

TRICHOMES IN SOME TILIACEAE

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The present communication is on the trichomes of 31 species of *Grewia*. Six species of *Corchorus* and two species of *Triumfetta*. Trichomes are distributed on all the plant part viz. stem leaf, root, floral parts and fruit wall. There are twelve types of trichomes which vary in their structure and ontogeny from one another.

Key words - Trichomes, Tiliaceae.

Tiliaceae a family of Malvales is valuable for its timber and fiber producing plants. The wood of *Grewia tiliaefolia* Vahl. is used for spokes and bent parts of carriages, valuable fibre is obtained from the phloem of several members of this family the best known being, jute which is derived from *Corchorus capsularis* and *C. olitorius* less familiar fibres are derived from species of *Grewia* and *Triumfetta*. The drupes of *G. subinaequalis*, *G. asiatica* and *G. sapida* are edible, commonly called as "phalsa". Recently a good number of workers tried to correlate the trichome types with the taxonomy of various taxa (Ramayya, 1969; Jain and Singh, 1973 and Gaur, 1979). Keeping this in mind, the present work has been undertaken.

MATERIALS AND METHODS

Trichome studies are carried out by series of anatomical sections following usual techniques of Johansen (1940) and through peelings taken out mechanically from different plant parts, stained with Delafield's haematoxylin in 25% glycerin.

OBSERVATIONS

Both glandular and non-glandular trichomes are observed on different plant parts of *Grewia*, *Corchorus* and *Triumfetta*. Trichomes are of 12 types and their distribution is mentioned in the table 1.

Type 1a : These are conical, papillate with round apex and thin walls (Fig. A). It develops from single protoderm initial without undergoing any division.

Type 1b : This is an elongated trichome with broad base and tapering apex. It is observed on the lamina of all the species studied (Fig. A₁)

Type 2 : Trichomes are two celled with straight, thin walled apical cell and short basal cell. The initial divides transversely to form a short basal cell and an apical cell which tapers at distal end (Figs. B-B₃).

Type 3 : The trichome is thick walled with short basal cell and peltate apical cell (Fig. C).

Type 4 : Trichome is bicelled, thick walled with hooked apical cell (Fig. D).

Type 5 : This type of trichome is three celled and thick walled, the foot and middle cells are short while terminal cell is unequally biarmed. The initial cell divides twice transversely to form foot, stalk and apical cell. After elongation of apical cell, it gives out a projection from the base on one side and becomes unequally biarmed. (Figs. E-E₁).

Type 6 : The trichomes are stellate with 5-10 arms. The initial cell divides longitudinally several times to form 5-10 armed trichome (Figs. F-F₃).

Type 7 : The trichome is uniseriate with small foot cell, elongated stalk cell and bicelled head. (Fig. G).

Type 8 : Trichome is 6-9 celled, uniseriate with a variation in the apical cell which may be obtuse or rounded. Due to transverse division in initial cell and repeated transverse divisions in apical cell this trichome is formed (Figs. H-H₂).

Type 9 : The trichome has biseriate club shaped head, single celled stalk and single apical cell. The initial divides to form foot, stalk and apical cell. Then the apical cell cuts off cells below which later divides vertically into two (Figs. I-I₁).

