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Studies on the flora of Jordan

7. On the desert flora of the area of H-4 and H-5 Pumping Stations, N.E. Jordan

LOUTFY BOULOS, JAMIL LAHHAM & WALID JALLAD

Résumé

Boulos, L., J. Lahham & W. Jallad (1977). Etude de la flore de Jordanie 7. Flore du désert dans la région des stations de pompage H-4 et H-5, NE de la Jordanie. *Candollea* 32: 255-268. En anglais.

Les auteurs énumèrent 198 espèces de plantes à fleurs récoltées en avril 1974 aux stations de pompage H-4 et H-5, et dans leurs environs au NE de la Jordanie. Des notes sur leur écologie, phénologie et leur distribution y sont jointes à l'occasion.

Abstract

Boulos, L., J. Lahham & W. Jallad (1977). Studies on the flora of Jordan 7. On the desert flora of the area of H-4 and H-5 Pumping Stations, N.E. Jordan. *Candollea* 32: 255-268. French abstract.

The authors enumerate 198 species of flowering plants collected in April 1974 at and around the pipeline pumping stations H-4 and H-5 in the desert area of N.E. Jordan. Occasional notes on the ecology, phenology and distribution are added.

The region including H-4 and H-5¹ constitutes the main part of the northeastern desert of Jordan, with Syria to the north, Iraq to the east, and Saudi Arabia to the south. This area seems to be among those desert regions that have not been well explored botanically. The authors were fortunate in being able to collect in April 1974, after exceptionally good rains had fallen, especially in H-5, where an observed maximum of 31.2 mm was recorded during 24 hours in February 1974. New findings were made, among which are: *Ducrosia flabellifolia* Boiss., which was known to be of rare occurrence in Jordan (Boulos & Al-Eisawi 1977); *Colchicum crocifolium* Boiss. and *Papaver glaucum* Boiss. & Hausskn. ex Boiss., both new to the flora of Jordan (Boulos & al. 1975).

The area of H-5 and its surroundings constitute the southern extension of the Jebel Druz Basalt Highlands and are a part of the northeast Jordanian basalt plateau.

¹ H-4 and H-5 (or their Arabian phonetic derivatives Ighfour and Ighfeif) are the current designations for two pipeline pumping stations and the small Bedouin villages now surrounding them.

