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Pharmacognostical studies on leaf of *Antidesma ghaesembilla* Gaertn, A promising wild edible plant

Poonam C. Patil[1], Varsha D. Jadhav(Rathod)[1*] and Shivprasad D. Mahadkar[2]

Dept. of Botany, Shivaji University, Kolhapur (M. S.), India

ABSTRACT

Antidesma ghaesembilla Gaertn. is small deciduous tree belongs to family Euphorbiaceae; its leaves and fruits are edible, nutritious and plant possess medicinal property. Due to the dual significance in traditional system of medicine the plant Antidesma ghaesembilla Gaertn. are selected for present work. The leaves of Antidesma ghaesembilla used as vegetable in rural area of Western Ghats and its paste applied on headache. In present investigation macroscopic, microscopic characters were studied along with powder behaviour, fluorescence studies and phytochemical screening etc. The powder behaviour indicates the presence of alkaloids, xanthoprotein, tannin, cystine and oil etc.

Key words: Pharmacognosy, leaf, *Antidesma ghaesembilla* Gaertn.

INTRODUCTION

Medicinal plants and herbal plants has assumed greater importance in recent days, due to the tremendous potential they offer in formulating new drugs against many diseases and illness that affect the human kind. Plants have been used in traditional health care system from time immemorial, particularly among tribal [1]. According to the World Health Organization (WHO) [2], the macroscopic and microscopic description of plant is the first step towards establishing the identity and the degree of purity of such material and should be carried out before any tests are undertaken. Pharmacognostical study is the preliminary steps in the standardization of crude drugs. The detailed pharmacognostical evaluation gives valuable information regarding the morphology, microscopical and physical characteristics of the crude drugs [3]. Pharmacognostic studies have been done on many important drugs and the resulting observations have been incorporated in various pharmacopoeias [4]. There are number of crude drugs where the plant source has not yet been scientifically identified. Hence pharmacognostical study gives the scientific information regarding the purity and quality of the plant drugs [5]. *Antidesma ghaesembilla* Gaertn. is wild edible, dioecious plant found in deciduous forest of Western Ghats. The plant being used by tribal people for their medicinal properties. Leaves of *Antidesma ghaesembilla* Gaertn. used as a medicine for headache and stem is used as medicine to stimulate menstrual flow as well as in case of menorrhea [6]. The fruit is eaten locally or used as purgative. Lactating women eat the leaves for breast milk production [7]. The leaves of *Antidesma ghaesembilla* Gaertn. are mainly used for medicinal purpose [8, 9, 10]. Leaves are also edible value [11, 12]. Young leaves of *Antidesma ghaesembilla* Gaertn. were boiled with water for blood nourishment and ripe fruits were eaten [13]. Hence, it may be an absolute necessity to create a profile in regards to their identification and then standardization which may lead to further scientific investigations.

MATERIALS AND METHODS

1. Collection of plant material
Plant were collected from Kolhapur districts of Maharashtra, in the month of July to August and identified with the help of flora of the presidency of Bombay [14], flora of Maharashtra [15], flora of Kolhapur district [16].

2. Drying of plant material
The collected plant material was washed and dried under the shade. These shade dried leaves were powdered with the help of an electric grinder till a fine powder was obtained. This powder was subjected to further study of powder behaviour, fluorescence study and preliminary phytochemical study of plant.

3. Microscopical study
Transverse section (T.S.) of petiole and leaf taken through midrib were taken, cleared in Chloral hydrate, mounted with glycerin and observe under microscope for its anatomical details [17]. Quantitative leaf microscopies to determine trichome, stomatal number, stomatal index, vein islet number were carried out [18].

4. Powder behaviour and fluorescence study
Powder behavior and fluorescence study of the leaf with different chemical reagents were determined under natural light and fluorescent UV light [19, 20].

5. Extraction and Phytochemical screening
Successive extractive values were performed with various solvent like Petroleum ether, Benzene, Chloroform, Acetone, Ethanol and Aqueous. The percentage yield of extract, Preliminary phytochemical tests of the extract were performed using specific reagents by methods [21, 22, 23, 24, 25].

