



# Phytochemical and Pharmacognostic Evaluation of *Euphorbia hirta* Linn. Leaves

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## ABSTRACT

*Euphorbia hirta* Linn. (Euphorbiaceae), a pantropic herbaceous wild plant which has been widely used in several countries as an antidiarrhoeal, antidiuretic, also as a treatment of expectorant and also remedy for bronchitis, asthma, intestinal ailments of children and for various skin diseases. The current study was therefore carried out to provide requisite pharmacognostic details about the plant. In the microscopic studies, the leaves showed the presence of trichomes, vascular bundles, collenchyma and anomocytic stomata. The total ash, acid insoluble ash, water-soluble ash and sulfated ash were observed to be 5.5±0.3%, 2.5±0.5%, 3.5±0.2% and 7.0% respectively. Water soluble, alcohol soluble and petroleum ether soluble extractive values were found to be 24±1.5%, 12±1.0% and 4±0.7% respectively. Moisture content was found to be 4.2±2.0%. The leaves were first defatted with petroleum ether and successively extracted with methanol finally fractionated into diethyl ether, chloroform, ethyl acetate and n-butanol. Preliminary phytochemical showed the presence of alkaloids, steroids, carbohydrates and flavonoids.

**Key words:** *Euphorbia hirta* Lin, Pantropic, pharmacognostic evaluation.

## INTRODUCTION

*Euphorbia hirta* Linn. belongs to the family euphorbiaceae. It is a small annual herb common to tropical countries. It can grow to a height of 40cm. Herbs have been used as a food and for medicinal purposes for centuries. However the use of medicinal herbs have increased over the past few years and research interest has focused on various herbs that possess hypolipidemic, antidiabetic, antitumor properties.<sup>2</sup> *Euphorbia hirta* Linn. has been widely used in traditional medicine in Asia, the middle East, Africa and the Caribbean. *Euphorbia hirta* Linn. has been recommended for various therapeutic indications such as diseases of the digestive system, respiratory system and for the urinary tract infections.<sup>3</sup> Various phytochemicals reported in *Euphorbia hirta* Linn. are ellagic, gallic, chlorogenic and caffeic acid, kaempferol, quercitol, quercitrin and a number of amino acids.<sup>4</sup> The herbal drug industry now a days considered as high growth industry of the late 90's and seeing the growing demand, it is all definitely going to flourish in the next century.<sup>5</sup>

## MATERIAL AND METHODS:

Leaves of *Euphorbia hirta* were collected from the surroundings of Hubli & Dharwad, Karnataka (India) and authenticated by Dr. B.D.Huddar, Head of the Department of Botany, Shri Kadasiddheshwar H.S. Kothambari Science institute, Vidyanagar, Hubli. A voucher specimen of PG-652 is preserved at KLES's college of pharmacy, Hubli. Leaves were air dried packed and stored.

## Pharmacognostic Studies:

### Macroscopic

Morphological studies were done using simple microscope. The shape, margin, taste and odour of leaves were determined. The macroscopic features of the fresh leaves of *E. hirta* were determined using the methods of Dr. C.K. Kokate.<sup>6</sup>

### Micrisopic:

Anatomical sections surface preparation of the fresh leaves and the powdered samples for the microscopy and chemomicroscopy were carried out according to the methods outlined by Khandelwal K.R.<sup>7</sup> and Iyengar M. A.<sup>8</sup>

### Physical Evaluation :

The physicochemical constant such as percentage of total ash, acid-insoluble ash, water soluble ash, water, alcohol and petroleum ether soluble extractives and loss on drying were calculated as per the WHO guidelines.<sup>9</sup> Quantitative microscopy of the fresh leaves of *E. hirta* to determine the stomatal number, stomatal index, vein islet and vein termination number were carried<sup>10</sup>.

### Preliminary Phytochemical Studies:

The dried leaves were pulverized and 100 gm of leaves sample was first defatted with 700 ml of Petroleum ether followed by successive extraction with 500 ml of methanol by hot maceration around 72 hrs. The methanolic extract was concentrated & dried under reduced pressure, further it is dissolved



in water and fractionated into ether, chloroform, ethyl acetate and n-butanol. Every extract and fraction was concentrated & dried over anhydrous sodium sulphate & left for phytochemical investigation.<sup>11</sup> The qualitative chemical tests were carried out as described by Harborne (1998)<sup>12</sup>, Trease and Evans (1997)<sup>13</sup>

