



Asian Journal of Biochemical and Pharmaceutical Research

Epidermal Studies of Some Plants of Family Apocynaceae

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Received: 24 January 2012; Revised: 4 February 2012; Accepted: 10 February, 2012

Abstract: Total twelve epidermal characteristics were studied in the three varieties (orange, yellow and white) of *Thevetia peruviana*, *Catharanthus roseus* L., *Nerium indicum* L. and *Tabernaemontana divericata* L. The nature of epidermal cell is variable to straight to sinuous type. There is not much variation in the occurrence of stomata/unit area and average size of stomata. Similarly the values of stomatal index (SI) and guard cell index (GCI) show little variations in all the plant types studied by us. Interestingly, in *T. divericata* L. some character and very conspicuous in comparison to other plant types. 2-type of stomata observed by us in all abovesaid plant species i.e. paracytic and anomocytic. Trichomes are conspicuously absent in all above said species except *N. indicum* L. wherein trichome are multicellular and glandular ($23.75 \times 3.25 \mu\text{m} \pm 8.593 \times 0.937$), *N. indicum* is quite distinct from abovesaid plant types, in having 'Stomatal crypt'.

Key words : Apocynaceae, Epidermal cell, Trichomes, Stomatal crypt, *Nerium*.

INTRODUCTION:

The family Apocynaceae consists of 300 genera and 1300 species of almost cosmopolitan distribution but most abundant panatropically several ornamental species have been introduced from South America and West Indies [12].

There is a great diversity in habit and habitat of the members of the family which are usually trees, shrubs, climbers and rarely perennial herbs [2]. Economically, the family is important due to the presence of large numbers of ornamentals and some medicinal plants [16]. This family received attention from many authors related to epidermal studies. [1, 3, 6, 7, 15, 17].

There was great interest in cuticular details of different genera of Apocynaceae showed by several authors [14, 4, 8, 18, 19, 9, 13, 10, 5]. However there is negligible variation in average number of epidermal cell. Although there is absence of trichomes except in *N. indicum* L. and special character of stomata is 'stomatal crypt' which also found in *N. indicum* L.

METHODOLOGY:

Leaves of three varieties of *Thevetia peruviana* namely (orange, yellow, white), *Catharanthus roseus* L., *Nerium indicum* L. and *Tabernaemontana divericata* L. were collected for epidermal studies. Samples of materials for slide preparation were taken from some region of each fresh leaf, generally

from midway between the leaf base and apex of lamina including the midrib. The epidermal peels were obtained using a sharp pointed forcep. A thin layer of nail polish was also spread over the leaf surface.

The strips were thoroughly washed with distilled water, stained with 1% safranin and then mounted in a drop of 1% glycerin jelly on a glass slide. A cover slip was placed over the drop and sealed with nail polish. Many characters of foliar epidermal structures i.e. epidermis, stomata and trichomes were studied. The stomatal dimensions considered were the length and breadth and also the stomatal index (SI). Measurement of the guard cells and stomatal pore were taken at the same magnification.

OBSERVATION:

Information about epidermal characters have been provided in **Table 1** [Fig. 1 and 2(A-F)].

RESULT AND DISCUSSION:

The results of epidermal studies in selected species of family Apocynaceae have been indicated in **table 1**. Total twelve epidermal characteristics were studied in the three varieties (orange, yellow and white) of *Thevetia peruviana* L., *Catharanthus roseus* L., *Nerium indicum* L. and *Tabernaemontana divericata* L. All these characters belong to three distinct epidermal structures, i.e. epidermis, stomata and trichomes. Whereas the average number of epidermal cell is concerned all the three varieties of *T. peruviana* L. differ distinctly from each other. However there is negligible variations in this character in *Catharanthus roseus* L., *N. indicum* L. and *T. divericata* L. The nature of epidermal cell is variable in all the six plant types studied (Straight, semi sinuous to sinuous) (Table 1).

The epidermal cells is very short ($5.612 \times 9.012 \pm 0.695 \times 2.152$) in *N. indicum* L. in comparison to *C. roseus* L. wherein it is very large ($49.0 \times 24.50 \pm 3.061 \times 4.599$). There is not much variation in the occurrence of stomata/unit area and average size of stomata. Similarly the values of stomatal index (SI) and guard cell index (GCI) show little variations in all the plant types studied by me, except *T. divericata* L. (GCI = 42.505). Interestingly, in *T. divericata* L. some character are very conspicuous in comparison to other plant types (**Fig. 1**).

Two type of stomata observed by us in all abovesaid plant species i.e. paracytic and anomocytic (**Fig. 2A-F**).

