Nat. Volatiles & Essent. Oils, 2021; 8(4): 11385-11396

NVEO
Natural Volatiles &
Essential Oils

# Systematic Study Of The Genus Cressa L. (Convolvulaceae) In Iraq

**Nidaa Adnan Abu-Serag* , Shaemaa Muhi HassonAL-Amery * and Ban Abdul Hussein AL-Khafaji****

*Department of Biology ,College of Science , University of Babylon.

** Department of Biology ,College of Science , University of Karbala.

**ABSTRACT**

Cressacretica L.is a unique species belongs to the genus Cressa L. in Iraq. Characters of morphology , anatomy , palynology were studied for the first time in this paper , and their taxonomic value were discussed . The morphological study consisted of studying the characteristics of the roots, stems, leaves, flowers, fruits and seeds .As well as studying the morphological characteristics of pollen grains for the polar and equatorial view .

As for the anatomical aspect , it is represented by studying the characteristics of the leaf epidermis and indumentum , as well as the transverse sections of each of the rhizome, stem and leaves .

The current study of the species Cressacretica L showed that the genus is widespread in the central and southern regions of the country, especially in highly saline soils.

.

**Key words :** Convolvulaceae ,Iraq ,genus Cressa, druses.

## INTRODUCTION

The genus Cressa L. belonging to the order Tubiflorae , family Convolvulaceae, Lawrence (1951) , usually a widespread family, distributed in tropical and subtropical regions , and includes about 50 genera and 1200 species, PandyandMirsa(2009).It has moderate economic value ,some members are edible such as Ipomea batatas ,others have medicinal importance as Convolvulus pluricaulis or used in ornamental .

In Iraq the family is small with only two genusConvolvulus and Cressa with about 18 species for the genus Convolvulus and only one species for the genus Cressa, AL-Musawi, (1987).The genus Cressais a native to the tropical and subtropical regions of the world.

CressacreticaL.is a widespread in the middle and lower regions of Iraq and known as Shuwall and Salmas, Chakravarty (1976) .

CressacreticaL. is athermo-cosmopolitan halophilous species and grows greogariously in saline soils,usually overlapping with different genera such Alhagi , Phragmites ,Typha,Suadea ,Salsola, Milovic and Maskovic(2003**)**.From a medical point of view: Several studies indicated the medical importance of Cressacretica L. due to the chemical composition of the aerial parts of the plant.The genus considerd one of the most important medicinal plants and has activity against some fungi & bacteria , Raniet al. ( 2011 ) , especially Candida albicans , Candida tropicalis ,and Aspergillusfumigatus and Aspergilusniger also with high activity against (both positive and negative ) bacteria especially Escherichia coliand Klebsiella pneumonia, Sunitaet al. (2011). Also ,Fawziet al.( 2019 ) showed that the ethanolic extract prepared from the aerial parts (leaves and stems) of the plant had a cytotoxic effect on both human ovarian and breast cancer cells.

Omran, et al. (2019) indicated that all parts of C.cretica were used as a paste and decoction to treated fungus infection, asthma, blood purifier and eczema treatment .They also proved in a study of the extract of alkaloids in C. cretica that thisextract has a strong efficacy against the growth of microorganisms, where the results confirmed that the extract has an inhibitory effect on the growth of s. aurous and less on the growth of E. coli and C. albicans . as well as , The results of GC-Mas analysis of the methanolic extract of this plant showed that the extract contained approximately 34 chemical compounds, which are plant chemicals that are useful as anti-inflammatory, anti-bacterial and anti-fungal.

Previous studies were also conducted on the chemical composition of the aerial parts of C. cretica. In the study of Shahatet al. ( 2004 ) , they reported the identification of (5) flavonoids in the aerial parts of Cressacretica, namely quercetin (1), quercetin-3-O-glucoside (2), kampferol-3-O-glucoside (3), kampferol-3-Orhamnoglucoside. (4) , and rutin (5). . These compounds were identified using spectroscopic methods (UV, FAB-MS, 1H NMR and 13C NMR).Also ,Mutlaget al. ( 2014 ) and Al-Snafi( 2016 ) indicated that C.cretica contains many biologically active constituents , including coumarins, sterols, alkaloids, tannins, glycosides (cardiac glycoside, anthraquinone glycoside), protein, carbohydrate, flavonoids, unidentified sugars and high salt content . In addition to a quantity of Kaempferol 3-O-β- glucoside (astragalin) is (0.3% W/W) extracted from the Iraqi plant Cressacretica under optimal conditions(80% aqueous ethanol and 80°c for 3 hrs.).This compound is a candidate for many clinical and pharmacological studies.

