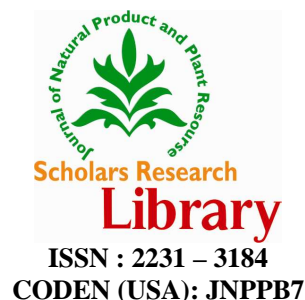




Scholars Research Library

J. Nat. Prod. Plant Resour., 2011, 1 (4):20-26
(<http://scholarsresearchlibrary.com/archive.html>)



Pharmacognostic, Phytochemical and Physiochemical Studies of *Atrocarpus hetrophyllus* leaf (Moraceae)

*Rashmi Solanki, Anshita Gupta, Atul Tripathy, Deependra Soni, Goutam Kumar Jana.

Department of Pharmacognosy, Gayatri College of Pharmacy, Jamadarpali, Sambalpur

ABSTRACT

The present study mainly focuses on the ethnomedicinal importance of Atrocarpus hetrophyllus by the regional tribes of Orissa state, India. The selected plant was reported to have wide ethnomedicinal use. The literatures revealed that there is lack of scientific reports on its leaf. So it is important to provide scientific means in a systematic manner. The Microscopic study revealed the presence of Upper Epidermis, Mesophyll, Upper Palisade, Spongy Parenchyma, Parenchymatous cells having intracellular space. Lower Epidermis, Midrib, Vascular bundle, Collenchyma, Cortical parenchyma. The powder microscopy of the plant stated about the presence of Annular vessel, Cluster crystals, Medullary rays, Gramineous stomata. The Phytochemical analysis of the plant has stated about the presence of alkaloids, proteins, tannins, flavanoids etc. The ethnomedicinal documentation confirms about the potent activity of the leaf part of Atrocarpus hetrophyllus.

Keywords: Ethnomedicinal, Parenchymatous cells, Annular Vessels, Collenchyma, Fluorescences Analysis.

INTRODUCTION

The plant *Atrocarpus hetrophyllus* belonging to the family Moraceae is a tropical evergreen plant of its own kind. There are various polyherbal preparations present in the market which contain *Atrocarpus hetrophyllus* as a chief constituents due to its versatility in treating different disorders.[1] The plant shows various medicinal properties and its phytochemical analysis shows that it has various phytoconstituents like alkaloids, tannins, fixed oils, proteins, phytosterols, etc. The Plant is applied for treatment of diarrhoea, antipyretic, Analgesic, chronic jaundice, fever,

headache and inflammation. Whole plant is anthelmintic, expectorant, tonic and used in the treatment of Cancer diseases. [2]The Bark paste is also used in treatment of broken bones and wounds. The Bark paste with other plant paste is used in cardiac treatment.[3]The *Artocarpus heterophyllus* lam. has been documented as a potent agent for the treatment of convulsions and neurodegenerative disorders.

MATERIALS AND METHODS

Plant Material- The leaf of the plant *Artocarpus heterophyllus* was collected from Sambalpur district Orissa, in the month of may 2010.It was further identified and authenticated by the Botanical Department, Government Womens College, Sambalpur, Orissa. Some voucher specimen numbers were submitted to the authority for future references.

Extraction Procedure- The leaf plant parts were dried in shade and powdered to get a coarse powder. About a significant amount of dry coarse powder was extracted with ethanol (40-60⁰C) by continuous hot percolation using soxhlet apparatus. The ethanol extract was filtered and concentrated to a dry mass by using vacuum distillation.[4] A deep green viscous residue obtained having characteristic odour. Further the solvents were evaporated to dryness.

Macroscopic study:

The fresh plant was taken for various macroscopic organoleptic evaluation like colour, odour, size, shape, taste, appearance, texture, fracture etc.

Microscopy Study:

Qualitative microscopic evaluation was carried out by taking transverse sections of fresh Leaf Extract of *Artocarpus heterophyllus*. The thinnest section was selected and cleared by boiling with chloral hydrate solution for 20mins and then carefully stained with phloroglucinol and HCl (1:1).[5,6] Then mounted on a slide and a cover slip was placed over it and observed the different histological characters.

