Cypsolar Anatomy of Two Species of the Tribe *Anthemideae*, Family *Asteraceae*

**Sourav Paul** and **Sobhan Kumar Mukherjee**

*Department of Life Sciences, Central University of Tamil Nadu, Tamil Nadu, India*

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**Abstract**

The family *Compositae* is the largest and most successful among the angiosperms because of its adaptability in a wide variety of ecological habitats and the family owes its biological and commercial success to certain morphological, anatomical and physiological characters in their flowers and fruits. The tribe *Anthemideae* is one of the most primitive tribe of the Asteraceae. The anatomical features of the species have been investigated to establish their potential usefulness in taxonomy. This study is important for showing how the family owes its biological and commercial success to certain morphological, anatomical and physiological characters in their flowers and fruits. The significant anatomical features of cypsela are cypselar shape in T.S., cypselar cuticle, ribs or elevations no., size of the ribs, thickness of cypsolar wall (in µm) at ribs and furrow, pericarp thickness (in µm) at ribs and furrow, tissue differentiation of epicarp, epicarpic cell shape, epicarpic cell wall thickness, orientation of epicarpic cell, tissue differentiation of mesocarp, mesocarpic parenchymatous cell, mesocarpic sclerotic braces, mesocarpic vascular bundle, mesocarpic resin cavity, mesocarpic cavity, presence of endocarp, testa thickness (in µm), testal attachment with pericarp, tissue differentiation of testa and layers, cell content of testa, testal cell shape, thick walled cells of testa, crystals and their distribution, testal palisade cells, orientation of testal cells, endosperm in mature cypselas, non–cellular pellicle, nature of mature embryo, resin ducts/secretory ducts in each cotyledon and relative size of the secretory ducts etc., have been examined. These characters of cypselas serve as reliable taxonomic marker in systematic study. Based on these above features, an artificial key is prepared for easy identification.

**Keywords:** Anthemideae; Compositae; Anatomy

**Introduction**

The value of cypselar features in the classification *Compositae* has been employed since the work of Schultz Bipontinus (1844 a, b) [1,2]. The *Anthemideae Cass* is one of the premier tribe where the application of morphological and anatomical features of cypselas has been employed for characterization of taxa [3-10]. have been attracted and fascinated by the tribe Anthemideae and have incorporated the characters of cypselas either from morphological or from anatomical observation or both, using light microscope but most of them have not presented any key to the species and genera considering the differences in the morphology of the cypselas. The present paper deals with the detailed studies of cypselas in 2 species under 2 genera, belonging to the tribe Anthemideae, and preparation of a key on that basis for the identification.

**Materials and Methods**

Dried mature cypselas were procured. Dry cypselas from each species were boiled in water to which few drops of any one compounds, i.e., glycerol, tepol sodium-hypochlorite solution has been added, depending on the natures of pericarp. After that’s oftened cypselas were stored in FAA. For each species at least two mature cypselas were critically studied and all sections were taken usually from middle part of cypselas. FAA preserved cypselas were cleaned in 5-10% KOH solution and stained in a solution of 0.5% aqueous safranin, for the proper identification of vascular bundles in the pericarp. For anatomical study, dry and FAA preserved cypselas were sectioned and were stained in safranin-fast green combination.

**Specimens**

1. *Artemisia vulgaris* L. KAL-1273.
2. *Chrysanthemum coronarium* L. KAL-104.

**Observations**

**Cypselar anatomy**

*Artemisia vulgaris* L.: Cypselas oval in transection cotyledon plano-convex. Pericarp very thin; consists of unequal rectangular to square thick-walled cells wall of which are dark reddish brown in colour; mucilage cells present throughout the pericarp surface (Endosperm uniseriate).

*Chrysanthemum coronarium* L.: Cypselas more or less circular in transection; cypselas bi-ribbed; cotyledon plano-convex in outline. Pericarp parenchymatous with resin ducts restricted only at the furrow regions of cypselas.

Testa is represented by uniseriate compactly arranged, rectangular thick-walled sclerotic cells; endosperm uniseriate, containing barrel shaped tangentially elongated cells; endosperm situated beneath the testa (Figures 1 and 2).

**Results and Discussion**

This tribe has been reviewed from the systematic point of view by Haywood and Humphries (1977). The authors have pointed out the following character of the cypselas as the tribal features:

*Corresponding author: Sourav Paul, Department of Life Sciences, Central University of Tamil Nadu, Tamil Nadu, India, Tel: +919836595839, +918902783694; E-mail: souravpaul.136@gmail.com*

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Cypselas variable; hetero- to homomorphic, with 2-10 ribs or 1-3 wings, circular or angled, terets to strongly dorsiventrally to laterally compressed. Pappus are apical palaceous coronal rim to cup shaped corona, auricle or apical annulus, occasionally absent, with or without pericarp modifications such as myxogenic mucilage cells, secretory canals and other lacunae”.

The systematic grouping of the genera of the tribe is complex and some systematic groupings are established in the tribe. Present study deals with only a few species of Artemisia, Chrysanthemum. The cypselar structure of the materials studied reveals that in Artemisia cypselas are heteromorphic (ray cypselas slightly larger than disc cypselas; no other differences observed), glabrous, very small, ellipsoidal with very fine longitudinal parallel striations; pappus with indistinct undifferentiated Carpopodium. Presence of mucilage cells on pericarp is a diagnostic character of Artemisia. In Artemisia vulgaris the columnar mucilage cells with bulbous tips are present throughout the cypselar surface.

In studied species of Chrysanthemum the cypselas are, ribbed and glabrous.

Presence of myxomatous slime cells or mucilage cells is common diacritical characters of these genera and the tribe Anthemideae. Absence of pappus is also a common feature of Artemisia.

Conclusion

Based on the above observations, it can be concluded that the members of the tribe Anthemideae are with diverse macro as well as micro morphological features of cypselas. These characters are a mixture of both primitive and advanced features. However, their value as taxonomic criteria will be greatly increased in combination with other lines of evidence.

References