How to Cite:
AL-Taie, G. R. I., AL-Jibouri, K. D., & Dawood, W. M. (2022). Anatomical study of stems for some Torilis Adans. species (Apiaceae) in Iraq. *International Journal of Health Sciences*, *6*(S7), 3734–3739. https://doi.org/10.53730/ijhs.v6nS7.12454

Anatomical study of stems for some torilis dans. species (Apiaceae) in Iraq

Ghassan Radam Idan AL-Taie
Department of Biology,college of Education for pure Science,University of Diyala,Iraq
Email: ghassan.radam@uodiyala.edu.iq

Khazal Dh.Wadi AL-Jibouri
Department of Biology,college of Science,University of Diyala,Iraq
Email: taxonomy_kh@yahoo.com

Wisam Malik Dawood
Department of Biology,college of Education for pure Science,University of Diyala,Iraq
Email: wisammdaood@gmail.com

***Abstract*---**The study included the anatomical characteristics of four species stems belonging the genus *Torilis* of the (Apiaceae family), which were *T. arvensis* , *T. leptocarpa* , *T. leptophylla* and *T.nodosa* the specimens were collected from different places in the mountainous region, and the upper plains and foothills region of (Phyto districts of Iraq). The results showed variations in the shapes of the cross-sections of the stems of the species, the stems were covered by a wavy and uneven layer of cuticle, its thickness ranged between 7-12 micrometers, and the epidermis was one row of cells, oval to ellipsoid in shape. The cortex consisted of three layers, the first layer consisting of thick-walled angular collenchyma cells, grouped in bundles, their number ranged between 12-15, and the second layer consisting of interrupted rows of parenchyma cells spherical, oval, elongated, or ellipsoidal to Irregular, varied in number of rows in species, ranged between 2-5 row. While the third layer consisted of a continuous ring of lacunar collenchyma, the number of rows ranged from 1-3, ovoid to sub ovoid to elliptic.The vascular bundles were a discontinuous cylinder consisting of bundles covered with a layer of sclerenchyma cells forming bundle sheath, the species differed in the number of vascular bundles, ranged between 10-19, and the also species varied in the number of xylem arms (2-3), and the number of vessels in each arm (2-9).

***Keywords*---**Anatomical Characteristics, Torilis (Apiaceae).

Introduction

The anatomical characters showed many variations in taxonomical categories and can be considered as a diagnostic trait as well as in phylogenetic relationships in plants (Davis&Heywood 1973). Many researchers considered the anatomical features as evidences in taxonomical studies (Radford et al. 1974). Some traits used in isolation of taxonomical taxa (genus, species, variety), because they showed significant variations in plant categories (Stace 1991).

Metcalfe & Chalk (1950) have stated a description for more of the vegetative anatomical characters for many of the Dicotyledons families involving Apiaceae and they appeared the importance of anatomical features in this family. Also, Cronquist (1981).

Ghazanfar&Edmondson(2013)wrote in flora of Iraq Apiaceae(Umbelliferae) of over 200 genera and 3000 species occurring mainly in the northern hemisphere. They mentioned 7 species in Iraq.Davis(1972) mentioned 8 species of the genus *Torilis* in flora of Turkey, also Rechinger(1987) descripted 10 species of the genus *Torilis* in flora of Iran, but AL- Eisawi(2013) explained 5 species in flora of Jordan. Esau (2007) studied some vegetable parts of families including Apiaceae.

Yao, et al. (2019) studied the complete chloroplast genome sequence of the *T. scabra* was obtained by de novo assembly using the NGS data. In Iraq, there is no anatomical study present for the genus *Torilis* precedes this study according to the available references.

Materials and Methods

The study depended on the dry specimens which were collected from Iraqi phyto-districts during 2021. The identification of species was according to the flora of Iraq (Ghazanfar and Edmondson 2013).

The study depended on hand sectioning (Musa&Al-Jibouri,2019).

1- 2-4 cm of the middle stem was taken for the study.

2- The stems were cut accurately to obtain very thin sections by using sharp blade.

3- The thin section transferred to slide and 2 drops of safranin 1% was added for 5 minutes.

4- One drop of Glycerin was added and covered the section, then the cover slid placed over it.

5-The slides were placed on hot plate for 1 hour to remove the air inside the cells.

6-The slides were studied by compound microscope (Novel).

7- the sections photographed by digital camera NSZ-606.

8- The measurement reported by ocular micrometer(10x&40x),

Results and discussion

The results showed variations in the shapes of the cross-sections of the stems of the species of the genus *Torilis*, the shape was ovate to semi-ovate in *T. arvensis* , striate in *T.nodosa* and *T.leptophylla,* while it was polygon to semi-polygon - polygon in *T.leptocarpa*.

