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ORIGINAL ARTICLE

HELIOTROPIUM CURASSAVICUM L., 1753 (BORAGINACEAE): A NEW RECORD FOR FLORA OF IRAQ

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ABSTRACT

Heliotropium curassavicum L., 1753 belongs to the Boraginaceae family, and it was recorded for the first time to the Flora of Iraq in Basrah Province, Iraq. Its morphological characteristics have been described with photos; as well as a taxonomical key has been suggested to separate it from other species of *Heliotropium* that grow in Basrah Province. The geographical distribution of the species was determined, and the results showed that it was grown in five different locations along the southern parts of Shatt Al-Arab. Pollen morphology and anatomy of leaves were studied by using light microscopy (LM) and scanning electron microscopy (SEM), which showed that the species has psilate and hexa-heterocolpate pollen grains, and the leaves were glabrous with anomocytic and hemiparacytic stomata.

Keywords: Basrah, Boraginaceae, *Heliotropium curassavicum*, New record, SEM.

INTRODUCTION

Heliotropium L.M 1753 is one of the large genera in the family Boraginaceae, and subfamily Heliotropioiodeae (Bramwell, 1978). It is commonly found as perennial or annual herb or shrub (Riedl, 1978). There are 247 accepted species which belong to this genus (POWO, 2022) that distribute extensively in arid or semiarid habitats of the temperate and tropical regions of the world with greater diversification in the Middle East and South America (Mabberley, 2008). In Iraq, Al-Rawi (1964) recorded 15 species which belong to *Heliotropium*, while Rechinger (1964) found 8 species. However, *Heliotropium curassavicum* is a halophytic succulent herb or shrub and is entirely glabrous.

The native range of this species is North and South America, Australia, and the Hawaiian Islands, but it is introduced to Portugal, Mediterranean countries, South Africa, Iran, Pakistan, and India (Dinarvand and Howeizeh, 2002; Charilaou, 2018; POWO, 2022), and no previous study recorded this species in Iraq. It has chemical compounds, represented by tannins, phenols, saponins, terpenoids, and alkaloids (Choudhary *et al.*, 2013; Wasiullah *et al*., 2019), which are isolated to be used effectively against infection with insects, fungi, and bacteria

(Yogamoorthi and Sathyapriya, 2006). This species is used in some countries to treat some human diseases such as ulcers, wounds, edema, local infections, gonorrhea, erysipelas, cancer, diabetes, as an enema, and to treat constipation, arteriosclerosis, and rheumatism (Davicino *et al*., 1988; Satyavani *et al*., 2013a, b; Kaliamurthi *et al.*, 2014). The distribution and anatomy of this species have been studied by Fariña *et al.*, (2003), Taia (2006), Satyavani *et al*., (2013b), Alwahibi and Buhary (2013), Pynee and Lorence (2014) and El-Hadidy *et al*. (2018). Morphological studies of leaf epidermis and Palynological studies are important in the classification of species, and have been used in many studies, such as Al-Mousawi *et al*. (2019) and Khamis and Hamdy (2023).

The aim of the present study is to provide taxonomic information on the morphological, pollen, and epidermis characteristics of the species *H. curassavicum*, which is recorded for the first time in the flora of Iraq. As well as determining the characteristics of its habitat and distribution.

MATERIALS AND METHODS

Plant collection: Fresh specimens were collected from various parts of Al- Mekhrag, Al-Dorah, Al-Duweeb, Al-Seeba and Al-Faw Districts in Basrah Province, South of Iraq through field trips that lasted for two consecutive years from 2020 to 2021. Specimens were brought to the laboratory, and the morphological characteristics were examined using a Wild M38 stereomicroscope, and all parts of the studied species were measured. Photographs were taken with a digital camera Sony E210. Some specimens have been preserved as herbarium specimens and deposited in the Basrah University Herbarium (BSRA). Specimens were identified based on the keys and descriptions in the flora of Turkey (Davis, 1978), flora of Iranica (Akhani and Forther, 1994), flora of Malesiana (Riedl, 1997), flora of Egypt (Boulos, 2000), and Electronic flora of Pakistan (eFloras, 2022).

