



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

Systematic Study of Two Species *Ferula cachroides* and *Hippomarathrum scabrum* (Umbelliferae) in Kurdistan Region of Iraq

Jawhar Fattah Saeed¹, Media Taher Raheem², Khazal Dh. Wadi³

1. College of Basic Education, Salahaddin University-Erbil, Kurdistan Region, Iraq.

2. Makhmor Education- Ministry of Education-Erbil, Kurdistan Region, Iraq.

3. Dep. of Biology- College of Science - University of Diyala, Iraq.

Manuscript Info

Manuscript History:

Received: 13 June 2013
Final Accepted: 22 June 2013
Published Online: July 2013

Key words:

Ferulacachroides,
Hippomarathrumscabrum,
Umbelliferae, Mountainous

Abstract

In this study a survey for two species *Ferulaca chroides* (schlecht) Eng.Kor. and *Hippomarathrum scabrum* Hoffmgg. ET Link (Umbelliferae) in Kurdistan Region of Iraq depended on the field trips to collect specimens, and the specimens preserved in a number of Iraqi herbaria were surveyed for identification. Morphological study was conducted on the vegetative and reproductive parts. These have been reinforced by graphs and figures. The present study dealt with the ecological and geographical distribution, and drew map for this purpose; furthermore, the flowering period of the species has been determined.

Copy Right, IJAR, 2013.. All rights reserved.

Introduction

One of the families that was not treated in the Flora of Iraq. Umbelliferae family is consisting of about 200 genera and 2900 species in world [1], while in Iraq involves 143 species distributed on 60 genera [2]. *Ferula* genus; Boissier [3] indicated 30 species of the genus, and Nabelek [4] stated only 1 species of the genus. In Syria, Palestine and Sinai, [5] mentioned 8 species of the genus. In Iraq, [6] pointed out to presence of 2 species of the genus were found involving studied species. In Mediterranean and Egypt, [7] and [8] indicated 2 species. Both Al-Rawi [9] and Rechinger [10] pointed out to presence of 4 species were found involving studied species in Iraq, as well as in low lands of Iraq, [11] also mentioned the distribution of 2 species of the genus. In Europe, [12] stated 8 species of the genus. In Turkey, [13] also mentioned that 17 species of the genus were found involving studied species in North of Iraq. [14] mentioned the distribution of 7 species of the genus were found indicating the districts in which the species are distributed, and [15] stated that 6 species of the genus were found involving studied species within MAM and MSU districts. [16] indicated 4 species in Kashmir and north western India.

As for *Hippomarathrum* genus, [3] and [17] pointed out to presence of 5 species of the genus were found involving studied species. Nabelek [4] mentioned that 2 species of the genus were found involving studied species. Both [5] and [18] also stated on 2 species of the genus. In Iraq, [6], [9], [10], [15] and [19] pointed out to presence of only 1 species of the genus were found involving studied species. Bentham and Hooker [20] indicated 6 species. In Russia, [21] indicated 4 species. While Khalaf [22], Faris [23] and Fatah [24] did not mention any species of the *Ferula* and *Hippomarathrum* in Sinjar, Piramagrun and Haibatsultan mountains and their adjacent area.

Economic importance for *Ferula* species, the gum-resin obtained from the roots, is used in perfumery and for flavoring food products, it is also used in medicines in the treatment of asthma, cough and indigestion, the roots and seeds produce an essential oil [16].

F. schlechtendalii Boiss. has also been reported by Zohary, under the authority of Boissier, as occurring at Rowanduz area, but there is no collection of this species in the National Herbarium or at Kew. This appears to have a very restricted distribution [14]. The present study aimed to specify the two species *Ferulacachroides* and *Hippomarathrum scabrum* in Kurdistan Region of Iraq and to study the morphological characters and the geographical

distribution of the species, some ecological notes were pointed out regarding the different environmental types and study of plant specimens found in some Iraqi herbaria to add a small part to the Flora of Iraq.

Materials and Methods

Many field trips (52trips) were made to different districts of Kurdistan: Amadyia (MAM), Rowanduz (MRO), Sulaimanyia (MSU), JabalSinjar (MJS), Erbil (FAR), Kirkuk (FKI), Nineveh (FNI) and Persian Foot hills (FPF) during Summer season of years 2009-2011 for plant specimens collection, some Iraqi herbaria specimens were used such as Baghdad, Iraq; The University Herbarium, College of Science; Erbil, Iraq; College of Science Herbarium/ University of Salahaddin and FAO-Herbarium (Food Agricultural Organization Herbarium), these specimens were identified by help of some keys especially in Flora of Turkey, the specimens were made herbarially to become formal specimens. The specimens were studied morphologically in detail from roots to seeds, the study was carried out by Dissecting microscope Leybold Didactic GmbH. Type. Geographical distribution was made by the aid of prepared maps (figure 1); ecological notes were pointed out according to the different environmental types.