RESULTS AND DISCUSSION

1. Pharmacognostic investigation
The detailed and systematic pharmacognostical evaluation would give valuable information for the future studies. The detailed morphology of *Antidesma ghaesembilla* Gaertn. was carried out to support proper identification of drug.

2. Macroscopical study
Antidesma ghaesembilla Gaertn. (fig. 1) leaves are simple, alternate, shortly petioled, broadly elliptic or orbicular obovate, entire pubescent margin, base rounded more rarely obtuse , apex rounded , sometime mucronate.

3. Microscopical studies
a) Transverse section of leaf (fig. 2)
Epidermis occurs on both dorsal and ventral surface. The dorsal and ventral epidermis compactly arranged by two layered more or less hexagonal cells without chloroplast. The outer surface of epidermis was covered by cuticle. Paracytic stomata (fig. 3) distributed throught out its ventral surface but absent on dorsal surface. A few multicellular hairs and unicellular trichomes are present on both dorsal and ventral surface of leaf (fig. 4).

The main part of the ground tissue of a leaf blade is differentiated as mesophyll characterized by an abundance of chloroplasts and a large intercellular spaces. The mesophyll tissue is made up of parenchyma cells, which are distinctly differentiated in to upper palisade parenchyma and lower spongy parenchyma. Upper palisade parenchyma composed of columnar, elongated compactly arranged two or more rows containing numerous chloroplast. While loosely arranged oval or spherical spongy parenchyma cells found below the lower epidermis, having abundant intercellular space with few chloroplast.

The midrib represents the large mid vein. The vascular system in leaf is commonly called veins and the pattern formed these veins, venation. Upper and lower epidermis layer continuous over the midrib which is followed by patch of collenchyma cells below the upper and above the lower epidermis. Vascular bundle is conjoint, collateral and closed type. Parenchymatous medulla represents the pith at the centre.