Light microscopy (LM) examination: Pollen morphology was examined by taking pollen grains directly from mature anthers of fresh flowers, then transferring them to a clean glass slide, adding Safranin dye for staining grains, then mounting them in glycerin jelly, and covering them with a cover glass (Sass, 1958). The slides were examined, and measurements were taken for 25 pollen grains by using an oil objective lens (100X) and an eye lens (10X) with an ocular micrometer. Measurements included the polar axis and the equatorial axis, the number of colpi, and pores, the length of colpi and the exine thickness. The terminology used for pollen grains follows Erdtman (1952). The leaves were immersed in Jeffrey's solution for 30 minutes, and then they were taken out. The epidermis was peeled from the adaxial and abaxial surfaces of the leaf, then the epidermis was stained with Safranin dye. It was placed on glass slides with glycerin jelly and covered with a slide cover (Johansen, 1940). Slides were examined using an objective lens (40X) with an ocular micrometer. Data, such as the shape of the anticlinal walls of epidermal cells, length and width of epidermal cells and stomata and type of stomata were recorded. The stomatal index was calculated using the formula from Dilcher (1974). The terminology used follows Metcalfe and Chalk (1979).

Stomatal index = (stomata No./stomata No.+ ordinary epidermal cells No.) x100

Scanning Electron Microscopy (SEM) examination: Samples of pollen and leaves were mounted on standard aluminum stubs using double-sided cellotape and coated with gold in the sputtering device, then examined in a Jeol T20 scanning electron microscope according to Perveen (2009) and El- Naggar *et al*. (2015).

Ecological factors: Soil samples were collected from various depths of the root zones of the species and then taken to the laboratory to do a number of physical and chemical examinations that include pH measurement according to Kalra (1995), electrical conductivity and salinity according to Whitney (1998), soil texture according to Soil Survey Division Staff (2017) , soil moisture according to El- Greeb (2006), and amount of organic substance according to Combs and Nathan (1998).

Geographical Distribution: Mapping the geographical distribution of the areas where the species has grown in Basrah Province was based on information obtained from field trips. The coordinates were determined by the Global Positioning System (GPS) (Tab. 1).

Table (1): The coordinates of the collection regions.

Collection regions	Latitude (N)	Longitude (E)
Al-Seeba	30.33736293°	48.26123545°
Al-Duweeb	30.21738932°	48.33432097°
Al-Dorah	30.1359149°	48.37367438°
Al-Mekhrag	30.09807907°	48.4048185°
Al-Faw	29.94489646°	48.4853565°

RESULTS AND DISCUSSION

Taxonomic treatment: *Heliotropium curassavicum* L. Sp. PI. 1:130 (1753). Lectotype (Iconotype) (VERDCOURT 1991: 67): Curacao, Morris., Pl. Hist. 3: 452, S. 11, t. 31/12. 1699; Typotype: Herb. MORISON (OXF: vidimus foto!) (Akhani and Forther, 1994)**.**

Synonyms: *Coldenia succulenta* Peter, 1928
Heliotropium angustifolium Raf.
Heliotropium chenopodioides Humb. & Bonpl. ex Willd.
Heliotropium lehmannianum Bruns
Heliotropium chilense Bertero
Heliotropium curassavicum var. *violaceum* Ram.Goyena
Heliotropium curassavicum var. *chenopodioides* (Humb. & Bonpl. ex Willd.) Lehm.
Heliotropium curassavicum var. *curassavicum* L.
Heliotropium glaucum Salisb.
Heliotropium portulacoides DC. ex Bello

Morphological description: Perennial herbs are much branched, and entirely glabrous. Height is 20-46 cm (Pl. 1). Roots are 10-18 cm long and 0.3-0.5 cm wide. Stems are prostrate to decumbent, 0.3-0.4 cm wide (Pl. 2). Leaves simple, sessile, succulent, glaucous, lamina lanceolate to oblanceolate-ovate, apex obtuse, margin entire, 1.3-4.0 cm long and 0.3-1.2 cm

wide. Inflorescences terminal and lateral, forked, scorpioid cyme, dense, ebracteate, 2.5-5 cm long, 10-27 flowers/ inflorescence (Pl .3). Flowers sessile. Calyx symmetric, lanceolate, five sepals united at the base, 2-3 mm long, sepals lobes lanceolate, 1.3-2 mm long, and 0.5-0.8 mm wide. Corolla white with yellow patches at the center in the inner side, funnel form, sympetalous, longer than calyx, corolla throat without scales, corolla tube 1.5-2.3 mm long and 1-2 mm wide, corolla lobes, ovate to oblong, sinuate margin, 0.5-1 mm long and 0.3-1 mm wide. Stamens five; filament short, 0.1-0.13 mm long and 0.05-0.08 mm wide. Anthers are sagittate، and subsessile, inserted in the middle of corolla-tube, 0.6-0.8 mm long and 0.2-0.3 mm wide. Stigmas are short conical, 0.5-0.6 mm long, and 0.5-0.7 mm wide. Style absent. Ovaries are glabrous, 0.4-0.5 mm long, and 0.7-0.8 mm wide. Fruits globose, breaking up into four nutlets, 1.5-2.5 mm long, and 1.5-3 mm wide. Nutlets wedge-shaped. Seeds 1.3-2.3 mm long and 1-1.3 mm wide (Pl. 4). Flowering and fruiting from May to November.