Results

Ferula Gen. pl. ed. 5:117 (1754); Sp. pl. ed. 1:246 (1953).

Erect, robust, perennial, with thick rootstock; fibrous collar present. Basal and lower cauline leaves 4-6 pinnate, triangular-ovate in outline with ovate-oblong to filiform-setaceous lobes, upper cauline leaves progressively reduced to sheathing bases. Sheath well developed, usually coriaceous, amplexicaul. Inflorescence paniculate-corymbose (i.e. lateral branches bearing more than 1 umbel) or rarely racemose (i.e. lateral branches 1- umbelled) or all umbels proliferating (i.e. rays arising from the axis). Central umbels fertile, often shortly peduncled; lateral umbels usually sterile, long-peduncled. Bracts absent. Bracteoles absent or a few, minute, caducous. Sepals minute or obsolete. Petals usually yellow, glabrous or rarely hairy. Mericarps strongly compressed dorsally, dorsal ridges filiform, laterals winged, wings 0.5-4mm wide; dorsal vittae solitary or 2-6 per vallecule, all equal and confined to intercostals area only; commissural vittae 2-12. Fruits and basal leaves are often essential for accurate identification [13].

1. *Ferulacachroides* (Schlecht.) Eng. Kor., 1.c.:56 (1947).

Syn: ***F. schlehtendalis* Boiss.**, Fl. Or. 2:958 (1872); Zoh. in Dep. Agr. Iraq Bull. 31: 112 (1946); Rawi, ibid. Tech. Bull. 14: 92 (1964).

Syn: ***F. orientalis* L.**, Sp. Pl. ed. 247 (1753); H. Pesmen in Fl. Turkey 4: 445 (1972).

Perennial, tall, robust, quite glabrous, 121-300 cm high. Root 5-7 cm width with thick woody tap root system. Stem cylindrical, caudex, erect, solid, branched and green with purple weakly sulcate corymbosal branches above, 110-274x2-3.3 cm. Basal leaves petiolate, petiole 14-32.5 cm long, purple lines are found on petiole and rachis. Sheath sulcate, 3.5-18.5x3-8 cm. Blade narrowly obovate, broadly obovate and depressed obovate-obtrullate in outline, 23.5-58x14-50 cm, pinnately to hexapinnate compounds, about (2-12) pairs for primary leaflets. Cauline leaves have big or giant sheath like funnel shape. Lower cauline leaves opposite and alternate, petiolate, petioles represented by sheaths, sheaths sulcate, 8.2-15.5x6-11.7 cm. Blade obovate, narrowly obovate, very broadly obovate-obtrullate in outline, 6-52x2.5-37 cm, pinnately to tetra pinnate compounds, about (7-10) pairs for primary leaflets. Upper cauline leaves opposite and subverticillate, petiolate, petioles represented by sheaths, sheath sulcate, 5-16.5x2.5-14.5 cm. Blade obdeltate, obovate, broadly obovate, narrowly triangular-obtrullate in outline, 6-29.5x2-30 cm, pinnately to bipinnate compound, about 2 pairs for primary leaflets. Segments of leaflets finely setaceous to setaceous-filiform, 2.5-25x0.09-0.1 mm, apex mucronate, base cuneate, margin entire. Leaves decreasing upwards in size and number of segments and leaves are green. Fruiting compound umbels diameter about 12-17 cm; peduncle cylindrical, greenish yellow, 0.8-30x0.4-0.6 cm. Primary rays 3.5-14 cm long, (10-25) rays. Secondary ray 2-6.5 cm long, (9-31) rays, they are taller than ripe fruits. Bracts and bracteoles are absent. Flowers diameter 2-6 mm, bisexual, zygomorphic, bright yellow. Calyx teeth small or obsolete. The corolla consists of five free petals called polypetalous. Petals broadly ovate, very broadly ovate, 1-1.5x1.1-1.5 mm, entire, above with a short inflexed acume, bright yellow. Androecium is composed of 5 free and fertile stamens, glabrous. Filaments conspicuous between the petals from being incurved over the anthers, filiform to tap form, 3.4-5x0.21-0.33 mm. Another oblong-elliptic, 1-1.2x0.5-0.6 mm. Ovary 1-2x0.9-1.6 mm, with longitudinal ridges, brown. The 2-styles 0.3-1.1x0.1-0.4 mm. Stylopodium somewhat elevated in middle and margins are very undulated, 1.2-2 mm diameter, brown. Stigma capitate or discoid, 0.1-1.5x0.2-1 mm.

