International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.10, pp 138-144, 2017

Pharmacognostical and Preliminary Phytochemical Evaluation of *Aegiceras corniculatum (L)*

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Abstract : The whole plant material of *Aegiceras corniculatum (L)* was collected and powedered. The powdered material was subjected to successive soxhlet extraction with petroleum ether (40-60°), chloroform, ethanol and finally macerated with water so as to get respective extracts. Physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value and sulphated ash value were determined which were 14.38, 8.12, 10.34 and 6.09% respectively. Moisture content, foreign organic matter, crude fibre content, alcohol soluble extractive and water soluble extractive were also determined. The percentage yield of petroleum ether, chloroform, ethyl acetate, ethanol and water were 5.7, 10.0, 5.5, 4.5 and 10.5% respectively. Preliminary phytochemical analysis of different extracts was carried out. The results were positive for glycoside, carbohydrate, sterols, flavonoids and phenolic compounds in petroleum ether extract. Chloroform extract showed positive test for tannins only, ethyl acetate extract showed positive test for sterols and saponins, ethanolic extract exhibited positive test for alkaloids, flavonoids, glycosides, tannins, amino acids and saponins whereas aqueous extract was found to be positive for flavonoids, alkaloids, carbohydrates, glycosides, amino acids and saponins. These secondary metabolites are the active constituents of *Aegiceras corniculatum (L)*. and may be responsible for its pharmacological activities.

Key words : *Aegiceras corniculatum (L)*, Pharmacognostic evaluation, Phytochemical analysis and Secondary metabolites.

Introduction:

Herbal drugs play an important role in health care programs especially in developing countries. Ancient Indian literature incorporates a remarkably broad definition of medicinal plants to be potential sources of medicinal substances [1]. For centuries, plant and plant products have been used for treating various illnesses. Today, several medicinal plants and their products are still in use, being employed as home remedies, over the counter drugs as well as raw materials for the pharmaceutical industry and they represent a substantial proportion of the global drug market [2]. However a key obstacle, which has hindered the acceptance of the alternative medicines in the developed countries, is the lack of documentation and stringent quality control. There is a need for documentation of research work carried out on traditional medicines [3]. Therefore it has become extremely important to make an effort towards standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise pharmacognostic studies [4]. These studies help in identification and authentication of the plant material. Correct identification and quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy [5].

Aegiceras corniculatum, commonly known as Black Mangrove, River Mangrove or Khalsi, is a species of shrub or tree mangrove in the Myrsine family (or Primrose family) with a distribution in coastal and estuarine areas ranging from India through South East Asia to southern China, New Guinea and Australia. *Aegiceras corniculatum* grows as a shrub or small tree up to 7 m high, though often considerably less. Its leaves are alternate, obovate, 30–100 mm long and 15–50 mm wide, entire, leathery and minutely dotted. Its fragrant, small, white flowers are produced as umbellate clusters of 10–30, with a peduncle up to 10 mm long and with pedicels 10–18 mm long. The calyx is 2–4 mm long and corolla 4–6 mm long. The fruit is curved and cylindrical or horn-shaped, light green to pink in colour and 20–75 mm long. It grows in mud in estuaries and tidal creeks, often at the seaward edge of the mangrove zone. *Aegiceras corniculatum* extract has analgesic properties [6-10]. The present study was designed to investigate the pharmacognostic and phytochemical properties of *Aegiceras corniculatum (L)*

Materials and Methods

Collection of plant material and authentication:

Aegiceras corniculatum (L) was collected from the tribal belts of the local area of Kanniyakumari district, Tamilnadu, India. The plant was identified, confirmed and authenticated by Dr. Madhava Chetty, Assistant Professor, Department of Botany, Sri Venkateswara University, Andhrapradhesh. After authentification the whole plant of *Aegiceras corniculatum (L)* were collected in bulk and washed under running tap water to remove adhering dirt. Then leaves were shade dried. The dried materials were made into coarse powder by grinding in mechanical grinder and stored in a closed air tight container for further use.