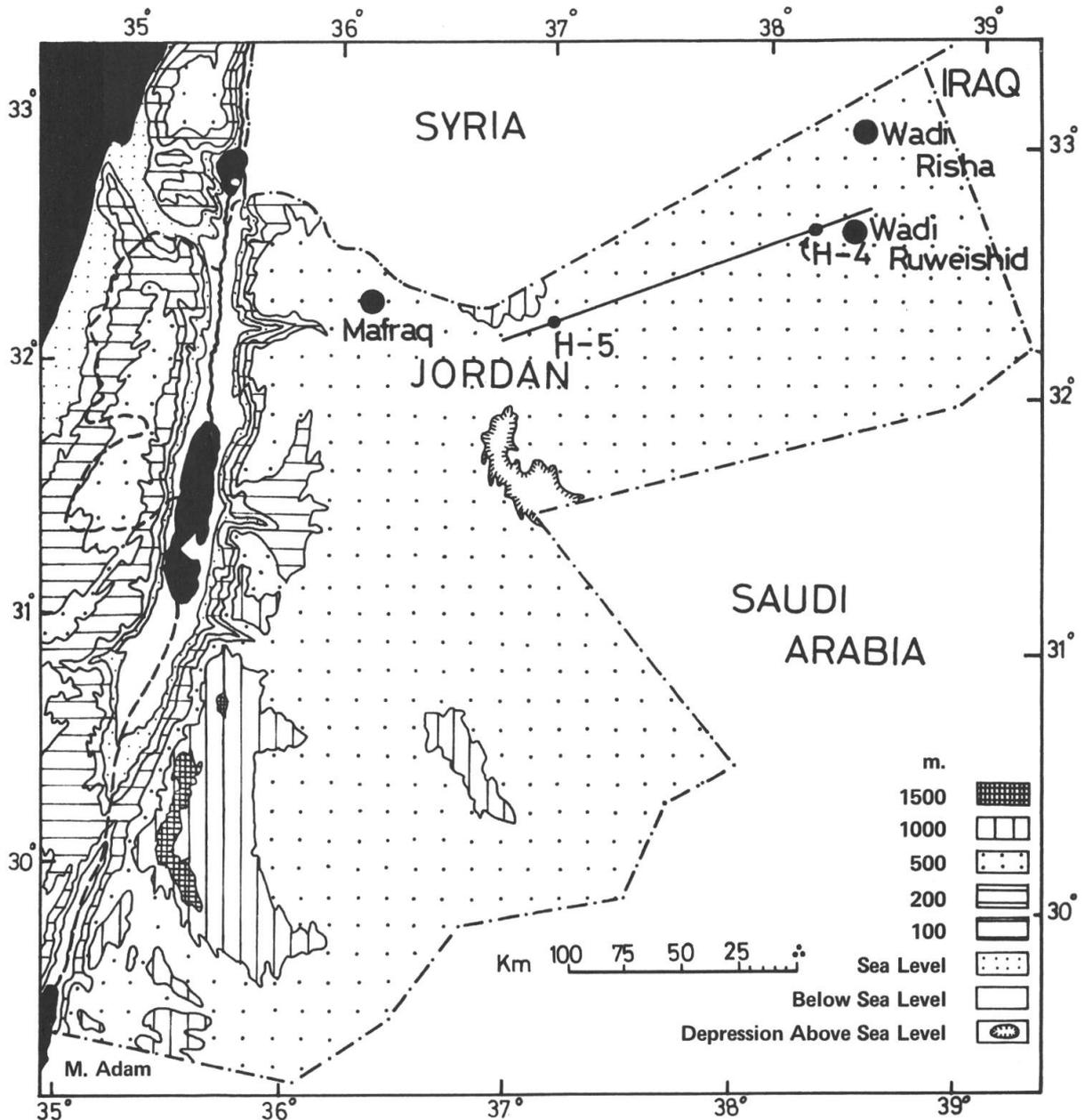


Fig. 1. — Map of Jordan showing H-4 and H-5 along the pipeline, Mafraq, Wadi Risha and Wadi Ruweishid.

Above this plateau rise several volcanic cones. In some localities within H-5, there are low topographic depressions, covered by extensive mud flats. The soil mainly consists of mud and silt, washed into these depressions from the encompassing higher lands; in general, the soil is poorly developed. The groundwater in H-5 is recharged by precipitations from the Jebel Druz Highlands.

The mean annual rainfall is 84.5 mm. The highest observed rainfall in 24 hours is 31.2 mm (February 1974). The mean maximum air temperature is 36.1°C, in July; while the mean minimum air temperature is 2.3°C, in January.

The area of H-4 and its neighbourhood, which is further east of H-5 and closer to the Iraqi frontier, is a plate-like depression covered by Tertiary and Cretaceous limestone sediments. The groundwater level is rather deep, usually over 100 m. The soils of H-4 are mainly formed by weathering under arid conditions; consequently, they are shallow and poorly developed.

The mean annual rainfall is 82.6 mm. The highest observed rainfall in 24 hours was 39.6 mm in February 1975. The mean maximum air temperature is 37.1°C, in July; while the mean minimum air temperature is 1.9°C, in January.

Collections made by the authors in April 1974 amounted to 377 numbers. These include 198 species and five varieties. The largest family is *Compositae*, represented by 33 species. Next are: *Cruciferae*, 26 species and 2 varieties; *Gramineae*, 17 species and 1 variety; and *Leguminosae*, 16 species and 1 variety.

The following is a list of the localities from which collections were made:¹

- 6696-6758: 20 km S.E. of Mafraq, along the road to H-5, 9.4.1974, B., J. & L.
326-337: idem, J.
- 6759-6788: 27 km S.E. of Mafraq, 9.4.1974, B., J. & L.
338-339: idem, J.
- 6789-6825: 22 km N.E. of H-5, along Mafraq road, 9.4.1974, B., J. & L.
340-345: idem, J.
- 6826-6859: 30 km S.W. of H-4, along the road to Mafraq, 9.4.1974, B., J. & L.
346-349: idem, J.
- 6860-6863: c. 30 km N.E. of H-4, 9.4.1974, B., J. & L.
350-355: 25 km N.E. of H-4, 9.4.1974, J.
- 6864-6903: 80 km N.W. of H-4, near the Syrian border, 10.4.1974, B., J. & L.
356-362: idem, J.
- 6904-6945: Wadi Ruweishid, 12 km E. of H-4, 11.4.1974, B., J. & L.
363-374: idem, J.
- 6946-6962: 35 km N.E. of H-4, 11.4.1974, B., J. & L.
375-378: idem, J.
- 6963-7009: Wadi Risha, 54 km N.E. of H-4, 11.4.1974, B., J. & L.
379-385: idem, J.
386: H-4, 11.4.1974, J.
387-388: Mafraq, 12.4.1974, J.