Fig. 1 Habit

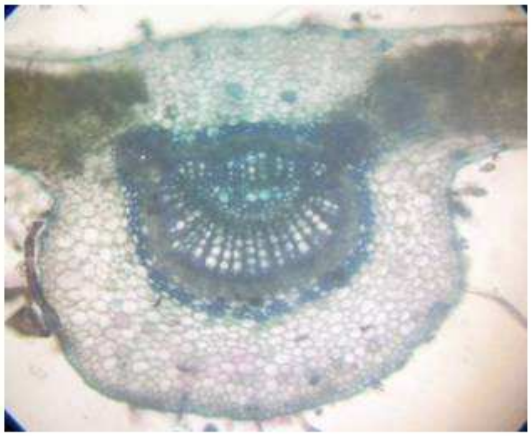


Fig. 2 T. S. of Leaf

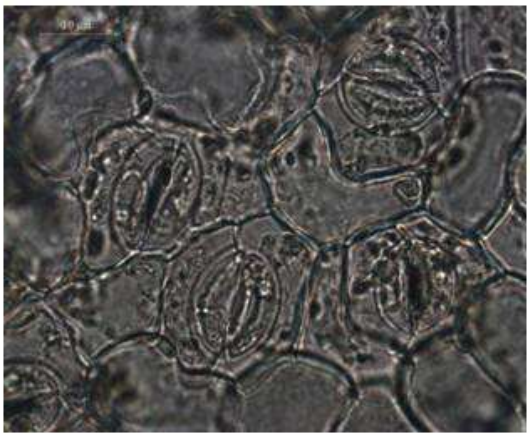


Fig. 3 Stomata

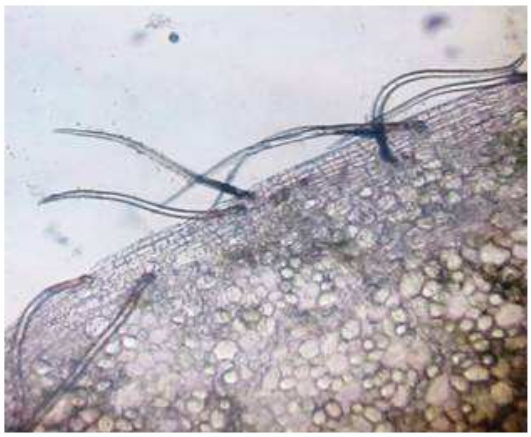


Fig. 4 Trichomes

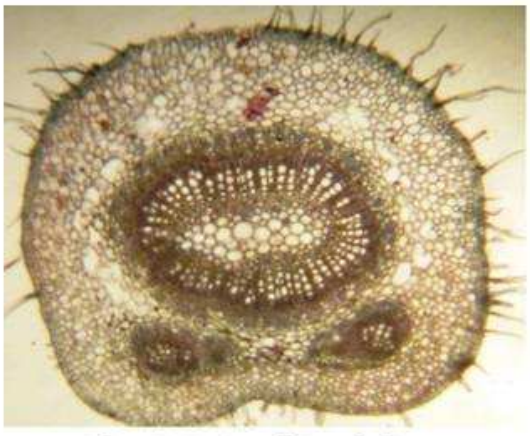


Fig. 5 T. S. of Petiole

b) Transverse section of Petiole (fig. 5)

Epidermis is single layer made up of tubular cells. Surface of petiole is covered by densely arranged unicellular and multicellular trichomes. Epidermis is followed by collenchymatous cells. Vascular bundle is conjoint collateral and closed type.

The pharmacognostic study revealed the purity of the sample. The study establishes the pharmacognostical and physico-chemical standards of the crude drug and helps to differentiate the plant sample from the adulterants. All the plants were found to contain various compounds after subjecting them to preliminary phytochemical composition test. Physicochemical parameter of plant showed in table no.1. Ash value is such a parameter by which purity of drug can be measured. Powder behavior and Fluorescence study of plant tabulated in table no. 2nd and 3rd respectively. Successive extraction of leaves made in Petroleum ether, Benzene, Chloroform, Acetone, Ethanol and aqueous. High amount of extract found in the Petroleum ether, Benzene and Chloroform as compare to the Acetone, Ethanol and aqueous solvent system (fig. 1). But the phytochemical screening analyze that the number of component extracted by the Acetone, Ethanol and aqueous solvent (Table No. 4). It reveals that presence of Phenol, Flavones, Tannin, Coumarin, Saponin, Xanthoprotein, Reducing sugar and glycosides in the leaves of *Antidesma ghaesembilla* Gertn.

The pharmacognostical standardization of *Antidesma ghaesembilla* Gertn., family phyllanthaceae [6]. They studied the microscopical, physicochemical, fluorences and preliminary phytochemical screening of the plant. They have find out diacytic type of stomata present on lower surface of leaf. Petroleum ether, alcohol and water used as successive extraction solvents which show presence of saponin, carbohydrates, glycosides, steroids, proteins, phenolic compounds, flavonoids, fats and oil. In present investigation leaf of *Antidesma ghaesembilla* Gertn. paracytic stomata have been find out on ventral surface of leaf. In preliminary phytochemical studies reveals presence of phenols, flavones, tannins, coumarins, saponins, xanthoprotein, reducing sugar and glycosides while absence of anthraquinones. Fluorescence analysis was done with different chemical reagents in different wavelength of light. Same method has been followed in present work using some similar chemical reagents with slight modification. Powder behaviour is one of the additional parameter studied in present investigation and find out the presence of tannin, alkaloid, cystein, xanthoprotein and oil.

The structure and ontogeny of stomata in some Euphorbiaceae [26]. They found stomata frequency, epidermal cells, stomata index, guard cell and epidermal cells with their length and breadth. *Antidesma ghaesembilla* Gaertn. is one of them. They found that presence of anomocytic type of stomata are perigenous and paracytic type are mesogenous and mesoperigenous on both surface of leaf. Stomatal index of lower surface is higher (24) than the upper surface (8). In present study the paracytic stomata found on ventral surface of leaf and stomata index is 32 respectively.