Key separate *H. curassavicum* from other *Heliotropium* species which were recorded from the Basrah Province:

1. Plant entirely glabrous, style absent ……..... *H. curassavicum*
   - Plant variously hairy, with conspicuous style .....…… 2
2. Fruits glabrous ……..…… *H. bacciferum*
   - Fruits hairy…… *H. crispum*

Leaves' epidermis: The epidermal cells are polygonal on the adaxial and abaxial surfaces in the studied species, and the anticlinal cell walls of epidermal cells are straight-curved on both surfaces too. This result is consistent with Diane *et al*. (2003) and Alwahibi and Bukhary (2013) (Pl. 5). The dimensions of epidermis cells vary between both surfaces of the leaves in the studied species; this may be due to the environmental conditions surrounding the plant or the genetic characteristics of the species (Al-Rubaie, 1998). The presence of salt glands on both surfaces of species is an adaptation to maintain the osmotic balance of the plant, contributing to eliminating the excess salt, regulating the salt concentration in the leaves, and allowing the species to tolerate different salinity gradients (Fahn and Cutler, 1992). The stomata complex types are Anomocytic and Hemiparacytic in both surfaces of leaves, but this does not match with Metcalfe and Chalk (1950) (Pl. 6). Stomata elliptic and slightly sunken, guard cell kidney-like (Pl. 7). This result agrees with Diane *et al*. (2003). The qualitative characteristics of epidermal cells and stomata for the studied taxa and stomatal indexes are presented in Tables (2, 3).

Table (2): Ordinary epidermal cells and Stomata measurements for the species.

	Ordinary epidermal cells		**The stomatal complex**	
	Length (µm)	**Width (µm)**	**Length(µm)**	**Width (µm)**
Adaxial surfaces	44.8(22.5 -65)	24.6(17.5 - 32.5)	28.4(22.5 - 32.5)	23.1(20 - 27.7)
Abaxial surfaces	45.6(25 - 70)	25.4(17.5 - 37.5)	29.6(25 - 32.5)	23.1(20 - 25)

Table (3) Stomatal index in adaxial surfaces and abaxial surfaces.

	Number of stomata	Number of epidermal cells	Stomatal index (%)
Adaxial surfaces	208	544	27.7
Abaxial surfaces	288	704	29

Pollen morphology: The results showed that the pollen grains of *H. curassavicum* exist in the form of monads and are radially symmetrical and isopolar. All grains were elliptical in the equatorial view and rounded lobed or triangular in the polar view, subprolate, small sized, tectum psilate, and 6-heterocolpate (Pl. 6). The polar diameter (P) = 21.3 (20-24) µm, the equatorial diameter (E) = 18.6 (17-20) µm, P/E= 1.15, colpi length =20 µm, exine thickness =1 µm, (Pl. 8). This result agrees with most characteristics of the results of Qureshi (1985), Ayyad and Moore (1995) and De Melo *et al*. (2006) on *Heliotropium* pollen description.

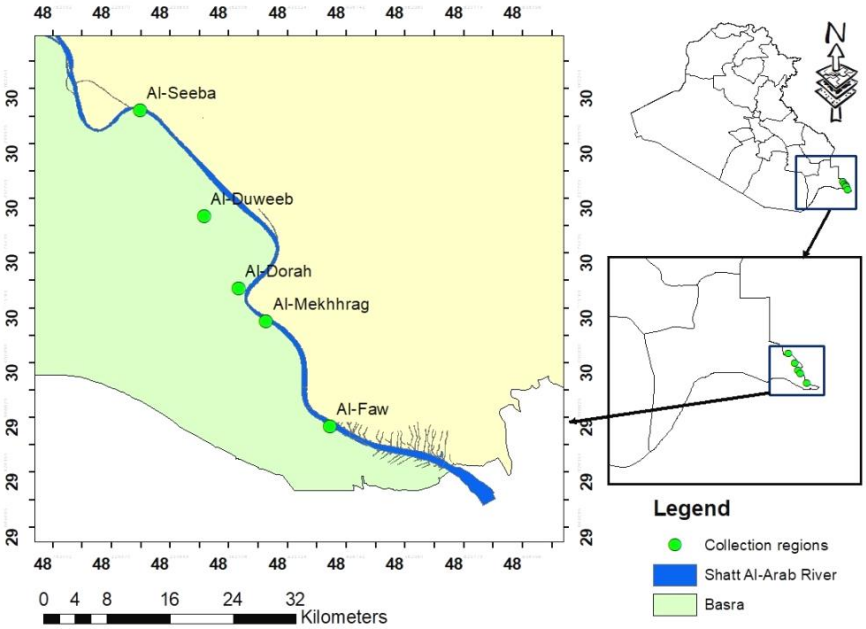
Ecological factors: The physical and chemical factors of soils are among the main dominant factors in the distribution of plants (Abd El-Waha *et al*., 2008). In all collection regions, the pH of all soils tended alkalinity, with the highest value being 8 in Al-Faw and the lowest being 7.1 in Al-Seeba. This is consistent with Adlan (2012), The salinity of soil ranges between 10.4-6.3 mg/l in all collection regions, and according to Soil Survey Division Staff (2017), the soils are moderately saline, which may be due to the continuous irrigation of the soils by the saline water of the Shatt al-Arab. Soil texture is generally loamy and ranges from clay loam in Al-Duweeb, Al-Dorah and Al-Mekhrag to sandy loam in Al-Seeba and Al-Faw, where the highest value of moisture content was 16.2**%** in Al-Seeba and the lowest value was 13.5**%** in Al-Dorah. The organic substances range between 0.2-0.8 gm, Because of their loamy nature, soils have the ability to hold moisture and nutrients more than others (Al-Knaany, 2019). Physical and chemical examinations of soil samples are summarized in Table (4).