**Table 1: Observations from the T.S. of Leaf**

Features	observations
Trichomes	covering trichomes are present
Upper epidermis	single layer cell with multicellular trichomes
Lower epidermis	single layer cell.
Parenchyma	spongy.
Vascular bundle	xylem towards upper epidermis and phloem towards lower epidermis.
Stomata	anomocytic

**Table 2: Physicochemical parameters of *E. hirta* leaves**

Parameter	Determined Value (%W/W)*
Moisture content	4.2±2.0
Total ash	5.5±0.3
Acid insoluble ash	2.5±0.5
Water soluble ash	3.5±0.2
Sulphated ash	7.0±0.4
Water soluble extractive	24±1.5
Ethanol soluble extractive	12±1.0
Petroleum Ether soluble	4±0.7

\* Mean value of three counts

**Table 3: Qualitative chemical test of *E. hirta* leaves**

Phytoconstituents	Successive extracts and fractions					
	P	M	D	C	E	N
Alkaloids	-	+	-	+	-	-
Flavonoids	-	+	-	-	+	-
Glycosides	-	-	-	-	-	-
Carbohydrates	-	+	-	-	-	+
Saponins	-	-	-	-	-	-
Tannins & Phenolic compounds	-	+	-	-	+	+
Steroids & triterpenoids	+	+	+	+	-	-

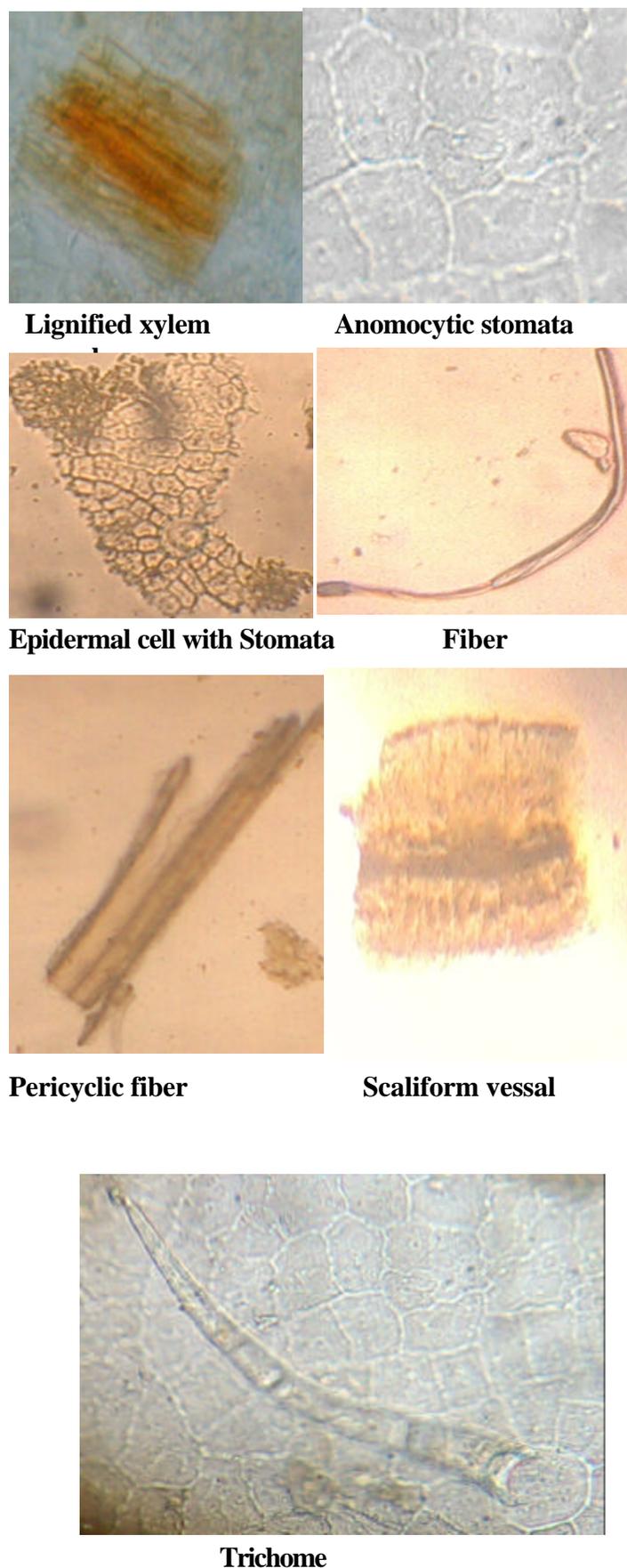
**P:** Petroleum ether extract, **M:** Methanolic extract, **D:** Diethyl ether fraction, **C:** Chloroform, **E:** Ethyl acetate, **N:** n-butanol. "+" Present, "-" Absent.