¹Collector's names are abbreviated as follows: B. = L. Boulos; J. = W. Jallad; L. = J. Lahham.

Specimens of the above-mentioned collections are deposited in the Herbarium, Faculty of Science, University of Jordan, Amman, Jordan. Duplicates were distributed to the following herbaria: B, BR, CAI, G and K. The following is an alphabetical list of the recorded plants, arranged after their families, genera, and species. The numbers refer to the localities from which the specimens were collected. The abbreviations used in the text are:

fl. = flowering specimen
fr. = fruiting specimen
ster. = sterile specimen, without flowers or fruits.

Aizoaceae

Aizoon hispanicum L.

6770 (fl.) – 6806 (fl.) – 6903 (fl., fr.) – 6988 (fl., fr.).

Mesembryanthemum nodiflorum L.

6771 (ster.).

Alliaceae

Allium aff. rothii Zucc.

6958 (fl.).

Allium sindjarensis Boiss. & Hausskn.

6881 (fl., fr.).

Amaryllidaceae

Ixiolirion tataricum (Pallas) Herbert

6700 (fl.). Flowers blue.

Boraginaceae

Anchusa aegyptiaca (L.) DC.

6804 (fl., fr.).

Arnebia decumbens (Vent.) Cosson & Kralik

6985B (fl., fr.).

Arnebia linearifolia DC.

6862 (fl., fr.) – 6949 (fl., fr.).

Arnebia macrocalyx (Cosson & Kralik) Boulos

6793 (fl., fr.) – 6835 (fl.) – 6860 (fl., fr.) – 6870 (fl., fr.) – 6951 (fl., fr.) – 6985A (fl., fr.). Common annual, usually occurring in sandy soils.

Buglossoides arvensis (L.) I. M. Johnston subsp. gasparrinii (Heldr. & Guss.) R. Fernandes
= *Lithospermum incrassatum* Guss.

6766 (fl., fr.). Flowers blue.

Gastrocotyle hispida (Forsskål) Bunge

6753 (fl., fr.) – 6901 (fl., fr.).

Heliotropium ramosissimum (Lehm.) DC.

6826 (fl.). Flowers white.

Lappula spinocarpos (Forsskål) Ascher-son ex Kuntze

6795 (fl., fr.) – 6856 (fl., fr.) – 6863 (fl., fr.) – 6896 (fl.) – 6930 (fl., fr.).

Nonea philistaea Boiss.

6748 (fl., fr.). Flowers creme-yellow.

Caryophyllaceae

Gypsophila arabica Barkoudah

6957 (ster.).

Herniaria hirsuta L.

6738 (fl.) – 6871 (fl.) – 6915 (fl.).

Minuartia picta (Sibth. & Sm.) Bornm.

6720 (fl.).

Paronychia argentea Lam.

6917 (fl., fr.).

Pteranthus dichotomus Forsskål

6836 (fl.) – 6998 (fl.). Annual; size of the plant varies tremendously according to the available water. Generally large specimens were collected due to the abundance of rain.

Silene apetala L.

6727 (fr.).

Silene colorata Poiret subsp. *oliveriana* (Otth) Rohrb.

6814 (fl., fr.) – 6837 (fl.) – 6946 (fl.).

Silene conoidea L.

6751 (fl.) – 6982 (fl., fr.).

Spergularia diandra (Guss.) Boiss.

6749 (fl.) – 6763 (fl.) – 6890 (fl., fr.) – 6996 (fl.).

Vaccaria pyramidata Medikus

7009 (fl.).

*Chenopodiaceae***Atriplex** cf. *tatarica* L.

6898 (ster.).