Table (4): Physical and chemical factors of soil.

Locality	Chemical factors			Physical factors		
	PH	Electrical conductivity ms / cm	Salinity mg/l	Soil texture	Soil moisture %	Organic substance (gm.)
Al-Seeba	7.1	14.37	9.2	Sandy loam	16.2	0.3
Al-Duweeb	7.5	10.4	6.7	Clay loam	10.9	0.8
Al-Dorah	7.4	9.8	6.3	Clay loam	13.5	0.6
Al-Mekhrag	7.8	14.8	9.5	Clay loam	15.1	0.2
Al-Faw	8.1	16.3	10.4	Sandy loam	15.8	0.2

Geographical Distribution: *H. curassavicum* distributes over the far south of Iraq in Al-Faw along the coasts of Shatt Al-Arab and the entrance of its secondary branches (Tab. 1). It thrives in moist places with saline or semi saline soils. It looks like a halophyte or a succulent plant. It was also found in villages of Al-Faw, Al-Mekhraq, Al-Dorah and all the way to Al-

Daweeb and Al-Seeba as shown in the (Maps 1, 2). The species may have appeared in our area recently due to the raising of the seawater level in the Gulf and the shortage of fresh in the Tigris water level, so the marine water during the high tide entered the Shatt Al-Arab carrying the seeds from the Gulf States to our area along the Shatt Al-Arab reaching to Seeba. Also, the seeds are likely to come to our area by the water current during the flood period of the Caron River in Iran.



Map (1): Collection regions of *H. curassavicum* in Basrah Province, Iraq.

Map (2): Distribution of *H. curassavicum* in Basrah Province, Iraq.

Plate (1): Photographs of *H. curassavicum.*

Plate (2): Floral parts of *H. curassavicum*; (1) Stem, (2) Root. [Scale bar = 5 cm].

Plate (3): Floral parts of *H. curassavicum*; (1) Leaf, (2) Inflorescence. [Scale bar =1cm].

