

## Taxonomic Value of Basal Meristematic Zone of Cypselas in Some Species of The Tribe- Lactuceae (Compositae)



### Botany

**KEYWORDS :** Basal meristematic zone; cypselas; Lactuceae; Compositae

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### ABSTRACT

Detailed structural features of basal meristematic zone of cypselas of 12 species of the tribe Lactuceae have been investigated in details with the help of LM and few with SEM. Basal meristematic zone or carpopodium is exists in between the receptacle and the base of cypselas. Thickness of carpopodial cells is diacritical for some taxa and varies from 1 to 30 cells rows.

### INTRODUCTION

Basal meristematic zone or carpopodium is situated at the basal region of cypselas and which is attached with the receptacle and is composed of one or more rows of cells and which are morphologically distinct from the rest of the cells of cypselar wall. The information regarding the different types of abscission zone of cypselas in Compositae, was presented in the works of John1, Vrgoc2, Mukherjee and Nordenstam3. According to the observation of Robinson4, this zone has been regarded as 'callus or podocarp'. According to the observation of Roth5, this zone is called as separation tissue. Carpopodium helps in cypselar detachment; consequently it is an important structure for active fruit dispersal.

### MATERIALS AND METHODS

For the study of basal meristematic zones, mature, identified, disease free cypselas were procured from different foreign herbaria of the world. Name of studied taxa and their sources were given in the table below.

Sl. No.	Studied taxa	Sender address
1.	<i>Crepis alpina</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
2.	<i>Crepis aspera</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
3.	<i>Crepis dioscoridis</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
4.	<i>Crepis foetida</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
5.	<i>Crepis neglecta</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
6.	<i>Crepis palaestina</i> (Bois.) Bornm	Botanic Garden of the University of Copenhagen, Denmark.
7.	<i>Crepis pulchra</i> L.	Botanic Garden of the University of Copenhagen, Denmark.
8.	<i>Lactuca serriola</i> L.	Humboldt- Universitat zu Berlin. Institut fur Biologie Spezielle Botanik u. Arboretum. Berlin, Germany.
9.	<i>Picris hieracioides</i> L.	Institut fur Pharmakognosie der Universitat Wien, Austria.
10.	<i>Tragopogon orientalis</i> L.	Institut fur Pharmakognosie der Universitat Wien, Austria.

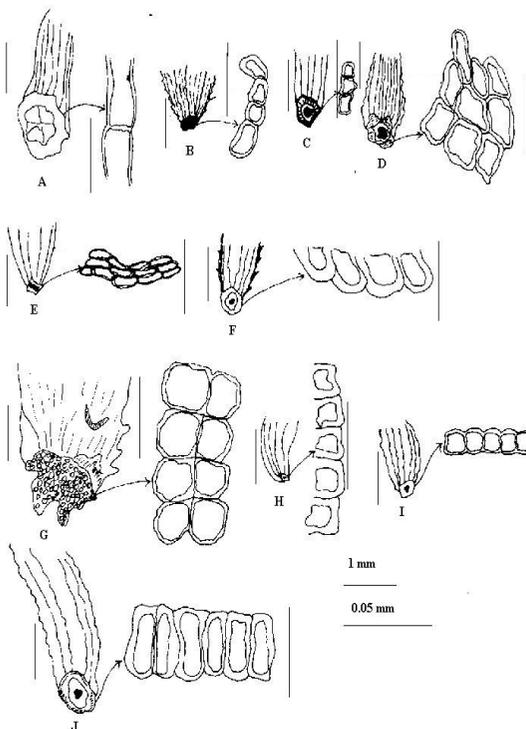
For microscopical investigation, mature dry cypselas were immersed in 2-4% NaOH solution and stained in 0.1 % aqueous safranin solution and finally mounted in 70 % phenol glycerine solution to observed the carpopodial features under compound light microscope. For SEM study, entire cypselas were mounted on a stubs and were processed using standard SEM techniques. Photographs were taken in Hitachi SEM, USIC of the University of Burdwan, Burdwan, West Bengal, India.

