 30-35 km N. of Aqaba to the entrance of the city.

There are few valleys with running water collected from the rain which fall on the high mountains of Jebal Ash-Shara in the southern part of Jordan. Usually along such valleys lots of herbs are growing, some of which occur as a result of seeds washed from the mountains during the rainy period.

The identified specimens in this manuscript are listed alphabetically according to their families, genera and species. POST & DINSMORE (1932-1933), ZOHARY (1966, 1972), TÄCKHOLM (1974) and FEINBRUN-DOTHAN (1978) were the main sources of identification.

Generic names which are followed by "sp." are due to the specimens being insufficient for full identification. Specific names which are interrupted by "cf." are doubtfully identified. Otherwise the identification is based on full specimens with flowers and fruits. All the specimens are deposited at the Herbarium, University of Jordan, Faculty of science, Amman, Jordan.

The localities of the collections are listed according to the specimens numerical order as follows:

- 2254-2276 Ghor As-Safi, tomato field, near the Ministry of agriculture station, 8 Feb. 1978, *D. Al-Eisawi*.
- 2277-2325 Ghor As-Safi, Um Al-Hashiem, 8 Feb. 1978, *D. Al-Eisawi*.
- 2326-2347 Wadi Araba, 80 km S. Ghor As-Safi, along the road to Aqaba, 8 Feb. 1978, *D. Al-Eisawi*.
- 2348-2356 Wadi Araba, 55 km S. Ghor As-Safi, along the road to Aqaba, 8 Feb. 1979, *D. Al-Eisawi*.
- 2357-2372 Ghor As-Safi along a water canal, beside a cultivated field, 9 Feb. 1978, *D. Al-Eisawi*.
- 2373-2377 Wadi Araba, 35 km S. Ghor As-Safi, along the road to Aqaba, 9 Feb. 1978, *D. Al-Eisawi*.
- 2378-2400 Wadi Araba, 50 km S. Ghor As-Safi, 5-8 km E. of the main road to Aqaba, along the way to Ammareen and Saidieen Farms, 9 Feb. 1978, *D. Al-Eisawi*.
- 2401-2413 Wadi Araba, 50 km S. Ghor As-Safi, 13 km E. of the main road to Aqaba, near Ammareen and Saidieen Farms, 9 Feb. 1978, *D. Al-Eisawi*.
- 2414-2440 Wadi Araba, 50 km S. Ghor As-Safi, 20 km E. of the main road to Aqaba, Wadi Faidan, 9 Feb. 1978, *D. Al-Eisawi*.