Microscopic study

Microscopy of plant material is performed to distinguish it from the allied drugs and adulterant. The dried leaf was soaked overnight in water to make it smooth enough for transverse section. Paraffin wax embedded specimens were sectioned using the rotatory microtome. The thickness of section was 10-12 µm. Very fine section was selectively subjected to staining reaction with staining reagent safranin one precent solution and light green 0.2% solution. Slides were cleaned in xylol and mounted in mountant (DPX). Photomicrographs were taken using trinocular microscope [11-14].

Powder studies

Microscopic study

The shade dried plant material were mechanically pulverized to coarse powder and sifted through 40 mesh sieve. Take a pinch of powder was taken on slide and mounted with phloroglucinol, hydrochloric acid and glycerine. Slide was seen under microscope.

Determination of physicochemical parameters [15-18]:

The dried plant material was subjected for determination of physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, moisture content, pet ether soluble, chloroform soluble, ethyl acetate soluble, alcohol soluble extractive and water soluble extractive, Crude fiber content, Loss on drying, Swelling index, Foaming index, Tanins contents, Bitterness value, and Haemolytic value.

Extraction of powdered plant material:

The shade dried powdered plant material was subjected to sequential soxhlet extraction using the solvents of different polarity such as petroleum ether (40-600), chloroform, ethyl acetate, ethanol and finally macerated with water so as to get respective extracts. Cold maceration was also done using ethanol and water. The extracts were filtered individually, evaporated to dryness and the percent yields of all the extracts were determined. All the extracts were then stored in a refrigerator till further analysis.

Preliminary phytochemical analysis:

Preliminary qualitative phytochemical analysis of all the extracts was carried out by employing standard conventional protocols.

Results and Discussion:

Microscopic features:

Anatomy of the Leaf:

The leaf is smooth and even on both surfaces the midrib is alternate, obovate, 30–100 mm long and 15–50 mm wide, entire, leathery and minutely dotted. The midrib has a thick adaxial epidermis layer of circular cells with thick warty cuticle.

These are one or two layers of the epidermal cells are also circular ,highly thick walled compact. A thin layer of palisade mesophyil cells is horizontally traus current along the adaxial side of the midrib. The adaxial epidermal cells are comparatively smaller but they are highly thick walled and possess thick, undulate cuticular surface

The ground tissue includes one or two subepidermate layer of cullenchyma cells and the remaining tissue includes large angular, thin walled and compact parenchyma cells

The vascular strand is single and shallow are shaped. It is collateral and consists of several short rows of xylem elements. The xylem cells are wide angular and thick walled. Phloem occurs in small or three celled limits along in lower surface of the xylem are. The vascular strand is 300µm wide and 150µm thick

Epidermis of the Lamina

The adaxial epidermis of the lamina consists of polyhedral cells with straight, fairly thick walls, The Epidermis is Apostomatic (without Stomata)

Adaxial epidermis

The Adaxial epidermis is Stomatiforoum. The Stomata are dense and are random in distribution. The Stomata are exclusively paracytic type. Each stomata has a pair of parallel subsidiary cells , one either side of the guard cells

The guard cells are Elliptical in shape and are 10 x20 µm in size. The antielail walls of the epidermal cells are thick and straight . The cuticular striations are feebly visible on the surface epidermal cells

Powder Characteristics

Venation Pattern:

The leaflet exhibits well defined reticulate venation . The Veinislets has thickly coated and straight foundares of veins.

The islets are rectangular, squarish or polygonal in out line. The Vein-Termination are well expressed and prominent. Almost all islets have one occasionally two termination are dendroid in outline

Epidermal Trichomes:

Non Granular covering type of Epidermal Trichome are abundant along the leaf margin and scarcely distributed on the lamina the Trichomes are unicellure and un-branched . They are acicular is shape and are mostly lopsided or curved horizontally. The trichomes measures 350µm inlength and 15 µm thicknes

Crystal Distribution:

Calcium oxalate crystals are fairly comman in the lamina. They are resticted to the cells fordeing the veins. The crystals are pragmatic type; they are eufoidal or rhom foidal in shape

