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Comparative anatomical study for fruits of some species of *Bunium L.* (Umbelliferae) in Iraq

Zainab Abid Aun Ali ^{1,*}, Hadeel Radawi H Al- Newani ² and Ghussun S Alubaidi ¹

¹ College of Science for Women- University of Baghdad, Iraq.

² College of Science- Al Mustansiriyah University, Iraq.

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Abstract

Bunium is one of the interested genus that grow in different region of Iraq, it is within the family Umbelliferae (Apiaceae), and the species within this family have a considerable fruit characteristics. The species that were chosen in this study are: *B. brachyactis* (Post) H. Wolff, *B. caroides* (Boiss.) Hausskn. Ex Bornm., *B. chaerophylloides* (Regel & Schmalh.) Drude, *B. rectangulum* Boiss. & Hausskn., *B. verruculosum* C.C.Towns. and *B. avromanum* (Boiss. & Hausskn) Drude., the study found that the fruits of these species have 5 protrusions different in size but all have the same number of vittae, but some are semiler in size and some are not, the number of vascular element are varied between these species, anatomical characteristics were provided.

Keywords: Apiaceae; *Bunium*; Comparative; Fruits; Iraq; Umbelliferae

1. Introduction

Apiaceae in Turkey consist 455 species, 33% are endemic [1]. *Bunium L.* is a geophyte genus in Apiaceae family, Apiioideae subfamily and (Apieae) tribe distributed in northern hemisphere with approximately 50 species and eight species of them are in Iraq which their taxonomical history were complicated since the establishment of this genus [2]. The study [3] mentioned that all *Bunium* spp. are arid or subarid geophytes, they have tuberiform storage roots, primary segmented petiolate, bi or tri- pinnatifid leaves and the calyx without teeth while the petals with inflexed terminal lobes, the fruits are a little bit compressed dorsally or laterally and the fruits contain keel or filiform more or less equal to ribs.

In Iraq the plants grow in the mountains on stony slopes among *Quercus* scrub, on limestone or on a cultivated hillside, *B. brachyactis* (Post) H. Wolff, *B. caroides* (Boiss.) Hausskn. ex Bornm., *B. chaerophylloides* (Regel & Schmalh.) Drude, *B. avromanum* (Boiss. & Hausskn) Drude. *B. rectangulum* Boiss. & Hausskn. and *B. verruculosum* C.C.Towns, the last one is very rare only a single record exist. [4].

Numerous anatomical studies have been carried out on the members of *Bunium* grow not in Iraq [5; 6; 7; 2] revealed the differences in the shape of the mericarps in cross-section, rib numbers and development, configuration of the secretory ducts and commissure width is particularly important. The current study interested to examine the anatomy of fruit of 5 species that were available during the time of the study of *Bunium* grow in Iraq, the study is the first in Iraq

* Corresponding author: Zainab Abid Aun Ali
College of Science for Women- University of Baghdad, Iraq.

2. Material and methods

The study collected fruits of six species of genus *Bunium* from different location in Iraq during scientific trips in 2009 and 2010. The study followed [8] paraffin method to prepare the cross sections of the fruits then examined the slides by light microscope and clear the anatomical characteristics. The study review the acceptance of the scientific names of the species with the.

3. Results and discussions

The acceptance of the binomial scientific name of the genus was confirmed by the world check list organization [9]. The synonyms of the species under study are listed in table (1).

Table 1 The synonyms of the species after World flora on line organization

<i>B. brachyactis</i> (Post) H. Wolff	<i>Bunium rhodocephalum</i> Hand- Mazz.
	<i>Carum brachyactis</i> Post
<i>B. caroides</i> (Boiss.) Hausskn. Ex Bornm.	<i>Bunium elvendia</i> (Boiss.) Drude
	<i>Carum elvendia</i> Boiss.
	<i>Elwendia caroides</i> Boiss.
<i>B. chaerophylloides</i> (Regel& Schmalh.) Drude	<i>Buniella chaerophylloides</i> (Regel& Schmalh.) Schischk.
	<i>Bunium sogdianum</i> (Lipsky) H. Wolff
	<i>Carum chaerophylloides</i> Regel& Schmalh
	<i>Carum sogdianum</i> Lipsky
<i>B. tamerlanii</i> Lipsky	<i>Carum tamerlanii</i> Lipsky
<i>B. rectangulum</i> Boiss. & Hausskn.	<i>Carum rectangulum</i> Boiss. & Hausskn.
<i>B. verruculosum</i> C.C.Towns.	No synonym
<i>B. avromanum</i> (Boiss. & Hausskn) Drude.	<i>Carum avromanum</i> Boiss. & Hausskn.

3.1. Anatomy study: plate 1

The transvers sections of fruits of *Bunium* L. are of tow homomorphic mericarps, semi- circular with five protrusions (ribs), the ribs are elongated in *B. caroides* more than other species. The exocarp in all species covered with thin smooth cuticle and consist of a single row of quadrangular cells enlarged at the top of the ribs; the exocarp is of 1- 2 rows of quadrangular cells become 3- 4 rows of cells at the top of the ribs in *B. caroides*, but in *B. chaerophylloides* become 2- 3 rows. The exocarp interrupted near the carpophore.