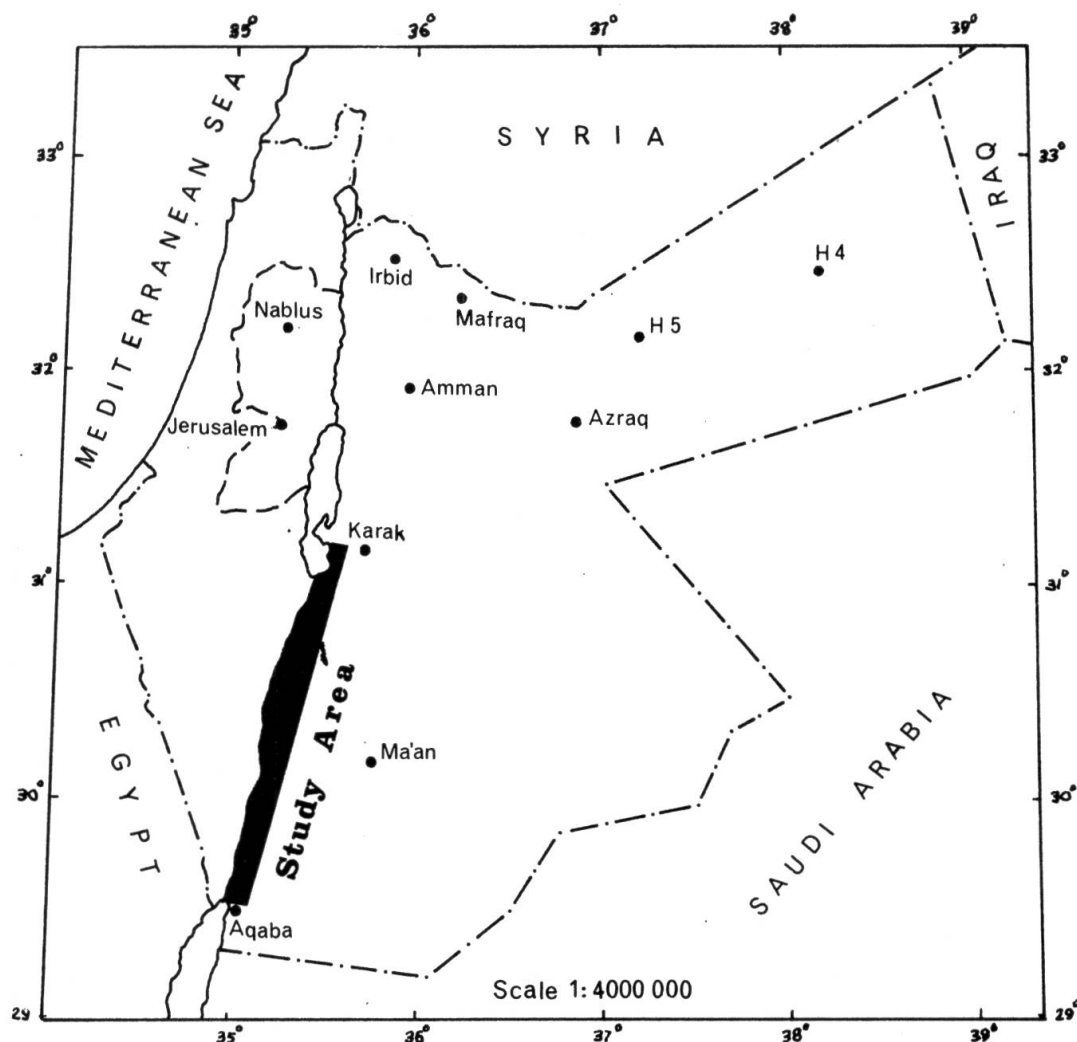


Fig. 1. – Map of Jordan showing Wadi Araba.

- 2441-2478 Wadi Araba, 50 km S. Ghor As-Safi, Wadi Faidan, about 25 km E. of the main road, up to the foot of the mountain, 9 Feb. 1978, *D. Al-Eisawi*.
- 4179-4200 Ghor As-Safi, 11 May 1978, *D. Al-Eisawi & R. Jarrar*.
- 4201-4241 Wadi Araba, 50 km S. Ghor As-Safi, along the road to Aqaba, 11 May 1978, *D. Al-Eisawi & R. Jarrar*.
- 4242-4257 Wadi Araba, 50 km S. Ghor As-Safi, 20 km E. of the main road to Aqaba, Wadi Faidan, 11 May 1978, *D. Al-Eisawi & R. Jarrar*.
- 4258-4275 Wadi Araba, Gharandal, stony hills, about 80 km, N. Aqaba along the road to Ghor As-Safi, 12 May 1978, *D. Al-Eisawi & R. Jarrar*.