Preliminary Phytochemical determination of some botanical bark powders [27]. They have taken five different plants, *Antidesma venosum* Tull. is one of them; its bark showed presence of carbohydrate, glycoside, tannins and anthraquinones in bark of it. In present study candidate has taken leaf powder of *Antidesma ghaesembilla* Gaertn. for Phytochemical investigation. In leaves of *Antidesma ghaesembilla* Gaertn. where the presence of phenols, tannins, glycoside, saponins, reducing sugar, flavones, xanthoproteins and cumarins etc. whereas anthraquinone is absent in present study. It may be due to different plant parts and species has been taken by previous author. And present work the Petroleum ether, Benzene, and Chloroform extracts of plant material revealed the presence of coumarins, saponins, reducing sugar and glycosides. Acetone, Ethanol and Aqueous extracts revealed the presence of phenols, flavones, tannins, coumarins, saponins, xanthoproteins and reducing sugar. The study scientifically validates the use of plant in traditional medicine and it contributes to the development of standardized parameters of herbal drugs used in medicine. Hence the present study reveals morphological, microscopical and preliminary phytochemical investigations were undertaken.

Phytochemical screening, cytotoxicity, antioxidant capacity and antibacterial potentiality of methanol extract of *Antidesma ghaesembilla* Gertn. [7]. They have analyzed glycoside, tannin and resin in plant. Phytochemical investigation and antitumor activity of *Euphorbia hirta* Linn. [28]. They found that the ethanol, chloroform and petroleum ether extract of *Euphorbia hirta* Linn. Showed the positive tests for tannin, saponin, alkaloids and flavonoids. Comparative phytochemical screening was conducted between the ethanolic and methanolic extracts of Jatropha curcas and Jatropha gossypifolia in order to detect the presence of major class of chemical compounds [29]. They analyzed that presence of alkaloids, phenols, tannins, steroids and glycosides. In present work candidate followed successive solvent extraction method for phytochemical screening and find out some chemical compound from leaf of *Antidesma ghaesembilla* Gertn. It reveals that flavonoids, tannins, glycosides, reducing sugar, xanthoproteins, coumarins and saponins etc.

The comparative and multidisciplinary approach to the study of *Antidesma ghaesembilla* Gaertn. help in understanding their morphological, anatomical and medicinal importance in depth. Adulterants if any can be easily

identified using these investigations. To promote proper conservation sustainable use of such plant resources, awareness of local communities should be enhanced incorporating the traditional knowledge with scientific findings.

Table 1: Physical constants for leaves *Antidesma ghaesembilla* Gertn.

Total Ash	08%
Moisture content	69%
Dry weight	31%
Stomatal index	32
Vein islet number	80

