

On the Flora of the Northeastern Desert of Jordan

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Received: January 7, 2022; Revised: March 5, 2022; Accepted: March 12, 2022

Abstract: A total of 194 species which belong to forty-four families were recorded from the northeastern desert of Jordan between 2010 and 2013. This is the first documentation of the flora of Jawa and Um Al Quttain areas and their vicinities. The most diverse families were Asteraceae (22.6%), Fabaceae (9.7%), Lamiaceae (8.2%), and Cruciferae (6.7%), while fourteen families were represented by a single species. Most recorded plants were annual plants (45%). The flora of the study area is a mixture of Saharo-Arabian, Irano-Turanian, and Mediterranean elements. The present study shows that Jawa and Um Al Quttain plant communities have a high species diversity.

Key words: Badia, Flora, Jordan, Angiosperms.

Introduction

Little is known about the flora of the eastern desert of Jordan. Indeed, there had been many old botanists who worked on the flora of Jordan including the eastern Badia. *Flora Orientalis*, the work of the Swiss botanist in the Middle East, Boissier, (1867-1988) was and is still considered as a milestone reference on the Flora of the whole region of the Middle East, including Jordan. Also significant is the work of Post, G. which was revised and published by Dinsmore (1932-1933) on the Flora of Syria, Palestine, and Sinai. Zohary's work together with Feinbrun-Dothan (1966-1986) as presented in the major reference of *Flora Palaestina*, is considered to be the main reference on

the flora of Jordan until this time. Moreover, amongst the earliest studies is a work conducted by Boulos *et al.* (1977) on the flora of Al Safawi and Al Ruwshid areas (H4 and H5), where 198 species were listed. Later, Cope and El-Eisawi (1998) listed 322 species most of which were collected west of Al Safawi area. Al-Eisawi (1985) studied the vegetation in Jordan and recognized nine bioclimatic subdivisions which belong to four biogeographical regions. Other studies focused on the flora of Al Azraq area including Townsend (1967) and Nelson (1973). Recently, Kherissat and Al-Eisawi (2019) listed 206 species which belong to 138 genera and thirty-five families from Wadi Hassan, in the northwestern desert of Jordan. Al Eisawi (1998) produced a field guide for the flora of Jordan. Taifour and El-Oqlah (2017) revised the flora of Jordan, with a total of 2531 species which belong to 112 families from the northwestern desert. This communication documents the flora of the northeastern parts of Jordan, especially around Um Al Quttain and Al Safawi areas.

Materials and Methods

Study Area

The present study was conducted in eight major areas extending from Um Al Quttain to the Burqu' area between 2010 and 2013 (Table 1). The study area also covers a few collections from Al Shawmari and the Wildlife Reserves.

Jordan Badia constitutes 80% of the Hashemite Kingdom of Jordan.

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Table 1. localities of collection with corresponding coordinates

Locality	N	E
Al Beqawywh	32° 03'	37° 07'
Al Hazim	31° 35'	37° 15'
Al Shawmari	30° 37'	36° 28'
Azraq	31° 49'	36° 47'
Burqu'a	32° 37'	37° 58'
Jawa	31° 51'	35° 56'
Marab Emish	32° 15'	37° 22'
Safawi	32° 10'	37° 07'
Um Al Quttain	32° 19'	36° 38'
Wadi Salama	32° 25'	37° 14'

Geographically, the area extends from the east, to the western mountains bordering the Jordan Valley. It is elevated between 700 and 1100 meters above sea level. Badia is different from the desert, as there is much more extensive plant and animal life. It falls within an arid climatic zone. Rainfall is erratic both spatially and temporally, with a maximum of 200 mm annually. Air temperature fluctuates widely between a daily mean minimum of 10° C, mean maximum of 24.5° C and a mean daily temperature of 17.5° C. Occasionally, the absolute minimum and Azraq maximum temperatures might reach -5° C and 46° C respectively (Allison *et al.*, 1998). The area is bounded by Syria to the north and Saudi Arabia in the south. The east and west margins approximately follow the perimeter of extensive basalt outcrops, which cover a large part of the ground surface between the towns of Azraq and Al Ruwayshid (Amr, 2008).

Rout transects were used to sample the flora of the area; individual plants or plant communities were registered wherever noticed even if not intercepted by the rout. Herbarium specimens were prepared whenever possible and the collected plants were photographed at location and were later identified based on the key of Zohary (1966 and 1972) and Feinbrun-Dothan (1978 and 1986). Whenever needed, they were compared with the voucher specimens kept at the Royal Botanic Garden/ Jordan.

Results

Following the Angiosperm Phylogeny Group IV system, a total of 196 species of angiosperms, which belong to forty-four families and one species of gymnosperms were recorded from the study area as follows:

Gymnosperms

1. Ephedraceae

1. *Ephedra alata* Decne., Ann. Sci. Nat. (Paris) 2: 239. 1824.
Locality: Safawi, 12.4.2013.

Angiosperms

2. Aizoaceae

1. *Aizoanthemum hispanicum* (L.) H.E.K. Hartmann, Illustr. Handb. Succ. Pl.: Aizoaceae A-E: 29. 2001.
Syn.: *Aizoon hispanicum* L., Sp. Pl. 1: 488. 1753.
Locality: Marab Emish, 2.5.2013.
2. *Aizoon canariense* L., Sp. Pl. 1: 488. 1753
Locality: Marab Emish, 2.5.2013.

3. Amaranthaceae

1. *Anabasis syriaca* Iljin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 138. 1960.
Locality: Safawi, 12.4.2013; Marab Emish, 2.5.2013.
2. *Atriplex leuococlada* Boiss. var. *leuococlada* Zohary, Diagn. Pl. Orient. 12: 95. 1853.

Locality: Safawi, 12.4.2013; Marab Emish, 2.5.2013.

3. *Caroxylon vermiculatum* (L.) Akhani & Roalson, Int. J. Pl. Sci. 168: 948. 2007. Syn.: *Salsola vermiculata* L., Sp. Pl. 1: 223. 1753; *Salsola villosa* Del. ex Roem. & Schult., Syst. Veg. ed. 15, 6 : 232 (1820); *Salsola vermiculata* L. var. *villosa* (Delile ex Roem. & Schult.) Moq.
Locality: Marab Emish, 11.4.2013.
4. *Halothamnus lancifolius* (Boiss.) Kothe-Heinr., Biblioth. Bot. 143: 88. 1993.
Locality: Marab Emish, 11.4.2013; Um Al Quttain, 12.4.2013.
5. *Noaea mucronata* (Forssk.) Asch. & Schweinf., Ill. Fl. Égypte 131. 1887. Syn.: *Salsola mucronata* Forssk., Fl. Aegypt.-Arab. 56 1775; *Anabasis spinosissima* L.f., Suppl. 173 1781.
Locality: Um Al Quttain, 12.4.2013.
6. *Salsola rosmarinus* (Bunge ex Boiss.) Eig, Palestine J. Bot., Jerusalem Ser. 3: 132. 1945.
Syn. *Suaeda rosmarinus* Ehrenb. ex Boiss. (1879); *Seidlitzia rosmarinus* Bunge ex Boiss. (1879).
Locality: Safawi, 12.4.2013; Marab Emish, 2.5.2013, Jaffar, Mdwarah

4. Amaryllidaceae

1. *Allium ascalonicum* L., Fl. Palaest.: 117. 1756.
Syn.: *Allium hierochuntinum* Boiss., Fl. Orient. 5: 244. 1882.
Locality: Safawi, 12.4.2013.
2. *Allium paniculatum* L., Syst. Nat. ed. 10, 2: 978. 1759.
Locality:
3. *Allium rothii* Zucc., Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 3: 232. 1843.
Locality: Um Al Quttain, 12.4.2013.

