

**Pharmacognosic studies on Leaves of Medicinally Important plant *Holoptelea Integrifolia* (Planch.)
Collected from Forest area of Adilabad District, Andhra Pradesh, India.**

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ABSTRACT

*In the present study emphasis was given on the leaves of the plant *Holoptelea integrifolia* (Planch.) belongs to family Euphorbiaceae, which was collected from the forest area of the study area. The present study at the area revealed that some less known medicinally important plants have been used by Gondu tribal community. The plant leaf extracts are used for treating pediculosis in human beings by the local tribals, which is being the main reason for selecting the plant for this study. To study the micro morphological arrangements of the epidermal cells, Stomatal cells, costal cells and trichomes if any, the standard protocols were employed. The study revealed the shape of the epidermal cells are polygonal aniso diametric non-linear on adaxial surface and rectangular linear on adaxial surfaces cells arranged irregularly and variously oriented, further, stomata were observed to be anisocytic type. The characteristic feature of the plant leaf is that the presence of uniseriate, unicellular hair present only on abaxial surface. Considering the widespread use of this medicinal plant to treat the purpose, it is therefore becomes crucial to scientifically validate the therapeutic uses and finally to check the adulteration of the plant drug by conducting the micro morphological studies and other Pharmacognostic studies.*

KEY WORDS: *Holoptelea integrifolia*, medicinal plant, micro morphology, epidermal cells, Stomatal cells, Pharmacognosy.

INTRODUCTION

Herbal drugs have great importance in modern days for the treatment of various ailments. Due to their remarkable potential as curing agents against many diseases that afflict the mankind [1] (Bhutani and Gohil, 2010). Presently, it is well recognized that drugs for various ailments in the international and national market ultimately depend upon plants for their extraction [2]. *Holoptelea integrifolia*, commonly known as Indian Elm Tree is a large spreading glabrous deciduous tree growing to a height of 50-60 ft., bark is grey, pustular [2] (Prajapati and Patel, 2010). Leaves 3-5 by 1^{1/2}-2^{1/2} inches in length, elliptic, acuminate, glabrous, entire, base rounded or cordate, main nerves are 5-7 pairs, petiolate. The fruit is circular samara, 2.5 cm in diameter, net veined wings, and flat seeds [3] (Kirtikar and Basu, 1999). Flowers are usually male and hermaphrodite mixed, arranged in short racemes or fascicles at the scars of fallen leaves. Flowers in February and March, distributed in India (Subhimalayas, Ajmere, bandelkand, Behar, birma, W. Peninsula), Ceylon, Cochin and china. The plant habit is shown in the Figure 1. The present study was conducted with the objectives to investigate the micro morphological profile of leaves of the above plant, the study will help in standardization of samples of whole, cut or powdered plant material which could guarantee the accurate means of identifying crude drugs.

MATERIAL AND METHODS

1. Study area:

Adilabad is the northern most district of Andhra Pradesh State. This District is situated between 77°46' and 80° of the eastern longitudes and 18°40' and 19°5 of northern latitudes. Agriculture is the main occupation of the district with a geographical area of 16,

01, 616 hectares. Forest occupies about 43.18% of total. The normal rainfall of the district is 1044 mm as against 634 mm of the state.

2. Collection and authentication of plant materials:

The leaves of the plant species were collected widely from the forest areas of Seethagondi, Adilabad District with the help of local tribal people (GPS- Ele: 1102 ft, N: 19°35.683', E: 078°31.445'). The collected plants were identified using available published literature [4-6] (Ambasta, 1992; Anonymous, 1948; Chopra, 1956) and the herbarium is deposited at the Department of Botany, Osmania University, Hyderabad, India. (accession No.RSK/17/BOT/UCS/OU/2013)

3. Fixation of the Material:

Mature plant parts (leaves) were fixed in the Carney's fixative consisting of alcohol and glacial acetic acid 3:1 [7] (Johanson, 1940). After two days the fixative was replaced by 70% alcohol for preservation of the material.

4. Micropreparations:

Several techniques were employed in the preparation of the epidermal peels. In the case of larger leaves which easily yield peels, the later come off by mere scraping with a blade or by inserting a sharp needle below the epidermis and pulling it out. In the case of material too hard to yield peels several techniques were attempted such as double treatment method [8] (Leelavathi and Ramayya, 1975) which gave satisfactory results. The peels were prepared from base to apex and midvein to margins of the leaf in five places.

The varied types of micropreparations described were stained with aniline blue and Toluidine blue and mounted in glycerin. Afterwards they were dried on slide warmer or in a desiccators, the cover glass was ringed with Canada balsam or D. P. X. mountant.

5. Micrometry:

Epidermal cell frequency (E. C. F), epidermal index (E. I), Stomatal frequency (S. F), Stomatal index (S. I) were calculated in five places i.e., leaf lamina, margin base, middle and apex regions both on adaxial and abaxial surfaces. For calculating the epidermal cells frequency, the epidermal cells as well as stomatal subsidiaries

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were counted together. Costal cells were excluded for the purpose of calculating E. C. F. the peels of base, middle and apex regions were observed separately for calculating E. C. F, stomatal frequency, stomatal index. The values are averages derived usually from ten readings and calculated by standard method [9] Salisbury (1927).

6. Statistical Analysis:

To improve visualization of data and to better understanding the results all statistical analyses were computed with XLstat software.