Bassia muricata (L.) Murray

6916 (fl., fr.).

Chenopodium album L.

6785 (fl., fr.).

cf. **Halocharis sulphurea** Moq.

6767 (ster.). Annual, aspect of young *Bassia muricata*; the plant was never collected in flower by the authors. Flowering specimens should be searched for during the summer. Zohary (1966) gives no mention of the genus *Halocharis* Moq. in Palestine and Jordan. However, Mouterde (1966) enumerates this and two other species, all confined to saline soils in some parts of Syria.

Halogeton alopecuroides (Delile) Moq.

6823 (ster.).

Haloxylon salicornicum (Moq.) Bunge ex Boiss.

6701 (ster.).

Londesia eriantha Fischer & C. A. Meyer

6765 (fl.). This Central Asiatic monotypic genus was not mentioned in Zohary (1966) or Mouterde (1966), which denotes its absence from Syria, Lebanon, Palestine, and Jordan.

On the other hand, Zohary (1973) enumerates *Londesia* among other genera as endemic or subendemic to the "Old Mediterranean area", without giving any detailed geographical distribution. However, Post & Dinsmore (1933) treat this taxon as follows: *Bassia latifolia* (Fresen.) Ascherson & Schweinf. b. *eriantha* (Fischer & C. A. Meyer) Dinsm., with mention of its occurrence in Arabia Petraea (Jordan), citing the following specimen: *Auch.* 2721 in Boissier "Flora Orientalis".

Bassia latifolia is synonymous with *B. eriophora*, according to Dinsmore's concept, and consequently our specimen should be named: *Bassia eriophora* (Schrad.) Ascherson var. *eriantha* (Fischer & C. A. Meyer) Dinsm. = *Londesia eriantha* Fischer & C. A. Meyer.

Täckholm (1974), distinguishes between *B. eriophora* var. *eriphora* and *B. eriophora* var. *eriantha* by the fruits, which have short spines in the first variety, but are unarmed in the second; and reports on the occurrence of var. *eriantha* in Sinai.

To sum up: the taxonomy, nomenclature, and geographical range of this taxon need further revision.

Cistaceae

Helianthemum ledifolium (L.) Miller

6725 (fl., fr.) – 6886 (fl., fr.) – 6948 (fl., fr.) – 6978 (fl., fr.). Annual with yellow flowers.

Helianthemum lippii (L.) Dum.-Courset

6828 (fl., fr.) – 6937 (fl., fr.). Woody perennial with sessile flowers.

Compositae

Aaronsohnia faktorovskyi Warburg & Eig

6834 (fl., fr.).

Achillea fragrantissima (Forsskål) Schultz Bip.

6933 (ster.).

Achillea santolina L.

6742 (fl.).

Anthemis melampodina Delile

6857 (fl.).

Anthemis pseudocotula Boiss.

6713 (fl.) – 6893 (fl.).

Anthemis sp.

6808 (fl.).

Artemisia inculta Delile

6852 (ster.) – 6908 (ster.).

Asteriscus graveolens Less.

6830 (fl.) – 6939 (fl., fr.).

Asteriscus pygmaeus (DC.) Cosson & Durieu

6980 (fl.).

Atractylis carduus (Forsskål) C. Chr.

6945 (fl., young heads).

Calendula arvensis L. s.l.

6746 (fl., fr.) – 6805 (fl., fr.).

Carduus pycnocephalus L.

6752 (fl., fr.) – 7004 (fl., fr.).

Centaurea ammocyanus Boiss.

6892 (fl., fr.) – 6954 (fl., fr.) – 6981 (fl., fr.).

Centaurea cf. *iberica* Trev.

6747 (fl.).

Centaurea cf. *laxa* Boiss. & Hausskn.

6821 (fl.).

Centaurea pallescens Delile

6824 (fl.).

Echinops spinosus L. s.l.

6943 (fl., fr.).

Filago desertorum Pomel

6699 (fl., fr.) – 6895 (fl., fr.) – 6905 (fl., fr.).

Filago pyramidata L.

6697 (fl.) – 6780 (fl., fr.) – 6812 (fl., fr.) – 6989 (fl., fr.).

Francoeuria crispa (Forsskål) Cass.

6929 (old fr.).

Gymnarrhena micrantha Desf.