5. Apiaceae

1. *Bifora testiculata* (L.) Roth, Enum. Pl. Phaen. Germ. 1: 888. 1827.
Syn.: *Coriandrum testiculatum* L., Sp. Pl. 1: 256. 1753.
Locality: Um Al Quttain, 12.4.2013.

2. *Coriandrum sativum* L., Sp. Pl. 1: 256. 1753.

Locality: Um Al Quttain, 12.4.2013.

3. *Ducrosia flabellifolia* Boiss., Ann. Sci. Nat., Bot. sér. 3, 1: 341. 1844.
Locality: Um Al Quttain, 20.4.2013
4. *Malabaila secacul* (Mill.) Boiss., Fl. Orient. 2: 1057. 1872.
Syn.: *Tordylium secacul* Mill., Gard. Dict. ed. 8: 5. 1768. *Heracleum carmeli* Labill., Icon. Pl. Syr. 5: 3. 1812.
Locality: Marab Emish, 12.4.2013.
5. *Torilis arvensis* (Huds.) Link, Enum. Hort. Berol. Alt. 1: 265. 1821.
Syn.: *Caucalis arvensis* Huds., Fl. Angl. 98. 1762
Locality: Marab Emish, 11.4.2013.

6. Arecaceae

1. *Phoenix dactylifera* L., Sp. Pl. 2: 1188. 1753
Locality: Al Hazim, 21013.

7. Asparagaceae

1. *Drimia undulata* Stearn, Ann. Mus. Goulandris 4: 208. 1978.
Syn.: *Urginea undulata* (Desf.) Steinh., Ann. Sci. Nat., Bot. sér. 2, 1: 330. 1834.
Locality: Marab Emish, 11.4.2013.
2. *Leopoldia bicolor* (Boiss.) Eig & Feinbrun, Palestine J. Bot., Jerusalem Ser. 4: 58. 1947.
Locality: Marab Emish, 11.4.2013.

8. Asteraceae

1. *Aaronsohnia factorovskyi* Warb. & Eig, Leaf. Agric. Exp. Sta. Zionist Organ. Inst. 6: 40. 1927.
Locality: Marab Emish, 11.4.2013.
2. *Achillea cretica* L., Sp. Pl. 2: 899. 1753.
Syn.: *Achillea santolina* L., Sp. Pl. 2: 896. 1753.
Locality: Jawa.
3. *Achillea falcata* L., Sp. Pl. 2: 897. 1753.
Locality: Marab Emish, 11.4.2013.
4. *Achillea fragrantissima* (Forssk.) Sch. Bip., Flora 38: 13. 1855.
Syn. *Santolina fragrantissima* Forssk. (1775).
Locality: Marab Emish, 11.4.2013.

- Safwai. Azraq.
5. *Anthemis bornmuelleri* Stoj. & Acht., Notizbl. Bot. Gart. Berlin-Dahlem 13: 522. 1937.
Locality: Marab Emish, 11.4.2013; Um Al Quttain, 12.4.2013.
 6. *Anthemis melampodina* Delile, Fl. Egypte 268. t. 45. 1813.
 7. *Anthemis rascheyana* Boiss. Diagn. Pl. Prient. Se.:8:198(1849).
Locality: Um Al Quttain, 12.4.2013.
 8. *Anvillea garcinii* (Burm.f.) DC., Prodr. 5: 487. 1836.
Syn.: *Anthemis garcinii* Burm.f., Fl. Ind. (N. L. Burman) 183. 1768.
Locality: Marab Emish, 11.4.2013
 9. *Artemisia sieberi* Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 80. 1836.
Syn.: *Artemisia herba-alba* Asso, Syn. Stirp. Aragon. 117.
Locality: Marab Emish, 11.4.2013; Um Al Quttain, 12.4.2013; Burqu'a.
 10. *Asteriscus graveolens* Less., Syn. Gen. Compos. 210. 1832.
Locality: Marab Emish, 11.4.2013.
 11. *Atractylis cancellata* L., Sp. Pl. 2: 830. 1753.
Locality: Jawa. Safwai.
 12. *Atractylis phaeolepis* Pomel, Nouv. Mat. Fl. Atl. 273. 1875.
Syn.: *Atractylis mutica* Townsend, Kew Bull. 21:53, f.2 (1967).
Locality: Marab Emish, 11.4.2013.
 13. *Calendula arvensis* L., Sp. Pl., ed. 2. 2: 1303. 1763.
Locality: Marab Emish, 11.4.2013.
 15. *Carthamus nitidus* Boiss., Fl. Orient. 3: 708. 1875.
Locality: Jawa, 2010.
 16. *Centaurea aegyptiaca* L., Mant. Pl. 118. 1767.
Locality: Marab Emish, 11.4.2013.
 17. *Centaurea ammocyanus* Boiss., Diagn. Pl. Orient. ser. 1, 10: 109. 1849.
Locality: Jawa, 2010.
 18. *Crepis aspera* L., Sp. Pl., ed. 2. 2: 1133. 1763.
Locality: Jawa, 2010.
 19. *Echinops glaberrimus* DC. In Decne., Ann.Sci.Ser.2,2:260 (1834).
Locality: Marab Emish, 11.4.2013.
 20. *Filago anatolica* (Boiss. & Heldr.) Chrtek & Holub, Preslia xxxv. 3. 1963.
Syn.: *Evax anatolica* Boiss. & Heldr., Diagn. Pl. Orient. ser. 1, 11: 2. 1849.
Locality: Jawa, 2010.
 21. *Filago argentea* (Pomel) Chrtek & Holub
Locality: Marab Emish, 11.4.2013.
Safwai.
 22. *Geropogon hybridus* (L.) Sch.Bip., Webb & Berth. Phyt. Canar. 2. 472. 1850.
Syn.: *Tragopogon hybridus* L., Sp. Pl. 2: 789. 1753.
Locality: Marab Emish, 20.4.2013.
 23. *Gundelia tournefortii* L., Sp. Pl. 2: 814. 1753.
Syn.: *Guizotia abyssinica* (L.f.) Cass.
Locality: Marab Emish 20.4.2013.
 24. *Gymnarrhena micrantha* Desf., Mém. Mus. Par. iv., 2. t. 1. 1818.
Locality: Marab Emish, 11.4.2013.
 25. *Lactuca orientalis* (Boiss.) Boiss., Fl. Orient. 3: 819. 1875.
Syn.: *Phaenopus orientalis* Boiss., Voy. Bot. Midi Esp. 390. 1893
Locality: Marab Emish, 11.4.2013.
 26. *Lasiopogon muscoides* (Desf.) DC., Prodr. [A. P. de Candolle] 6: 246. 1838
Syn.: *Gnaphalium muscoides* Desf., Fl. Atlant. 2: 267. 1799.
Locality: Marab Emish, 20.4.2013.
 27. *Launaea fragilis* (Asso) Pau
Locality: Marab Emish, 11.4.2013.
 28. *Launaea mucronata* Muschl. subsp. *cassiniana* (Jaub. & Spach) N.Kilian, Willdenowia 25(1): 277. 1995.
Syn.: *Sonchus cassinianus* Jaub. & Spach, Ill. Pl. Orient. iii. 112. 1848; *Launaea cassiniana* Muschl., Man. Fl. Egypt ii. 1058. 1912.
Locality: Marab Emish, 11.4.2013.
 29. *Launaea nudicaulis* (L.) Hook.f., Fl. Brit. India [J. D. Hooker] 3: 416. 1881.
Syn.: *Chondrilla nudicaulis* L., Mant. Pl. Altera 278. 1771.
Locality: Um Al Quttain, 12.4.2013.2.5.2013.
 30. *Matricaria aurea* (Loefl.) Sch.Bip., Bonplandia 8: 369. 1860.
Locality: Um Al Quttain, 12.4.2013.