The mesocarp consist of thin walled paranchyma cells, they are irregular polygonal shaped, the cells enlarged at the top of the ribs.

The vascular bundles are placed at each base of ribs in all species, contain 2- 3 columns of vascular elements in *B. brachyactis* and it contain 3- 4 columns of vascular elements in *B. caroides* and *B. verruculosum* while it contain 7- 8 columns of vascular elements in *B. rectangulum* and *B. chaerophylloides*, and the vascular bundle of *B. avromanum* contain 4- 5 columns of vascular elements.

Tow Vallecular vittae and four Commissural vittae, all placed alternate with ribs in all species. The vittae shapes are transvers rectangles with rounded angles, similar in size with lignified walls in *B. brachyactis*, *B. chaerophylloides*, *B. rectangulum*, *B. verruculosum* and *B. avromanum* but the vittae in *B. caroides* are semi-circle in shape.

The endocarp is of one row lamellar collenchyma cells, transvers rectangle, narrow in shape covered the testa. The endosperm located at the center of the section, fill with paranchyma cells, granular contents as much as the study see they are druses crystals.

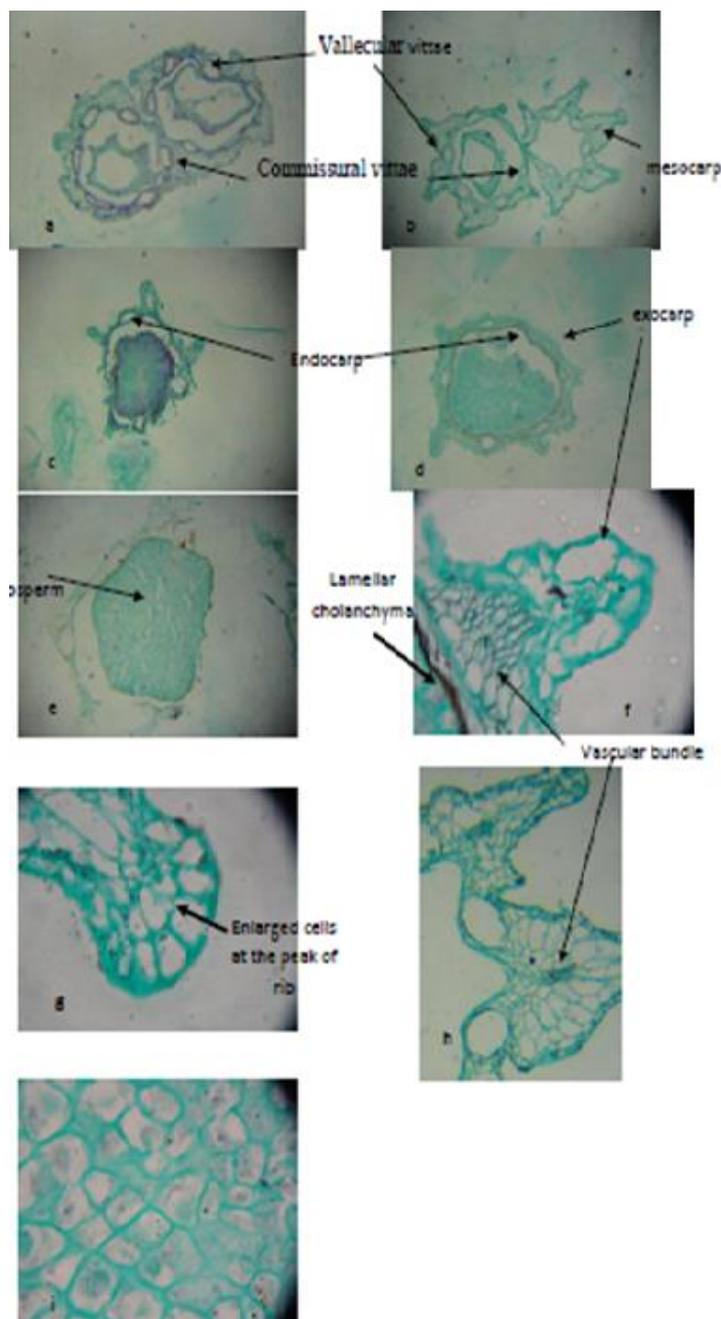


Figure 1 Transvers sections in fruits of some species of *Bunium*: (a) *B. brachyactis*. (b) *B. caroides*. (c) *B. chaerophylloides* (d) *B. rectangulum*. (e) *B. verruculosum*. (f) *B. avromanum*, vascular bundle at the base of a rib. (g) Enlarged cells at the top of the rib. (i) granulated tissue of endosperm; (a, b, c, d, e) 100x, (f, g, h) 400x, (i) 1000x

4. Conclusion

There fruits anatomy of *Bunium* L. were interested to study; there were variations in the shape of sections due to the shape of fruits, the vascular bundles, some lack collenchyma tissue and this was the first time to study the anatomy of some fruits of *Bunium* in Iraq.

Compliance with ethical standards

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Disclosure of conflict of interest

There were no Disclosure of conflict of interest.

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