The stems are surrounded from the outside by a wavy and uneven layer of cuticle, its thickness ranged between 7-12 µm, the average of thickness was 7 µm in *T. arvensis and T.leptophylla*, 8 µm in *T.leptocarpa* and 10 µm in *T.nodosa*.The epidermis was a single row of cells, oval to ellipsoidal in shape, through which the cells of the bases of the capillaries of elongated shape spread, and they are mostly larger than the normal epidermal cells, and there were stomata complexes, as the average thickness of the epidermis reached 10 micrometers in *T.nodosa* and *T. leptocarpa* and 12 µm in the *T. arvensis* and *T. leptophylla*,

The cortex consisted of three layers, the first formed of thick-walled angular collenchyma cells grouped in the form of bundles of oval to circular to irregular shape, they were 12 bundles in *T.nodosa* ,13 bundles in *T. arvensis* and *T.leptophylla*, and 15 bundles in the *T.leptocarpa*, while the second layer consisted of discontinuous rows of parenchyma cells spherical or ovate, elongated or elliptical to irregular, they varied in the number of rows in studied species, as it was 2-3 rows in *T.leptophylla* , 3-4 rows in *T.nodosa* and 5-3 rows in *T.arvensis* and *T.leptocarpa*.

While the third layer consisted of a continuous ring of lacunar collenchyma, the number of rows ranged from 1-3 rows of ovoid to semi-subovoid to elliptic with distinct cells and their sizes larger than the rest of the cells in the inner cortex, and it was permeated by the secretory ducts in the form of a group of the cells around the exocrine duct, widened, round or cylindrical in shape, at the end of the vascular bundles, opposite the angles.

All studied species shared a layer of sclerenchyma cells consisting of 3-6 rows in the form of bands or bundles in the cortex area surrounding the bark from the outside. and 4-6 rows in *T. arvensis* and 8-12 rows in *T.nodosa* and *T.leptocarpa*. Vascular bundles were a discontinuous cylinder consisting of bundles covered with a layer of sclerenchyma cells forming the bundle sheath. The size of the vascular bundles increases in the corners and decreases between them, the phloem is outward and is narrower than the wood that is inward and whose vascular elements are organized in rows Clear diagonal forming compact bundles separated by fibers and xylem parenchyma. These bundles are concentrated and the number of their vascular elements increases in the corners of the stems.

The species differed in the number of vascular bundles, it was 10-15 bundles in *T.leptophylla* 11-14 bundles in *T.leptocarpa*,12-15 bundles in *T.nodosa* and 13-19 bundles in *T.arvensis*.

The species also varied in the number of xylem arms and the number of vessels in each arm, the number of arms in all the studied species was 2-3 arms, but they also differed in the number of vessels in each `arm, as it was 2-5 in *T.nodosa* and 3 -5 in *T. arvensis* and *T.leptocarpa* and 4-9 in *T.leptophylla*.

The Pith consisted of large-sized parenchymal cells with thin walls with intercellular spaces and increasing in size towards the center of the stem.

Conclusion

The study included the anatomical characteristics of four species stems belonging the genus Torilis of the (Apiaceae family), The current study concluded, this work is the first research on a cross-section of the stem, which was obtained from the soft parts For the species of the genus Torilis studied from northern Iraq, to make an anatomical comparison between the species, The results showed differences qualitative and quantitative characteristics are measured in micrometers. Cuticle thickness, Epidermis thickness, Number of collenchyma, Number of Parenchyma, Number of fibers, Number of vascular bundle, Number of wood , Number of vessels in each arm.

"TABLE", Qualitative and quantitative characteristics in the cross-sections of the stems of species of the genus *Torilis* are measured in micrometers.

Species	Stem sh:	Cutic thick ness	Epider thickn ess	Number collench yma	Number Parench yma	Numbe fibers	Numbe vascu lar bundl e	Numl of woo d arms	Number vessels in each arm
Torilis arvensis	ovate-sim ovate	(6-7)7	(5-12)12	1-3	4-5	4-6	13- 19	2-3	3-5
Torilis leptocarpa	polygon - semi polygon	(7-8)8	(5-15)10	1-3	3-5	8-12	11-15	2-3	3-5
Torilis leptophylla	striate	(6-7)7	(7-15)12	1-3	2-3	3-5	10-15	2-3	4-9
Torilis nodosa	striate	(8-10)1(	(7-15)10	1-3	3-4	8-12	12-15	2-3	2-5