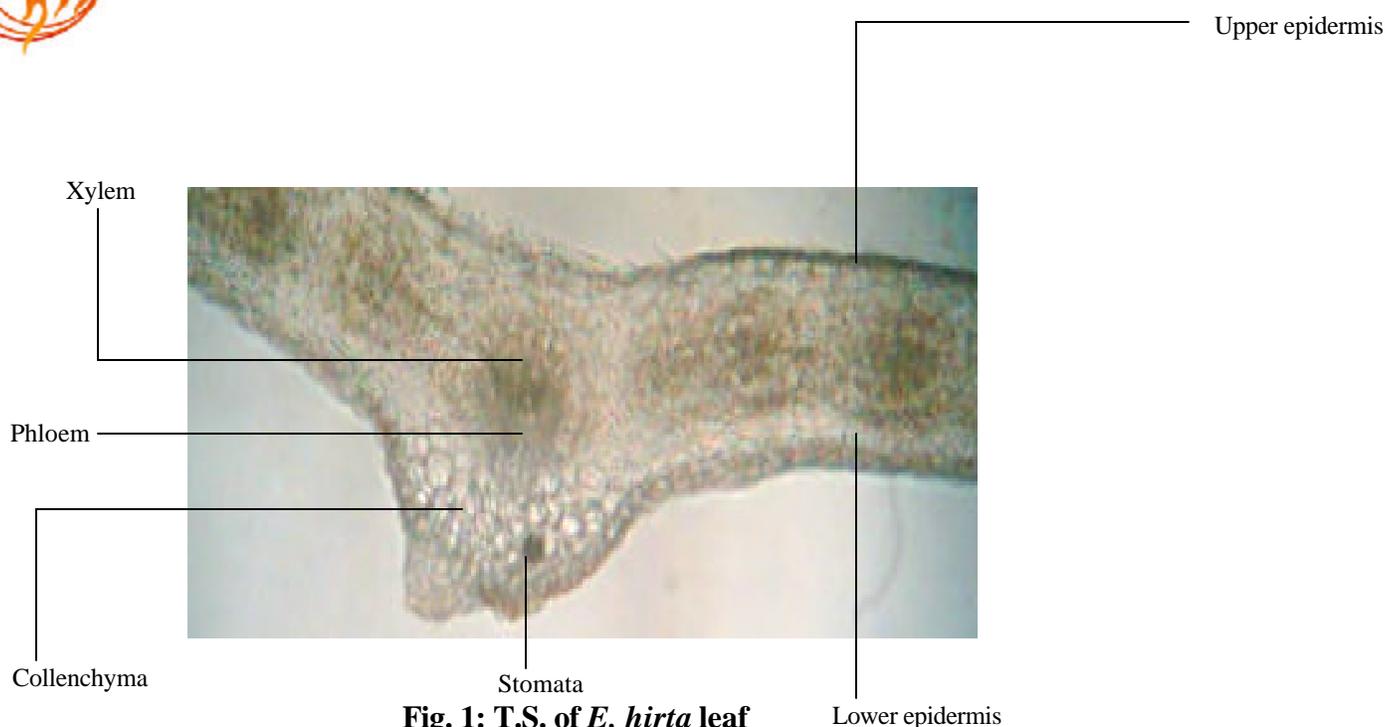
**Table 4: Quantitative microscopy of leaves of *E. hirta***

Determinations	Range	Mean*
Upper epidermal stomatal index	12-14	13
Lower epidermal stomatal index	14-16	15
Vein islet number	4-6	5
Vein termination number	20-22	21

\*Mean value of 10 count

**Fig. 2: Powder characteristics**





**Fig. 1: T.S. of *E. hirta* leaf**

## RESULTS AND DISCUSSIONS:

The detail and systemic pharmacognostical evaluation would give valuable information for the future studies. Macroscopic characters of *E. hirta* leaves shows composition of leaf is simple with dark green color having no odour about 2-6cm. long in size, shape is ovate, texture is hairy, apex is acute and midrib is distinct on both the side.