31. *Notobasis syriaca* (L.) Cass., Dict. Sci. Nat., ed. 2. [F. Cuvier] 25: 225. 1822; 35: 170. 1825.
Syn.: *Carduus syriacus* L., Sp. Pl. 2: 823. 1753.
Locality: Marab Emish, 11.4.2013.
32. *Onopordum jordanicola* Eig, Palestine J. Bot., Jerusalem Ser. 2: 196. 1942.
Locality: Marab Emish, 11.4.2013.
33. *Onopordum macrocephalum* Eig, Palestine J. Bot., Jerusalem Ser. 2: 194. 1942.
Syn.: *Onopordum transjordanicum* Eig, Palestine J. Bot., Jerusalem Ser. 2: 194. 1942.
Locality: Marab Emish, 11.4.2013.
34. *Phagnalon rupestre* (L.) DC., Prodr. [A. P. de Candolle] 5: 396. 1836.
Syn.: *Conyza rupestris* L., Mant. Pl. 113. 1767.
Locality: Safawi, 12.4.2013.
35. *Pulicaria incisa* (Lam.) DC., Prodr. [A. P. de Candolle] 5: 479. 1836.
Syn.: *Inula incisa* Lam., Encycl. 3(1): 256. 1789.
Locality: Jawa, 12.4.2013.
36. *Scorzonera papposa* DC., Prodr. [A. P. de Candolle] 7(1): 119. 1838.
Syn.: *Scorzonera kurdica* Boiss. & Noë
Locality: Burqu'a, 2010; Um Al Quttain, 12.4.2013.
37. *Scorzonera psychrophila* Boiss. & Hausskn. ex Boiss. & Hausskn., Fl. Orient. 3: 777. 1875.
Syn.: *Scorzonera judaica* Eig, Repert. Spec. Nov. Regni Veg. Beih. 63(1): 78, nomen. 1931.
Locality: Burqu'a,
38. *Scorzonera pusilla* Pall., Reise Russ. Reich. ii.: 744; 329. 1773.
Locality: Marab Emish, 4.3.2007.
39. *Scorzonera shweinfurthii* Boiss., Fl. Suppl. 320 (1888).
Locality: Marab Emish, 17.3.2007.
40. *Senecio glaucus* L., Sp. Pl. 2: 868. 1753.
Locality: Um Al Quttain, 12.4.2013.
41. *Silybum marianum* (L.) Gaertn., Fruct. Sem. Pl. 2(3): 378, t. 168. 1791.
Syn.: *Carduus marianus* L., Sp. Pl. 2: 823. 1753
Locality: Marab Emish, 11.4.2013. Um Al Quttain, 12.4.2013.
42. *Sonchus asper* (L.) Hill. ssp. *glauescens* (Jordan) Ball.
Locality: Um Al Quttain, 12.4.2013.
43. *Tragopogon buphthalmoides* (DC.) Boiss., Fl. Orient. 3: 750. 1875.
Syn.: *Scorzonera buphthalmoides* DC., Prodr. [A. P. de Candolle] 7(1): 121. 1838.
Locality: Marab Emish, 11.4.2013.
44. *Tragopogon collinus* DC., Prodr. [A. P. de Candolle] 7(1): 115. 1838.
Locality: Um Al Quttain, 12.4.2013.

9. Berberidaceae

1. *Bongardia chrysogonum* (L.) Spach, Hist. Nat. Vég. 8: 65. 1839.
Locality: Jawa, 20.4.2013.
2. *Leontice leontopetalum* L., Sp. Pl. 1: 312. 1753.
Locality: Jawa, 20.4.2013.

10. Boraginaceae

1. *Alkanna tinctoria* Tausch, Flora 7: 234. 1824.
Locality: Marab Emish, 11.4.2013.
2. *Anchusa aegyptiaca* (L.) A.DC., Prodr. 10: 48. 1846.
Locality: Marab Emish, 11.4.2013.
3. *Anchusa milleri* Willd., Bot. Gart. Halle Nachtr. 1: 11. 1801.
Locality: Marab Emish, 11.4.2013.
4. *Anchusa strigosa* Banks & Sol., Nat. Hist. Aleppo ed. 2, 2: 246. 1794.
Locality: Marab Emish, 11.4.2013. Um Al Quttain, 12.4.2013.
5. *Buglossoides tenuiflora* (L.f.) I.M. Johnst., J. Arnold Arbor. 35: 42. 1954.
Syn.: *Lithospermum tenuiflorum* L.f., Suppl. Pl. 130. 1782 [1781 publ. Apr. 1782].
Locality: Marab Emish, 11.4.2013.
6. *Nonea melanocarpa* Boiss., Diagn. Pl. Orient., ser. 1 2(11): 96. 1849.
Locality: Marab Emish, 20.4.2013.
7. *Paracaryum rugulosum* (DC.) Boiss., Diagn. Pl. Orient. 11: 129. 1849.
Locality: Marab Emish, 11.4.2013.

11. Brassicaceae

1. *Alyssum szovitsianum* Fisch. & C.A.Mey., Index Seminum (LE) 4: 31. 1837
Syn.: *Alyssum campestre* (C.A.Mey.) Boiss. var. *micranthum*; *Alyssum pyramidatum* Bornm.; *Alyssum marginatum* Steud. ex Boiss., Ann. Sci. Nat., Bot. 2, 17: 157. 1842.
Locality: Marab Emish, 11.4.2013
2. *Brassica tournefortii* Gouan, Ill. Observ. Bot. 44. 1773.
Locality: Marab Emish, 11.4.2013.
3. *Diploaxis harra* (Forssk.) Boiss., Fl. Orient. 1: 388. 1867
Syn.: *Sinapis harra* Forssk., Fl. Aegypt.-Arab. 118. 1775 [1 Oct 1775].
Locality: Burqu'a, 2010; Um Al Quttain, 12.4.2013.
4. *Eruca vesicaria* (L.) Cav. subsp. *sativa* (Mill.) Thell.
Syn.: *Eruca sativa* Mill., Gard. Dict. ed. 8 1 1768
Syn.: *Eruca sativa* Mill. var. *eriocarpa* (Boiss.) Post; *Eruca cappadocica* Reut.; *Eruca cappadocica* Reut. var. *eriocarpa* Boiss.; *Eruca lativalvis* Boiss., Fl. Orient. 1: 396. 1867; *Eruca eruca* (L.) Asch. & Buchenau.
Locality: Um Al Quttain, 12.4.2013.
5. *Erucaria microcarpa* Boiss., Diagn. Pl. Orient. 8: 47. 1849.
Locality: Marab Emish, 11.4.2013.
6. *Glasteria glastifolia* (DC) Kuntze
Syn.: *Texieria glastifolia* (DC) Jaub.et. Spach.III. Pl.or.1:t.1(1842).
Locality: Marab Emish, 11.4.2013. Um Al Quttain, 12.4.2013.
7. *Isatis lusitanica* L., Sp. Pl. 670. 1753.
Syn.: *Isatis aleppica* Scop., Delic. Fl. Faun. Insubr. 2: 81, t. 16. 1787 [Feb-Mar 1787].
Locality: Jawa, 20.4.2013.
8. *Lepidium aucheri* Boiss., Ann. Sci. Nat., Bot. II, 17: 195. 1842.
Locality: Jawa, 20.4.2013.
9. *Lepidium draba* L., Sp. Pl. 2: 645. 1753.
Syn.: *Cardaria draba* (L.) Desv. subsp. *draba*; *Cardaria draba* (L.) Desv., J. Bot. Agric. 3: 163. 1813.; *Lepidium draba* L. subsp. *eu-draba* Thell.