- 4276-4291 Wadi Araba, 40 km N. Aqaba, along the road to Ghor As-Safi, near salt marshes, 12 May 1978, *D. Al-Eisawi & R. Jarrar*.
- 4733-4773 Al-Hadetha, at the eastern side of the southern end of the Dead Sea, near Ghor Al-Maraa, 14 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 4932-4933 Ghor As-Safi, halophytic vegetation, 15 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 4934-4969 Wadi Araba, midway between Ghor As-Safi, and Ghor Faifa, 15 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 4970-4985 Ghor Ath-Thira, 20 km. E. Ghor As-Safi along the road to Karak, 15 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 4986-5044 Wadi Araba, 50 km S. Ghor As-Safi, Wadi Faidan, 10-20 km E. the main road to Aqaba, 15 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 5045-5077 Wadi Araba, 80 km N. Aqaba, along the road to Ghor As-Safi, 15 March 1979, *D. Al-Eisawi & R. Jarrar*.
- 5078-6084 Wadi Araba, 40 km N. Aqaba, along the road to Ghor As-Safi, near salt marshes, 15 March 1979, *D. Al-Eisawi*.
- 5565 Ghor As-Safi, 28 March 1979, *D. Al-Eisawi & S. Oran*.
- 5566-5567 Ghor Faifa, 10 km S. Ghor As-Safi, 2 April 1979, *D. Al-Eisawi*.
- 5915-5924 Wadi Araba, Ghor Faifa, 10 km S. Ghor As-Safi, along the road to Aqaba, 8 Feb. 1981, *D. Al-Eisawi*.
- 8925-8993 Wadi Araba, Khnaizera, near the Jordan Valley Authority Station & Wadi Dahal (near water canal) 8 Feb. 1981, *D. Al-Eisawi*.

#### *Acanthaceae*

***Blepharis ciliaris* (L.) B. L. Burtt** – 2286, 4257

#### *Aizoaceae*

***Aizoon canariense* L.** – 2302, 4184, 4284, 4959, 4991, 8942

***Aizoon hispanica* L.** – 4771, 4989

***Mesembryanthemum forsskalii* Hochst. ex Boiss.** – 4245

***Mesembryanthemum nodiflorum* L.** – 2423, 4760, 5036

*Amaranthaceae*

**Aerva japonica** (Burm. fil.) Sprengel; syn.: *A. persica* (Burm. fil.) Merrill – 8971

*Amaryllidaceae*

**Pancratium sickenbergeri** Ascherson & Schweinf. – 5040, 8954

*Apocynaceae*

**Nerium oleander** L. – 4243, 8992

*Aricaceae (Palmae)*

**Phoenix dactylifera** L. – 4277, 5078

*Asclepiadaceae*

**Calotropis procera** (Ait.) Ait. fil. – 2360, 4937, 8973

**Pergularia tomentosa** L. – 4259

*Balanitaceae*

**Balanites aegyptiaca** (L.) Del. – 8924

*Boraginaceae*

**Anchusa aegyptiaca** (L.) DC. – 2258, 4213, 4758

**Arnebia deucumbens** (Vent.) Coss. & Kral. – 2415, 5060A

**Arnebia hispidissima** (Lehm.) DC. – 2297

**Arnebia tinctoria** Forssk.; syn.: *A. tetrastigma* Forssk. – 5060B

**Arnebia** sp. (seedling) – 2383

**Gastrocotyle hispida** (Forssk.) C. B. Clarke – 2305, 2428, 8953

**Heliotropium arbainese** Fresen – 2424, 4770

**Heliotropium bacciferum** Forssk. – 2316, 4212, 8915

**Lappula spinocarpos** (Forssk.) Ascherson – 2417

*Capparaceae***Capparis cartilaginea** Decne – 8979**Capparis spinosa** L. – 4258**Cleome africana** Botsch.; syn.: *C. arabica* L. – 2315, 2364, 2391, 4181, 4248**Cleome trinervia** Fresen – 5000**Maerua crassifolia** Forssk. – 5567, 8928*Caryophyllaceae***Gymnocarpus decandrum** Forssk. – 2338, 5027, 5071, 8975**Herniaria hemistemon** J. Gay – 2435**Herniaria hirsuta** L. – 2470, 4982, 5021**Paronychia arabica** (L.) DC. – 2307, 2454**Paronychia sinaica** Fresen – 4224**Polycarpea repens** (Forssk.) Ascherson & Schweinf. – 2308, 2332, 4253, 4273, 5040, 8951**Pteranthus dichotomus** Forssk. – 2356B, 4767, 4997**Robbairia delileana** Milne-Redhead – 2312, 2449, 4189, 4227, 8936**Sclerocephalus arabicus** Boiss. – 2356A, 2446, 8935, 8976**Silene damascena** Boiss. & Gaill. – 4979**Silene villosa** Forssk. – 4953, 4996A, 8919**Silene** sp. – 2370**Spergula fallax** (Lowe) Krause – 2451**Spergularia diandra** (Guss.) Heldr. & Start. – 4999