Fruits are characterized by schizocarp, cremocarp and composed of 2-mericarps, every mericarp is 1-seeded. Every mericarp has 5 primary ribs (two of them are lateral ribs, one dorsal rib and two intermediate ribs).

Fruit narrowly elliptic, elliptic, broadly elliptic, 2-5x1.1-2mm, yellowish brown. Seeds have clear longitudinal ribs, 1.8-4.7x0.5-0.9mm, brown, narrowly-very narrowly elliptic, apex acuminate, base acute (figure 2, plate 1-A).

Type: Described from the "Orient", Tournefort (holo. Hb. Cliff.!) (Flora of Turkey).

Selected samples from the studied specimens

MAM: ESUH/Gara Mt., 1100m, 23.5.2009, Al-Dalawi & Al-Makhmuri, 7101; MRO: Sakran Mt., 1720m, 20.6.2011, Al-Dalawi & Al-Makhmuri, 7102; MSU: Kopi Qaradagh Mt., 1350m, 4.6.2010, Saeed, Al-Khayat, Al-Dalawi & Al-Makhmuri, 7103.

Ecological and geographical distributions

Found as separated individuals within the area or as a population, in mountainous region on high rocky slopes, in limestone, rocky, gravelled-clay, sandy loam soil; altitude: 950-3000m; flowering period: April-June.

F. cachroides, distributed in Amadyia district MAM from Kanimasi, Amadia, Sarsang, Garamountain, Matin Mt. In Rowanduz district MRO in Karokh Mt., Sakran Mt., Hassari Sakran, Sarifaqian, Mandau Mt. (chia-i-Mandala, chia-i-Mandali), Shaikhan Mt.,

Qandil Mt., S.E. and N.E. facing slope of Halgord Mt., Kodo Mt. then elongated to Sulaimanyia district MSU in Pira Magron Mt., Qula-Rash top area (Merquli), Qaradagh, Jafaran, Kopi Qaradagh Mt., chain mountains: Kotrarash, Smaqoli, Klora and Mt-Dolan near Chwarta on Persian frontier, Beara and Hawraman Mt (figure 1).

2. *Hippomarathrum Hoffm.* ET Link, Fl. Post. 2:411 (1820); Bouloumoy, Fl. Li. Syr. VI: 142 (1930); Post, Fl. Syr. Pal. Sin. 1: 537 (1932); Bobrov, Fl. U.S.S.R. 24: 179 (1950).

Erect, stiff, much branched perennials; rootstock thick, crowned by a collar of fibers or bristles. Basal leaves 3-5 ternate or verticillate-ternate, with linear or filiform ultimate segments. Upper stem leaves much reduced, sometimes simple, lanceolate. Bracts and bracteoles 5-7, linear to lanceolate, entire. Flowers hermaphrodite. Sepals conspicuous. Petals yellow. Fruit ellipsoid to globose, not compressed; ridges obtuse and broad to acute, papillose, verrucose or cristate-dentate; valliculae and commissures multivittate [17].

2. *Hippomarathrum scabrum* (Fenzl.) Boiss., Fl. Orient. 2:933 (1872); Hand.-Mazz. in Ann. Naturh. Mus. Wien 27:89 (1910); Zoh. in Dep. Agr. Iraq Bull. 31:112 (1946); Rawi, ibid. Tech. Bull. 14:93 (1964); Nouv. Fl. Syr. 2:611 (1970); D.F. Chamberlain in Fl. Turkey 4:392 (1972).

Syn: *Ferula scabra* Fenzl in Flora 26:461 (1843).