The minimum pore area index was recorded in *T. divericata* L. (12.907) in comparison to quite high (35.304) in orange variety of *T. peruviana* L. However there is negligible variation in total pore area in all selected plant materials (**Fig. 1**).

Trichomes are conspicuously absent in all the plant types studied by us except *N. indicum* L. wherein they are frequently present. These trichome are shagged multicellular long and glandular ($23.75 \times 3.255 \pm 8.593 \times 0.937$).

N. indicum L. is quite distinct from other plant types in having "stomatal crypts". Herein the stomata occur in the part of abaxial epidermal that lines deep cavities called stomatal crypt (**Fig. 2C**).

Trivedi (1979)[18] had also studied four varieties of *Tabernaemontana divericata* L. for epidermal characters. He found distinctiveness among such varieties on the basis of epidermal studies.

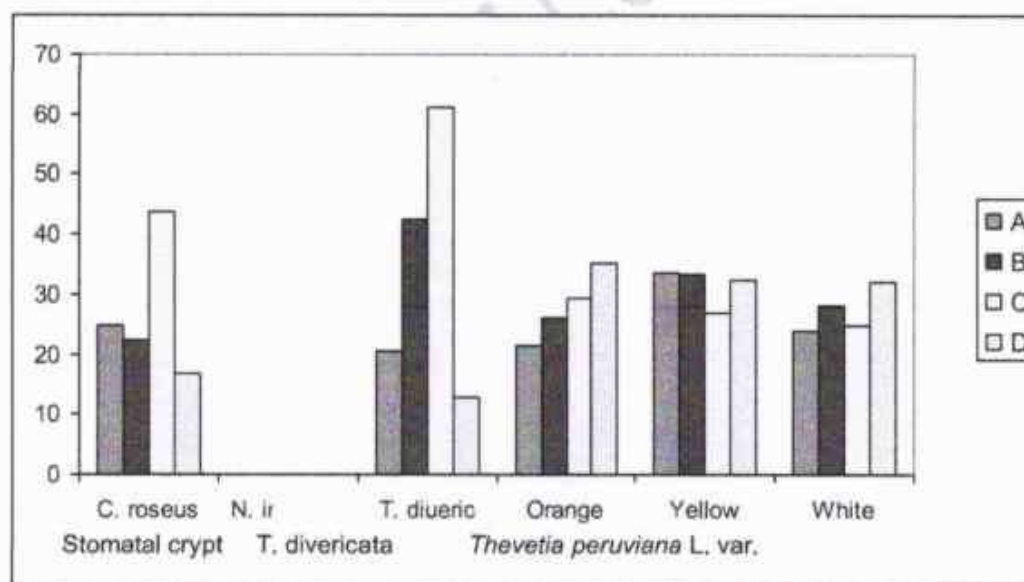
Ingemer (1983)[8] observed oxalate crystals in cell wall of upper epidermis and non articulated branched laticifers on both sides of vascular bundles in *T. peruviana*. We have not observed any oxalate crystals in epidermal cells of any varieties of *T. peruviana*. However some laticiferous cells are frequently observed in epidermal cells in white variety of *T. peruviana* L.

Kaur (1995) [9] also observed laticifers in many members of apocynaceae including *Nerium*. They were non-articulated and unbranched which develop from meristematic tissue and grow sympastically in length and diameter with the growth of plant parts in which these were present.

In the present investigation paracytic type of stomata occur in *Thevetia* species. It is in conformation of previous reports on type of stomata in members of Apocynaceae [13,19].

Metcalf and Chalk (1950)[11] reported that *Tabernaemontana* spp. and *Catharanthus* spp. bearing ranunculaceous type stomata. In which no subsidiary cells present. Direct epidermal cells are joint with stomata. It is also called anomocytic stomata. We have also observed abovesaid type of stomata in *Tabernaemontana* spp. and *Catharanthus* spp.

Fig.-1 : Data on epidermal characters in *C. roseus*, *N. indicum*, *T. divericata* L. and three varieties of *T. peruviana* L.