Locality: Marab Emish, 11.4.2013.

10. *Malcolmia africana* (L.) R.Br., Hortus Kew. 4: 121. 1812.
Syn.: *Hesperis africana* L., Sp. Pl. 2: 663. 1753 [1 May 1753].
Locality: Jawa, 20.4.2013.
11. *Malcolmia crenulata* (DC.) Boiss., Fl. Orient. 1: 229. 1867.
Locality: Jawa, 20.4.2013.
12. *Sisymbrium irio* L., Sp. Pl. 659. 1753.
Locality: Marab Emish, 11.4.2013.
13. *Zilla spinosa* (Turra) Prantl, Nat. Pflanzenfam. 3(2): 175. 1891
Syn.: *Zilla myagroides* Forssk.
Locality: Burqu'a, 2010. Jawa, 20.4.2013. Wadi Al Buttum.

12. Capparaceae

1. *Capparis spinosa* L., Sp. Pl. 1: 503. 1753
Syn.: *Capparis spinosa* L. var. *canescens* Coss., Ann. Sci. Nat., Bot. 11: 28. 1849 ; *Capparis spinosa* (DC.) Boiss. var. *leucophylla*; *Capparis spinosa* (Boiss.) Boiss. var. *parviflora*; *Capparis spinosa* L. var. *deserti* Zohary, Bull. Res. Counc. Israel D, 8:54 (1960); *Capparis spinosa* L. var. *arvensis* Zohary, Bull. Res. Counc. Israel D, 8:53 (1960); *Capparis ovata* Desf., Fl. Atlant. 1: 404. 1798; *Capparis sicula* Duhamel, Traité Arbr. Arbust. 1: 159. 1755; *Capparis leucophylla* DC., Prodr. 1: 246. 1824; *Capparis cartilaginea* (Non Decne.) auctt. incl. Blakelock; *Capparis parviflora* Boiss. var. *glaberrima* Hand.-Mazz.; *Capparis ovata* Desf. var. *kurdica* Zohary; *Capparis leucophylla* DC. var. *parviflora* (Boiss.) Zohary
Locality: Burqu'a, 2010.

13. Caprifoliaceae

1. *Lomelosia porphyroneura* (Blakelock) Greuter & Burdet, Willdenowia 15: 75. 1985.
Syn. *Scabiosa porphyroneura* Blakelock (1849).
Locality: Marab Emish, 11.4.2013. Dayr Al Kahef.
2. *Pterocephalus papposus* (L.) Coult., Mém.

Dipsac. 32. 1823.

Syn.: *Pterocephalus plumosus* (L.)
Coulter, Mém. Dipsac. 31. 1823;
Scabiosa papposa L., Sp. Pl. 1: 101.
1753; *Knautia plumosa* L., Mant. Pl.
Altera 197. 1771.

Locality: Marab Emish, 11.4.2013.

3. *Valerianella coronata* (L.) DC., Fl. Franç.
ed. 3, 4: 241. 1805

Syn.: *Valeriana locusta* L. var.
coronata, Sp. Pl. 1: 34. 1753.

Locality: Marab Emish, 11.4.2013.

14. Caryophyllaceae

1. *Dianthus monadelphus* Vent., Choix Pl. t.
39. 1807.

Locality: Marab Emish, 11.4.2013.

2. *Dianthus monadelphus* Vent. subsp.
judaicus (Boiss.) Greuter & Burdet,
Willdenowia 12(2): 186. 1982.

Syn. *Dianthus judaicus* Boiss. (1849); *D.*
auraniticus Post (1888).

Locality: NE Al Beqawywh.

3. *Herniaria hirsuta* L., Rev. Bot. Recueil
Mens. 2: 371. 1847.

4. *Silene conoidea* L., Sp. Pl. 1: 418. 1753.

Locality: Jawa, 2010.

5. *Silene damascena* Boiss. & Gaill., Diagn.
Pl. Orient. 2, 6: 34. 1859.

Locality: Um Al Quttain, 12.4.2013.
Dayr Al Kahef.

6. *Vaccaria hispanica* (Mill.) Rauschert,
Wiss. Z. Martin-Luther-Univ. Halle-
Wittenberg, Math.-Naturwiss. Reihe
14: 496 (1965).

Syn.: *Vaccaria pyramidata* Medik.,
Philos. Bot. 1: 96. 1789.

Locality: Marab Emish, 11.4.2013.

15. Colchicaceae

1. *Colchicum tunicatum* Feinbrun, Palestine
J. Bot., Jerusalem Ser. 6: 87. 1953

Locality: Jawa, 27.10.2007.

16. Convolvulaceae

1. *Convolvulus althaeoides* L., Sp. Pl. 1: 156.
1753

Locality: Jawa, 2010.

17. Crassulaceae

1. *Umbilicus intermedius* Boiss DC., Prodr.
3: 400 (1828) var. *intermedius* (Boiss.)
Chamberlain, Fl. Turk. 4:213 (1972).

Syn. *Cotyledon intermedia* (Boiss.)
Bornm. (1904); *Umbilicus intermedius*
Boiss. (1872); *U. pendulinus* DC. var.
intermedius (Boiss.) Post (1896).

Locality: Um Al Quttain, 12.4.2013.
Jawa, 2010

18. Cucurbitaceae

1. *Citrullus colocynthis* (L.) Schrad., Linnaea
12: 414. 1838.

Syn.: *Cucumis colocynthis* L., Sp. Pl.
2: 1011. 1753.

Locality: Al Beqawywh, 8.10.2009.
Burqu'.

19. Euphorbiaceae

1. *Andrachne telephioides* L. Sp.Pl.1753.

Locality: Marab Emish, 12.3.2013.

2. *Chrozophora tinctoria* (L.) Juss., Euphorb.
Gen. 110. 1824.

Syn.: *Croton tinctorius* L., Sp. Pl. 2:
1004. 1753; *Chrozophora obliqua*
(Vahl) A.Juss. ex Spreng., Euphorb.
Gen. 28. 1824; *Chrozophora*
verbascifolia (Willd.) A.Juss. ex
Spreng., Syst. Veg. 3: 851 (1826);
Chrozophora hierosolymitana Spreng.,
Syst. Veg. 3: 850. 1826.