There are several studies confirming the importance of the effective chemical content and the medical importance of this plant.

No detailed taxonomic study has been conducted for this species in Iraq.. The aim of the study , Due to the wide spread of the genus and the absence of a taxonomic study about it in Iraq , the current research has dealt with some basic taxonomic aspects in diagnosing this plant .

**MATERIALS AND METHODS**

The study was conducted on fresh samples collected from the fields during the multiple trips and from different regions of center and south of Iraq , for the period ( 2017-2019) . The samples dried , fixed , numbered and deposited at the Babylon University Herbarium .

Study of morphological characteristics based on these data , measurements were tookfor some of characters , others were draw by camera type wild under dissecting microscope type Olympus .

The anatomical study has depended on fresh samples after save in alcohol .epidermis was prepared by scraping , stem and leaf sections has been prepared using hand section from fresh samples preserved in alcohol 70%.

Special characteristics to this study were drawn using camera under lightening microscope.

For study of pollen grains , fresh , mature , indehiscent flowers were used . and prepared according to , AL-Mayah, (1983).

**RESULTS AND DISCUSSION**

**1- Morphology :**

- **Habit:**CressacreticaL.grows as a small dwarf perennial herbs , Chakravarty(1976), has a short creeping rhizome ( usually less than 5 cm ).
- **Stem :** Reaching a height of 32 cm. . branched from the base , the number of branches more than 20 , erect – ascending , hairy , cylindrical , solid ,Chakravarty (1976).
- **Leaf :** a small , especially at the top . alternate on the branches . Leaves are sessile or with very small petiolate , lanceolate-elliptic in shape , and appear larger on the main branches than those on the smaller branches , entire , sometimes dark green , hairy , apex ( acute ) , base (truncate).( McDonald ,1991 ; Watson and Dalwitz ,1992 ; Pandy and Mirsa , 2009 ) .
- **Inflorescence :** Racemose , usually simple spike , bracteates , tracts two , herbaceous , elongate .
- **Flower :**The flowers are small, white in color. With five polysepalous calyx , each one elliptic – semirhomboid shape , apex ( acute- acuminate ) , margin ( entire ) with densely white hairs . Corolla with five gamopetallous , infundibulariform in shape , white or pink – white , each petal has ovate – oblong shape , margin entire , Tackholm ( 1974) . Stamens five

extrorse . Pistil is one , bicarpellate , Styles two with filiform shape , Stigmas two capitate , each ovary has one-two ovules , ( Cronquist , 1981and McDonald , 1991 ) .

- **Fruit and Seed** : Fruit dry , capsular , oblong - ovate , with one-two seeds , ovate , brown in color .

**2- Anatomy :**

- **Rhizome :** Epidermis is uniserriate , composed of cubic cells , periderm present , cortex is composed of parenchyma cells with conspicuous chloroplast ( chlorenchyma ) , have large amount of druses, vascular cylinder composed of a thick cylinder of phloem and a thick cylinder of xylem , individual fibers surrounding the phloem , vascular bundles bicollateral with internal and external phloem , pith is a narrow , composed of loosely arranged parenchymatic cells . Figure (4) .
- **Stem :**Usually similar to rhizome in most characters but the cortex have a longitudinal chlorenchyma cells similar to palisade layers of the leaf and a thick fibers surrounding the vascular bundles . Figure (5).
- **Leaf :**There are an upper and lower epidermis in the leaf . both of them are composed of rectangular thin walled cells with distinct cuticle . Stomata( Anomocytic and Paracytic type ) are present on both epidermis, Metcalfe and Chalk(1950), Figure (6) . mesophyllis differented into two palisade layers .

Each layer have 3-4 layers and small a mount of spongy cells .Sunitaand Pattanayak, (2011).Druses usually present . Vascular bundles are collateral and closed.Figure (6)

- **Trichomis :**of two types glandular and non-branched hairs . Druses also present in large a mount .Figure (3) .