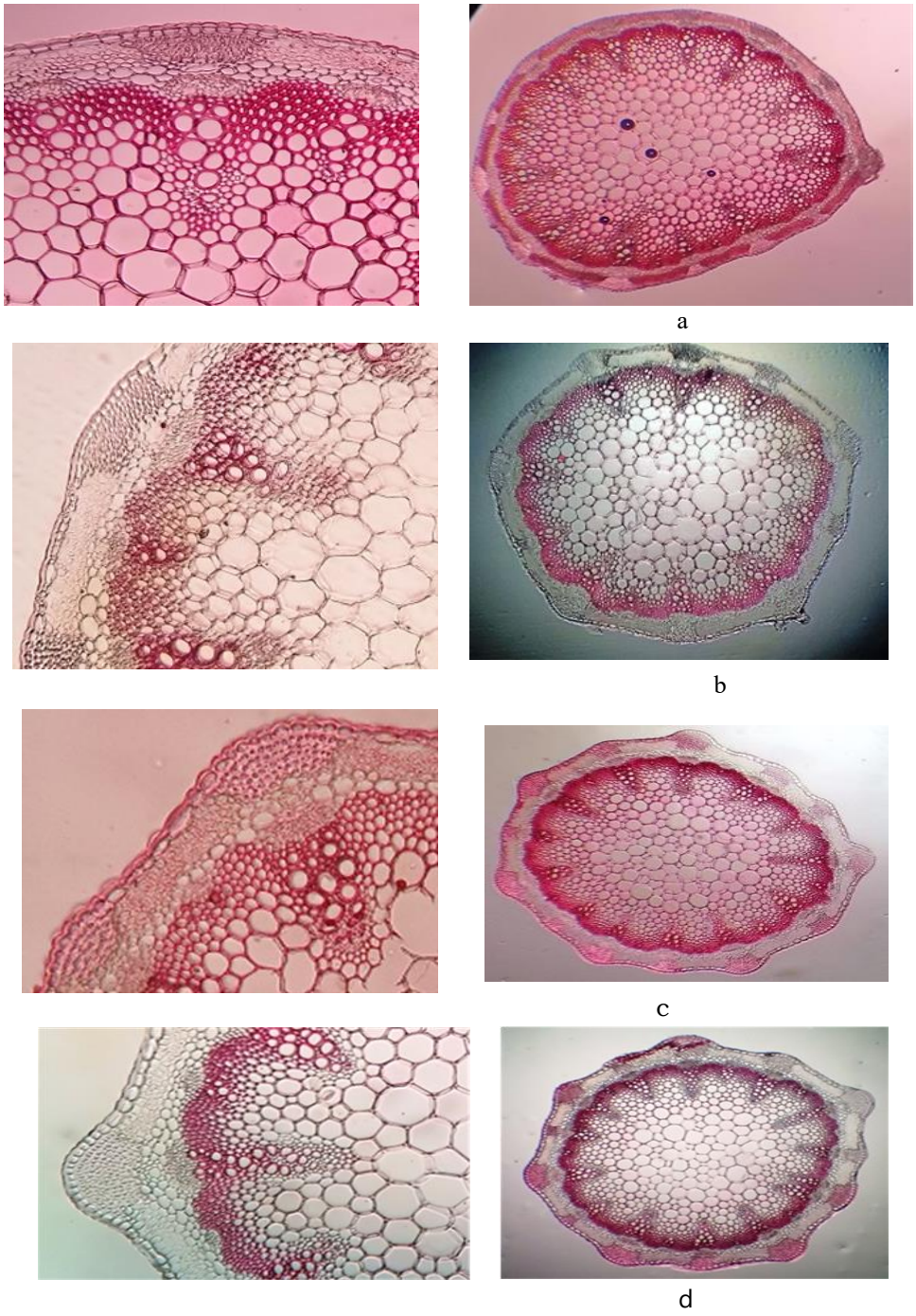

FIGURE.cross section in stems of different studied species. (A,a) *Torilis arvensis,* (B,b) *Torilis leptocarpa*, (C,c) *Torilis leptophylla*, (D,d) *Torilis nodosa* . 10x×40

References

1. A.Cronquist, An integrated system of classification of flowering plants. (Press, New york,1981),p.566
2. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Get vaccinated when it is your turn and follow the local guidelines. International Journal of Health Sciences, 5(3), x-xv. https://doi.org/10.53730/ijhs.v5n3.2938
3. A.E Radford, D.C.William, R.M. Jimmy and C.Ritchin, Vascular Plant Systematic (Harper and Row New york, 1974), p.891.
4. C.A.Stace, plant taxonomy and Biosystematic (Edb Ward Arnold . London,1980), p.279.
5. C.R. Metcalf, and L, chalk, Anatomy of the Dicotyledons (Clarendon press. Oxford .Volume2, 1950), p.1500.
6. D. M. H. Al-Eisawi, Flora of Jordan ,Checklist Revised Edition1.The University of Jordan Press , Amman-Jordan, 2013.
7. K.Esau, Plant anatomy (National Library of Benghazi- Libya. first edition, 2007), P.909. (In Arabic)
8. K.H.Rechinger, Flora of Iranica, (No.162,Academische Druck.u.verlagsanstalt, Graz-Austria1987), p.555.
9. M. O. Mousa & K. D. W. Al-Jibouri ANATOMICAL STUDY OF STEMS FOR SOME SPECIES FROM CARYOPHYLLACEAE FAMILY IN IRAQ (Plant Archives vol.2019, 19) pp.1433-1440.
10. p.H. Davis, Flora of Turkey and the east Aegean island (Edinburgh Univ,press.volume four, 197 2) , pp.518-521.
11. p.H.Davis and V.H.Heywood, principles of angiosperm taxonomy. Robert E. Kriger (publishing company Huntington, New York, 1973), p.558.
12. S. A. Ghazanfar and J.R .Edmondson, Flora of Iraq (Printed in Great Britain by Charles worth Press.Vol.5,2013), p.349.
13. X. Y. Yao, Z. X. Chen & Q. Z. Wang, The complete chloroplast genome of Torilis scabra (Apiaceae). Mitochondrial DNA Part B, 4(2), 2019,pp 2914-2915.