Figure (1) A map showing the distribution of the two species

● *Ferula cachroides* ★ *Hippomarathrum scabrum*

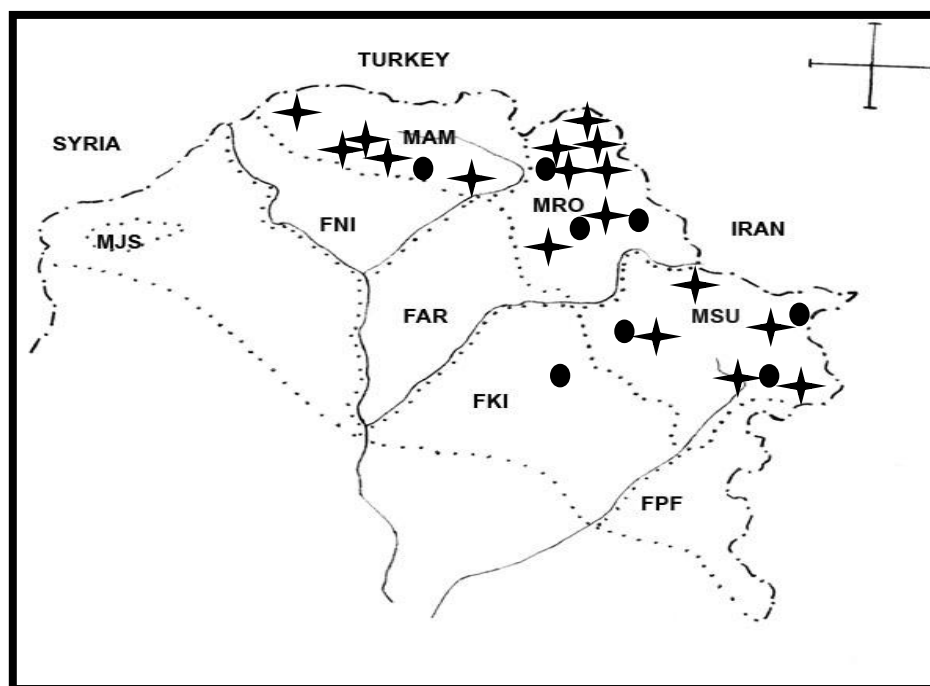


Figure (2): *Ferula cachroides*; 1. Basal leaf; 2. Lower cauline leaf; 3. Upper cauline leaf; 4. Petal; 5. Androecium; 6. Gynoecium; 7. Fruit; 8. Seed.