*Chenopodiaceae*

**Anabasis articulata** (Forssk.) Moq. – 2343, 2399, 2407, 2466, 4218, 4263, 5023, 5057, 8980

**Arthrocnemum macrostachyum** (Moric.) Moris & Delponte – 2325

**Atriplex dimorphostegia** Kar. & Kir. – 2427, 5006, 8918

**Atriplex halimus** L. – 2402, 4240, 5029

**Atriplex rosea** L. – 2467

**Bassia eriophora** (Schrader) Ascherson – 5019

**Bassia muricata** (L.) Ascherson – 2353, 2424, 4207, 4244, 5062, 8920, 8966, 4966

**Beta vulgaris** L. – 4759

**Chenolea arabica** Boiss. – 4281

**Chenopodium album** L. – 4193, 4791A

**Chenopodium murale** L. – 2260, 2425, 4751B

**Halocnemum strobilaceum** (Pall.) M. B. – 2344, 2404, 5031

**Haloxyton persicum** Bunge – 2345, 2354, 2400, 2476, 4269, 4291, 4942, 5030, 5064, 8917

**Hammada salicornica** (Moq.) Iljin – 2343, 2355, 2398, 2408, 2466, 5023, 5057, 5081

**Hammada scoparia** (Pomel) Iljin – 2321, 2478, 4286

**Salsola baryosma** (Roem. & Schult.) Dandy – 5069, 4267, 4268

**Salsola jordanicola** Eig – 4186

**Salsola vermiculata** L. – 5072

**Suaeda aegyptiaca** (Hasselq.) Zohary – 2275, 4200, 4283, 4761, 4932

**Suaeda palaestina** Eig & Zohary – 4194

**Traganum nudatum** Delile – 2419, 8928

*Cistaceae*

**Helianthemum lipii** (L.) Dum.-Courset – 2317, 2445, 4188, 4215, 4255, 8930

*Compositae*

**Aaronsohnia faktorovskyi** Warburg & Eig – 5010

**Ambrosia maritima** L. – 4756

**Anthemis melampodina** Delile; syn.: *A. deserti* Boiss. – 4960, 4763

**Anthemis** cf. **nabataea** Eig – 2384

**Anthemis** sp. (young plants) – 2465, 4233

**Anvillea garcinii** (Burm. fil.) DC. – 2264

**Asteriscus graveolens** (Forssk.) Less. – 4274, 4210, 4254, 4256

**Asteriscus pygmaeus** (DC.) Coss. & Dur. – 4234

**Calendula arvensis** L. – 2295, 4223, 4766, 5045

**Carlina hispanica** Lam. – 4275

**Carthamus glaucus** M. Bieb. – 4753

**Centaurea aegyptiaca** L. – 4214, 4246

**Centaurea hyalolepis** Boiss.; syn.: *C. calcitrapella* Burm. & Dinsm. – 4192

**Centaurea** cf. **postii** Boiss. – 2380

**Centaurea** sp. – 2306

**Cichorium pumilum** Jacq. – 4196, 4734

**Conyza bonariensis** (L.) Cronquist – 4748

**Crepis radicata** Forssk. – 4983

**Crepis** cf. **aculeata** (DC.) Boiss. – 5008

**Filago desertorum** Pomel – 2432, 5034

- Gymnarrhena micrantha** Desf. – 8947