RESULTS AND DISCUSSION

1. Epidermal characters:

The shape of the epidermal cell in present studied taxa is polygonal aniso diametric non-linear on adaxial surface while it is rectangular linear on abaxial surfaces. The outer wall of the cell is flat in nature. The cytoplasm of the epidermal cells is scanty. The surface of the epidermal cells is smooth. Anticlinal walls of epidermal cells are straight type. The cells of leaf epidermis are irregularly arranged and variously oriented on both the adaxial and abaxial surfaces (as shown in Fig. 2 & 3). The frequency of epidermal cell differ on both the surfaces and also within the same surface and at various locations of the same leaf i.e., at leaf base, Midrib, Apex, Lamina and Leaf Margin. The epidermal frequency is observed to be maximum at leaf margin of the adaxial and abaxial

surfaces as 25,516.93 cm⁻² while it is minimum at leaf base of abaxial surface as 23, 360.55 cm⁻². Similarly epidermal index is observed to be maximum on adaxial surface at all the studied leaf parts i.e., leaf base, leaf apex, leaf midrib, leaf lamina and leaf margin as 100 cells/unit area and minimum as 95.63 cells/unit area on abaxial surface of leaf base (Table 1). Costal cells are absent.

2. Stomatal characters:

Stomata were reported to be Diacytic type. The shape of the guard cell is circular narrowly elliptic on both adaxial and abaxial surfaces. Stomatal pore is parallel to the guard cells in present studied taxa and the position of the guard cells is sunken. Cells surrounding the guard cells which are distinct or indistinct are designated as subsidiary cells, monocyclic nature of subsidiary cells as seen in these taxa. The subsidiaries are mostly abutting type (a-type) were a subsidiary cells of one stomata abute one or more subsidiary cells of another stoma. Hypostomatic condition is observed in *Holoptelea integrifolia* were the stomata are present only on abaxial surface (as shown in Fig. 3). Stomatal frequency is observed to be maximum on abaxial surface of leaf lamina, leaf margins as 10655.73 cm⁻² and minimum on abaxial surface of leaf apex region as 9180.32 cm⁻². The Stomatal index is maximum on abaxial surface of leaf base as 4.43 cells/unit area and minimum on abaxial surface of leaf apex as 3.38 cells/unit area (given in the Table 2). Trichomes are uniseriate, unicellular and hypotrachous type which are present only on abaxial surface.



Figure 1 showing the Habit of *Holoptelea integrifolia*

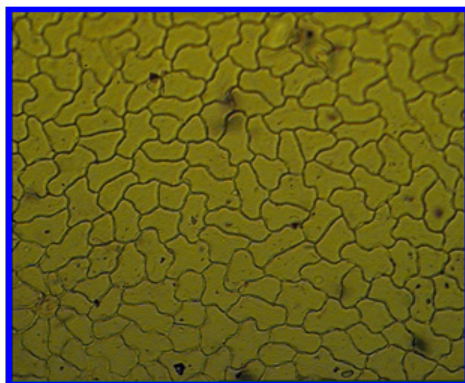


Fig. 2: Showing the characters of epidermal cells on adaxial surface

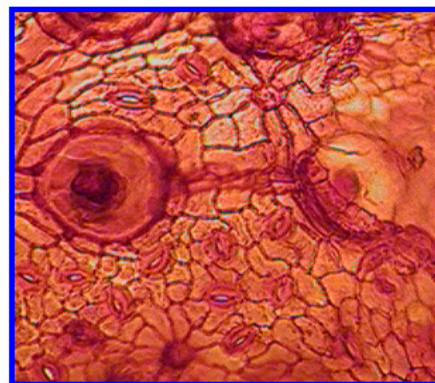


Fig. 3: Showing the characters of epidermal cells on abaxial surface

Table No. 1: Showing the statistical data of epidermal cells

Readings	Leaf base		Leaf apex		Leaf midrib		Leaf lamina		Leaf margin	
	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial
Mean	304.3	285.4	311.1	314.5	316	312.5	315.2	316	320.5	320
S.D (%)	2.75	2.35	2.45	3.13	1.97	3.02	1.76	2.18	2.17	1.91
S.E	0.87	0.74	0.77	0.99	0.62	0.95	0.55	0.69	0.68	0.60
E.C.F (cm ⁻²)	24918.32	23360.55	25491.03	25737.04	25901.39	25571.70	25819.72	25901.37	26229.08	26229.08
E.I	100	95.63	100	96.61	100	95.70	100	96.04	100	96.09

Table No. 2: Showing the statistical data of Stomatal cells

Readings	Leaf base		Leaf apex		Leaf midrib		Leaf lamina		Leaf margin	
	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial	Adaxial	Abaxial
Mean		13		11.2		14.2		13		13
RANGE		3		3		4		4		4
S.D (%)	ABSENT	1.24	ABSENT	1.22	ABSENT	1.24	ABSENT	1.15	ABSENT	1.05
S.E		0.39		0.38		0.39		0.36		0.33
S.F		10655.77		9180.32		11639.34		10655.73		10655.73
S.I		4.43		3.38		4.29		3.95		3.90

CONCLUSION

In the present study of micro morphology on leaves of *Holoptelea integrifolia* have shown the above results where the shape, surface, cytoplasm, anticlinal wall characters, arrangement and orientation of the epidermal cells observed are of special characters of these taxa. The numbers of epidermal frequency and epidermal index gives an idea of density of the cells in those particular regions on both adaxial and abaxial surfaces which help us to know the region of high photosynthetic rate and also the region of high productive value. Similarly stomata have been considered as an important plant structure physiologically. The shape, structure, type and number of stomata present help us to predict rate of gaseous exchange at particular region on both adaxial and abaxial surfaces. Taking in the account that from the results observed, it is clear that the plant is showing some distinct characteristic features which help pharmacognosists to identify the species. And also it helps to check the adulteration of the plant drug for safe use for the purpose. Finally, it opens a scope for further research to observe the micro morphological characters of ecotypes present on the globe.

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