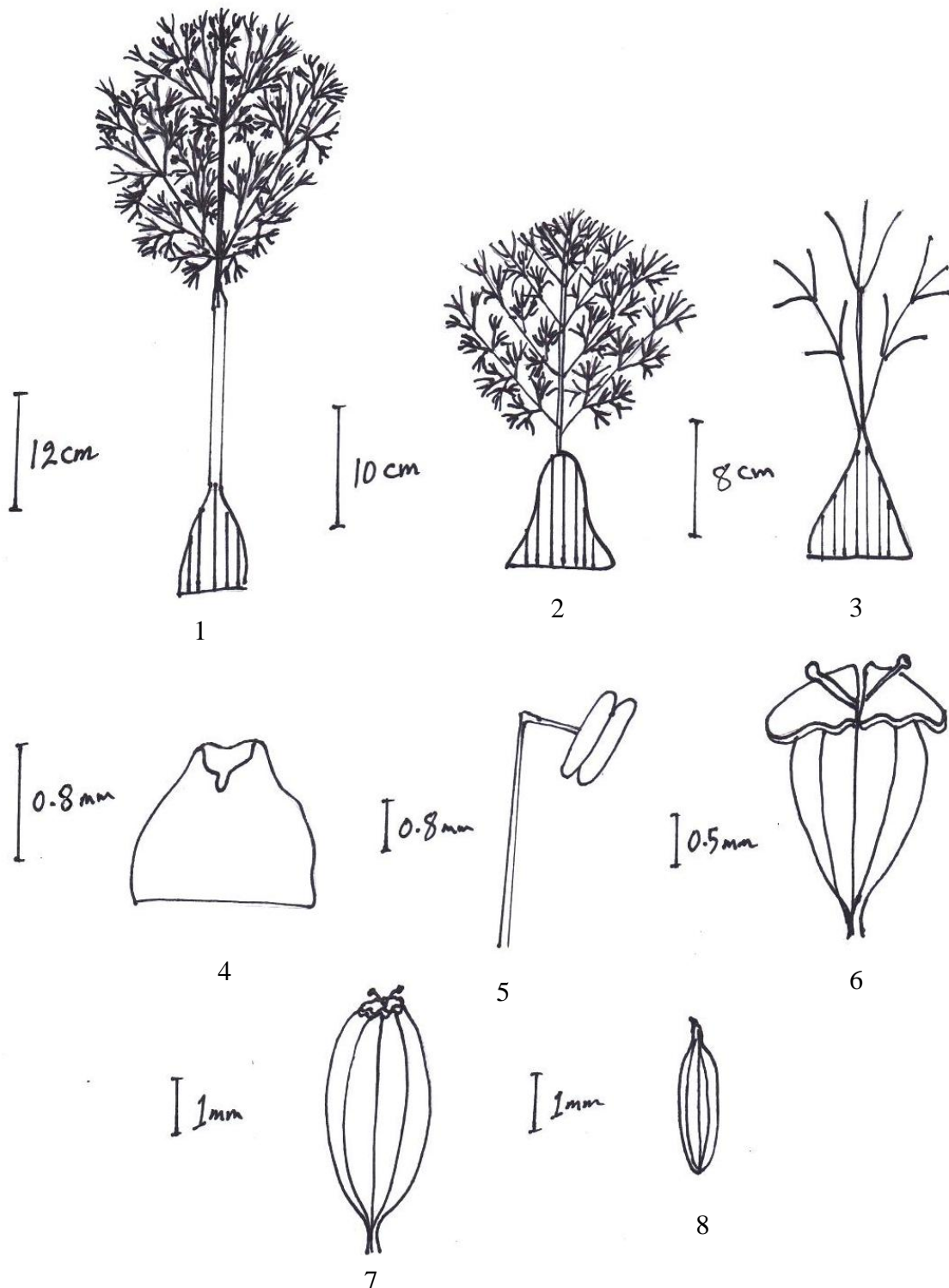
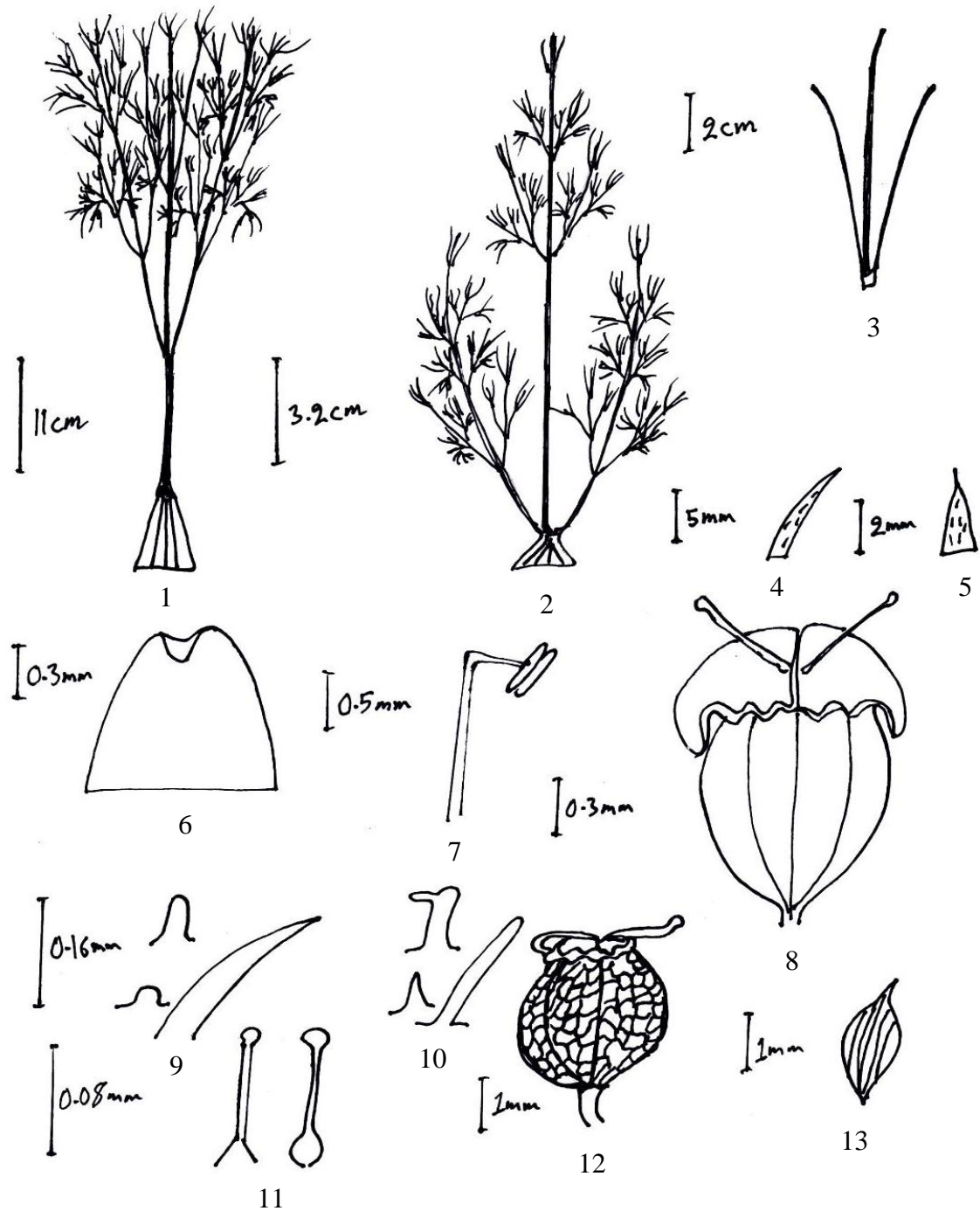


