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Foliar Micromorphology of the Genus Cyathocline Cass. (Asteraceae) Species : A Scanning Electron Microscopy Screening

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ABSTRACT

The genus Cyathocline Cass. represents three species belonging to the highly advanced, largest dicotyledonous family Asteraceae (alt. nom. Compositae). Two species namely Cyathocline purpurea (Buch.-Ham. ex D. Don) Kuntze and Cyathocline lutea Law ex Wight are screened for scanning electron microscopy (SEM). SEM foliar micromorphological data revealed that both species show the presence of glandular and non-glandular trichomes.

Keywords: Cyathocline, foliar, SEM, trichomes, micromorphology

I. INTRODUCTION

The genus Cyathocline Cass. represents three species and is mainly distributed in the Western Ghats and Eastern Ghats of India belongs to the highly advanced, largest dicotyledonous family Asteraceae (alt. nom. Compositae). *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze is common in distribution but *Cyathocline lutea* Law ex and *Cyathocline manilaliana* CP Raju & RRV Raju are restricted to India only [1]. Out of these three species two species are screened for scanning electron microscopy (SEM). It has been observed that the micromorphology of the foliar surface is a very useful tool in the characterization of the genus *Cyathocline* Cass. for a systematic point of view. Epidermal outgrowths have a significant role in the growth and development of plants. It was stated that trichomes possess taxonomic value, that both glandular & non-glandular hairs are present in the Compositae, and that the non-glandular hairs are of various morphological types, whereas the glandular hairs are more or less homogeneous with a uniform structure [2]. One pioneer anatomical worker, Solereder has stated that trichomes are very much important in a systematic investigation of Angiosperms which is used for determining many generic circumscriptions in the Compositae [3]. Anatomically, a trichome or hair is an epidermal outgrowth of diverse forms, structures, and functions [4]. Amphianomocytic type of stomata was reported in several genera of the family Asteraceae and it was concluded that stomatal characters are an important tool in the taxonomic study of plants [2-4]. It was shown that the

ultrastructural study of plant surfaces using electron microscopic data (SEM) has a significant role in solving taxonomical problems [5]. Several species belonging to many genera of the family Asteraceae have been screened for scanning electron microscopy technique showing the variety of trichomes diversity that have significant taxonomic value [6-9]. The objective of this study is to (a) characterize detailed *Cyathocline* Cass. foliar micromorphological peculiarities and (b) to describe the taxonomic significance of foliar micromorphological data using scanning electron microscopy (SEM).

II. MATERIALS AND METHODS

Plant Material Collection

The plant material was collected from the Durgawadi Plateaus of Junnar Tahsil (Pune District) at 800 to 1200 meters altitude (Maharashtra state) during the flowering season. The voucher specimen was submitted to Shrimant Pratap Shethaji Herbarium, Department of Botany, K.E.S. Pratap College, Amalner for identification purposes.

Scanning Electron Microscopy (SEM)

For SEM analysis, leaf samples (foliar samples) were prepared using a simple air-drying method [10]. Prepared leaf samples were coated with gold particles (05-10 nm) using Emitech Sputter Coater. Then all the foliar surface micromorphological characterization of the prepared sample was done using Zeiss MA15 LaB6 Based Scanning Electron Microscope at High Vacuum Mode.

III. RESULTS AND DISCUSSION

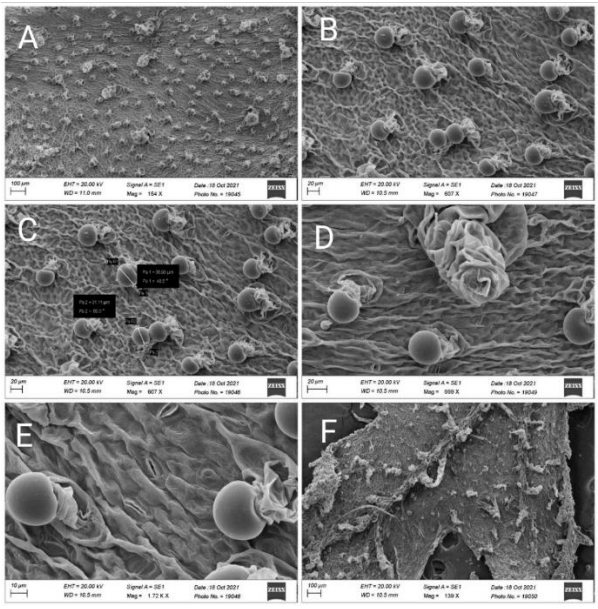

Figure 1 (A-F): Scanning Electron Microscopic images of *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze foliar sample

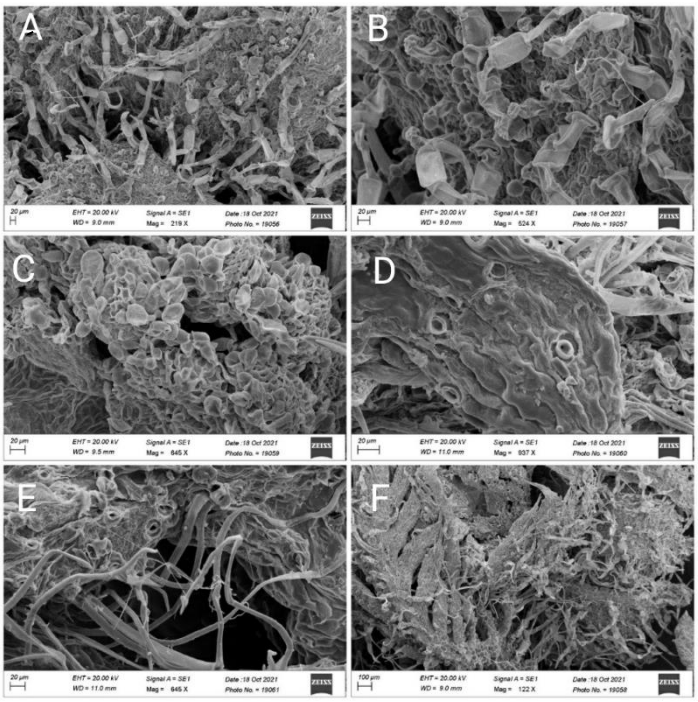

Figure 2 (A-F): Scanning Electron Microscopic images of *Cyathocline lutea* Law ex Wight foliar sample