Locality: Marab Emish, 12.3.2013.

3. *Euphorbia chamaepeplus* Boiss. & Gaill.,
Diagn. Pl. Orient. ser. 2, 4: 88. 1859.

Syn.: *Euphorbia herniariifolia* (Non
Willd.) Anth.

Locality: Jawa, 2010.

4. *Euphorbia helioscopia* L., Sp. Pl. 1: 459.
1753.

Locality: Marab Emish, 12.3.2013.

5. *Euphorbia hierosolymitana* Boiss., Diagn.
Pl. Orient. 12: 110. 1853.

Syn. *Euphorbia thamnoides* Boiss.
(1860)

Locality: Marab Emish, 12.3.2013.

6. *Euphorbia retusa* Forssk., Fl. Aegypt.-
Arab. 93. 1775.

Syn. *Euphorbia kahirensis* Raeusch.
(1797).

Locality: Marab Emish, 12.3.2013.
Safawi-Ruwaished

20. Fabaceae

1. *Astragalus bombycinus* Boiss., Diagn. Pl. Orient. ser. 1, 2: 50. 1843.
Syn.: *Astragalus palmyrensis* Post
Locality: Jawa, 20.4.2013
2. *Astragalus caprinus* L., Fl. Sicul. Syn. 2(1): 315. 1844.
Syn.: *Astragalus beershabensis* Eig & Samuelson ex Rech.f., Ark. Bot. ser. 2, 1: 309. 1950; *Astragalus platyrhaphis* Fisch., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 7. 11(16): 37. 1868.
Locality: Um Al Quttain, 20.4.2013.
3. *Astragalus guttatus* Banks & Sol., Nat. Hist. Aleppo 2: 260. 1794.
Locality: Jawa, 2010.
4. *Astragalus oleifolius* DC., Astragalogia 192 (ed. quarto), no. 87. 1802.
Syn.: *Astragalus deinacanthus* Boiss., Diagn. Pl. Orient. ser. 1, 2(9): 76. 1849; *Astracantha deinacanthus* (Boiss.) Podlech, Mitt. Bot. Staatssamml. München 19: 9. 1983.
Locality: Um Al Quttain, 20.4.2013.
5. *Astragalus sanctus* Boiss., Diagn. Pl. Orient. ser. 1, 9: 47. 1849.
Locality: Marab Emish, 11.4.2013.
6. *Astragalus spinosus* (Forssk.) Muschl., Verh. Bot. Vereins Prov. Brandenburg 49. 98. 1908.
Locality: Marab Emish, 11.4.2013.
7. *Coronilla scorpioides* (L.) W.D.J.Koch, Syn. Fl. Germ. 188. 1835.
Locality: Um Al Quttain, 20.4.2013.
8. *Hippocrepis areolata* Desv., Mém. Soc. Linn. Paris 4: 329. 1827.
Syn.: *Hippocrepis bicontorta* Loisel., Mém. Soc. Linn. Paris 6: 424. 1827; *Hippocrepis cornigera* Boiss., Diagn. Pl. Orient. ser. 1, 2: 102. 1843 [Mar 1843].
Locality: Marab Emish, 11.4.2013.
9. *Hippocrepis multisiliquosa* L., Sp. Pl. 2: 744. 1753.
Locality: Um Al Quttain, 20.4.2013.
10. *Hippocrepis unisiliquosa* L., Sp. Pl. 2: 744. 1753.

Locality: Um Al Quttain, 20.4.2013.

11. *Lathyrus annuus* L., Demonstr. Pl. 20. 1753.
Syn.: *Lathyrus hierosolymitanus* Boiss., Diagn. Pl. Orient. ser. 1, 9: 127. 1849.
Locality: Marab Emish, 11.4.2013.
12. *Lotus palustris* Willd., Sp. Pl., ed. 4. 3(2): 1394. 1802.
Syn.: *Onobrychis cadmea* Boiss., Diagn. Pl. Orient. ser. 1, 2: 96. 1843.
Locality: Ma'an. Modwarah.
13. *Lotus ornithopodioides* L., Sp. Pl. 2: 775. 1753.
Locality: Azraq. Wadi Al Bottom. Qasr Amra.
14. *Onobrychis ptolematica* (Dlile) DC. prodr. 2:347.
Locality: Marab Emish, 11.4.2013.
15. *Pisum fulvum* Sibth. & Sm., Fl. Graec. 7. 79. t. 688. 1806-1840.
Locality: Um Al Quttain, 20.4.2013.
16. *Retama raetam* Webb & Berthel., Hist. Nat. Iles Canaries 2: 56. 1842.
Locality: Al Hazim, 2010; Um Al Quttain, 20.4.2013.
17. *Trigonella stellata* Forssk., Fl. Aegypt.-Arab. 140. 1775.
Locality: Marab Emish, 11.4.2013.
18. *Tripodion tetraphyllum* (L.) Fourn. Ann. asoc. Linn. Lyon. ser. 2, 16: 359. 1868
Syn.: *Physanthyllis tetraphylla* (L.) Boiss. Voy. Bot. Espagne 2 162 .t. 162. 1840
Locality: Um Al Quttain, 20.4.2013.
Dayr Al Kahef.
19. *Vicia peregrina* L. Sp. Pl. 2: 737. 1753.
Locality: Um Al Quttain, 20.4.2013.

21. Geraniaceae

1. *Erodium glaucophyllum* (L.) L'Hér., Hort. Kew. 2: 416. 1789.
Syn.: *Geranium glaucophyllum* L., Sp. Pl. 2: 679. 1753.
Locality: Marab Emish, 12.3.2013
2. *Erodium laciniatum* (Cav.) Willd., Sp. Pl., ed. 4. 3(1): 633. 1800
Syn.: *Erodium strigosum* Karel.; *Geranium laciniatum* Cav., Diss. 4: 228. 1787.

Locality: Jawa, 20.4.2013.

3. *Geranium tuberosum* L., Sp. Pl. 2: 680. 1753.

Locality: Um Al Quttain, 26.5.2013.

22. Iridaceae

1. *Crocus moabiticus* Bornm., Repert. Spec. Nov. Regni Veg. 10: 383. 1912.
Locality: Dayr Al Kahef.
2. *Iris atropurpurea* Baker, Gard. Chron. 1: 330. 1889.
Locality: Um Al Quttain, 12.4.2013.
3. *Iris bostrensis* Mouterde, Bull. Soc. Bot. France 101: 420. 1955
Locality: Dayr Al Kahef.
4. *Moraea sisyrrinchium* (L.) Ker Gawl., Ann. Bot. 1(2): 241. 1804
Syn.: *Iris sisyrrinchium* L., Sp. Pl. 1: 40. 1753; *Gynandriris sisyrrinchium* (L.) Parl., Nuov. Gen. Sp. Monocot. 52. 1854.
Locality: Marab Emish, 2010.

23. Ixiolirionaceae

1. *Ixiolirion tataricum* (Pall.) Schult. & Schult.f., Syst. Veg. 7: 752. 1829.
Syn.: *Amaryllis montana* Labill., Icon. Pl. Syr. 2: 5. 1791 [Jul 1791]; *Ixiolirion montanum* (Labill.) Schult. & Schult.f., App. 37 (1821); *Ixiolirion pallasii* Fisch. & C.A.Mey. ex Ledeb., Fl. Ross. (Ledeb.) 4(12): 116. 1852; *Amaryllis tatarica* Pall., Reise Russ. Reich. 3: 727. 1776.
Locality: Um Al Quttain, 26.5.2013.