Figure (3): *Hippomarathruscabrum*; 1. Basal leaf; 2. Lower cauline leaf; 3. Upper cauline leaf; 4. Bract; 5. Bracteole; 6. Petal; 7. Androecium; 8. Gynoecium; 9. Scabrous-papillate; 10. Puberulent; 11. Glandular; 12. Fruit; 13. Seed.



Syn: *Cachrysscabra* (Fenzl) Meikle, Fl. Cyprus 1:727 (1977).

Perennial, tall and stout herbs, 100-160 cm high. Root 2.2-3.5 cm wide with thick woody tap root system. Stem very rigid, cylindrical to quadrangular, caudex, erect, solid, branched and greenish yellow, puberulent, scabrous-papillate, glandular especially below and in the region of the nodes; corymbosal branches above, 85-150x0.9-1.8 cm. Basal leaves petiolate, petiole 10.3-20.5 cm long. Sheath sulcate, 3.5-6.5x2-5 cm. Blade obtriangular, narrowly obovate in outline, 27-41x13-35 cm, pinnately to pentapinnate decomposed, about (6-7) pairs for primary leaflets. Lower cauline leaves alternate, petiolate, or sub sessile which have very short sheath. Petiole 6.5-7.5 cm long, sheaths sulcate, 0.5-1.9x1-2 cm. Blade ovate, narrowly ovate, 7-27x4-12 cm, pinnately to tetrapinnate decomposed, about (4-5) pairs for primary leaflets. Upper cauline leaves opposite, subverticillate and rarely alternate, sub sessile, very short sheath, sheath sulcate, 1-5x2.5-6 mm. Blade ovate-narrowly ovate, 2-20x1.2-9 cm, pinnately to bipinnate compound, about 2 pairs for primary leaflets. Segments of leaflets linear-setaceous, 3-90x0.3-0.9 mm, apex mucronate, base cuneate, margin entire. Leaves glabrous, decreasing upwards in size and number of segments and leaves are green and in several places with the final divisions usually trifid. Sheath and primary division of leaves with dense scabrous-papillate. Fruiting compound umbels diameter about 1-6.3 cm; peduncle cylindrical, light green, 15-80x1-2.2 mm. Primary rays 7-35 mm long, (8-12) rays. Secondary rays 1-8 mm long, (9-20) rays, they are taller than ripe fruits. Involucral bracts narrowly lanceolate, lanceolate, linear, puberulent, scabrous-papillate, 3-20x0.1-1.3 mm, (4-8) bracts, green-yellow, apex acute, margin entire with cuneate base. Involucel bracteoles 0.8-9x0.08-1.2 mm, about (4-8) bracteoles, bracteoles are like to bracts in shape, color, type of vestures, it is usually persistent. Flowers diameter 2-4.1 mm, bisexual, zygomorphic bright yellow. Calyx with five short distinct teeth. The corolla consists of five free petals called polypetalous. Petals narrowly ovate-very broadly ovate, elliptic, 0.9-1.8x0.6-1.2 mm, dorsal surface of petals covered with scabrous-papillate, entire with the apex inflexed, usually yellow. Androecium is composed of 5 free and fertile stamens, glabrous. Filaments conspicuous between the petals from being incurved over the anthers, filiform to tap form, 1-2.4x0.1-0.18 mm. Another oblong-elliptic, 0.4-1.1x0.09-0.5 mm. Ovary 1-1.2x1-