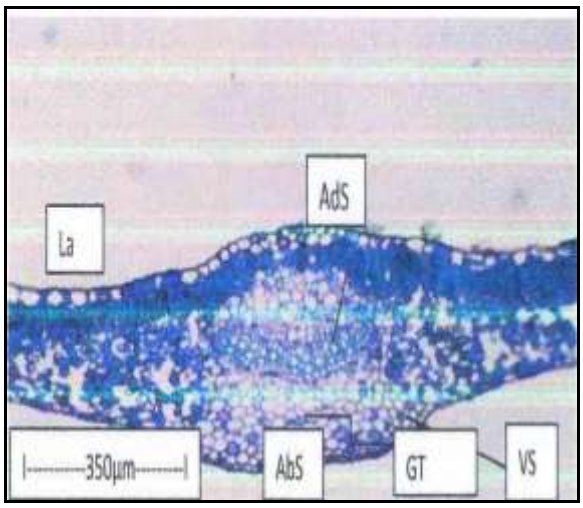

Fig.No 1: T.S of Leaf through midrib Adaxial epidermis

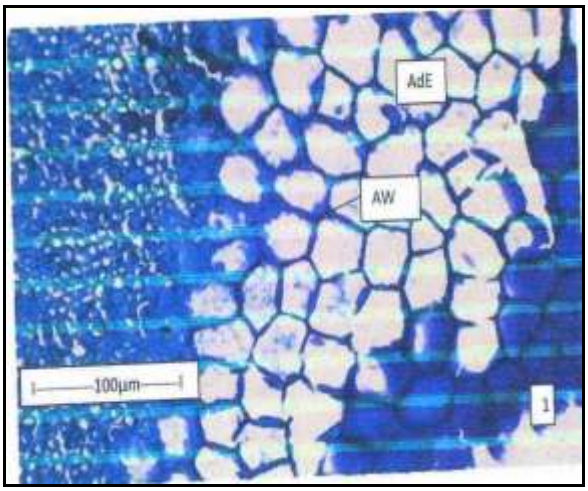

Fig.No 2: Adaxial epidermis

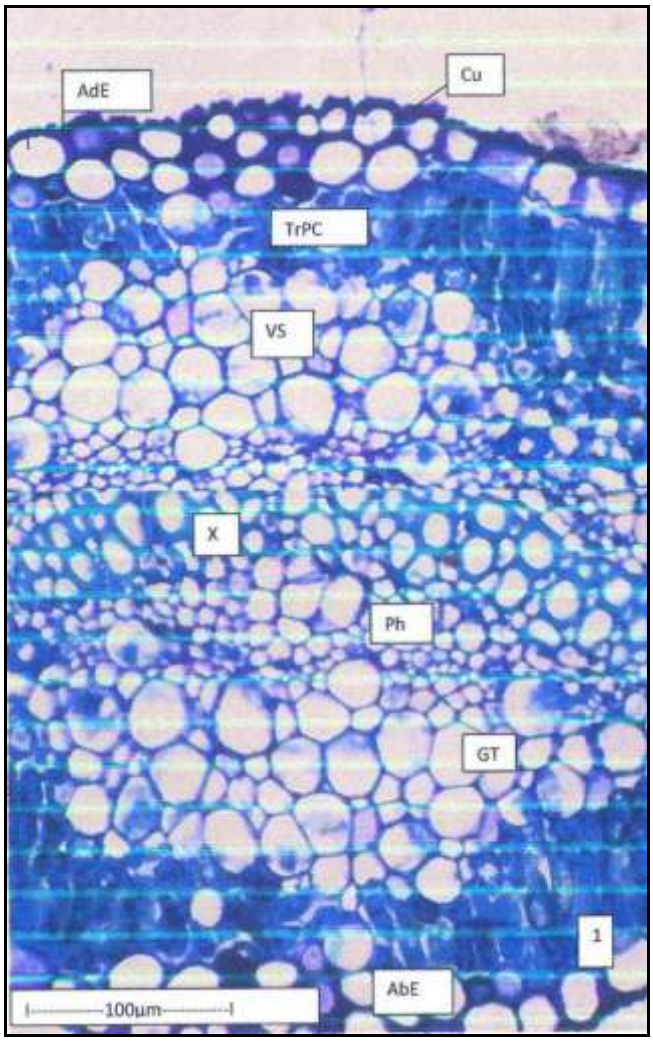

Fig.No 3: Epidermis of the Lamina

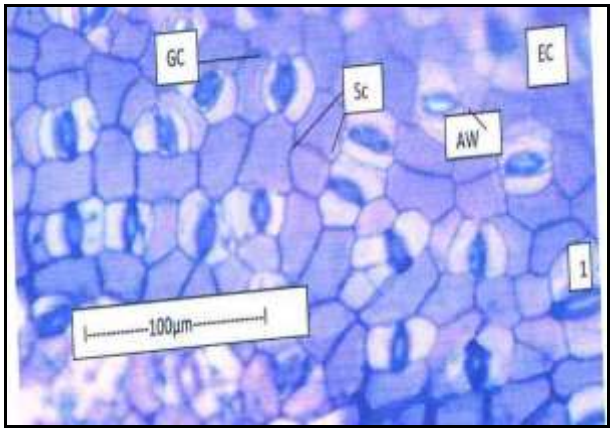

Fig.No 4: The Epidermis Stomata

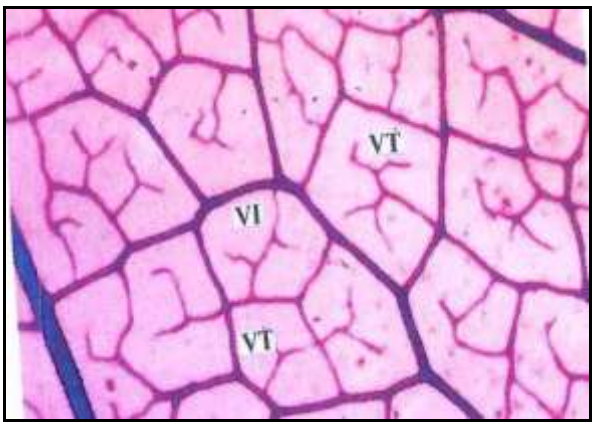

Fig.No 5: Venation Pattern islet

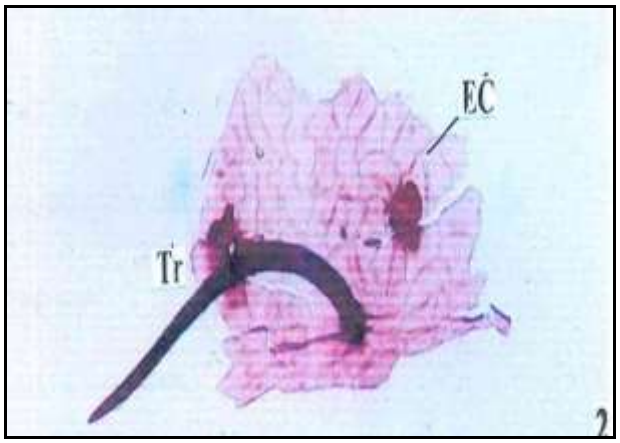