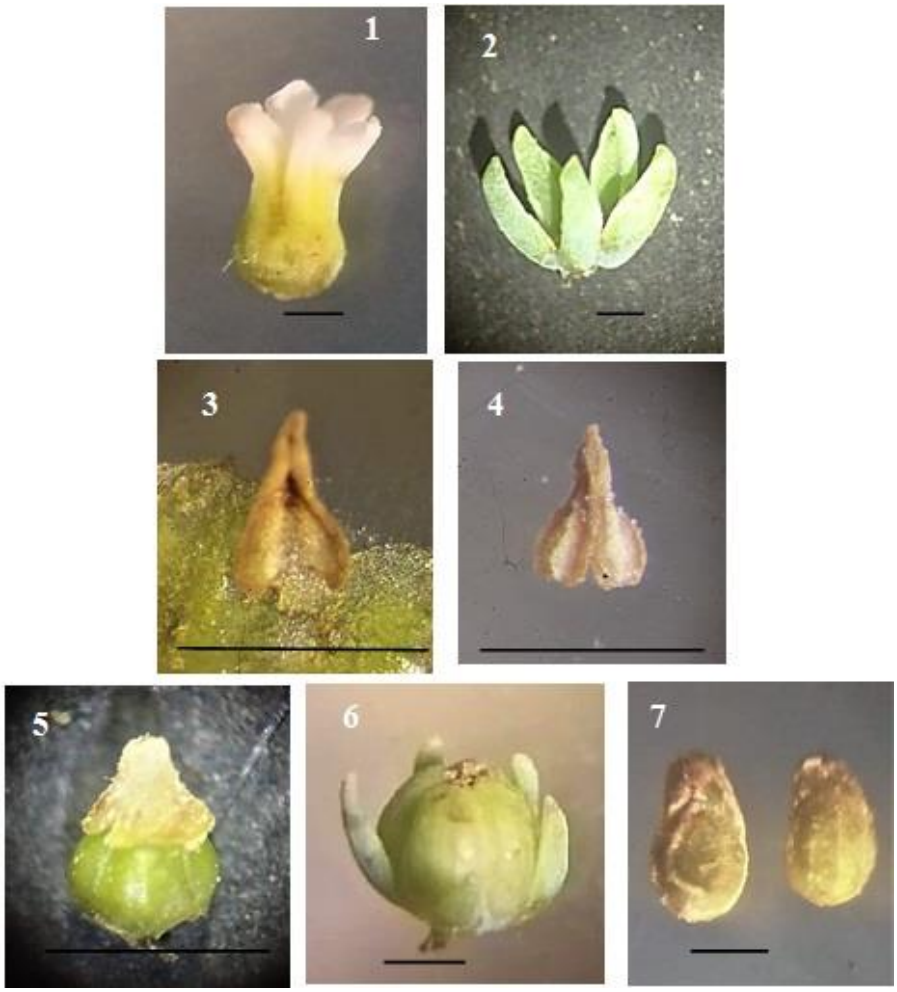


Plate (4): Floral parts of *H. curassavicum*; (1) Corolla, (2) Calyx, (3) Stamen, (4) Anther, (5) Pistil, (6) Fruit, (7) Seed. [Scale bar = 1 mm].

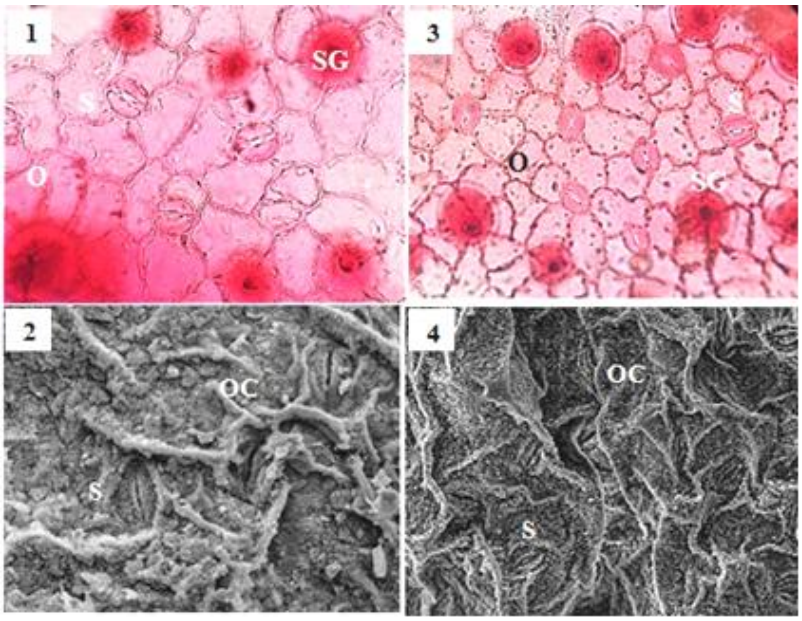


Plate (5): Epidermis of *H. curassavicum*: 1, 2 Abaxial surface and 3, 4 Adaxial surface; Ordinary epidermal cells (OC), Stomata (S) and Salt gland (SG).

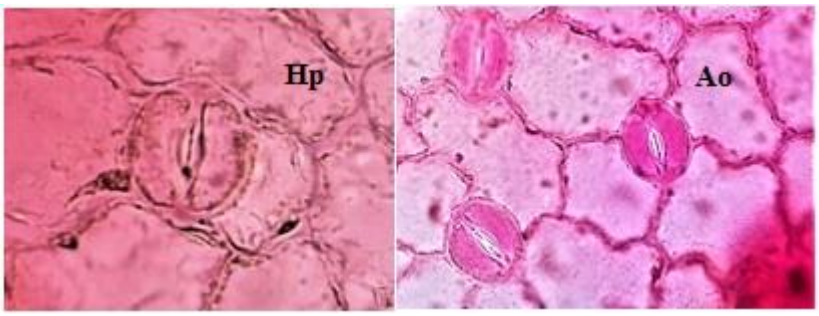


Plate (6): Stomata types of *H. curassavicum*; Anomocytic type (Ao), Hemiparacytic type (Hp).