- Ifloga spicata** (Forssk.) Schultz. Bip. – 2288, 2382, 2453, 4228, 4950
- Koelpinia linearis** Pall. – 4972
- Launaea angustifolia** (Desf.) O. Kuntze – 8967
- Launaea mucronata** (Forssk.) Maschler – 2416, 8977
- Launaea nudicaulis** (L.) Hook. fil. – 2304, 2330, 2412, 4205, 4764, 4993, 5047, 8969
- Leyssera capilifolia** (Willd.) Spreng.; syn.: *Asteropterus leyseroides* (Desf.) Rothm. – 2298, 4222
- Matricaria aurea** (Loefl.) Schultz. Bip. – 4973
- Phagnalone barbeyanum** Aescherson & Schweinf. – 2339
- Pulicaria arabica** (L.) Cass. – 4195
- Pulicaria crispa** (Forssk.) Oliver – 8978
- Pulicaria incisa** (Lam.) DC.; syn.: *P. undulata* (L.) Kostel. – 2323, 2436, 4768, 8961, 8965
- Reichardia tingitana** (L.) Roth – 2299, 2386, 4208, 4980, 5013, 8974
- Senecio flavus** (Decne.) Schultz. Bip. – 4994
- Senecio glaucus** L. subsp. **coronopifolius** (Maire) Alexander – 4962
- Senecio vernalis** Waldst. & Kit. – 2464
- Sonchus maritimus** L. – 2357
- Sonchus oleraceus** L. – 2367, 2421, 4741, 8964
- Tripleurospermum auriculatum** (Boiss.) Rech. fil. – 4221
- Cruciferae*
- Anastatica hierochuntica** L. – 2434, 8933
- Cakile maritima** Scop. – 2379, 8941

- Carrichtera annua** (L.) DC. – 2351, 2392, 2450
- Diplotaxis eruroides** (L.) DC. – 4749
- Diplotaxis harra** (Forssk.) Boiss. – 2327, 4202, 4948, 5011, 8963
- Eremobium aegyptiacum** (Sprengel) Ascherson & Schweinf. – 2326, 2350, 4250, 4272, 5066, 8927
- Erophila verna** (L.) Bess. – 2452
- Erucaria pinnata** (Viv.) Täckholm & Boulos; syn.: *Reboudia pinnata* (Viv.) O. E. Schulz – 4958
- Erucaria boveana** Coss. – 5033, 4219
- Farsetia aegyptiaca** Turra – 2284, 2336, 5015
- Hirschfeldia incana** L. – 4743
- Lobularia arabica** (Boiss.) Muschl. – 2447, 5035
- Malcolmia chia** (L.) DC. – 2444
- Maresia pygmaea** (Delile) O. E. Schulz – 2448
- Matthiola parviflora** (Schousb.) R. Br. – 2294, 2463, 4954, 8943
- Nasturtium officinale** R. Br. – 4954
- Notoceras bicornis** (Sol.) Caruel – 2296, 2441, 4230
- Pseuderucaria clavata** (Boiss. & Reuter) O. E. Schulz – 8938
- Savignya parviflora** (Delile) Webb – 2328, 2373, 2394, 2414, 4969, 5009, 5046
- Schimpera arabica** Hochst. & Steud. – 5037
- Sisymbrium irio** L. – 5016, 2262
- Zilla spinosa** (L.) Prantl – 4220, 4975, 5055, 8981