**3- Palynology :**

Pollen grains of C. cretica were monads , tricolporate , smooth , with small – medium size according to , Erdtman (1971), Equatorial diameter ( 25-32.5) 29 µm. and Polar diameter (20-30) 20.2 µm.Figure (7)

**4- Geographical distribution of Cressacreticain Iraq .**Iraq is distinguished by the diversity of Vegetation due to the diversity of the surface of Iraq in its height and the varying temperatures and rains .

(Guest, 1966) mentioned that Iraq lies within two geographical regions, the Iranian-Turanian region, specifically within the two sub-regions between the Mesopotamian region and the semi-Iranian Anatolia region.While the second region is the Indian desert region .

Cressacretica L.is a halophytic plant, widespread, recorded in most of the Mediterranean countries , Jaspricaet al. ( 2015 ) .Its growth was also recorded in depressions in sandy areas that are seasonally wet, as well as in salt marshes and ponds .

In Iraq :Cressacretica L is a widespread plant, and its spread has been recorded in different regions of the country. The samples preserved in the Iraqi National Herbarium were relied upon to record the regions of spread of this species , Table (1) .

Table (1) illustrates some regions of spread of the species Cressacretica L. in the various Iraqiprovinces

| Area name | collection date | Herbarium sample Nu. |
|---|---|---|
| Hilla ( in salt place ) | Jun. 1920 | **103** |
| N. of Mosul | Octo. 1929 | **0395** |
| Kut | Sep.1929 | **193** |
| **Nasirigh** | 15 Apr. 1932 | **2530** |
| Habbaniya | 1.12.1934 | **5431** |
| Basra | 14. 8. 1943 | **5162** |
| Abu Ghraib | 15.5. 1950 | **14568** |
| E . of Amara | 18.8.1950 | **16638** |
| GarmatBani Said | 24.8.1950 | **16561** |
| Mahmudiya | 4.11.1953 | **13110** |
| Near Shit alla | 12.11.56 | **16302** |
| 20Km. N.W.ofKerbala | 12.11.1956 | **16282** |
| Saline flats on Hilla road near Dora .Baghdad . | 27.10.1956 | **19551** |
| Fakki – 70 Km. , E of Amara | 7.4.1958 | **25812** |
| 5Km. W. of Shamiyia | 4.8. 1963 | **32147** |
| Shatra( in salty clay soil nr. Water ) . | 17.9.1967 | **35245** |

| | | |
|---|---|---|
| Suwaira | 6.7.1968 | **35773** |

**CONCLUSIONS**

The study confirmed the importance of anatomical and morphological characteristics, and morphological characteristics of pollen grains in the diagnosis of genera and species.