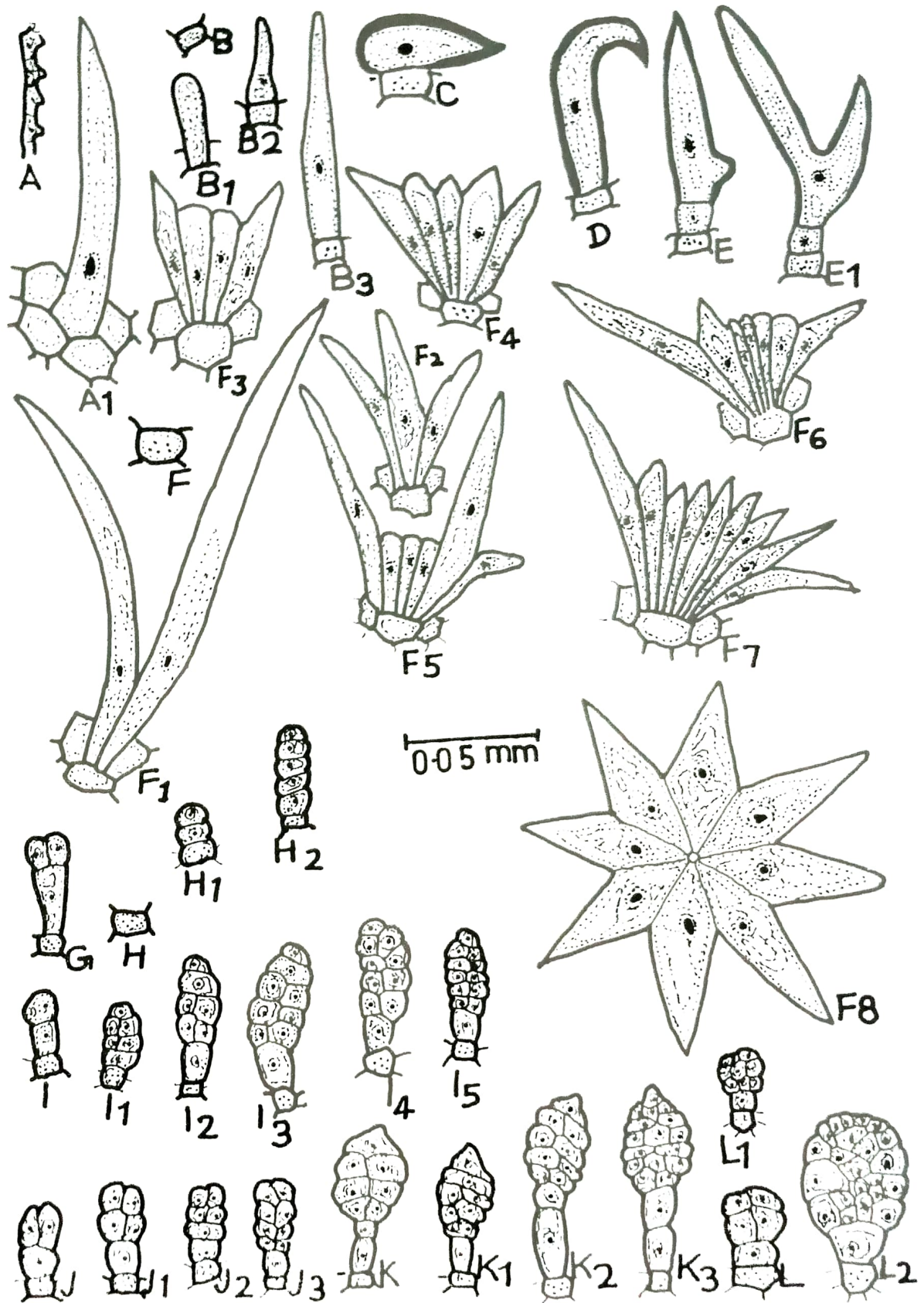


Table 1: Distribution of Trichomes on different plant parts.

S. No.	Plant species	Stem	Foliar parts	Floral parts	Fruit wall
1.	<i>Grewia abutilifolia</i> Went ex Juss	6,10	1b,5,6,9	-	6,9
2.	<i>G. asiatica</i> Linn.	1a,6,9,12	1b,6,8,9,10	6,9,12	1a,6,10
3.	<i>G. bracteata</i> Heyne ex Roth	6,9,10	1b,5,6,9,10	6,9	-
4.	<i>G. columnaris</i> DC	-	1b,6,9,11	4,6,9,11	-
5.	<i>G. damine</i> Geartn	6,9	1b,6,9,10	-	-
6.	<i>G. disperma</i> Rottl	6,8,9	1b,2,6,8,9	6,10	6,10
7.	<i>G. elastica</i> Royle	6,10,12	1b,6,9	6,10	-
8.	<i>G. emarginata</i> W & A.	-	1b, 6,8,9	3,6,10	-
9.	<i>G. flavescence</i> Juss	6,9	1b,6,8,9,10,11	2,6,10	6,10
10.	<i>G. glabra</i> Bl.	1a, 6, 8, 9	1b,6,10	1a,4,6,9,11	-
11.	<i>G. hainesiana</i> Hole	6,9	1b,6,8,10	-	6,9,10,11
12.	<i>G. helicterifolia</i> Wall	-	1b,2,8,10	-	-
13.	<i>G. hirsuta</i> Vahl	6,8,9,10,12	1b,5,6,8,9,11	6,8,9,10,11	5,6,9,12
14.	<i>G. leptopetala</i> Cokke ex Brandis	-	-	6,9,10	-
15.	<i>G. laevigata</i> Vahl	-	-	3,6,9,10,11	-
16.	<i>G. microcos</i> L. ex. DC	1a,2,6,8,9,10,	1b,5,6,9	6,10	1a,6,9,10,12
17.	<i>G. macrophylla</i> G. Don	6,9,10	1b,2,4,6,8,9	-	1a,6,9,10,12
18.	<i>G. obtusa</i> Wall	-	1b,6,9,10	6,10	-
19.	<i>G. oppositifolia</i> Buch ex DC	-	-	3,6,8,9	-
20.	<i>G. optiva</i> J R Drumm	6,8,9,10,11	1b,2,3,6,9	2,6,10	-
21.	<i>G. orbiculata</i> Roth	2,6,9,10,12	1b,6,8,9,10	6,8,9	-
22.	<i>G. polygama</i> Roxb	-	1b,3,6,9,10	-	-
23.	<i>G. rigida</i> Stocks	-	1b,5,6,9	-	-
24.	<i>G. sapida</i> Roxb	2,6,8,9,10,11	1b,5,6,10,11	6,8,9	-
25.	<i>G. scabrophylla</i> Roxb.	2,6,8,9,10	1b, 2,3,6,8,9	6,8,9,10	-
26.	<i>G. subinaequalis</i> DC	6,9	1b,6,9,10	2,6,9,10	-
27.	<i>G. tanax</i> (Persk) Fiori	1a,6,9,10,12	1b,6,8,9	1a,2,5,6,10,12	6,9,10
28.	<i>G. tiliaefolia</i> Vahl	6,8,9,10,11	1b,2,5,6,9,10	6,9,10,11	2,6,9,11
29.	<i>G. vestita</i> wall	2,6,9	1b, 4, 6,9,11	3,6,9,10	-
30.	<i>G. villosa</i> willd	-	1b,6,9	-	-
31.	<i>G. orientalis</i> Linn.	-	1b,3,6,8,9	2,4,6,9	-
32.	<i>Corchorus aestuans</i> Linn	6,9,10,12	1b,2,6,9,10,11	-	6,10
33.	<i>C. capsularis</i> Linn.	6,8,9,10	1b,6,9,10	6,8,9	5,6,9,10
34.	<i>C. depressus</i> Linn.	2,6,9	1b,6,8,9	-	1a,2,6,9,10
35.	<i>C. olitorius</i> Linn	6,8,9,12	1b,2,6,9	6,8,9,12	2,6,10
36.	<i>C. tridens</i> Linn	6,9,10,11	1b, 6, 8,9	-	1a, 5,6,10
37.	<i>C. trilocularis</i> Linn	6,9	1b,2,6,9,10	-	6,9,11
38.	<i>Triumfetta rhomboidea</i> Jacq.	6,9,10,11	1b,6,7,8,9	6,9	1a,5,6,9,10
39.	<i>T reflecta</i> W & A	6,9	1b,6,8	6	6,9,10