6736 (fl., fr.) – 6879 (fl., fr.) – 6910 (fl., fr.). Poisonous to livestock.

Koelpinia linearis Pallas

6817 (fl., fr.) – 6914 (fl., fr.).

Lactuca undulata Ledeb.

6762 (fl., fr.). Flowers mauve.

Lasiopogon muscoides (Desf.) DC.

6882 (fl., fr.).

Launaea nudicaulis (L.) Hooker fil.

6810 (fl., fr.) – 6927 (fl., fr.).

Leontodon laciniatus (Bertol.) Widder

6880 (fl., fr.) – 6964 (fl., fr.).

Matricaria aurea (Loefl.) Schultz Bip.

6709 (fl.) – 6874 (fl.) – 6993 (fl., fr.).

Reichardia tingitana (L.) Roth

6772 (fl., fr.).

Rhagadiolus angulosus (Jaub. & Spach)

Kupicha

= *Garhadiolus hedyphnois* (Fischer & C. A. Meyer) Jaub. & Spach

6737 (fl.).

Scorzonera mollis M.B.

6735 (fl., fr.) – 6934 (fl., fr.). Flowers yellow.

Scorzonera papposa DC.

6843 (fl., fr.). Flowers mauve.

Senecio coronopifolius Desf.

6854 (fl., fr.) – 6897 (fl., fr.).

Tripleurospermum auriculatum (Boiss.)

Rech. fil.

6711 (fl.) – 6899 (fl., fr.).

Cruciferae

Alyssum damascenum Boiss. & Gaill.

355 (fl., fr.).

Alyssum linifolium Stephan ex Willd.

370 (fr.).

Alyssum marginatum Steudel

342 (fl., fr.) – 357 (fl., fr.) – 368 (fl., fr.) – 379 (fl., fr.).

Biscutella didyma L.

338 (fl., fr.).

Capsella bursa-pastoris (L.) Medikus

331 (fl., fr.).

Cardaria draba (L.) Desv.

386 (fl., fr.).

Chorispora purpurascens (Banks & Sol.)

Eig

332 (fl., fr.) – 362 (fl., fr.) – 381 (fl., fr.).

Diploaxis eruroides (L.) DC.

340 (fl., fr.).

Diploaxis harra (Forsskål) Boiss.

347 (fl., fr.).

Erucaria boveana Cosson

327 (fl.) – 349 (fl., young fr.).

- Erysimum oleifolium** J. Gay
374 (fl., fr.).
- Farsetia aegyptia** Turra var. **ovalis**
(Boiss.) Post
348 (fl., fr.).
- Isatis lusitanica** L.
334 (fl., fr.) – 387 (fl., fr.).
- Lepidium aucheri** Boiss.
341 (fl., fr.) – 358 (fl., fr.) – 382
(fl., fr.).
- Leptaleum filifolium** (Willd.) DC.
361 (fl., fr.).
- Malcolmia crenulata** (DC.) Boiss.
330 (fl.) – 350 (fl., fr.) – 360 (fl.,
fr.) – 369 (fl., young fr.).
- Matthiola longipetala** (Vent.) DC.
344 (fl., fr.) – 346 (fl., fr.) – 351
(fl., fr.) – 356 (fl., fr.) – 373 (fl., fr.)
– 375 (fl., fr.) – 380 (fl., fr.). A poly-
morphic species.
- Savignya parviflora** (Delile) Webb
364 (fl., fr.).
- Schimpera arabica** Hochst. & Steudel
365 (fl.).
- Sinapis arvensis** L. var. **orientalis** (L.)
Koch & Ziz
336 (fl., fr.).
- Sisymbrium bilobum** (C. Koch) Grossh.
333 (fl., fr.) – 354 (fl., fr.) – 366
(fl., fr.) – 378 (fl., fr.) – 384 (fl., fr.).
- Sisymbrium irio** L.
328 (fl., fr.) – 339 (fl., fr.).
- Sisymbrium runcinatum** Lag. var. **hirsu-
tum** (Lag.) Cosson
337B (fl., fr.).
- Sisymbrium runcinatum** Lag. var. **runci-
natum**
337A (fl., fr.).
- Texiera glastifolia** (DC.) Jaub. & Spach
335 (fl., fr.).
- Torularia torulosa** (Desf.) O. E. Schulz
var. **scorpiuroides** (Boiss.) O. E.
Schulz
326A (fl., fr.) – 343 (fl., fr.) – 385
(fl., fr.) – 388 (fl., fr.).
- Torularia torulosa** (Desf.) O. E. Schulz
var. **torulosa**
326B (fl., fr.) – 345 (fl., fr.) – 352
(fl., fr.) – 353 (fl., fr.) – 359 (fl., fr.)
– 367 (fl., fr.) – 371 (fl., fr.) – 376
(fl., fr.) – 383 (fl., fr.).
- Zilla spinosa** (Turra) Prantl
363 (fl., fr.).
- Cucurbitaceae*
- Citrullus colocynthis** (L.) Schrader
6925 (ster.).
- Cyperaceae*
- Carex stenophylla** Wahlenb.
6884 (fl., fr.).
- Dipsacaceae*
- Scabiosa porphyroneura** Blakelock
6783 (fl.) – 6959 (fl.) – 6984 (fl.).