Fig.No 6: Epidermal Trichome

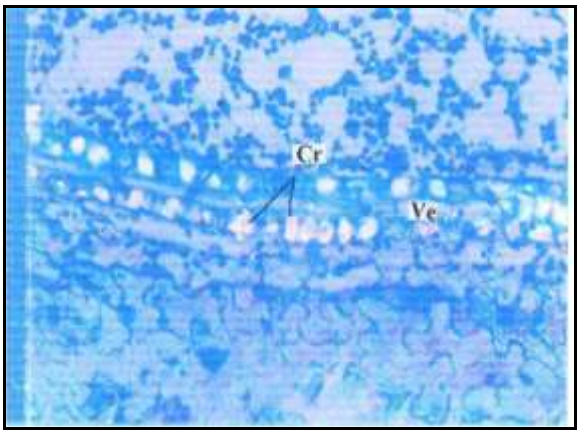

Fig.No 7: Calcium Oxalate

Abe: abaxiul epidermis; Ade: adaxial epidermis; Ads: adexial side; Ep: epidermis; Gt: ground tissue; La: lamina; Mr: midrib; Ph: phloem; Lv: latrial vein; Pm:palisade mesophill; Sm: spongy mesophyll; Sc: scllerenchyma; X: xylem AW- Arlicliral walls, EC- Epidermal Cell, GC –Guard Cells, SC- Subsidaiary Cells