(-) part are not studied.

Type 10: This trichome has biseriate and torulose head with constricted walls, foot and stalk are one celled each. The initial divides transversely to form 3 celled trichome. Apical cell divides longitudinally and stalk cell then divides transversely. Each of the upper cell so formed divides longitudinally to form a biseriate trichome with single celled stalk and bicelled apical cell (Figs. J-J₃).

Type 11: Such trichomes have single stalk cell and a large multicelled globular head. The initial divides

transversely to form foot, stalk, and apical cell. The apical cell divides transversely and longitudinally to form head (Figs. L-L₂).

Type 12: The trichome has one celled foot, 2-3 celled stalk and a swollen multicellular pitcher shaped head with a beaked apical cell. The initial divides transversely to form single celled foot, 2-3 celled stalk and an apical cell. The apical cell divides transversely and ultimate cell becomes beaked. The penultimate cell forms the body by repeated transverse and longitudinal divisions (Figs. K-K₃).

DISCUSSION

According to Metcalfe and Chalk (1950), 6 types of hairs viz., unicellular, uniseriate, stellate, tufted, peltate and glandular occur in Tiliaceae. All these types with several variations except for tufted type have been observed in the present work. All the trichomes are developed from a single initial cell, This is in conformity with the observations of Carlquist (1959,b), Uphof (1962), Inamdar (1967) and Ramayya (1962a, b; 1969, 1972). Uphof (1962) reported that the initials of glandular trichomes are usually round tipped and those of non-glandular trichomes are acute. In the present study no such correlation was found. Ramayya (1969), Jain and Singh (1973) also confirmed this fact on the basis of trichome studies in Compositae and *Dombeya natalensis* respectively. Gaur (1979) has reported unicellular and unbranched, multicellular and branched and multicellular with various configurations on the ovary of *Corchorus tridens*. Uphof (1962) recognised two types of development of trichomes 1 - where the initial first divides anticlinally and 2-where the initial first divides periclinally. Ramayya (1969) introduced a third type where the trichome initial divides anticlinally more than twice. Such a mode of development is observed in stellate trichomes. There is one more type of development where the initial remains undivided. Ramayya (1969) placed stellate hairs of Compositae in the uniseriate macroform type. The present study does not agree with this and supports the view of Jain and Singh (1973) because as the initial of stellate trichome divides more than twice anticlinally and brings it to multiseriate macroform types.

Although many of the earlier workers have tried to correlate the trichome type in the taxonomy of various taxa, the present study does not reveal much correlation, though extensive study of all the genera and species of the family may probably help in taxonomy. However, during the present study it is found that stellate type of trichomes are prominently present all over the surface of the plants. In the species of *Grewia* viz., *G. sapida*, *G. hirsuta*, *G. subinaequalis*, *G. optiva*, *G. oppositifolia*, *G. disperma* and *G. hainesiana* the lamina, stem are completely covered with stellate trichomes. In *Corchorus capsularis*, *C.*

olitorius and *C. tridens* the lamina is densely covered with unicellular elongated trichomes with a broad base and tapering apex. The fruit walls of *G. asiatica*, *G. macrophylla*, *G. abutilifolia* and *Corchorus aestueans* are covered with stellate trichomes. Only stellate and unicellular papilliform trichomes are present among the non-glandular trichomes on the fruit wall of different species studied. Trichome type 2, type 3 and Type 12 are totally absent in *Triumfetta* while type 7 is restricted to it. Trichome type 3 and 4 are found in *Grewia* only.

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