



MORPHOLOGICAL VARIATION OF TRICHOMES IN SOME COMMON SPECIES OF ANGIOSPERM AND THEIR SYSTEMATIC ENUMERATION USEFUL FOR TAXONOMIC SIGNIFICANCE

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Abstract

A systematic enumeration characterizes the trichome morphology in 20 species. Evolution of trichome types appears to proceed from branched hairs to simple and dendritic. Trichomes generally refer to outgrowths ranging from small hairs to larger outgrowth. Trichomes originate from epidermal cells. Morphologically as either non glandular or glandular.

Key words : Micro morphology, Trichomes, Taxonomy and systematic enumeration.

Introduction

The term trichome includes different types of unicellular or multicellular appendages of the epidermis. Trichomes from the Greek (trikhoma) meaning “ hair”, are fine outgrowth or appendages on plants, algae, lichens, and certain protists. They are of diverse structure and function. Examples are hairs, glandular hairs, scales and papillae. A covering of any kind of hairs on a plant is an indumentum, and the surface bearing them is said to be pubescent. (Leelavathi P.M., Ramayya N. 1983.), These are at times so much characteristic, that they have been successfully used in taxonomy, in classification of genera and species. Trichomes are found both on vegetative and as well as reproductive parts and may be living or dead, epidermal or persistent and variable in structure, form and function and thus are of much taxonomic value. In Cruciferae, for example, Schulz (1936) used types of hairs as a major criterion in the sub division of the family in to tribes and genera. In the genus *Digitalis* (Scrophulariaceae), two groups of species have been recognized on the basis of presence or absence of glandular hairs. Ramaya (1969) has provided a generic key for the Indian members of Compositae on the basis of his studies of trichomes in the family. (Pathan A.K., Bond J., Gaskin R.E.2008). (Karousou R., A.M.Bosabalidis and S. KOKKINI 1992),

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Trichomes may be classified in to different morphological categories. The hair may be subdivided in to (i) unicellular and (ii) multicellular. The unicellular hairs may be unbranched or branched. Multicellular hairs are branched in dendroid (tree-like) manner, others have branches oriented largely in the plane (stellate hairs). (Nyawuame H.G.H., Gill L.S.1990), (Banerjee A., Sinhababu A., Kar R.K., Mandal S.2004).

Functions of Trichomes

Generally a dense covering of woody trichomes controls the rate of transpiration, also reduce the heating effect of sunlight. They aid in the protection of plant body from outer injurious agencies. Hairs present on the stigma are helpful in pollination. When present on seeds these are helpful in dispersal. Unicellular and multicellular hairs, even the shield shaped peltate hairs, may be capable of secretion. Secretary trichomes from some of the most important glands found in the plant kingdom. The substances secreted vary with plants – resins, gums, oils, mucilage. (.Edeoga H.O., Ikem C.I.2001)..

Trichomes and Taxonomy

The trichomes types have been successfully used in the classification of genera and even of species in certain families and the recognition of interspecific hybrids (Metcalf and Chalk, 1950 : Hoff, 1950: Sporne, 1956; and Robison, 1969-70; Ramayya, 1972; use the trichomes

types to establish genetic limits among Magnoliales. Systematic work on *Croton* L. (Euphorbiaceae) has been hampered by the lack of a classification based on the array of taxa and data available in the twentieth century. Trichomes types show great variation within *Croton*, and have been used by Muller and most of other workers to characterize species and supers specific taxa. Uphof (1952) classified trichomes on the basis of morphological characters. (Webster G. L., M.J.Del-Arco-Agular and B.A.Smith 1996).

Materials and Methods

Plant material collection

Plant materials collected from the field visit. Collected plant material was processed in laboratory for preparing herbarium for further study. To collect different plant species for to study different trichomes in proper season throughout the year. Plant material were identified with the help of local floras e.g. - Flora of Nandurbar and Dhulia District by Patil D.A. and Flora of presidency of Bombay by T. Cooke.

Results and Discussion

Our approach involved the collection, identification, morphological variation of trichomes derived from commonly occurring native plants growing in the Nandurbar region. In this study 20 plant species belonging to 12 different families were collected. Most of these plants were reported to variety of trichomes. (Vary from unicellular to multicellular, conical to elongated, smooth to ridges, with or without flattened disk at base, thin to thick walled.)

Systematic Enumeration of some Angiosperms

1. *Abutilon indicum* (L.) Sweet.

Family – Malvaceae

Types of trichome- Nonglandular unicellular as well as multicellular.

2. *Blumea membranacea* DC.

Family – Compositae

Types of trichome – Glandular as well as non-glandular, multicellular present.

3. *Biophytam sensititum*

Family- Geraniaceae

Types of trichome- Shortly and sparsely unicellular and bicellular.

4. *Calotropis procera*(Ait.) R. BR.

Family- Asclepiadaceae

Types of trichome- Glacous, white hair.

5. *Chrozophora rottlerei*

Family- Euphorbiaceae

Types of trichome- Stellate.

6. *Ipomoea speciosa* L.

Family- Convolvulaceae

Types of trichome- Long hispid, soft woody trichome.

7. *Hyptis suaveolens*

Family- Labiatae

Types of trichome- Glandular as well as non-glandular.

8. *Ipomoea nil*(L.) Roth.

Family- - Convolvulaceae

Types of trichome- Short pointed multicellular trichomes.

9. *Goggygium herbaceum*

Family—Malvaceae

Types of trichome- Trichome in tuft and in non-glandular unicellular and Multicellular.

10. *Erigeron asteroids* Roxb.

Family- Compositae

Types of trichome- Non-glandular, unicellular and multicellular, bulbous base.