1.3 mm, with longitudinal ridges, scabrous-papillate on ridges, brown or greenish yellow. The 2-styles 0.4-0.9x0.1-0.2 mm. Stylopodium is flattened and margins are very undulation, 1.2-2 mm diameter, brown or greenish yellow. Stigma capitate or discoid, 0.08-0.18x0.1-0.5 mm. Fruits are characterized shizocarp, cremocarp and composed of 2-mericarps, every mericarp is 1-seeded. Every mericarp has 5 primary ribs (two of them are lateral ribs, one dorsal rib and two intermediate ribs). Fruit globose, somewhat compressed laterally, densely whitish-verrucose, ridges not prominent, crenate-edged disk, 1.8-4x1.8-4 mm, Pericarp corustaceous. Seeds have clear longitudinal ribs, 1.5-3.9x0.6-1.2 mm, brown, narrowly, elliptic, apex acuminate, base acute (figure 3, plate 1-B).

Type: [Turkey C7/8 Diyarbakir/Mardin] in Mesopotamia inter Diyarbakir ET Mardin, *Kotschy* 322 (Flora of Turkey).

Selected samples from the studied specimens

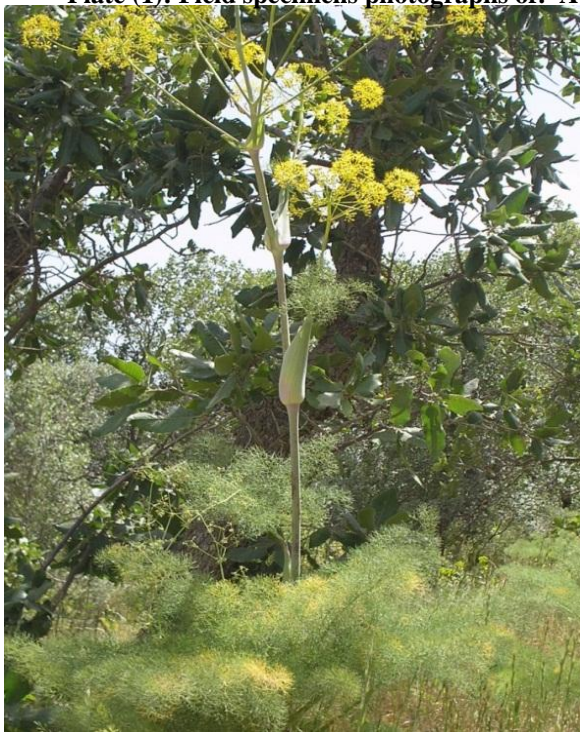
MAM: ESUH/Matin Mt., 700m, 2.7.2011, Al-Dalawi&Al-Makhmuri, 7108; MRO: Sakran Mt., 1900m, 7.6.2010, Al-Khayat, Saeed, Al-Dalawi&Al-Makhmuri, 7109; MSU: Piramagrün Mt.-Qularash, 1800m, 16.7.2010, Al-Khayat, Saeed, Sardar, Al-Dalawi&Al-Makhmuri, 7110; FKI: Qarahanger, 620m, 2.5.2009, Al-Dalawi&Al-Makhmuri, 7111.

Ecological and geographical distributions

The environment similar to the environment of *F.chachroides*; altitude: 550-2100 m; flowering: May-June.

H. scabrum distributes in MAM district in Matin Mt. In MRO district in Mandau Mt., Sakran Mt. S.E. and E. facing slope, Halgord Mt. S., E. and N. E. facing slope. In MSU district in Piraagrün Mt. top area, Qula Rash top area, Kopy Qaradagh in forest, Beara and Hawraman Mt. In FKI in Qarahanger (figure 1).

Plate (1): Field specimens photographs of: A- *Ferula cachroides* B- *Hippomarathruscarbum*



A



A



A



B

Discussion

This study dealt with two species *Ferula cachroides* and *Hippomarathrum scabrum* from limited aspects including the study of morphological characters as well as the study of environment and their distribution in the studied districts.

One of *Ferula cachroides* characters which have a taxonomical importance is the plant height which is tall among Umbelliferae family up to 300 cm. It seems that the segments of leaflets are finely setaceous to setaceous-filiform, not exceeding 0.1 mm in width. Another character which has an important role is the sheaths of cauline leaves which are very large, inflated, firm, which are completely amplexicaul, overlapping at the basal margins for stem leaves. Bracts and bracteoles are absent in *Hippomarathrum scabrum*, dorsal surface of petals covered with scabrous-papillate and fruits globose, densely whitish warty. The other characters did not show any taxonomical importance or have limited taxonomical importance. During the field trips to the different districts, the specimens of each species were collected. The flowering period extended from the end of April to the beginning of June, and the two species were perennials. The research was somewhat capable to cover the environment and geographical distributions of the two species that are distributed in the same regions.