Table No 1: Total ash, water soluble ash, acid insoluble ash and sulphated ash of aerial plant parts of the powder

S. No.	Ash	Percentage in AC
1	Total ash	14.38
2	Water soluble ash	8.12
3	Acid insoluble ash	10.34
4	Sulphated ash	6.09

Table No 2: Extractive values of roots powder with various solvents

S. No.	Solvent	Extraction period (h)	AC Extractive values (%) w/w
1.	Petroleum ether (60-80°C)	24	5.7
2.	Chloroform	24	10.0
3.	Ethyl acetate	24	5.5
4.	Ethanol	24	4.5
5.	Aqueous	24	10.5

Table No 3: Crude fiber content, Loss on drying, Swelling index, Foaming index, Tanins contents, Bitterness value, Haemolytic value.

S. No.	Parameter	Observation in AC
1.	Crude fiber content	9.45 %
2.	Loss on drying	14 %
3.	Swelling index	No significant result
4.	Foaming index	No significant result
5.	Tannins	22
6.	Bitterness value	1.9 unit / g
7.	Haemolytic activity	23.45 %

The Total ash; water insoluble ash; sulphated ash; and acid insoluble ash (14.38%, 8.12%, 10.34%, and 6.09%). Extracting values, i.e. petroleum ether (PE); chloroform (CF); ethyl acetate (EA); ethanol (ET) and aqueous extract (5.7%, 10.0%, 5.5%, 4.5%, and 10.5%). The fiber content was found to be 9.45%. Plant bitterness was found to be 1.9 unit / g. The plant also has hemolytic potential. The tannin content was found to be 22.

Table 5.2: Preliminary phytochemical screening of *Aegicras corniculatum (L)*

Sr. No	Plant Constituents Test / Reagent	Pet. Ether extract	Ethyl acetate extract	Chloroform extract	Ethanol extract	Aqueous extract
1.	**ALKALOIDS**					
	Mayer's reagent	+	-	+	+	-
	Dragendroff's reagent	+	-	+	+	-
	Wagner's reagent	+	+	+	+	-
2.	**GLYCOSIDES**					
	Killer-Killani test	-	-	-	-	-
	Sodium nitropruside	-	-	-	-	-
	test	-	+	-	+	-
3.	**CARBOHYDRATES**					
	Molisch's reagent	-	-	-	+	+
	Fehling solution	-	-	-	+	+
4.	**STEROLS**					
	Liebermann-	-	-	-	+	-
	Burchard's test	-	-	-	-	-
	Salkowski test	+	-	-	+	-
	Hesses reaction	-	-	-	-	-
	Hersch reaction					
5.	**SAPONINS**					
	Foam test	-	-	-	+	-
	Sodium bicarbonate test	-	-	-	+	-
6.	**PHENOLIC COMPOUNDS & TANNINS**					
	Ferric chloride solution					
	Lead acetate solution	-	-	-	-	-
7.	**PROTEINS & AMINO ACIDS**					
	Biuret test					
	Millon's reagent	-	-	-	+	-
	Ninhydrin reagent	-	-	+	+	-
8.	**FLAVANOIDS**					
	Shinoda/Pew test	-	-	-	+	-
	Ammonia test	-	-	-	+	-

+ve : Detected; –ve : absent

The preliminary phytochemical investigations of various extracts of *Aegicras corniculatum (L)* were studied. The results were positive for glycoside, carbohydrate, sterols, flavonoids and phenolic compounds in petroleum ether extract. Chloroform extract showed positive test for tannins only, ethyl acetate extract showed positive test for sterols and saponins, ethanolic extract exhibited positive test for alkaloids, flavonoids, glycosides, tannins, amino acids and saponins whereas aqueous extract was found to be positive for flavonoids, alkaloids, carbohydrates, glycosides, amino acids and saponins. These secondary metabolites are the active constituents of *Aegicras corniculatum (L)* and may be responsible for its pharmacological activities.