24. Lamiaceae

1. *Ajuga chamaepitys* (L.) Schreb. subsp. *chia* (Schreb.) Arcang., Comp. Fl. Ital. 560. 1882
Syn.: *Ajuga chia* Schreb., Pl. Verticill. Unilab. Gen. Sp. 25 1774.
Locality: Marab Emish, 12.4.2013
2. *Ballota undulata* (Sieber ex Fresen.) Benth., Labiat. Gen. Spec. 595. 1834.
Locality: Um Al Quttain, 2.5.2013.
3. *Eremostachys transjordanica* Eig, Palestine J. Bot., Jerusalem Ser. 4: 173. 1948.
Locality: Marab Emish, 12.4.2013.

4. *Marrubium cuneatum* Banks & Sol., Nat. Hist. Aleppo ed. 2, 2: 255. 1794.

Locality: Marab Emish, 12.4.2013.

5. *Moluccella laevis* L., Sp. Pl. 2: 587. 1753.
Locality: Marab Emish, 12.4.2013.

6. *Phlomis brachyodon* (Boiss.) Zohary ex Rech.f., Oesterr. Bot. Z. 89: 290. 1940.
Syn.: *Phlomis armeniaca* Willd. var. *brachyodon* Boiss., Diagn. Pl. Orient. 12: 88. 1853.

Locality: Marab Emish, 12.4.2013.

7. *Salvia ceratophylla* L., Sp. Pl. 1: 27. 1753.
Locality: Um Al Quttain, 20.4.2013.

8. *Salvia deserti* Decne., Ann. Sci. Nat., Bot. sér. 2, 2: 248. 1834.

Locality: Al Hazim. Rwasheed. Safwai.

9. *Salvia lanigera* Poir., Encycl. Suppl. 5: 49. 1817.

Locality: Um Al Quttain, 20.4.2013.

10. *Salvis sclarea* L., Sp. Pl. 27 (1753).

Locality: Marab Emish, 12.4.2013.

12. *Salvia spinosa* L., Mant. Pl. Altera 511. 1771.

Locality: Um Al Quttain, 20.4.2013.

13. *Teucrium capitatum* L., Sp. Pl. 2: 566. 1753.

Locality: Marab Emish, 12.4.2013

14. *Teucrium pollium* L., Sp. Pl. 2: 566. 1753.

Locality: Um Al Quttain, 20.4.2013.

15. *Thymus bovei* Benth., Labiat. Gen. Spec. 342. 1834.

Locality: Jawa, 20.4.2013

16. *Vitex agnus-castus* L., Sp. Pl. 2: 638. 1753.

Locality: Wadi Salama, 2010. Marab Emish, 12.3.2013.

25. Liliaceae

1. *Gagea commutata* K. Koch, Linnaea 22: 227. 1849

Locality: Um Al Quttain, 20.4.2013. Safwai

2. *Gagea reticulata* (Pall.) Schult. & Schult.f., Syst. Veg. 7: 542. 1829.

Syn.: *Ornithogalum circinnatum* L.f.; *Gagea reticulata* (Pall.) J.A. & J.H.Schultes var. *tenuifolia* Boiss.; *Gagea tenuifolia* (Boiss.) Fomin; *Ornithogalum reticulatum* Pall., Reise Russ. Reich. 3: 727. 1776.

Locality: Marab Emish, 20.4.2013.

3. *Tulipa biflora* Pall., Reise Russ. Reich. 3: 727. 1776

Syn.: *Tulipa polychroma* Stapf, Denkschr. Akad. Wien I. 18. 1885

Locality: Jawa,

26. Linaceae

1. *Linum album* Kotschy ex Boiss., Diagn. Pl. Orient. 6: 27. 1846.
Locality: Safawi-Ruwaishid.
2. *Linum mucronatum* Bertol., Misc. Bot. 1: 18. 1842
Locality: Um Al Quttain, 20.4.2013.
Dayr Al Kahf.
3. *Linum nodiflorum* L., Sp. Pl. 1: 280. 1753
Locality: Dayr Al Kahf.
4. *Linum utatissimum* L., Sp. Pl. 1: 277 1753
Locality: Marab Emish, 20.4.2013.

27. Malvaceae

1. *Alcea acaulis* (Cav.) Alef., Oesterr. Bot. Z. 12: 251. 1862.
Syn.: *Althaea acaulis* Cav., Diss. 2, Secunda Diss. Bot. 93 (t. 27, f. 3). 1786.
Locality: Jawa, 20.4.2013.
2. *Alcea chrysantha* (Sam.) Zohary, Bull. Res. Council Israel. Sect. D, Bot. 11: 221. 1963.
Syn.: *Althea chrysantha* (Sam.) 1935
Locality: Wadi Salma, 2013.
3. *Malva neglecta* Wallr., Syll. Pl. Nov. 1: 140. 1824.
Locality: Marab Emish, 11.4.2013.
4. *Malva parviflora* L., Demonstr. Pl. 18. 1753.
Syn.: *Malva microcarpa*; *Malva parviflora* L. var. *crispata* Boiss.; *Malva parviflora* L. var. *microcarpa* (Pers.) Fiori & Paol.
Locality: Dayr Al Kahf. Marab Emish.

28. Nitrariaceae

1. *Nitraria retusa* (Fosk.) Aschers., Verh. Bot. Ver. Prov. Brandenb. 18:94 (1876).
Locality: Al Hazim, 15.4.2012.
2. *Peganum harmala* L., Sp. Pl. 1: 444. 1753.
Syn.: *Peganum harmala* L. var. *stenophyllum* Boiss.
Locality: Burqu, 2010. Marab Emish,

11.4.2013.

29. Orobanchaceae

1. *Cistanche salsa* (C.A.Mey.) Beck, Nat. Pflanzenfam. [Engler & Prantl] iv. III b. 129. 1893.
Syn. *Phelipaea salsa* C.A.Mey. (1830).
Locality: Al Hazim.
2. *Cistanche tubulosa* (Schenk) Wight ex Hook.f., Fl. Brit. India, 4. 2: 324. 1884.
Syn.: *Phelypaea tubulosa* Schenk, Pl. Spec. Schubert 23. 1840.
Locality: Um Al Quttain, 11.4.2013.
3. *Orobanche cernua* Loebl., Iter Hispan. 152. 1758.
Locality: Al Shawmari, 2012.

30. Papaveraceae

1. *Fumaria densiflora* DC., Cat. Pl. Horti Monsp. 113. 1813.
Syn.: *Fumaria micrantha* Lag., Gen. Sp. Pl. [Lagasca] 21. 1816.
Locality: Um Al Quttain, 12.4.2013.
2. *Glaucium arabicum* Fresen., Mus. Senckenberg. 1: 174. 1833.
Locality: Jawa, 30.5.2013.
3. *Hypocoum aegyptiacum* (Forssk.) Asch. & Schweinf., Mém. Inst. Égypt. 2: 37. 1887.
Locality: Marab Emish. Dayr Al Kahf.
4. *Papaver hybridum* L., Sp. Pl. 1: 506. 1753.
Locality: Marab Emish, 11.4.2013.
5. *Papaver polytrichum* Boiss. & Kotschy, Diagn. Pl. Orient. ser. 2, 5: 14. 1856.
Locality: Marab Emish, 11.4.2013.
6. *Roemeria hybrida* (L.) DC., Syst. Nat. [Candolle] 2: 92. 1821
Locality: Marab Emish, 11.4.2013.