A = Stomatal index B = Guard cell index C = Distance between stomata D = Pore area index

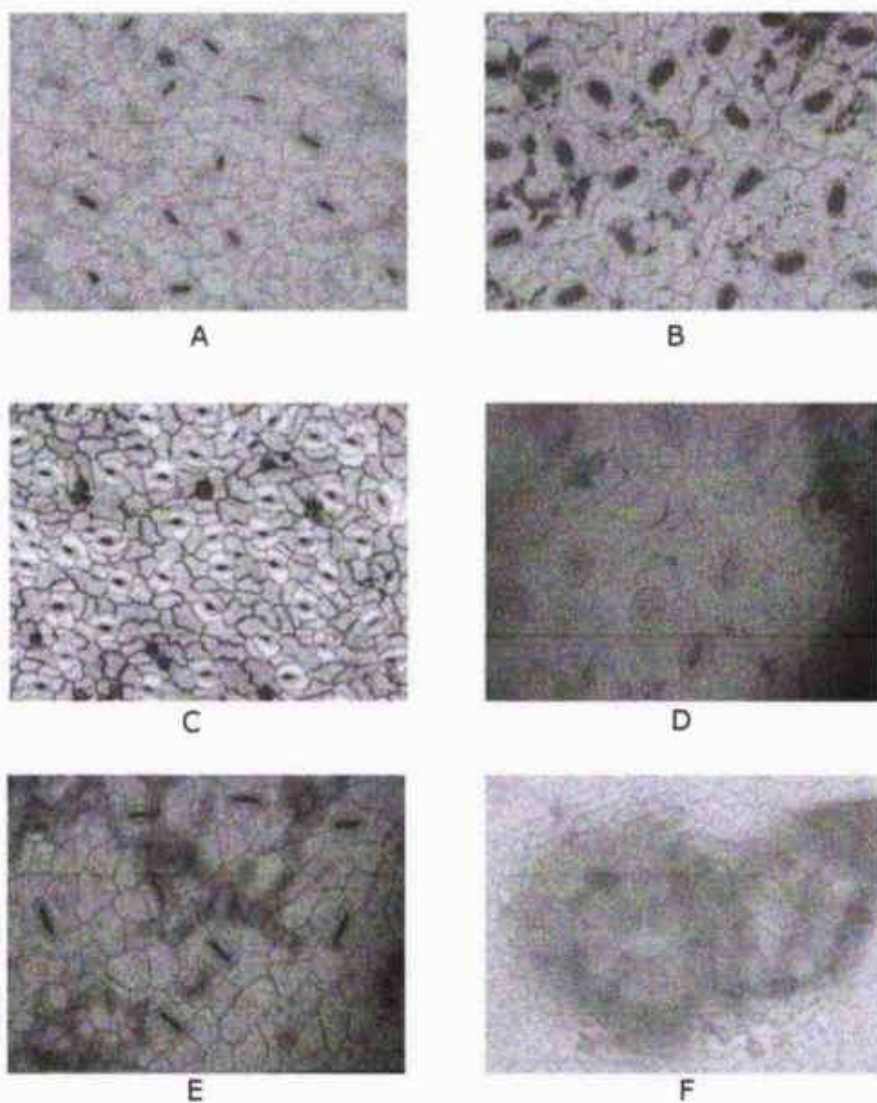


Fig. 2(A-F) : Lower surface of leaf for epidermal studies showing
A,B & C - Paracytic type of stomata in *T.peruviana* L. (var.
orange, yellow,white). D&E - Anomocytic type of stomata in
C.roseus L., *T.divericata* L. . F- Stomatal crypt in *N. indicum* L.

Table 1 : Data on epidermal studies on *Catharanthus roseus* L., *Nerium indicum* L., *Tabernaemontana divericata* L. and *Thevetia peruviana* L.

Plant species	<i>Thevetia peruviana</i> L. var.		
	Orange	Yellow	White
Epidermal Characters	<i>Tabernaemontana divericata</i> L.		
1. Average number of epidermal cells	100.00 ± 35.231	50.00 ± 6.013	78.75 ± 13.591
2. Average size of epidermal cell*	35.0 ± 27.12 ± 3.061 × 4.212	27.5 ± 24.8 ± 19.122 ± 9.403	37.62 ± 29.75 ± 28.712 × 1.533
3. Type of epidermal cell wall	Straight	Sinuuous	Sinuuous straight
4. Average number of stomata*	21.25 ± 8.593	25.25 ± 0.843	25.50 ± 4.125
5. Average size of stomata*	27.12 × 16.62 ± 1.148 × 1.481	29.75 ± 18.37 ± 7.655 × 1.143	26.85 ± 32.37 ± 1.533 × 1.141
6. Stomatal index	20.481	33.552	23.981
7. Guard cell index	42.505	33.332	27.976
8. Type of stomata	Anomocytic	Paracytic	Paracytic
9. Distance between stomata	61.255	29.255	24.756
10. Pore area index	12.907	35.304	32.148
11. Total pore area	0.1236	0.520	0.696
12. *Size of trichome	Absent	Absent	Absent
	23.75 × 3.255 ± 8.593 × 0.937		

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