### RESULTS AND DISCUSSION

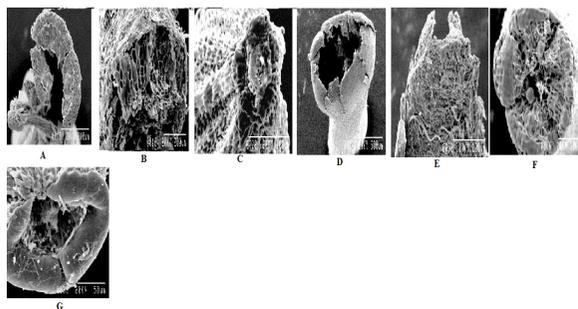
Different features of meristematic zone of the cypselas of 10 species of the tribe Lactuceae were given in tabular form.

Sl. No.	Name of taxa	Presence or absence	Diameter	Type of carpopodium	Thickness of carpopodium
1.	<i>Crepis alpina</i> L. (Fig. 1A, 2A)	Present	Narrow than the base of cypselar body.	Asymmetric, irregular, ring like	3-4 rows
2.	<i>Crepis aspera</i> L. (Fig. 1B, 2B)	Present	Equal to the base of cypselar body.	Asymmetric	3-4 rows
3.	<i>Crepis dioscoridis</i> L. (Fig.1C, 2F)	Present	Narrow than the base of cypselar body.	Asymmetric, irregular, ring like	1 row
4.	<i>Crepis foetida</i> L. (Fig. 1D, 2E)	Present	Narrow than the base of cypselar body.	Asymmetric, irregular, ring like	1 row
5.	<i>Crepis neglecta</i> L. (Fig.1E, 2C)	Present	Narrow than the base of cypselar body.	Symmetric, pentangular	2-3 rows
6.	<i>Crepis palaestina</i> (Bois.) Bornm (Fig. 1F, 2D)	Present	Equal to the base of cypselar body.	Asymmetric, irregular, ring like	2-3 rows
7.	<i>Crepis pulchra</i> L. (Fig. 1G)	Present	Equal to the base of cypselar body.	Symmetric, hexagonal	1 row
8.	<i>Lactuca serriola</i> L. (Fig. 1H, 2G)	Present	Narrow than the base of cypselar body.	Symmetric, complete ring like.	1 row
9.	<i>Picris hieracioides</i> L. (Fig. 1I)	Present	Narrow than the base of cypselar body.	Symmetric, square.	1 row
10.	<i>Tragopogon orientalis</i> L. (Fig. 1J)	Present	Narrow than the base of cypselar body.	Symmetric, irregular, ring like	1 row

**Fig.1: Basal meristematic zone of studied cypselas**



A-*Crepis alpina*, B- *Crepis aspera*, C- *Crepis dioscoridis*, D- *Crepis foetida*, E- *Crepis neglecta*, F- *Crepis palaestina*, G- *Crepis pulchra*, H- *Lactuca serriola*, I- *Pieris hieraciodes*, J- *Tragopogon orientalis*



**Fig. 2. SEM photographs showing the basal meristematic zone of studied cypselas.**

A-*Crepis alpina*, B- *Crepis aspera*, C- *Crepis neglecta*, D- *Crepis palaestina*, E- *Crepis foetida*, F- *Crepis dioscorides*, G- *Lactuca serriola*

Basal meristematic zone or carpophyll of cypselas of 10 species (*Crepis alpina*, *Crepis aspera*, *Crepis dioscoridis*, *Crepis foetida*, *Crepis neglecta*, *Crepis palaestina*, *Crepis pulchra*, *Lactuca serriola*, *Pieris hieraciodes*, *Tragopogon orientalis*) of the tribe Lactuceae have been studied. In the studied cypselas, carpophyll cells varies from 1 layer to 3-4 layers. In the cypselas of *Tragopogon orientalis*, *Pieris hieraciodes*, *Lactuca serriola*, *Crepis pulchra*, *Crepis foetida* and *Crepis dioscoridis*, carpophyll cells are arranged in single row. In the cypselas of *Crepis neglecta* and *Crepis palaestina*, carpophyll cells are varies from 2-3 rows. In the cypselas of *Crepis alpina* and *Crepis aspera*, carpophyll cells varies from 3-4 rows. So, from the above observation, it is clear that cellular layer of carpophyll is variable. The presence or absence of carpophyll and its structure (i.e., types, symmetry, arrangement, thickness and number of carpophyll cells) are diacritical taxonomic parameters. Usually the orientation of carpophyll cells and the number of rows of carpophyll cells are more or less constant in each species and with the help of this character it is possible to distinguish easily among the