31. Plantaginaceae

1. *Nanorrhinum heterophyllum* (Schousb.) Ghebr Dandy, Fl. Pl. Sudan 3. 137. 1956.
Syn.: *Linaria spartioides* Brouss. ex Buch, Phys. Besch. Canar. Ins. 163. 1828; *Kickxia spartioides* (Brouss. ex Buch) Janch., Oesterr. Bot. Z. 82: 152. 1933.
Locality: Jawa, 3.5.2013.

32. Poaceae

1. *Phragmites australis* (Cav.) Trin. ex Steud., Nomencl. Bot., ed. 2, 2: 324. 1841.
Syn.: *Phragmites australis* subsp. *maritimus* (Mabille) Soó.
Locality: Um Al Quttain, 12.4.2013.
2. *Poa bulbosa* L., Sp. Pl. 70 (1753)
Syn. *Poa eigii* Feinbrun (1941)
Locality: Um Al Quttain, 12.4.2013.

33. Polygonaceae

1. *Rheum palaestinum* Feinbrun, Palestine J. Bot., Jerusalem Ser. 3: 117. 1944.
Locality: Jawa, 12.4.2013.
2. *Rumex vesicarius* L., Sp. Pl. 1: 336. 1753
Locality: Jawa, 12.4.2013.

34. Primulaceae

1. *Androsace maxima* L., Sp. Pl. 1: 141. 1753.
Locality: Marab Emish, 11.4.2013.

35. Ranunculaceae

1. *Adonis aleppica* Boiss., Ann. Sci. Nat., Bot. sér. 2, 16: 350. 1841
Locality: Dayr Al Kahf. Mafrag.
2. *Adonis dentata* Delile, Descr. Egypte, Hist. Nat. 287. 1813.
Locality: Jawa, 12.4.2013.
3. *Ranunculus damascenus* Boiss. & Gaill., Diagn. Pl. Orient. ser. 2, 6: 5. 1859
Locality: Marab Emish, 11.4.2013.

36. Resedaceae

1. *Caylusea hexagyna* (Forssk.) M.L. Green, Stand.-Sp. Nom. Conserv. 29, 63. 1926
Syn.: *Reseda hexagyna* Forssk., Fl. Aegypt.-Arab. 92. 1775.
Locality: Jawa, 2.5.2013.
2. *Reseda alba* L., Sp. Pl. 1: 449. 1753.
Locality: Marab Emish, 11.4.2013.
3. *Reseda decursiva* Forssk., Fl. Aegypt.-Arab. 67. 1775
Locality: Marab Emish, 12.4.2013.

37. Rubiaceae

1. *Galium pisiferum* Boiss., Diagn. Pl. Orient. ser. 1, 10: 67. 1849.

Locality: Um Al Quttain, 20.4.2013.

2. *Valantia hispida* L., Syst. Nat., ed. 10. 2: 1307. 1759
Locality: Jawa, 2.5.2013.

38. Rutaceae

1. *Ruta buxbaumii* Poir., Encycl. 6: 336. 1804
Syn.: *Haplophyllum buxbaumii* (Poir.) G. Don, Gen. Hist. 1: 780. 1831
Locality: Marab Emish, 11.4.2013.

39. Scrophulariaceae

1. *Scrophularia peyronii* Post, Bull. Herb. Boissier 1. 28.1893
Locality: Jawa, 3.5.2013.
2. *Verbascum eremobium* Murb., Acta Univ. Lund., 2 29(2): 458. 1933
Locality: Jawa, 3.5.2013.
3. *Verbascum transjordanicum* Murb., Acta Univ. Lund., 2 35(1): 5.4 1939.
Locality: Azraq, Ruwaishid.

40. Solanaceae

1. *Hyoscyamus desertorum* (Asch. ex Boiss.) Täckh., Svensk Bot. Tidskr. xxxvi. 252. 1942.
Locality: Um Al Quttain, 12.4.2013.
2. *Hyoscyamus reticulatus* L., Sp. Pl., ed. 2. 1: 257. 1762.
Locality: Um Al Quttain, 12.4.2013.
3. *Solanum nigrum* L., Sp. Pl. 1: 186. 1753.
Locality: Jawa, 3.5.2013.

41. Urticaceae

1. *Parietaria alsinifolia* Delile, Descr. Egypte, Hist. Nat., 2: 281, pl. 50, f. 2. 1813
Syn.: *Freirea alsinaefolia* (Delile) Gaudich., Voy. Uranie 502 1826
Locality: Jawa, 3.5.2013.

42. Asphodalaceae

1. *Asphodeline recurva* Post, Bull. Herb. Boissier 3: 166. 1895
Locality: Jawa, 3.5.2013.

43. Zygophyllaceae

1. *Fagonia bruguieri* DC., Prodr. 1: 704. 1824
Syn.: *Fagonia parviflora* Zohary,

Diagn. Pl. Orient. ser. 1, 8: 124. 1849 [Jan-Feb 1849]; *Fagonia bruguieri* DC. var. *rechingeri* Hadidi; *Fagonia olivieri* DC. var. *glandulosa* Hadidi. Locality: Jawa, 20.4.2013.

44. Tamaricaceae

Tamarix aphylla (L.) H. Karst., Deut. Fl.

(Karsten) 641. 1882.

Syn. *Thuja aphylla* L. (1755); *Tamarix articulata* Vahl (1791), nom. illeg.

Locality: Azraq.

Discussion

Part of the Saharo-Arabian realm is represented entirely by the lava desert of pebble hammada (Harra) which harbours various habitats including the bare basalt rocks and flat silty wadis beds with *Artemisia sieberi* as the leading species. The pebble Hammada covers vast area extending from Mafraq to Al Ruwaished and up north to the Syrian borders. The species that can be seen within Harra include *Achillea fragrantissima*, *Artemisia sieberi*, *Anabasis articulata*, *Caroxylon vermiculatum*, *Tamarix aphylla*, *Zilla spinosa*, *Matricaria aurea*, *Astragalus spinosa*, *Peganum harmala*, *Euphorbia retusa*, *Fagonia mollis*, *Asteriscus graveolens*, *Ferula blabche*, *Glaucium arabicum*, and *Linum album*. Also, *Onopordom transjordanicum*, is considered endemic to Jordan. At areas with permanent water and well water, species such as *Cynodon dactylon*, *Amaranthus* sp. *Urtica* sp., *Malva* sp. can be seen.

One of the main marabs within this block is marab Shbeika that harbours high plant coverage. The plant species recorded include, *Hammada eggii*, *Anabasis articulata*, *Aleuropus littoralis*, *Heliotropium* sp., *Oligomeris* sp. *Noaea mucronata*, *Herneiaria hirsute*, *Trigonella stellata*, *Zila spinosa*, *Atriplex leucoclada*, *Halogeton alopecuroides*, *Achillea fragrantissima*, *Citrillus colycinthus*, and *Vitex angus-castus*. The grassland steppe is represented by pure grasslands, grassy undulating hills, and grasslands with coarse and fine wadis, and grasslands on scattered basalt near

the east. As a continuation to the steppe vegetation above, main plain associations include *Centaurea damascene* and *Lactuca orientalis*, *A. sieberi*, *Poa bulbosa* and *Stipa capensis*. Associations of *Caroxylon vermiculatum*, and *Anabasis articulata*.