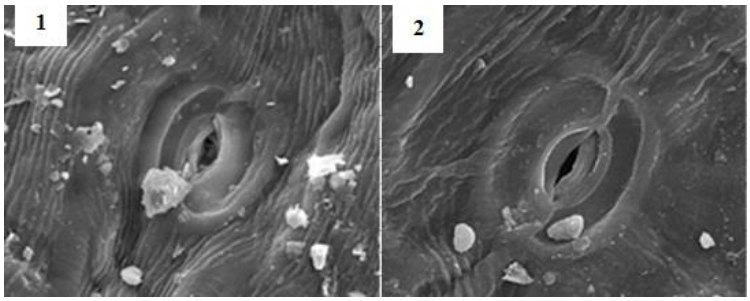


Plate (7): Shape of stomata; (1) Abaxial surface, (2) Adaxial surface of *H. curassavicum* .

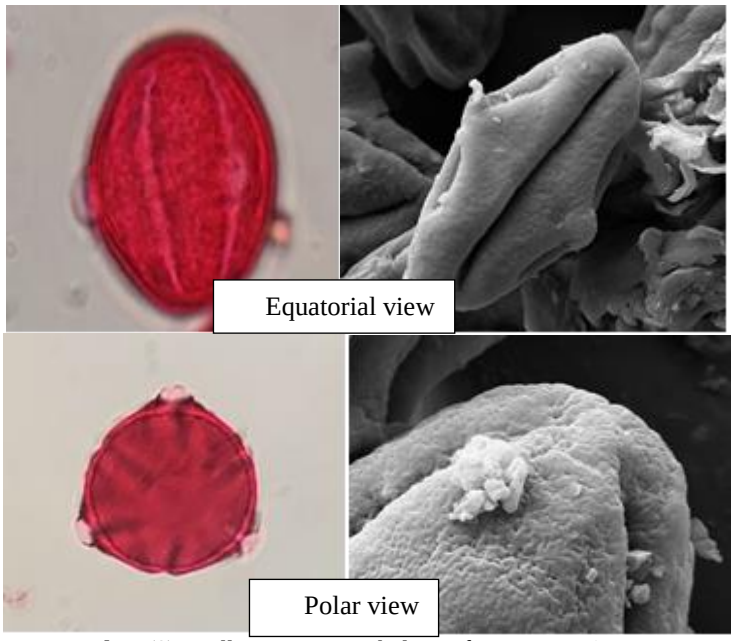


Plate (8): Pollen grains morphology of *H. curassavicum*.

CONCLUSIONS

The current study confirmed the presence of the species *H. curassavicum* as a new record in Iraq; therefore, it will be an addition to the Iraqi plants. According to the literature review that was used in the study, there are now four species in the genus *Heliotropium* that are found in Basrah Province*: H. curassavicum* which is found along the southern coasts of Shatt Al-Arab As well *as H. bacciferum*, *H. crispum* and *H. europaeum* which are present in the southern desert of Basrah Province.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare. We "the authors" have followed and signed the scientific research ethics announced by the journal.

LITERATURE CITED

Abd El-Wahab, R., Zaghloul, M., Kamel, W. and Abd El-Raouf, A. 2008. Diversity and distribution of medicinal plants in north Sinai, Egypt. *African Journal Environmental Science of Technology*, 2(7):157-171. [Click here]

Adlan, N. H. 2012. Environmental study of aquatic plants and water quality in Shatt Al-Arab River by applying Geographical Information Systems (GIS). Ph.D, thesis in Biology. University of Basrah, College of Science, 262pp.

Akhani, H. and Forther, H. 1994. The genus *Heliotropium* L. (Boraginaceae) in Flora Iranica Area. *Sendtnera*, 2: 187-276. [ResearchGate]

Al-Knaany, S. nA. 2019. Study of plant biodiversity in Wadi Al-Tib region, north east of Ammara. Ph. D. thesis in Biology. University of Basrah, College of Science, p.268.

Al-Mousawi, U. M. N., Al-Waheeb, A. N. and Al-Saadi, S. A. M. 2019. Anatomical study of some species belonging to the Papaveracea family in North of Iraq. *Bulletin of the Iraq Natural History Museum*, 15(4): 363-379. [CrossRef]

Al- Rawi, A. 1964. Wild plants of Iraq with their distribution. Ministry of Agriculture and Irrigation, state board for agricultural and water resources research, National Herbarium of Iraq, Baghdad, p. 134-140.

Al-Rubaie, E.M. 1998. A Systematics study of the genus *Ziziphus* L. (Rhamnaceae) in Iraq. MSc. thesis in Biology. University of Basrah, College of Science, Biology department. p. 244.