different species of same tribes or different tribes. Mukherjee and Nordenstam<sup>6</sup> have done a contribution regarding the carpophyll features of some species of Compositae. The present observation is clearly fulfill with the observation of Mukherjee and Nordenstam<sup>7</sup>. When a true carpophyll is absent, the abscission zone or thick-walled carpophyll cells are lacking, as in *Actites*, *Anacyclus*, *Arctium*, *Arctotheca*, *Arctotis*, *Bidens* (2 spp.) (Mukherjee and Nordenstam<sup>8</sup>). In the present observation, all the studied taxa are with true carpophylls but the absence of carpophyll has also been reported by Haque & Godward<sup>9</sup>. Often carpophyll cells are arranged in two to many rows, but in cypselas with a poorly differentiated carpophyll the abscission zone may or may not be visible externally, although having one row of thick-walled carpophyll cells. The carpophylls may be symmetric or asymmetric. Among the studied taxa, in *Crepis neglecta*, *Crepis pulchra*, *Lactuca serriola*, *Pieris hieraciodes* and *Tragopogon orientalis* cypselas are with symmetric type of carpophylls, whereas in remaining studied cypselas, carpophylls are asymmetric type. The diameter of carpophyll may be as same as the base of the cypselus or wider than the base of cypselus or narrow than the base of cypselus. Short *et al.*<sup>10</sup> have noted that a prominent annular carpophyll exists in *Craspedia*, *Chrysocephalum* (as '*Helichrysum*'), *Rhodanthe* (as '*Helipterum*'), *Myriocephalus stuartii*, *Rutidosis helichrysoides* and others. Short *et al.*<sup>11</sup> have emphasized on the presence or absence of carpophyll in some members of the Inuleae, whereas Karis<sup>12</sup> has emphasized the length and breadth ratio of the carpophyll cells, and whether the carpophyll is well developed and sclerified, or carpophyll is absent or very obsolete. The morphology, cell structure and the presence or absence of carpophyll along with other characters were used by King & Robinson<sup>13</sup>. Robinson & King<sup>14</sup>, have identified five types of carpophylls in the Eupatorieae. They also emphasized the mode of orientation and wall thickness of carpophyll cells. In the present study, the following types of carpophylls are present:-

- Type-1: Carpophyll is narrow than the base. It is usually asymmetric, ring like. Carpophyll cells are arranged in 1 (*Crepis dioscoridis*, *Crepis foetida*) or 3-4 rows (*Crepis alpina*).
- Type-2: Carpophyll is narrow than the base. It is usually symmetric, complete ring like (*Lactuca serriola*); asymmetric, square type (*Pieris hieraciodes*) or symmetric, irregular ring like (*Tragopogon orientalis*), arranged in single row.
- Type-3: Carpophyll is equal to the base of cypselus. It is usually asymmetric and carpophyll cells are arranged in 3-4 rows (*Crepis aspera*); asymmetric, irregular ring like, carpophyll cells are arranged in 2-3 rows (*Crepis palaestina*) or symmetric, hexagonal and carpophyll cells are arranged in single row (*Crepis pulchra*).

**CONCLUSION**

Therefore, the tissue orientation of abscission zone is very characteristic for each species. So, the characteristic feature of the abscission zone, or carpophyll, is apparently stable and diacritical for each species. So, structural details of carpophyll zone has taxonomical value for Compositae systematics.

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