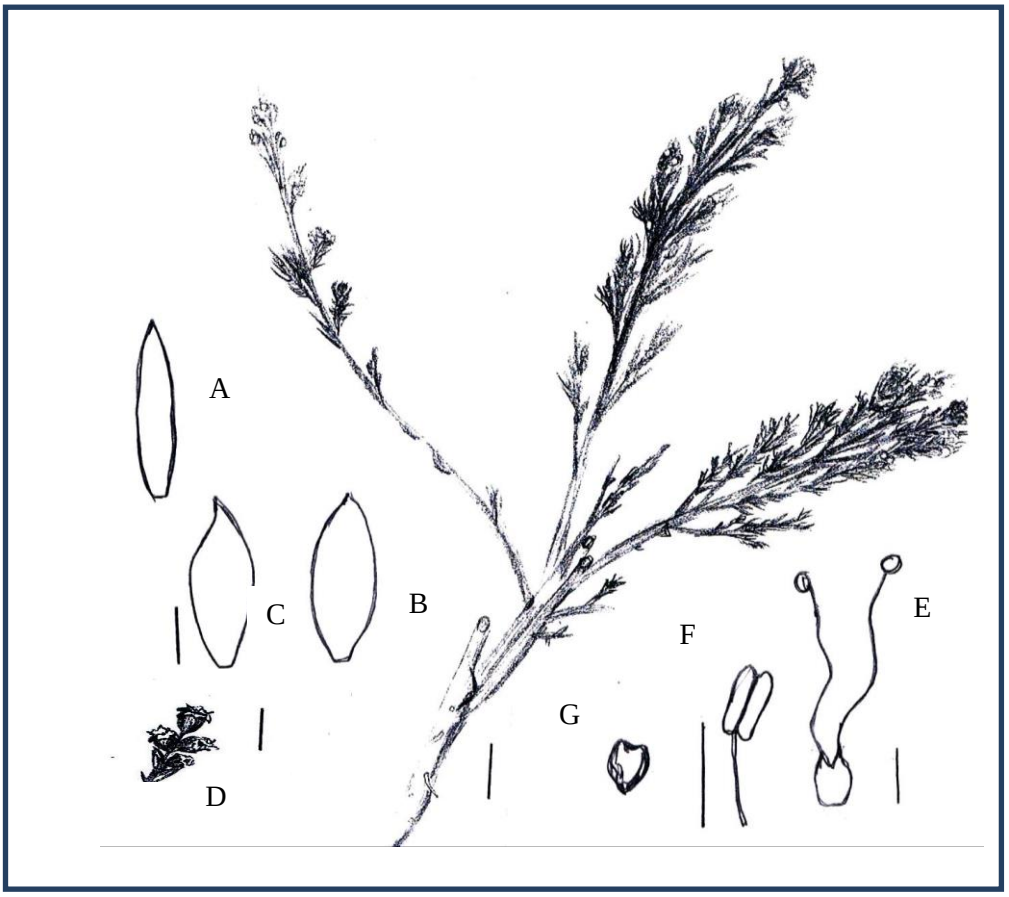


**Figure (1) Shows the morphological characters of the genus Cressacretica L**

**A:**bract **B:**petal **C:**sepal **D:**flower **E:** pistal**F:** stamen **G:**seed

2MM=1MMF=A,B,C,D,E,G

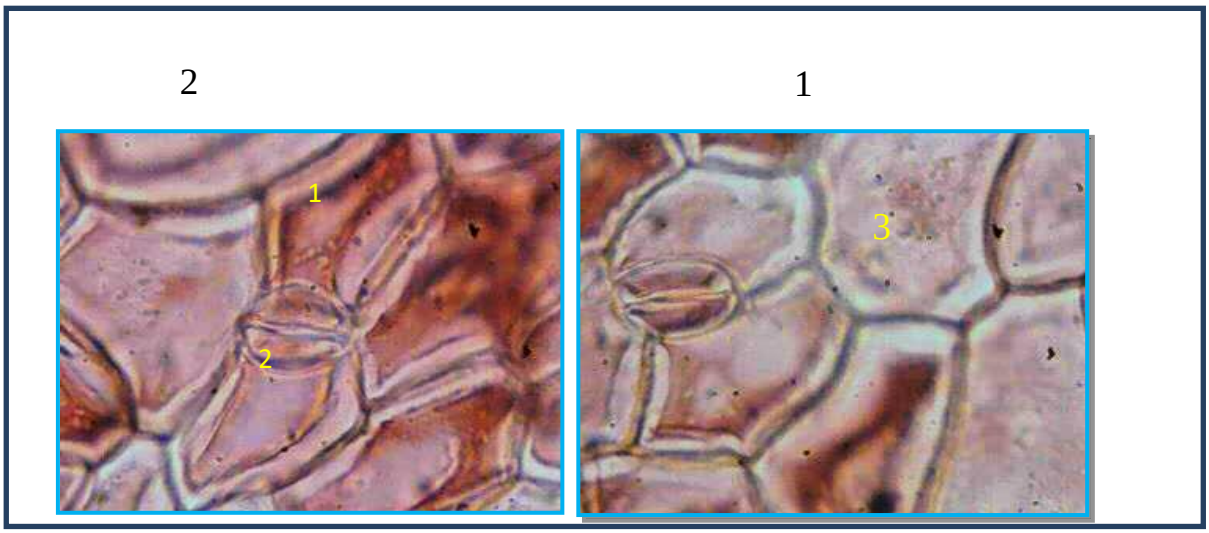


Figure (2) : Illustrate leaf epidermis characters of CressacreticaL.

1: Upper epiderm 2: Lower epiderm .