Alwahibi, M. and Bukhary, N. 2013. Anatomical study of four species of *Heliotropium* L. (Boraginaceae) from Saudi Arabia. *African Journal of Plant*, 7(1): 35-42. [CrossRef]

Ayyad, S. M. and Moore P. D. 1995. Morphological studies of the pollen grains of the semi-arid region of Egypt. *Flora*, 190 (2): 115-133. [CrossRef]

Bramwell, D. 1978**.** Flowering plants of the world. Oxford University Press, Oxford: 335pp.

Boulos, L. 2000. Flora of Egypt. Volume 2, Geraniaceae - Boraginaceae. Al-Hadara Publishing, Cairo, Egypt, 352pp.

Charilaou, P. 2018. *Heliotropium curassavicum* L. (Boraginaceae), a new alien species collected in Cyprus. *Cypricola* 10: 1-4.

Choudhary, K., Singh, M., Meghwal, S., Mathuriya, B. and Nagar, J. 2013. Study of Phytochemical constituents and antimicrobial activity of common plants of Hadoti Region of Rajasthan India. *Indian International Journal of Recent Biotechnology*, 1: 12-16. [Click here]

Combs, S. M. and Nathan, M. V. 1998**.** Soil organic matter. p. 53-58. *In*: Brown, J.R. (ed.) Recommended Chemical Soil Test Procedures for the North Central Region. North Central Regional Research Publication Bull. No. 221 (revised). Missouri Agricultural Experiment Station SB 1001, University of Missouri, Columbia. [Click here]

Davicino, J. G., Pestchanker, M. J. and Giordano, O. 1988. Pyrrolizidine alkaloids from *Heliotropium curassavicum*. *Phytochemistry*, 27(3): 960-962 . [CrossRef]

Davis, P.H. 1978. Flora of Turkey and the East Aegean Islands. Edinburgh University Press, Edinburgh, 6: 237-437.

De Melo, J. I. M., De Sales, M. F. and dos Santos, F. A. R. 2006. Morfologia polínica das espécies de *Heliotropium* L. (Boraginaceae) ocorrentes em Pernambuco, Brasil. *Ernstia* 16(1): 69-79. [Click here]

Diane, N., Jacob, C. and Hilger, H. 2003. Leaf anatomy and foliar trichomes in Heliotropiaceae and their systematic relevance. *Flora*, 198(6): 468–485. [Click here]

Dilcher, K. L. 1974. Approaches to the identification of angiosperm leaf remains. *Botanical Review*, 40(1): 1-157. [CrossRef]

Dinarvand, M. and Howeizeh, H. 2002. A new weed for the weed flora of Iran. *Iranian. Journal of Botany*, 9(2): 229-231. [Click here]

eFloras. 2022. Electronic Flora of Pakistan. Boraginaceae. [Click here]

El- Greeb, R. M., El- Shiekh, M. A. and Testi, A. 2006. Diversity of plant community in coastal salt marshes habitat in Kuwait. *Rendiconti Lincei. Scienze Fisiche e Naturali*, 17(3): 311-331. [CrossRef]

EL- Hadidy, A., Olwey, A. and EL- Naggar, S. 2018. Phenetic assessment among *Heliotropium* L. species. *Turkish Journal of Botany*, 42(6): 732-755. [Click here]

El- Naggar, S., El-Hadidy, A. and Olwey, A. 2015. Taxonomic revision of the genus *Heliotropium* (Boraginaceae) in south Yemen. *Nordic Journal of Botany*, 33(4): 401-413. [CrossRef]

Erdtman, G. 1952. Pollen morphology and plant taxonomy. Angiosperms, Stokholms, 74(4): 526-527.

Fahn, A. and Cutler, D. 1992. Xerophytes. Gebrüder Borntraeger, Berlin, Germany, 176pp. [Google Scholar]

Fariña, Á., Arrieche, D., Boada, A. and Velázquez, D. 2003. Anatomía comparada de la lámina foliar de las especies de *Heliotropium* L. (Boraginaceae) presents en Venezuela. *Interciencia*, 28(2): 68-74. [Click here]

Johansen, D. A. 1940. Plant microtechnique. McGraw-Hill, New York, 523pp.

Kaliamurthi, S., Selvaraj, G. and Thirugnanasambandam, R. 2014. Documentation of hypoglycemic and wound healing plants in Kodiyampalayam coastal village (southeast coast of India). *Journal of Coastal Life Medicine*, 2(8): 642-647. [CrossRef]

Kalra, Y. P. 1995. Determination of pH of soils by different methods: collaborative study. *Journal of AOAC INTERNATIONAL*, 78(2): 310-324. [CrossRef]

Khamis, A. and Hamdy, R. 2023. Palynological studies for some cultivated species of *Pinus* L., 1753 (Pinales, Pinaceae) in Egypt. *Bulletin of the Iraq Natural History Museum*, 17(3): 325-347. [CrossRef]

Mabberley, D. J. 2008. Mabberley's Plant-book: A portable dictionary of plants, their classification and uses.3rd Edition. Cambridge University Press, 1019 pp.