References

- 1-Lawrence, G.H.M. (1951). Taxonomy of vascular plant. Macmillan publishing Co., INC., New York: 644.
- 2-Al-Musawi, A.H. (1987). plant taxonomy. Univ. of Baghdad: 241 (in Arabic).
- 3-Boissier, E. (1872). Flora Orientalis. Vol.2. Geneva et Basileae, Apud H. Georg, Bibliopolan, Lugduni: 931-995.
- 4-Nabelek, F.R. (1923). Iterturcico-persicum. part 1. Dela Faculte Des Scien. de L'universite Masaryk Rediges par: 125, 127.
- 5-Post, G.E. (1932). Flora of Syria, Palestine and Sinai. Vol.1, American Press, Beirut: 537-548.
- 6-Zohary, M. (1946). The Flora of Iraq and its phytogeographical subdivision. Ministry of Economics, Directorate general of Agr., Bull.No.3: 112.

- 7-Blamey, M. and Wilson, Ch.G. (2005). Wild flowers of the Mediterranean. Great Britain, Bath Press, Glasgow and Bath. : 161.
- 8-Tackholm, V. (1956). Students Flora of Egypt. Anglo-Egyptian bookshop, Cairo: 202.
- 9-Al-Rawi, A. (1964). Wild plants of Iraq with their distribution, Min. of Agr. and Irrigation-National Herb. of Iraq, Baghdad: 92-93.
- 10-Rechinger, K.H. (1987). Flora Iranica. No.162, Akademische Druk-u. Verlagsanstalt, Graz-Austria: 209-210, 387-426.
- 11-Rechinger, K.H. (1964). Flora of lowland Iraq. Verlag von J. Cramer: 468.
- 12-Tutin, T. G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. and Webb, D.A. (1968). Flora Europaea. Vol.2, Cambridge Univ. Press: 358-359.
- 13-H. Pesmen. (1972). *Ferula* L., In: Flora of Turkey and east Aegean Island. Vol. 4, Davis, P.H. (ed.) Edinburgh Univ. Press: 440-453.
- 14-Chacravarty, H. L. (1976). Plant wealth of Iraq, a dictionary of economic plants. Vol. 1, Min. Agr. Iraq: 236-237.
- 15-Ridda, T.J. and Daoud, W.H. (1982). Geographical distribution of wild vascular plants of Iraq. Nat. Herb. of Iraq: 63-64.
- 16-Pandey, B.P. (2005). Taxonomy of Angiosperms. Ram Nagar, New Delhi : 381-388. 17-D.F.
- Chamberlain. (1972). *Hippomarathrum* Link, In: Flora of Turkey and east Aegean Island. Vol. 4, Davis, P.H. (ed.) Edinburgh Univ. Press: 390-393.
- 18-Bouloumoy, L. (1930). Flora du Liban et de la Syrie. Freres, Paris (VI): 142.
- 19-Handel-Mazzetti, H.F. (1910). Die vegetation verhältnisse von mesopotamien and Kurdistan. Wissenschaftliche Ergebnisse der Expedition nach Mesopotamien: 89.
- 20-Bentham, G. and Hooker, J.D. (1876). Genera plantarum. Vol. 2. part 1, Reeve and Co., Williams and Norgate, Londini: 883.
- 21-Bobrov, E.G. (1950). Flora of the U.S.S.R. Vol.14, B.A. Fedchenko; E.P. Korovin; A.N. Krishtofovich;

I.A.Linchevskii; A.I.Poyarkova and B.K.Shishkin,
Moskva Leningrad: 179.

22-Khalaf,M.K.(1980).The vascular plants of
JabalSinjarMSc.Thesis, Baghdad Univ.

23-Faris,Y.S.(1983).The vascular plants of
PiraMagrunmountain.MSc.Thesis,SalahaddinUniv.,C
oll.Sci.

24-Fatah,H.U. (2003). The vascular plants of
HaibatSultanmountain and the adjacent areas.
MSc.Thesis, Sulaimaniya Univ., Coll. of Sci.

25-Watson,L. and Dallwitz,M.J. (1992). The families
of flowering plants: description, illustrations,
identification, and information retrieval. [http://delta-
inkey.com](http://delta-inkey.com)