Other existing species include *Atriplex halimus*, *Anabasis syriaca*, *A. articulata*, *Anhcusa stigosa*, *Nonea mucronata*, *Caroxylon vermiculatum*, *Notobasis syriaca*, *Hyocyamus reticulata*, *Alcea acaule*, *Retama raetam*, and *Gymnarrhena micrantha*. Many bulbous species from the lily and the Iris families were recorded including *Moraea sisyrinnchium*, *Gladiolus* sp., *Tulipa polychroma*, *Glaucium grandiflorum*, *Allium stamineum*, and *Gagea reticulata*.

The "harra", referring to the above description of the Desert Ecosystem, harbours various habitats including the bare basalt rocks and flat silty wadis beds with *A. sieberi* as the leading species. Other habitats such as marabs and mud flats, and sandy hammada do occur within this relatively large vegetation type. The Wadi vegetation is often referred to as run-off hammada. Runoff hammada exists within Harra and the chert/gravel hammada where vegetation is confined to the wadis and watersheds are usually rich and dense in comparison to the surrounding areas. The vegetation at these wadis differs from one area to another as shown here. In general, the leading species in these wadis are *Retama raetam*, *Tamarix aphylla*, *Astragalus* spp., *Achillea fragrantissima*, *Artemisia sieberi*, *Atriplex halimus*, *Anabasis articulata*, and *Peganum halrmala*.

Noteworthy species recorded in the harra area include *Iris postii* (Aretain area), *Alcea chrysantha*, *Rheum palaestinum*, and *Onopordom transjordanicum* (Harra). These are considered endemic to Jordan and require special attention.

Acknowledgments

The researchers would like to express their gratitude to GEF/SGP for funding this study through the project entitled "Plant Biodiversity in the Eastern Badia and Their

Use". Also, special thanks go to the Badia Ecological Education centre-Anageed al Khair Cooperative Society and the Badia Research and Development Program (BRDP) for their generous and logistic support during this study. Thanks are also extended to Dr. Zuhair Amr for helping in plates' preparations.

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Plate 1



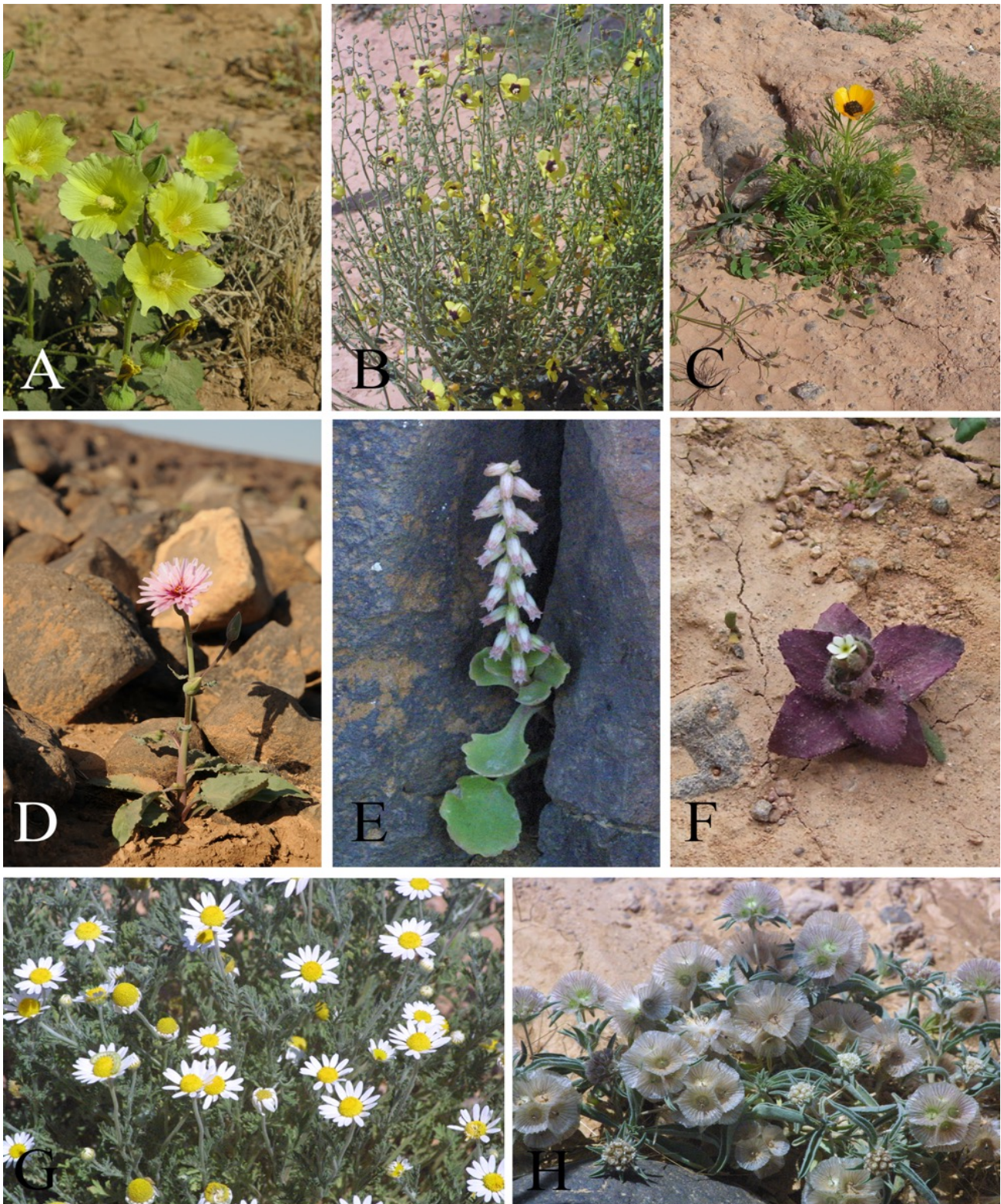
A. *Aizoon hispanicum* B. *Convolvulus althaeoides*. C. *Anchusa milleri*. D. *Asteriscus hierochunticus*. E. *Bongardia chrysogonum*. F. *Alyssum szowitsianum*. G. *Glaucium leiocarpum*. H. *Gagea reticulata*. I. *Linum album*. J. *Linum nodiflorum*

Plate 2



A. *Capparis spinosa* B. *Astragalus spinosus*. C. *Rheum palaestinum*. D. *Colchicum tunicatum*. E. *Crocus aleppicus*. F. *Moraea sisyrinchium*.

Plate 3



A. *Alcea chrysantha*. B. *Verbascum jordanicum*. C. *Adonis dentata*. D. *Scorzonera papposa*. E. *Umbelicus intermedius*. F. *Androsace maxima*. G. *Anthemis. bornmuelleri* H. *Lomelosia porphyroneura*.

Plate 4



A. *Malabaila secacul*. B. *Torilis arvensis*. C. *Hyoscyamus reticulatus*. D. *Verbascum eremobium*. E. *Reseda alba*. F. *Alcea acaulis*. G. *Allium rothii*. H. *Iris atropurpurea*. I. *Salvia lanigera*. J. *Euphorbia helioscopia*.