Based on the micromorphological data obtained from the SEM study shows the following characteristics.

***Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze:**

The epidermal cuticular membrane has a smooth ornamentation layer (Fig. 1 A-F). The examined species is amphianomocytic (Fig. 1 A-F). The length of stomata ranges from 15 to 30 µm and the width range from 10 to 20 µm (Fig. 1E). Both glandular and non-glandular trichomes were observed on the surface of the leaf but some trichomes are deciduous in nature, mostly non-glandular ones (Fig. 1F). The length of trichomes ranges from 40 to 200 µm (Fig. 1D). The glandular head has a size of 30 to 40 µm (Fig. 1C). Capitate mushroom-like multicellular type of glandular trichomes noted in this species (Fig. 1E). The Glandular hairs are stalked or sessile and one-to-many-celled. The body and head of the trichome are variable in structure as observed in c. purpurea.

***Cyathocline lutea* Law ex Wight:**

The epidermal cuticular membrane has a smooth ornamentation layer (Fig. 2 A-F). The examined species is amphianomocytic (Fig. 2 A-F). The length of stomata ranges from 20 to 30 µm and the width range from 15 to 30 µm (Fig. 2 D). Both glandular and non-glandular trichomes were observed on the surface of the leaf. The length of trichomes ranges from 10 to 300 µm (Fig. 2 A-B). The glandular head has a size of 10 to 15 µm (Fig. 2 B). Non-glandular trichomes were uniseriate and they are one-celled, two-celled, and three celled. The frequency of non-glandular trichomes is more as compared to the glandular ones. Sessile club-shaped types of glandular trichomes are noted in this species (Fig. 2 B). The Glandular hairs are small stalked or sessile. The body or head of the trichome is variable in structure as observed in c. purpurea. Sessile secretary heads occur

in this species. Some epicuticular wax depositions may be present on this species' cuticular membrane. The wax crystals deposits are threadlike, long, and flat (Fig. 2E).

Solereder (1908) recorded glandular as well as non-glandular trichomes from *Baccharis, Artemisia, Helianthus, Vernonia, Haplopappus,* etc. Metcalf and Chalk (1950) recorded diverse kinds of trichomes in Asteraceae. Manfron *et al.* (2018) recorded glandular as well as non-glandular trichomes from many species of *Baccharis.* As per observed micromorphological data, The *Cyathocline purpurea* (Buch.-Ham. ex D.Don) has a high frequency of trichomes. *Cyathocline lutea* Law ex Wight has very less frequency as compared to *Cyathocline purpurea*. The present investigation is another supportive evidence of their work and for the family.

IV. CONCLUSION

It is found after SEM screening that the genus is homogenous with respect to foliar micromorphology and also shows somewhat similar micromorphological characteristics to a related genus of the family Asteraceae.

V. REFERENCES

[1]. Salve JT, Tuwar AR, Tadavi SC. Molecular And Taxonomic Review Of The Genus Cyathocline Cass (Asteraceae): A Case Study. Journal of Advanced Scientific Research. 2021 Nov;12:337-340.
[2]. Metcalfe CR, Chalk. Anatomy of Dicotyledon. Vol. I. Oxford: Clarendon Press; 1950. p. 782-804.
[3]. Solereder H. Systematic Anatomy of the Dicotyledons. Vol. I. Oxford: Claredon Press; 1908. p. 456-468.
[4]. Fahn A. Plant Anatomy. 4rth Ed. Oxford: Pergamon Press; 1990. p. 222-269.
[5]. Garry TC, Behnke HD. Electron Microscopy and Plant Systematics. Taxon. 1975;24(1):3-15.
[6]. Manfron J, Raman V, Mendes M, Paes de A, Valter, Bobek V, Heiden, Takeda I, Khan I. Foliar anatomy and microscopy of six Brazilian species of Baccharis (Asteraceae). Microscopy Research and Technique. 2018; 81(8):832-842.
[7]. Younis S, Shaheen S, Zaib M, Harun N, Khalid S, Hussain K, Hanif U, Khan F. Scanning electron microscopic screening of 20 medicinally important Asteroideae taxa Microscopy Research and Technique. 2020 Aug;83(8):988-1006.
[8]. Duarte M, Manfron J, Matzenbacher N, Menarim D. Microscopic Diagnosis of the Leaf and Stem of Lucilia nitens Less., Asteraceae. LATIN AMERICAN JOURNAL OF PHARMACY. 2011; 30(10):2070-2075.
[9]. Erdogan I. Epidermal Leaf Micromorphology of Some Tanacetum L. (Asteraceae) Taxa In Turkey. Gazi University Journal of Science. 2017; 30(4): 30-41.
[10]. Pathan AK, Bond J, Gaskin RE. Sample Preparation for SEM of Plant Surfaces. Materials Today. 2010;12:32-43.