*Cucurbitaceae*

- Citrullus colocynthis** (L.) Schrader – 2390, 4183, 4270

**Cucumis prophetarum** L. – 2281, 4238, 4765, 5020

*Cyperaceae*

**Cyperus fuscus** L. – 2358

**Cyperus longus** L. – 2361

**Cyperus rotundus** L. – 2266, 4749

**Fimbristylis ferruginea** (L.) Vahl – 4735

**Scirpus holoschoenus** L. – 4733

*Dipsacaceae*

**Pterocephalus brevis** Coult. – 4229

*Ephedraceae*

4265

**Ephedra alte** C. A. Meyer – 2407, 4265

*Equisetaceae*

**Equisetum ramosissimum** Desf. – 2371

*Euphorbiaceae*

**Chrozophora oblongifolia** (Delile) A. Juss. & Sprengel – 4236

**Mercurialis annua** L. – 2254

**Ricinus communis** L. – 4938

*Frankeniaceae*

**Frankenia pulverulenta** L. – 5565

*Fumariaceae*

**Fumaria densiflora** DC. – 2255, 2290

*Geraniaceae*

**Erodium cicutarium** (L.) L'Hér. – 4981

- Erodium deserti** (Eig) Eig – 2356C, 2413, 4956  
**Erodium glaucophyllum** (L.) L'Hér. – 2374, 2437, 8945  
**Erodium hirtum** Willd. – 5007A  
**Erodium laciniatum** (Cav.) Willd. – 2474, 5007B  
**Monsonia nivea** (Decne.) Decne. ex Webb – 2303

*Graminae*

- Aeluropus littoralis** (Gouan) Parl. – 4197, 4290  
**Bromus fasciculatus** Presl – 4992  
**Cutandia dichotoma** (Forssk.) Trabut – 5018  
**Cynodon dactylon** (L.) Pers. – 4969  
**Diplachne fusca** (L.) P. Beauv. – 2429  
**Hordeum glaucum** Steudel – 5058  
**Imperata cylindrica** (L.) P. Beauv. – 2362, 4289  
**Lolium rigidum** Grandin – 4736  
**Panicum turgidum** Forssk. – 2322, 2341, 2397, 4179, 5042, 8916  
**Pennisetum divisum** (Gmel.) Henr. – 4968  
**Pennisetum elatum** Hochst. ex Steudel – 5049, 8944  
**Pennisetum orientale** L. C. Richard – 4206  
**Pennisetum setaceum** (Forssk.) Chiov. – 2274  
**Phragmites australis** (Cav.) Trin. ex Steudel – 2276, 8968  
**Polypogon fugax** Nees ex Steudel – 4198  
**Polypogon monspeliensis** (L.) Desf. – 4744  
**Polypogon semiverticillatus** (Forssk.) Hyl. – 4740