40x . 1: subsidiary cells. 2: guard cell 3: ordinary cell

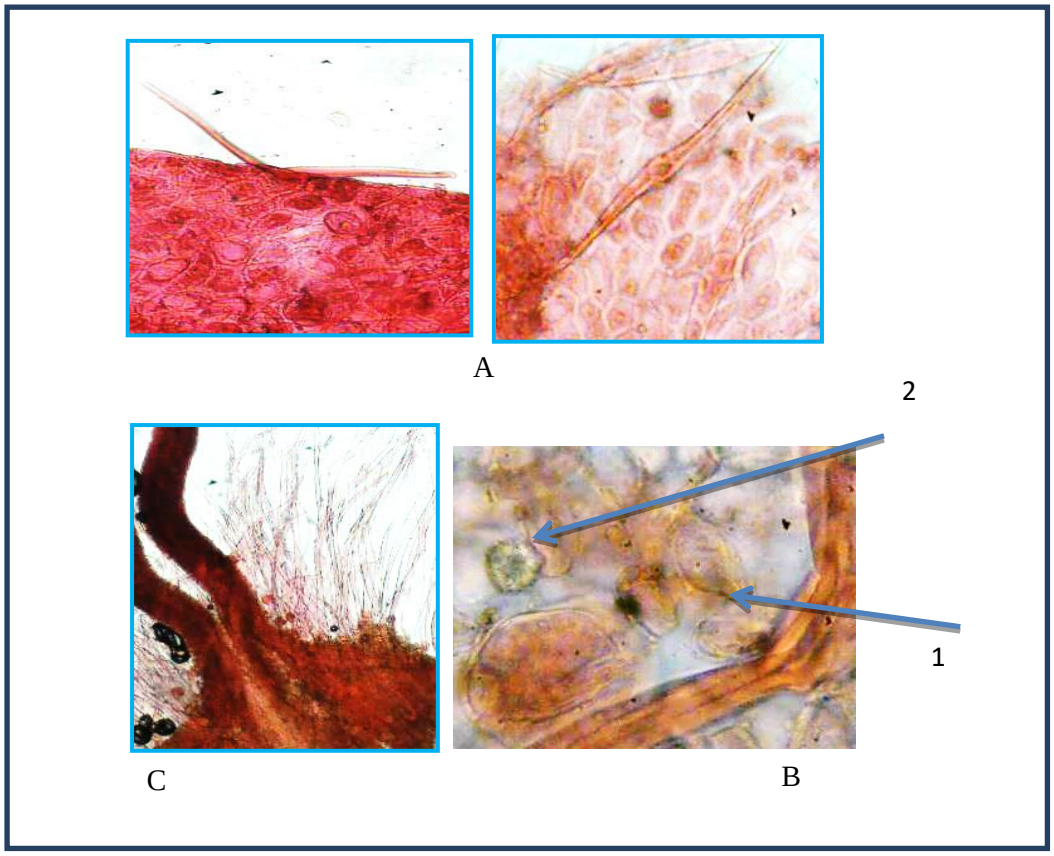

Figure (3) : Illustrate Indumentum of *Cressacretica L*
**A:** branched hair on epiderm surface .
**B:** 1 . gland hair2 .Druses crystal ,**C :**unicellular hair on ovary