11. *Croton bonplandianum* L.

Family- Euphorbiaceae

Types of trichome- Stellate.

12. *Tridax procumbens* L.

Family- Compositae

Types of trichome- Shortly dentate to unicellular to bicellular trichomes.

13. *Sonchus oleraceus* L.

Family- Compositae

Types of trichome- Glandular, scattered, head or capitulum gland dark pink and stalk white.

14. *Sida acuta* Burm. L.

Family- Malvaceae

Types of trichome- unicellular to bicellular trichomes, in tuft.

15. *Withania somnifera*(L.) Dunal.

Family- Solanaceae

Types of trichome- Dendroid.

16. *Raphanus sativa*

Family- Brassicaceae

Types of trichome- Distantly placed, trichomes are

unicellular.

17. *Quisqualis indica*

Family- Combretaceae

Types of trichome- Non glandular, multicellular.

18. *Oxalis corniculata* L.

Family- Oxalidaceae

Types of trichome- Non glandular,. bicellular.

19. *Murrya koenigi*

Family- Rutaceae

Types of trichome- Densely tomentus woody.

20. *Jatropha glossypifolia* L.

Family- Euphorbiaceae

Types of trichome- Glandular as well as non-glandular.

Taxonomic Keys on the basis of Trichomes for identification in field

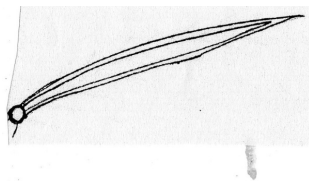
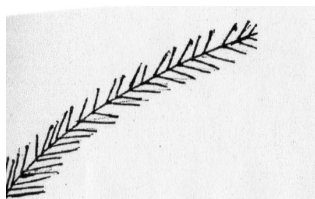
- 1. Trichomes bulbous based—*Stylosamthes fruticosa*
- 1. Trichomes not bulbous based—
- 2. Trichomes glandular— *Hyptis suaveolens*
- 2. Trichomes non glandular—
- 3. Trichomes stellate— *Croton bonplandianum*
- 3. Trichomes not stellate—
- 4. Trichomes dendroid— *Withania somnifera*
- 4. Trichomes not dendroid—
- 5. Trichomes glaucous white— *Calotropis procera*
- 5. Trichomes not glaucous white—
- 6. Trichomes wooly— *Callisstemon lanciولاتus*
- 6. Trichomes not wooly—

Line Drawings

1. *Abutilon indicum*(L.) Sweet.

2. *Biophytam sensititum*

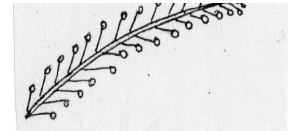
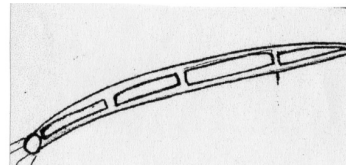
Nonglandular Trichome Unicellular Trichome



3. *Goggypium herbaceum*

4. *Jatropha glossypifolia* L.

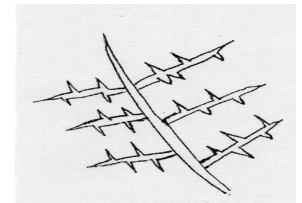
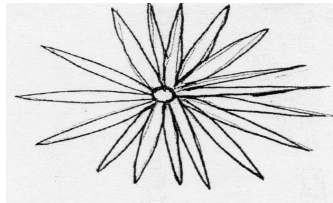
Multicellular Trichome Glandular Trichome



5. *Croton bonplandianum* L.

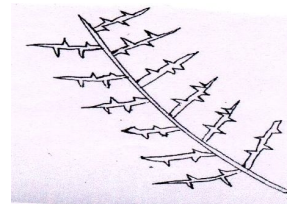
6. *Tridax procumbens* L.

Stellate Trichomes Shortly denatate Trichome



7. *Withania somnifera*(L.) Dunal.

Dendroid Trichomes



References

Banerjee, A., A. Sinhababu, R.K. Kar and S. Mandal(2004). Micromorphological studies of four fuel wood yielding tropical leguminous plant. *Pak. J. Biol. Sci.*, **7(1)**:100–104.

Edeoga, H.O. and C.I. Ikem(2001). Comparative morphology of the leaf epidermis in three species of *Boerhavia* L.(Nyctaginaceae) In: Maheshwari J.K., Jain A.P., editors. Recent Research in Plant Anatomy and Morphology. Scientific Publishers; Jodhpur, India, 197-205.

Esau, K.(1965). Plant Anatomy, 2nd Edition. John Wiley & Sons, 76.

Karousou, R., A.M. Bosabalidis and S. Kokkini(1992). Glandular trichome structure and development in relation to systematic. *Nordic journal of Botany*, **12(1)**: 31-37.

Leelavathi, P.M. and N. Ramayya(1983). Structure, distribution and classification of plant trichomes in relation to taxonomy II. Caesalpinoideae. *Ind. J. For.*, **6**: 43–56.

Nyawuame, H.G.H. and L.S. Gill(1990). Epidermal morphology and histogenesis in some crop plants. *Nig. J. Agron.*, **4**: 6–10.

Pathan, A.K., J. Bond and R.E. Gaskin(2008). Sample preparation for scanning electron microscopy of plant surfaces-Horses for courses. *Micron*, **39**: 1049–1061.

Webster, G.L., M.J. Del-Arco-Agular and B.A. Smith(1996). Systematic distribution of foliar trichome types in *Croton*(Euphorbiaceae). *Botanical Journal of Linnean society*, London, **121**: 41-57.