Table 2: Powder behavior with different chemical reagents

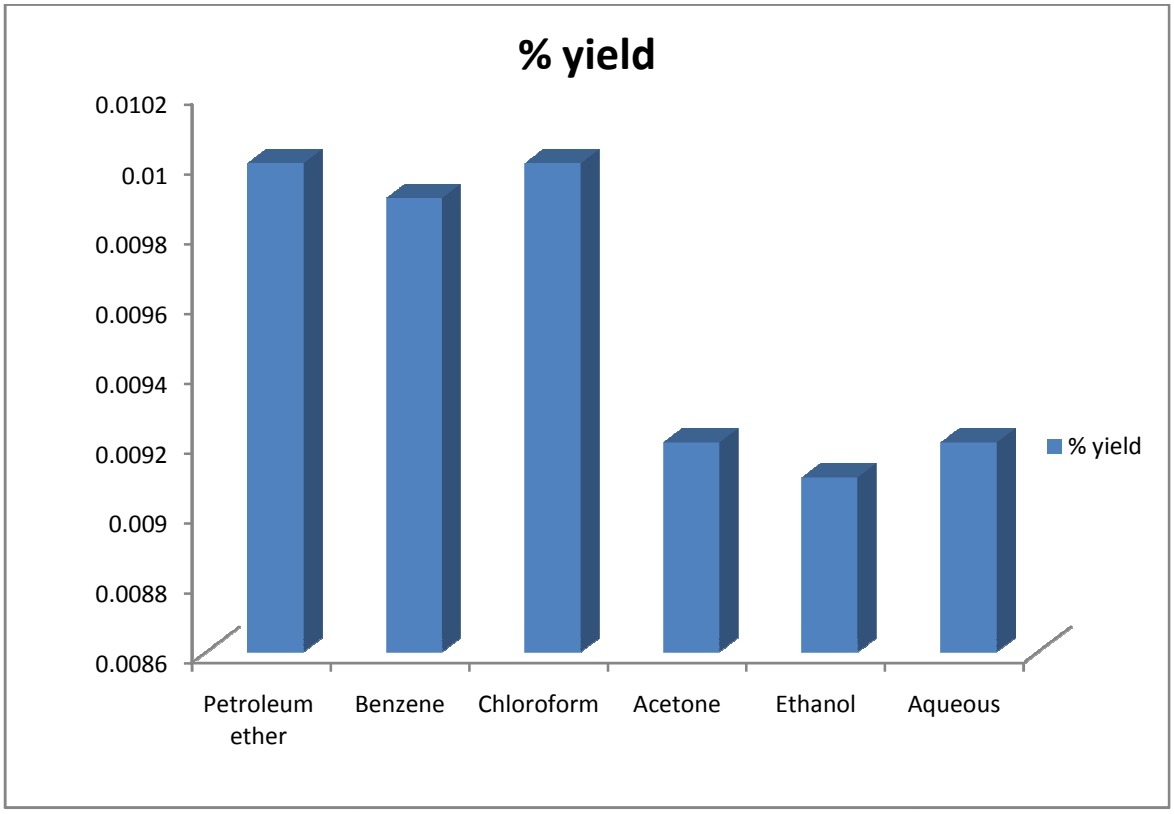
Sr. No.	Reagents	Colour / Behaviour	Inference
1	Powder as such	Apple green	-
2	Powder + 5% $FeCl_3$	Olive drab green	Tannin present
3	Powder + Picric acid	Sunglow yellow	Alkaloids Present
4	Powder + 5% Iodene	Apple Green	Starch Absent
5	Powder+40%NaOH+LeadAcetate	Brown	Cystiene Present
6	Powder+ Conc.HNO_3 +Ammonia	Orange Yellow	Xanthoprotein Present
7	Powder +Sudan III	Olive drab Green	Oil Present

Table 3: Fluorescence study of powder with different chemical reagent in Visible and U.V. light

Sr. No.	Powder with Chemical reagent	Visible light	Short wavelength	Long wavelength
1	Powder as such	Apple green	Asparagus green	Black
2	Powder + Distilled water	Apple green	Fern green	Black
3	Powder + 1N NaOH in D.W.	Seal brown	Phthalo green	Black
4	Powder + 1N NaOH in Alcohol	Chocklet brown	Dark olive green	Black
5	Powder + 10% HCL	Olive green	Forest green	Black
6	Powder + Conc. HCL	Olive green	Forest green	Black
7	Powder + Conc. HNO_3	Selective yellow	Yellow green	Black
8	Powder + Conc. H_2SO_4	Bole brown	Seal brown	Black
9	Powder + Acetone	Olive drab green	Apple green	Black
10	Powder + 5% KOH	Chocklet brown	Dark olive green	Black
11	Powder + 5% Iodine	Ecru brown	Fern green	Black
12	Powder + 5% $FeCl_3$	Sand brown	Fern green	Black

Table 4: Preliminary Phytochemical screening

Compound	P. ether	Benzene	Chloroform	Acetone	Ethanol	Aqueous
Phenols	-	-	-	+	+	++
Anthraquinones	-	-	-	-	-	-
Flavones	-	-	-	+++	+++	+++
Tannins	-	-	-	+	+	++
Coumarins	+	+	+	++	++	+++
Saponins	+	-	-	+	+	+
Alkaloids	-	-	-	-	-	-
Xanthoproteins	-	-	-	-	++	++
Reducing sugar	-	-	+++	++	+++	+++
Glycosides	+	+	+	-	-	-
oil	-	-	-	-	-	-
+++ High, ++ Moderate, + Slight, - Negative, P. ether- Petroleum ether						