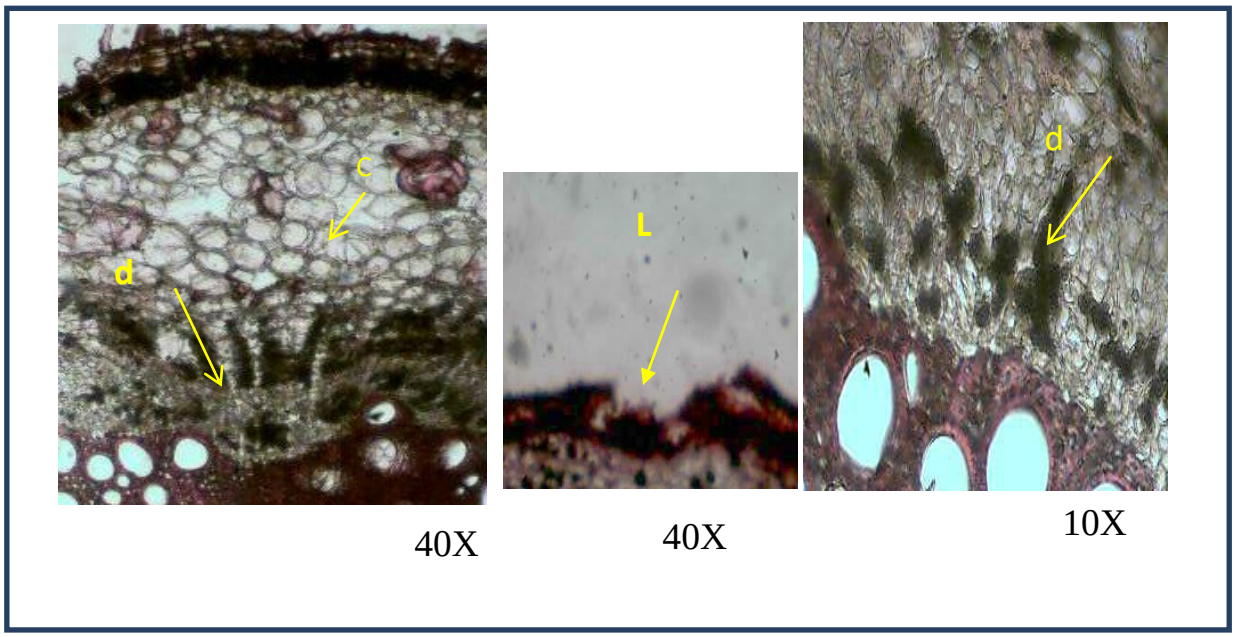


Figure (4) : Cross section of Cressa cretica L. Rhizome .
vessels : v . cortex: c .lenticel: L .druses crystal: d