**Saccharum spontaneum** L. var. **aegyptiacum** (Willd.) Hack. – 8958

**Schismus barbatus** (L.) Thell. – 2311, 2468, 4951, 5003

**Stipa capensis** Thunb. – 2395, 4231, 4989

**Stipa hohenackeriana** Trin. & Rupr. – 4287

**Stipagrostis ciliata** (Desf.) De Winter – 2292

**Stipagrostis obtusa** (Delile) Nees – 2331, 4217, 5048

**Stipagrostis plumosa** (L.) Munro ex T. Anderson – 4182, 8925

*Juncaceae*

**Juncus acutus** L. – 2359, 4199, 4278, 5080

**Juncus rigidus** C. A. Meyer – 2401, 8983

*Labiatae*

**Lavandula pubescens** Decne. – 2320

**Mentha longifolia** L. – 2368, 2420, 4742

**Salvia aegyptiaca** L. – 2337, 4209

**Salvia lanigera** Poiret – 2420, 8937

*Leguminosae*

**Acacia raddiana** Savi – 5054, 4260, 4288

**Acacia tortilis** (Forssk.) Hayne – 2278, 2411, 2477, 4934, 5026, 5082, 8984

**Alhagi maurorum** Medikus – 2272

**Astragalus bombycinus** Boiss. – 5073

**Astragalus hauarensis** Boiss. – 4949, 5061

**Astragalus hispidulus** DC. – 4955, 4995

**Astragalus spinosum** (Forssk.) Muschl. – 2346

- Astragalus tribuloides** Delile – 2389, 2433
- Astragalus** sp. – 2377
- Lathyrus** cf. **hierosolymitanus** Boiss. – 4737
- Lotononis platycarpa** (Viv.) Pichi-Sermolli – 2300
- Lotus halophilus** Boiss. & Sprun. – 5077
- Medicago laciniata** (L.) Miller – 2376, 2469
- Medicago laciniata** (L.) Miller var. **brachyacantha** Boiss. – 2291, 4946B, 5005
- Medicago laciniata** (L.) Miller var. **laciniata** – 4946A
- Medicago truncatula** Gaertner – 4944
- Melilotus messanensis** (L.) All.; syn.: *Melilotus siculus* (Turra) B. D. Jacks. – 4738
- Ononis natrix** L. – 2473, 4226
- Ononis sicula** Guss. – 2381
- Retama raetam** (Forssk.) Webb; syn.: *Lygos raetam* (Forssk.) Heywood – 2460, 4262, 5038, 5052, 8956
- Trifolium** cf. **argutum** Banks & Sol. – 2271
- Trifolium** cf. **spumosum** L. – 2269
- Trigonella stellata** Forssk. – 2388, 2458, 4943
- Trigonella** sp. – 2369, 2372
- Vicia** cf. **esdräelonensis** Warb. & Eig – 2256
- Vicia perigrina** L. – 4739, 4971

*Liliaceae*

- Allium sinaiticum** Boiss. – 4996B
- Allium** cf. **desertorum** Forssk. – 8946



**Allium** sp. – 5074

**Androcymbium palaestinum** (Boiss.) Bak. – 2310, 2418, 5039, 8921, 8932, 8993

**Asphodelus fistulosus** L. – 2399, 2426, 2456, 4978, 5017

**Asphodelus viscidulus** Boiss. – 4961

**Bellivalia desertora** Eig & Feinbr. – 8991

**Dipcadi erythraeum** Webb & Berth. – 2289, 2329, 2396, 5067, 8922, 8931

**Urginea maritima** (L.) Baker – 2472

*Loranthaceae*

**Loranthus acaciae** Zucc. – 5032, 8986

*Malvaceae*

**Abutilon hirtum** (Lam.) Sweet – Seen and photographed.

**Alcea striata** (DC.) Alef. – 8955

**Malva parviflora** L. – 2261, 2461, 4945, 4998B, 5059

*Menispermaceae*

**Coculus pendulus** (J. R. & G. Forst.) Diels. – 2406, 4242, 5041

*Moraceae*

**Ficus salicifolia** Vahl – 4933. Seen in a farm house in Ghor As-Safi; tree of about 10 m high. It is mostly cultivated.