Metcalfe, C. R. and Chalk, L. 1979. Anatomy of Dicotyledons I. London: Oxford University Press, p. 945 - 954.

Metcalfe, C. R. and Chalk, L. 1950. Anatomy of the Dicotyledons. Vol. 1, Clarendon Press, Oxford, p. 243-245.

Perveen, A. 2009. Trichomes morphology as a taxonomic marker in the subfamily Heliotropioideae (Boraginaceae) from Pakistan and Kashmir. *International Journal of Biology and Biotechnology*, 6 (1-2): 13-19. [Click here]

POWO, 2022. Plants of the World Online. [Click here]

Pynee, K. and Lorence, D. 2014. First record and distribution of *Heliotropium curassavicum* (Boraginaceae) in Mascarene Islands. *Phelsuma*, 22:6-8. [Click here]

Qureshi, U. S. 1985. Studies on the pollen morphology of the genus *Heliotropium* L. from Pakistan. *Pakistan Journal of Botany*, 17(1): 107- 114.

Rechinger, K. H. 1964. Flora of lowland Iraq. New York, N.Y. Hanfner Publishing Company. p. 492-513.

Riedl, H. 1978. *Heliotropium* L. *In*: Davis PH, editor. Flora of Turkey and the East Aegean Islands, Vol. 6. Edinburgh, UK: Edinburgh University Press, p. 248-255.

Riedl, H. 1997. Flora Malesiana, Series I, 13: 43-144. [Click here]

Sass, J. E. 1958. Botanical Microtechnique. 3rd edition. The Lowa State University Prees, 228pp.

Satyavani, K., Deepak, V., Gurudeeban, S. and Ramanathan, T. 2013a. Direct organogenesis of Seaside Heliotrope (*Heliotropium curassavicum*) using stem explants. *Pakistan Journal of Biological Science*, 16 (20): 1261-1219. [CrossRef]

Satyavani, K., Gurudeeban, S., Deepak, V. and Ramanathan, T. 2013b. *Heliotropium curassavicum* mediated silver nanoparticles for environmental application. *Research Journal of Chemistry and Environment*, 17(3): 27-33. [ResearchGate]

Soil Survey Division Staff. 2017. Soil survey manual. United State, Department of Agriculture Handbook, no. 18, 602pp. [Click here]

Taia, W. K. 2006. Family Boraginaceae: Hair variations and their significance in the systematic of the genera. *Asian Journal of Plant Sciences*, 5(3): 441-454. [Click here]

Wasiullah, J. S., Saeed, A., Shad, A. A., Basit, A. and Ullah, F. 2019. Phytochemical investigation and pharmacological activities of *Heliotropium curassavicum* L. *Latin American Applied Research, An International Journal*, 49(2): 105-109. [CrossRef]

Whitney, D. A. 1998**.** Soil Salinity. Chapter 13, p. 59-60. *In*: Brown, J. R. (ed.) Recommended Chemical Soil Test Procedures for the North Central Region. North Central Regional Research Publication Bull. No. 221 (revised). Missouri Agricultural Experiment Station SB 1001, University of Missouri, Columbia. [Click here]

Yogamoorthi, A. and Sathyapriya, E. 2006. Anti-inflammatory and analgesic property of methanolic extract of *Spinifex littoreus* (Burm.f.) Merr. *Journal of Environmental Biology*, 27(2): 271-273. [ResearchGate]

Bull. Iraq nat. Hist. Mus.
(2024) 18 (1): 1-16.

:*Heliotropium curassavicum* L., 1753 (Boraginaceae)
تسجيل نوع جديد للفلورا العراقية

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الخلاصة

تتضمن هذه الدراسة تسجيلاً للنوع *Heliotropium curassavicum* L., 1753. التابع لعائلة لسان الثور Boraginaceae لأول مرة في العراق ؛ اذ تم اكتشافه لأول مرة في قرية المخراق في منطقة البحار على ضفاف مجرى "شط العرب" في البصرة، ولقد تم جمع عينات النوع من مناطق مختلفة على امتداد الجزء الجنوبي من "شط العرب" ووصفه وتحديد توزيعه الجغرافي. تمت دراسة بعض الخصائص المظهرية والتشريحية تحت المجهر الضوئي والإلكتروني الماسح بالإضافة إلى دراسة حبوب اللقاح التي أوضحت إنها من نوع سداسية الأخاديد والثقوب المتباينة، أما الثغور فكانت من الطراز الشاذ و شبه المتوازي.