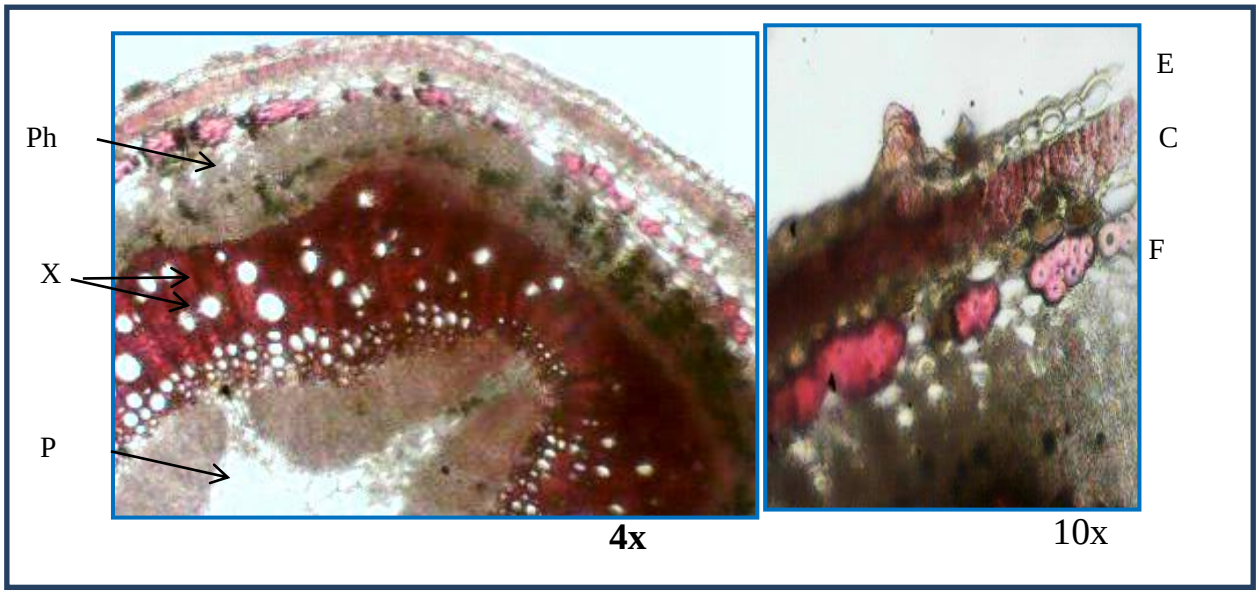

Figure (5) : Cross section of Cressa cretica L. stem

E: epidermis ; C: cortex ; F: phloem fibers ; Ph: phloem ; X: xylem vessels

P: pith

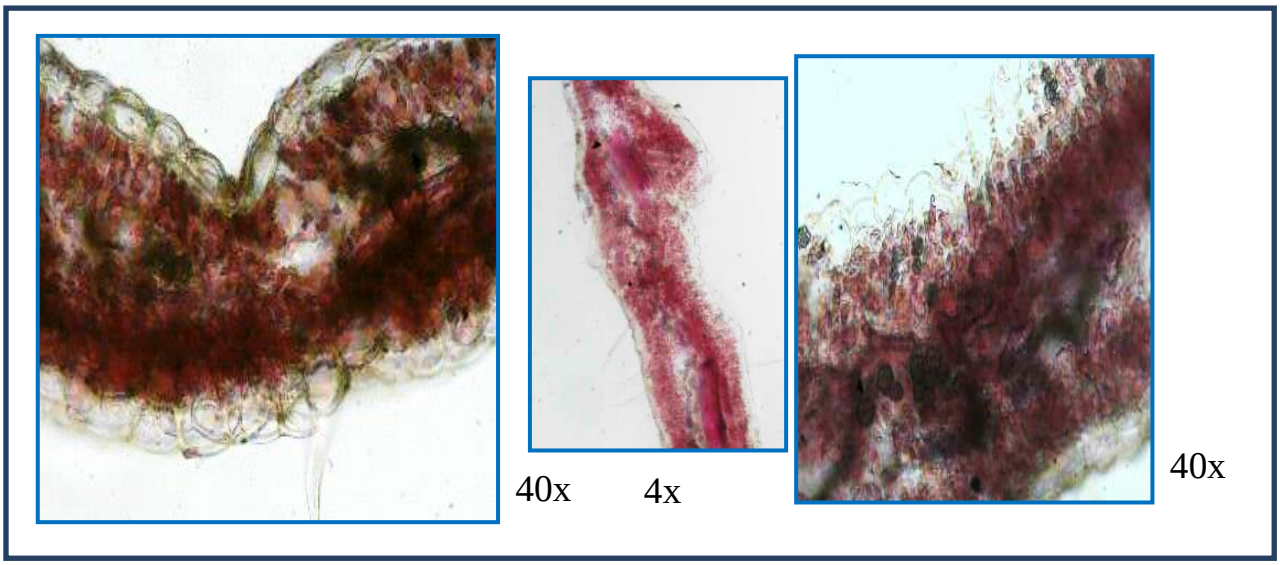


Figure (6) : Cross section of Cressa cretica L. leaf

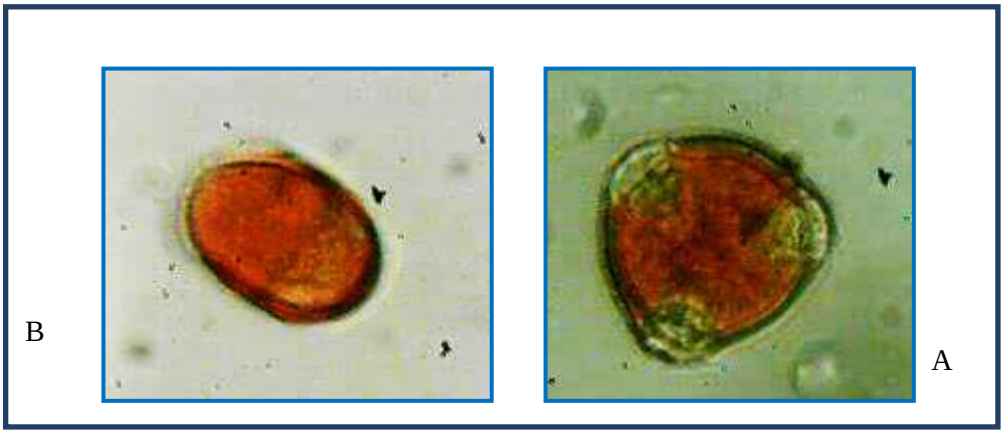


Figure (7) : Pollen grains of Cressa cretica L.

A: Polar view . B : Equatorial view

Figure (8 ) : Morphological characteristics of stems, leaves and flowers ofCressacretica L.

Figure ( 9) : The adult plantCressacretica L.

**References :**


- **AL-Mayah, A.A. (1983).** Taxonomy of Terminalia (Combretaceae) Ph.D. Thesis, Univ. of Leicester, U.K.Al-Bermani,A.K.(1991).Taxonomic Cytogenetic and Breeding Relationships of FestucarubraSensulato ,University of Leicester.
- **AL-Musawi, A.H. (1987).** Plant Taxonomy. Baghdad University.
- **Al-Snafi , A. E. ( 2016 ) .** The chemical constituents and therapeutic importance of Cressacretica- A review .IOSR Journal Of Pharmacy .Volume 6, Issue 6 Version. 3 , PP. 39-46
- **Chakravarty, H.L (1976)** Plant Wealth of Iraq.Vol.I.Baghdad.505Pp.