Extractive values

REFERENCES

[1] B. J. R. Kumar P, C. P. Kiladi S, *Ethno. Leaf*., **2009**, 13, 1222-1231.
[2] World Health Organization. Quality control methods for medicinal plant materials. WHO Library, Geneva. **1998**, 1-115.
[3] R. K. Sindhu, N. Vasudeva, S. K. Shrma, *J. Herbal med. and Toxi*., **2010**, 4(2), 113-118.
[4] S. K.Sharma, Recent approach to herbal formulation development and standardization. http/pharmainfo.net, **2004**.
[5] S. P. Dhanbal, B. Suresh, E. Sheeja, E. Edwin, *Ind. J. of Nat. Prod*., **2005**, 21(1), 9-11.
[6] G. P. Devi, C. P. Chowdary, D. Prasanna, T. Damodar, Balreddy, Satish, R. Gupta, *J. Phar. Rese.*, **2012,** 5(4), 1942-1945.
[7] M. R. Habib, M. M. Rahman, K. Hamid, M.O. Raihan, M. A. Sayeed, *J. Adv. Nat. and App. Sci*., **2011**, 5(2), 69-74.
[8] http://www.fruitipedia.com/black_current_tree%20aantidesma_ghaesembilla.htm.
[9] K. C. Madhava, K. Sivaji, K. R. Tulasi, Flowering plants of Chitoor Dist. A.P. India. Students offset printers, Tirupati. First edition, **2008**.
[10] T. Pullaiah, D. A. Moulali, Flora of Andhra Pradesh (India). Jodhpur: Scientific Publishers, Vol-II, **1997**.
[11] A. Dey, J. N. De., *Life Sci. leaflets*. **2011**, 18, 690-694.
[12] R. Sinha, V. Lakra. *Ind. J. Trad. Know*., **2005**, 4(3), 246-252.
[13] S. Suksri1, S. Premcharoen, C. Thawatphan, S. Sangthongprow, *Kasetsart J. Nat. Sci*. **2005**, 39**,** 519-533.
[14] Theodore Cooke CIE. Flora of the presidency of Bombay, **1967**.
[15] M. R. Almeida. Flora of Maharashtra, Vol. IV; Orient Press, Mumbai; 1998, 279.
[16] S. R. Yadav, M. Sardesai, Flora of Kolhapur District. Shivaji University Press, Kolhapur, **2002**. 423.
[17] K. Esau, Anatomy of seed plants. Anand RK for Wiley Eastern private limited, J 41 South extension 1, New Delhi, **1959**.
[18] G. E. Trease, W. C. Evans, Pharmacognosy. Great Britain at the University press Aberdeen, **1972**.

[19] C. R. Chase, R. Pratt, *J. Am. Pharmacology Assoc*., **1949**, 38, 324-331.
[20] C. J. Kokoski, R. J. Kokoski, F. J. Slama, *J. Am. Pharm Assoc*. **1958**, 47, 715-717.
[21] K. R. Khandewal, Practical Pharmacognosy Techniques and experiments. Nirali Prakashan, Pune, **2005**.
[22] C. K. Kokate, Practical Pharmacognosy. Vallabh Prakashan, Pune, **2002**.
[23] C. K. Kokate, A. P. Purohit, S. B. Gokhale, Methods of crude drug evaluation pharmacognosy. Nirali Prakashan, Pune, **1995**.
[24] N. Raman, Phytochemical techniques. Publishing agency New India publications, New Delhi, 1st edition, **2006**.
[25] G. E. Trease, W. C. Evans, Pharmacognosy. 12th ed. English Language Book Society, Bailliere Tindall, London, **1985.**
[26] J. A. Inamdar, M. Gangadhara, www.biologiezentrum. **1978**, 19, 37-60.
[27] A. D. Mundi, A. Z. Umar, Y. M. Musa, R. S. Adamu, L. J.Bomayi, www. Patnsukjournal.net/currentissue (*PAT)* **2012**, 8(1), 91-101.
[28] S. B. Patil, C. S. Magdum, *European j. Exp. Bio*., **2011**, 1(1), 51-56.
[29] T. H. Nazeema, Girija, *European j. Exp. Bio*., **2012**, 2(2), 421- 426.