*Euphorbiaceae***Euphorbia chamaepeplus** Boiss. & Gaill.

6723 (fl., fr.) – 6800 (fl., fr.).

Euphorbia cuspidata Bertol.= *E. chesneyi* (Klotzsch & Garke) M. S. Khan

6904 (fl., fr.). Zohary (1972), questions the presence of this species in Jordan, while Mouterde (1970) reports its occurrence: "Transjordanie. Nombreuses récoltes, surtout à Azraq". However, neither author gives the correct name, *Euphorbia cuspidata* Bertol.; and both use instead the synonym *E. chesneyi*, with different authors' names for the combination.

Euphorbia oxyodonta Boiss. & Hausskn.

6696 (fl., fr.).

*Fumariaceae***Fumaria densiflora** DC.

6705 (fl., fr.).

Fumaria parviflora Lam.

6774 (fl., fr.).

*Geraniaceae***Erodium cicutarium** (L.) L'Hérit.

6743 (fl., fr.) – 6815 (fl., fr.) – 6868 (fl., fr.).

Erodium glaucophyllum (L.) L'Hérit.

6831 (fl.).

Erodium laciniatum (Cav.) Willd. var. **laciniatum**

6850 (fl., fr.) – 6941 (fl., fr.).

Erodium laciniatum (Cav.) Willd. var. **pulverulentum** (Cav.) Boiss.

6741 (fl., fr.).

*Gramineae***Ammochloa palaestina** Boiss.

6731 (fl., fr.).

Bromus danthoniae Trin.

6803 (fl.).

Bromus madritensis L.

6801 (fl.).

Bromus rubens L.

6764 (fl.) – 6794 (fl.) – 6829 (fl.) – 6950 (fl.).

Bromus scoparius L.

6734 (fl.) – 6972 (fl.).

Bromus tectorum L.

6922 (fl.) – 6956 (fl.) – 6992 (fl.).

Cutandia memphitica (Sprengel) Benth

6921 (fl.).

Eremopyrum bonaepartis (Sprengel) Nevski

6789 (fl.).

Eremopyrum distans (C. Koch) Nevski

6855 (fl.) – 6889 (fl.) – 6947 (fl.).

Hordeum glaucum Steudel

6773 (fl.) – 6791 (fl.) – 6796 (fl.) – 6798 (fl.) – 6891 (fl.) – 6920 (fl.).

Lophochloa berythea (Boiss. & Blanche) Bor

6877 (fl.).

Lophochloa cristata (L.) Hylander
= *L. phleoides* (Vill.) Reichenb.

6712 (fl.) – 6970 (fl.).

Oryzopsis coerulescens (Desf.) Hackel

6987 (fl.).

Phalaris minor Retz.

6729 (fl., fr.) – 6841 (fl.).

Poa bulbosa L. var. *bulbosa*

6799 (fl.) – 6867 (fl., fr.) – 6977 (fl.).

Poa bulbosa L. var. *vivipara* Koeler

6698 (fl.) – 6865 (fl.).

Schismus barbatus (L.) Thell.

= *S. arabicus* Nees

6768 (fl.) – 6797 (fl.) – 6858 (fl.)
– 6869 (fl.).

Stipa capensis Thunb.

6792 (fl.) – 6990 (fl.).