- **Cronquist, A. (1981).** An integrated of classification of flowering plants . New York: Columbia University Press.
- **Erdtman, G.(1971) .** Pollen Morphology and Pant Taxonomy ,New York ,Hafner Publishing Company , 539 Pp .
- **Fawzi, F. ; Mahdi, M.F. and Abaas , I.S. ( 2019)**.Cytotoxic Activity of Iraqi CressaCretica. Al Mustansiriyah Journal of Pharmaceutical Sciences,Vol.19, No.1**.**
- **Fawzi, F. ; Mahdi, M.F. and Abaas , I.S. ( 2019)** .Isolation of Astragalin from Cressacreticacultivated in Iraq . Journal of Pharmaceutical Science and Research . Vol. 11(1), 185-190 .
- **Guest, E. (1966).** Flora of Iraq. Ministry of Agriculture, Iraq, Vol.1, pp.213.
- **Jasprica, N. ;Milović, M. and Romić, M. ( 2015 ) .** Phytosociology and ecology of Cressacretica L. (convolvulaceae) on the eastern Adria tic coast . HACQUETIA 14/2 • 2015, 265–276
- **Lawrence, G.(1951) .** Taxonomy of Vascular Plant .The Macmillan Co , New York , 883 Pp.
- **Lansdown, R.V. (2013).** "Cressacretica". IUCN Red List of Threatened Species. 2013: e.T164004A16702137. doi:10.2305/IUCN.UK.2013-1.RLTS.T164004A16702137.en.
- **Metcalfe,C.R&Chalk,L (1950)** . Anatomy of Dicotyledons . Clarendon.Press, Oxford ,(1), Pp 724 .
- **McDonald, A(1991)** . Origin and Diversity of Mexican Convolvulaceae.AnalesInst.Biol Univ. Nac.Auton.Mexico.Ser.Bot.62(1)65-82
- **Milovic,M&Maskovic,L (2003)**. Cressa cretica in Flora of Croatia , Nat.Vol.12(1):1-18.
- **Mutlag , S. H. ; Hamad, M. N. ; Abbas, I.S. and Ismae , S.H. ( 2017 )** . The Evaluation of Ethyl Acetate Fraction of Cressacretica Effect on Mitotic Index and Micronucleous Frequency in Mice . Int. J. Pharm. Sci. Rev. Res., 45(1), No. 28, P: 147-150.
- **Omran ,A. M. ' AL-Mousawi, H.G. and Salih , R.H. ( 2019 )** . Effect of Plant Alkaloids on Some Pathogens.Indian Journal of Public Health Research & Development, Vol.10, No. 10 .
- **Omran , A.M. ; Abu-seraj, N.A. and Al Husaini, I.M. ( 2016 ) .** Gas chromatography mass spectrum and Fourier transform - infrared spectroscopy analysis of methanolic extract of CressacreticaL. leaves .World Scientific News 49(2) 381-404 .
- **Pandy,S.N&Mirsa,S,P (2009)** . Taxonomy of Angiosperm.Swan Press, Delh. P:290-390 .
- **Rani, S. ; CHaudhary,S.; Singh, P.; Mishra, G. ; Jha, K.K**. ( 2011 ). Cressa Cretica Linn: An Important Medicinal Plant-A Review on Its Traditional Uses, Phytochemical and Pharmacological Properties . J. Nat. Prod. Plant Resour. 1 (1): 91-100 .

- **Shahat , A.A. ; Abdel-Azim, N.S. ; Pieters, L. and Vlietinck , A.J. ( 2004 ) .** Flavonoids from Cressacretica . Pharmaceutical Biology , Vol. 42, Nos. 4–5, pp. 349–352 .
- **Sunita, P; Jha,s& Pattanayak, Sp (2011)** . Phsmocognostic Studies on leaf and stem of Cressa cretica Linn.UPSR,Vol.2(4):849-855.
- **Tackholm, V. ( 1974)** . Students Flora of Egypt .2 ed . Cooperative Co. , Beirut , 888Pp.
- **Watson, L. &Dalwitz, M.J. (1992)** . The Families of Flowering Plants ,Description ,illustrations, identification , and information retrieval.