T.S. of the leaf revealed the presence of stomata, upper and lower epidermis, trichomes vascular bundle and collenchyma. Powder characteristics revealed the presence of starch granules, scalariform vessels, covering trichomes, lignified fibres, pericyclic fibres, epidermal cells with trichomes.

The various diagnostic characteristic of leaf powder was coarse, dark green, odourless, with bitter test which revealed the presence of lignified xylem vessel, anomocytic type of stomata, epidermal cells with stomata, pericyclic fibers, scalariform vessel and trichomes.

The quantitative determination of some pharmacognostic parameters is useful for setting standard for crude drugs the vein islet, vein termination and other parameters determined in the quantitative microscopy are relatively constant for the plants and can be used to differentiate closely related species. The physical constant evaluation of drugs is an important parameter in detecting adulteration or improper handling of drugs.

The moisture content of the drug is not too high, thus it could discourage bacteria, fungi or yeast growth. The total ash is particularly important in evaluation of purity of drugs. (Table 2)

Qualitative chemical test revealed the presence of alkaloids, steroids, carbohydrates and flavonoids.

Quantitative microscopy of leaf of *E. hirta* (Table 3)

In quantitative microscopy, the stomatal index for upper and lower surface was found to be average 13 and 15 respectively. Vein islet and vein termination number average 5 and 21 respectively. The total moisture was found to be  $4.2 \pm 2.0\%$ . Total ash  $5.5 \pm 0.3\%$  of which  $2.5 \pm 0.5\%$ , acid insoluble ash  $3.5 \pm 0.2\%$  water soluble ash and sulfated ash was found to be  $7.0 \pm 0.4\%$ . Water soluble, alcohol soluble and petroleum ether soluble extractive values were found to be  $24 \pm 1.5\%$ ,  $12 \pm 1.0\%$  and  $4 \pm 0.7\%$  respectively. Moisture content was found to be  $4.2 \pm 2.0\%$ .

## REFERENCE:

- Ogueke CC, Ogbulie JN, Okoli IC and Anyanwu BN, Antibacterial activities and toxicological potential of Crude ethanolic extract of *Euphorbia hirta*. Journal of American science, 3(3), 2007, pp 12-15.
- Adeolu A Adedapo, Olufemi O Shabi and Oyeduntan A Adedokun, Anthelmintic efficacy of the aqueous crude extract of *Euphorbia hirta* in Nigerian Dogs. Veterinarski arhiv, 75,1,2005, pp 39-47
- Lanher MC, Fleurentin J, Cabalion P, Rolland, Dorfman P, Misslin R and Pelt JM, Behavioural effects of *Euphorbia hirta* Linn. Sedative and Anxiolytic properties. Journal of Ethnopharmacology, 29,1990, pp 189-98.
- Adedapo A A, Abatan M O, Idowu S O and Olorunsogo O O, Effects of chromatography Fractions of *Euphorbia hirta* on the rat serum biochemistry, African Journal of Biomedical Research, Vol. 8, 2005, pp 185-89.
- Soni Sapna, Kandalkar Avinash, Tailang Mukul, Pathak AK, pharmacognostic and phytochemical investigation of *Stevia rebaudiana*, Pharmacognosy Magazine vol. 4 (13), 2008, pp 89-94



6. Kokate CK, Purohit AP, Gokhale SB, Text book of Pharmacognosy, 24<sup>th</sup> Ed Nirali Prakashan, Pune 2004, pp 99
7. Khandelwal KR, Practical Pharmacognosy, 18<sup>th</sup> Ed. Nirali Prakashan 2007, Pune, pp 45-51.
8. Iyenger MA, and Nayak SGK, Anatomy of crude drugs, 5<sup>th</sup> Ed. Navayuga Press-Udupi, 1991, pp 42-54.
9. WHO, Geneva, Indian Ed., A.I.T.B.S. publishers and distributors Delhi, 2004, pp 28-30
10. Kokate CK, Practical book of Pharmacognosy, 1<sup>st</sup> edition, Vallabh Prakashan, Delhi 1986, pp 119-25
11. Atta A H, Mohamed N H, Nasr S M, Mounair S M. Phytochemical & pharmacological studies on *Convolvulus fatmensis* Ktze. Journal of natural remedies: 7(1), 2007, pp 109-19
12. Harborne JB, Phytochemical Methods, London, Chapman and Halls, 1998, p 91.
13. Evans WC, Trease and Evans Pharmacognosy, Singapore, Hartcourt Brace and Company Asia Pvt. Ltd, 1997, p 226.

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