Hypocoaceae

Hypocoum imberbe Sm.

6719 (fl., fr.). Flower orange-yellow.

Hypocoum pendulum L.

6721 (fl., fr.) – 6864 (fl., fr.) –
6919 (fl., fr.) – 6983 (fl., fr.). Flowers
greenish-yellow.

Iridaceae

Iris sisyrinchium L.

6755 (fl.).

Labiatae

Lamium amplexicaule L.

6745 (fl.).

Phlomis damascena (Bornm.) Rech. fil.

6906 (ster.).

Salvia lanigera Poiret

6912 (fl., fr.).

Salvia spinosa L.

6847 (fl.).

Teucrium polium L.

6924 (ster.).

Thuspeinanta persica (Boiss.) Briq.

6960 (fl.). A rare, delicate annual probably not known previously from this desert area. However, Post & Dinsmore (1933) report its occurrence in other desert areas of Jordan.

Thymus bovei Benth

6769 (ster.) – 6931 (ster.).

Leguminosae

Astragalus acinaciferus Boiss.

6936 (fl.).

Astragalus asterias Steven ex Ledeb.

6778 (fl., fr.) – 6940 (fl., fr.) –
7005 (fl., fr.).

Astragalus bombycinus Boiss.

6825 (fl.) – 6840 (fl., fr.) – 6888 (fl., fr.) –
6942 (fl., fr.) – 6955 (fl., fr.) – 7001 (fl., fr.).

Astragalus caprinus L.

6782 (fl.).

Astragalus kahiricus DC.

6961 (fl., fr.).

Astragalus sieberi DC.

6944 (fl., old fr.).

Astragalus spinosus (Forsskål) Muschler
6788 (fl., fr.) – 6848 (fr.) – 7008
(fr.).

Astragalus trachoniticus Post
6845 (fl., fr.) – 6938 (fl.). Flowers
mauve.

Astragalus tribuloides Delile var. *el-
arishensis* Eig
6813 (fl., fr.).

Astragalus tribuloides Delile var. *tribu-
loides*
6718 (fl.) – 6811 (fl., fr.) – 6876
(fl.) – 7003 (fl., fr.). Flowers whitish
mauve.

Medicago laciniata (L.) Miller
6833 (fl., fr.) – 6969 (fl.) – 6997
(fl., fr.).

Medicago polymorpha L. emend.
Shinners var. *vulgaris* (Bentham)
Shinners
6744 (fl., fr.).

Onobrychis ptolemaica (Delile) DC.
6827 (fl., fr.).

Trigonella arabica Delile
6708 (fl., fr.).

Trigonella hamosa L.
6809 (fl., fr.).

Trigonella stellata Forsskål
6807 (fl., fr.). This annual is more
frequent in the southern hotter deserts
of Jordan (see Boulos 1977; Boulos &
Lahham 1977).

Vicia peregrina L.
6790 (fl., fr.) – 6995 (fl., fr.).

Leonticaceae

Leontice leontopetalum L.
6757 (fr.).

Liliaceae

Bellevalia macrobotrys Boiss.
6902 (fl., fr.) – 7002 (fl., fr.).

Bellevalia stepporum Feinbrun
6702 (fl.).

Colchicum crocifolium Boiss.
6952 (fr.). This species was recently
discovered in Jordan (see Boulos & al.
1975).

Gagea reticulata (Pallas) A. & H.
Schultes
6733 (fl.).

Leopoldia longipes (Boiss.) A. Losinsk.
6758 (fl., fr.) – 6787 (fl.).

Malvaceae

Althaea ludwigii L.
6974 (fl.).

Malva parviflora L.
6740 (fl., fr.) – 6976 (fr.).

Papaveraceae

Papaver glaucum Boiss. & Hausskn. ex
Boiss.
6861 (fl., fr.) – 6918 (fl.). This spe-
cies was recently discovered in Jordan
(see Boulos & al. 1975).

Papaver humile Fedde
6968 (fl., fr.). Flower small.

Papaver polytrichum Boiss. & Kotschy

6724 (fl.) – 6966 (fl.). Corolla with two large petals which are entirely red; and two small ones with a black spot at base, a white narrow zone, and a majority of red.

Papaver syriacum Boiss. & Blanche

6859 (fl.).

Roemeria hybrida (L.) DC.