Conclusion:

Aegiceras corniculatum (L) powder was subjected for preliminary Pharmacognostic standardization including phytochemical screening. The present investigation adds to the existing knowledge of *Aegiceras corniculatum (L)* and will be quite useful for development of a formulation for treating various ailments.

Reference:

1. Shankar D. and Ved D.K. (2003). Indian Forester. 129, 275-288.
2. World Health Organization Geneva, Quality control methods for medicinal plant materials, Type set in Hong kong, Printed in England, ISBN 92 415 45100 (NLM classification QV 766).
3. Dahanurkar S.A., Kulkarni R.A. and Rege N.N. (2000). Ind.J. Pharmacol., 32 ; 81-118.
4. Ozarkar K.R. (2005). Studies on antiinflammatory effects of two herbs Cissus quadrangularis Linn. andValeriana wallichi DC using mouse model. Ph.D. Thesis, University of Mumbai, Mumbai.
5. Thomas S., Patil D.A., Patil A.G. and Naresh Chandra, (2008). Pharmacognostic evaluation and physicochemical analysis of Averrhoa carambola L. fruit. J of Herb Med and Toxicol. 2(2), 51-54.
6. llison, J.; Koedam, N.E.; Wang, Y.; Primavera, J.; Jin Eong, O.; Wan-Hong Yong, J. & Ngoc Nam, V. (2010). "*Aegiceras corniculatum*". IUCN Red List of Threatened Species. Version 2013.2. International Union for Conservation of Nature. Retrieved 3 May 2014.
7. "*Aegiceras corniculatum*". PlantNET - New South Wales Flora Online. Royal Botanic Gardens & Domain Trust. Retrieved 2010-05-20.
8. "*Aegiceras corniculatum*". FloraBase. Department of Environment and Conservation, Western Australia. Retrieved 2010-05-20.
9. Roome, Talat; Dar, Ahsana; Naqvi, Sabira; Choudhary, M. Iqbal (2011). "Evaluation of antinociceptive effect of *Aegiceras corniculatum* stems extracts and its possible mechanism of action in rodents". Journal of Ethnopharmacology. 135 (2): 351–8. doi:10.1016/ j.jep. 2011.03.025. PMID 21419211
10. Gupta PC, Sharma N, Rao ChV. Pharmacognostic studies of the leaves and stem of Careya arborea Roxb. Asian Pac J Trop Biomed. 2012;2(5):404-8.
11. Azajudin, Saraf Sailendra. Evaluation of physiochemical and phytochemical properties of safoff-E-Sana, a Unani polyherbal formulation. Pharmacognosy Res. 2010; 2(5):318-322
12. Liu WR, Qiao WL, Liu ZZ, et al. (2013). *Gaultheria*: Phytochemical and pharmacological characteristics. Molecules 18:12071–108
13. Okhale SE, Amanabo MO, Jegede IA, et al. (2010). Phytochemical and pharmacognostic investigation of antidiabetic *Scoparia dulcis* Linn Scrophulariaceae whole plant grown in Nigeria. Researcher 2:7–16
14. Singh A, Saharan VA, Bhandari A. (2013). Pharmacognostic standardization with various plant parts of *Desmostachya bipinnata*. Pharm Biol 52:298–307
15. Prajapati DN, and Purohit SS (2003). Agro's color atlas of medicinal plants. Agrobios India: New Delhi.
16. Dobelis NI, Ferguson, James D, and Rattray D. Magic and medicine of plants. Pleasantville: NewYork, 1986
17. Ayitey SE and Addae ML. Phytochemical nutritional and medical properties of some leafy vegetables consumed by Edo people of Nigeria. J.Pharmacol.Drug Res, 1977, 4:7- 8.
18. Maobe MAG, Gatebe E, Gitu L and Rotich H. Preliminary phytochemical screening of eight selected medicinal herbs used for the treatment of diabetes, malaria and pneumonia in Kisii region, southwest Kenya, European journal of applied sciences, 2013, 5(10) : 01-06.

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