*Moringaceae*

**Moringa peregrina** (Forssk.) Fiori – 8987

*Neuradaceae*

**Neurada procumbens** L. – 2309, 4251, 5075, 8934

*Nyctaginaceae*

**Commicarpus africanus** (Lour.) Dandy – 8970

*Orobanchaceae*

**Cistanche salsa** (C. A. Meyer) G. Beck – Species was seen and photographed.

**Cistanche tubulosa** (Schenk) Wight – Species was seen and photographed.

**Orobanche cernua** Loefl. – 2259

*Papaveraceae*

**Papaver polytrichum** Boiss. & Kotschy – 4762, 4976

*Plantaginaceae*

**Plantago albicans** L. – 8926

**Plantago ciliata** Desf. – 2301, 2440, 4232, 4769

**Plantago coronopus** L. – 2385, 2471

**Plantago cylindrica** Forssk. – 2349, 2379, 2387, 4249, 4947, 5063

**Plantago natata** Lag. – 2442

**Plantago ovata** Forssk. – 2293

**Plantago pumila** L. – 4963

*Plumbaginaceae*

**Limonium thouinii** (Viv.) O. Kuntze – 4984

*Polygonaceae*

**Calligonum cumosum** L'Hér. – 2340, 4252, 4935, 5053, 5070

**Emex spinosa** (L.) Campd. – 2257, 5004, 8950

**Rumex cyprius** Murb. – 2457, 4998A, 4970, 8948, 8966

**Rumex pictus** Forsk. – 2455

*Primulaceae*

**Anagalis arvensis** L. – 2263

*Ranunculaceae*

**Adonis dentata** Delile – 4977

*Resedaceae*

**Caylusea hexagyna** (Forssk.) Green – 2459, 2438, 4239, 4757, 8960

**Ochradenus baccatus** Delile – 2334, 2363, 4264, 4936, 5051, 8940, 8962

**Oligomeris subulata** (Delile) Boiss. – 2348, 2439, 4225, 4987

**Reseda arabica** Boiss. – 8949

**Reseda boissieri** Müller – 4952

**Reseda stenostachya** Boiss. – 4237

*Rhamnaceae*

**Ziziphus spina-christi** (L.) Desf. – 2270, 5025, 8988

*Rubiaceae*

**Crucianella herbacea** Forssk. – 2443

*Ruppiaceae*

**Ruppia maritima** L. – 5084

*Rutaceae*

**Haplophyllum tuberculatum** (Forssk.) Ad. Juss. – 4180, 4204, 4261, 8939

*Salvadoraceae*

**Salvadora persica** L. – 2273, 2279, 4940

*Scrophulariaceae*

**Antirrhinum orontium** L. – 2267

**Bacopa monniere** (L.) Pennell – 4773

**Kickxia floribunda** (Boiss.) V. Täckholm & Boulos – 4201, 4241, 8959

**Kickxia spartioides** (Bross. ex Busch) Janchen – 5022

**Linaria haelava** (Forssk.) Delile – 2287, 2378, 4747, 4939, 4986, 5068

**Scrophularia deserti** Delile – 5001

**Verbascum** cf. **sinuatum** L. Boiss. – 2319

**Verbascum** sp. – 4750

#### *Solanaceae*

**Hyoscyamus aureus** L. – 8990

**Hyoscyamus pusillus** L. – 2430, 4990

**Lycium depressum** Stocks – 4190, 4235, 4276

**Lycium europaeum** L. – 5043

**Lycium shawii** Roem. & Schult. – 2277, 2347, 2405, 2475, 4266, 8985

**Solanum incanum** L. – 4772, 4974

**Solanum luteum** Miller – 2431

**Solanum sinaicum** Boiss. – 8989

#### *Tamaricaceae*

**Reaumuria hirtella** Jaub. & Sp. – 2342, 5065, 5044

**Tamarix jordanis** Boiss. – 5024

**Tamarix nilotica** (Ehrenb.) Bunge – 2352

**Tamarix tetragyna** Ehrenb. – 5079

**Tamarix** sp. – 4941, 4282

*Tiliaceae*

**Corchorus trilocularis** L. – 2265

*Umbelliferae*

**Ammi majus** L. – 2268, 4752

**Anisosciadium isosciadium** Burm. – 8953

**Pimpinella cretica** Poir. – 4191

*Urticaceae*

**Forsskaolea tenacissima** L. – 2314, 2366, 4187

**Parietaria alsinifolia** Delile – 4755, 4988

*Verbenaceae*

**Lippia nodiflora** (L.) Michx.; syn.: *Phyla nodiflora* (L.) Greene – 4746

*Zygophyllaceae*

**Fagonia arabica** L. – 2282, 8982

**Fagonia bischarorum** Schweinf. – 4967

**Fagonia bruguieri** DC. – 2283

**Fagonia glutinosa** Delile – 2285, 2335, 2393, 2422, 2462, 4247, 8929

**Fagonia latifolia** Delile – 5076

**Fagonia mollis** Delile – 2318, 2409, 4211, 4216

**Nitraria retusa** (Forssk.) Ascherson – 2280, 2403, 4279, 5028, 5083

**Peganum harmala** L. – 5014

**Tribulus bimucronatus** Viv. – 2365

**Tribulus longipetalus** Viv. – 2313

**Zygophyllum dumosum** Boiss. – 2333, 2410, 5012, 5056, 8972

**Zygophyllum simplex** L. – 4280, 4964, 5002

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