6730 (fl., fr.) – 6887 (fl., fr.) – 6973 (fl., fr.).

Roemeria procumbens Aaronsohn & Oppenheimer

6965 (fl., fr.). Plant almost glabrous, leaf lobes are fewer and broader than in the above species.

*Plantaginaceae***Plantago amplexicaulis** Cav.

6818 (fl., fr.) – 6853 (fl., fr.).

Plantago coronopus L.

6784 (fl., fr.) – 6816 (fl., fr.) – 6923 (fl., fr.).

Plantago lagopus L.

6756 (fl., fr.).

Plantago notata Lag.

6754 (fl., fr.) – 6760 (fl., fr.) – 6986 (fl., fr.).

Plantago ovata Forsskål

6822 (fl., fr.) – 6846 (fl., fr.) – 6900 (fl., fr.) – 6926 (fl., fr.) – 6991 (fl., fr.).

*Polygonaceae***Polygonum equisetiforme** Sibth. & Sm.

6911 (fl.) – 6971 (ster.).

Rumex cyprius Murb.

6832 (fl., fr.).

*Primulaceae***Anagallis arvensis** L.

6716 (fl.).

Androsace maxima L.

6894 (fr.) – 6999 (fr.).

*Ranunculaceae***Adonis aestivalis** L.

6717 (fl., fr.) – 6775 (fl.). Flowers red, petals large, sepals hairy on lower side.

Adonis dentata Delile

6710 (fl., fr.) – 6873 (fl., fr.). Flowers yellow.

Adonis microcarpa DC.

6715 (fl.). Flowers red, petals small.

Ceratocephala falcata (L.) Pers.

6704 (fl., fr.) – 6872 (fl., fr.) – 6963 (fr.).

*Resedaceae***Caylusea hexagyna** (Forsskål) Green

6928 (fl., fr.).

Reseda decursiva Forsskål

6819 (fl.) – 6838 (fl.) – 6979 (fl., fr.).

*Rubiaceae***Callipeltis cucullaris** (L.) Rothm. var. *aptera* (Boiss. & Buhse) Rech. fil. & Ehrend.

6802 (fl., fr.).

Galium tricornutum Dandy
6739 (fl., fr.) – 6994 (fl., fr.).

Rutaceae

Haplophyllum blanchei Boiss.
6839 (fl.).

Haplophyllum tuberculatum (Forsskål)
A. Juss.
6935 (fl.).

Scrophulariaceae

Linaria micrantha (Cav.) Hoffmanns. &
Link
6750 (fl., fr.) – 6866 (fl., fr.) –
6967 (fr.). Flowers whitish blue.

Scrophularia xanthoglossa Boiss.
6907 (fl.).

Veronica syriaca Roemer & Schultes
6706 (fl., fr.).

Solanaceae

Hyoscyamus desertorum (Ascherson &
Boiss.) Täckholm
7000 (fl., fr.).

Hyoscyamus pusillus L.
6776 (fl., fr.).

Umbelliferae

Anisosciadium isosciadium Bornm.
6842 (fl.) – 7007 (fl.).

Chaetosciadium trichospermum (L.)
Boiss.
6722 (fl., fr.) – 6777 (fl., fr.).

Ducrosia flabellifolia Boiss.
6932 (old inflorescence). For details
on geographical distribution, chromo-

some number, etc., see Boulos &
Al-Eisawi 1977.

Ferula blanchei Boiss.
6849 (fl.) – 6962 (fl.).

Ferula ovina (Boiss.) Boiss.
6851 (ster.).

Zosima absinthiifolia (Vent.) Link
7006 (fl.).

Urticaceae

Parietaria alsinifolia Delile
6779 (fl.).

Urtica pilulifera L.
6761 (fl., fr.).

Urtica urens L.
6759 (fl., fr.).

Valerianaceae

Valerianella dactylophylla Boiss. &
Hohen.
6726 (fl.).

Valerianella sp.
6781 (fl.).

Zygophyllaceae

Fagonia bruguieri DC. var. *laxa* Boiss.
6844 (fl., fr.).

Fagonia olivieri DC.
6913 (fl.). According to Zohary
(1972), this species was not previously
recorded from Jordan.

Ephedraceae

Ephedra alte C. A. Meyer
6909 (male fl.).

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