Physicochemical parameters:[7]

The determination of various physicochemical parameters such as total ash, acid insoluble ash, water soluble ash, water soluble extractive value, alcohol soluble extractive value, swelling index, foaming index, moisture content, ash value, pH were calculated as per Indian Pharmacopoeia.

Preliminary phytochemical screening of Leaf Extract of *Artocarpus heterophyllus*:

For preliminary phytochemical screening, 100 g of powder drug was extracted with Ethanol.[8] The mother extract obtained from successive solvent extraction were then subjected to various qualitative chemical tests to determine the presence of various phytoconstituents like glycosides, tannins, phytosterols, fixed oils and fats, proteins and amino acids, flavonoids, saponins, gums and mucilages etc.[9]

RESULTS AND DISCUSSION

Macroscopy of Leaf Extract of *Atrocarpus hetrophyllus*:

The macroscopic character were always served as useful keys in faster and early identification of plant material and also serves as an important standardization parameter. The macroscopic features of Leaf Extract of *Atrocarpus hetrophyllus* are described here. The organoleptic evaluation is discussed in Table1.

Microscopy Of T.S. of Leaf Extract of *Atrocarpus hetrophyllus*:

T.S. of Leaf-A transverse section of rhizome showed the presence of following histological characters.[Figure-1]

- Upper Epidermis- Single layer of polygonal parenchymatous cell.covered with smooth cuticle.
- Mesophyll
- Upper Palisade-Single layer of parenchyma covering the 2/3rd of the lamina
- Spongy Parenchyma- Parenchymatous cells having intracellular space.
- Lower Epidermis-It is likely similar to the upper epidermis but the cell are smaller than the upper epidermis
- Midrib
- Vascular bundle
- Collenchyma
- Cortical parenchyma

Powder Microscopy Observations:

During the powder microscopic Study of leaf of *Atrocarpus hetrophyllus* following observations were observed like Annular vessels, Cluster crystals, Medullary rays, Gramineous stomata.[Figure-2]

Phytochemical Analysis of Leaf Extract of *Atrocarpus hetrophyllus*:

The powder drug with different chemical reagents show different color when seen on naked eye. The different colour observed shows presence of different type of phytoconstitue. Many drugs fluorescence when their powder is exposed to ultraviolet radiation. It is important to observe all materials on reaction with different chemical reagents under U.V. light. The fluorescence characteristics of powdered drug were studied under U.V. light after treating with different chemical reagents are reported. The extract was subjected to different qualitative chemical tests. The presence of various phytoconstituents were observed during the test. Theses test were carried out over the aqueous extract. The data obtained is specified in[Table no.2,3,5]

Physicochemical parameters:

The determination of physico-chemical parameter is important in determination of adulterants and improper handling of drugs. Table- 4 shows the result of various physico chemical parameter of powdered drug carried out using standard methods. Moisture content of drugs could be at minimal level to discourage the growth of bacteria, yeast or fungi during storage. Ash values used to determine quality and purity of crude drug. It indicates the presence of various impurities like carbonate, oxalate and silicate.

Table1: Organoleptic Evaluation of Leaf Extract of *Atrocarpus hetrophyllus*

S.No.	Organoleptic Parameters	Result
1.	Colour	Green
2.	Odour	Characteristic
3.	Taste	Slightly Bitter

Table 2: Powder Analysis With Chemical Agents

Reagents	Colour observed
Powder as such	Slide green
Powder + Concentrated HCL	Brick red
Powder + Concentrated HNO ₃	Brick red
Powder + Concentrated H ₂ SO ₄	Redish brown
Powder + Glacial acetic acid	Blackish green
Powder + 5% NaOH solution	Redish Brown
Powder + 5% KOH solution	Redish Brown
Powder + 5% Ferric chloride solution	Greyish green
Powder + Picric acid	Yellowis green
Powder + Ammonia	Wine red

Table 3: Fluorescence Analysis Of Powdered Drug

Reagents	Fluorescence Observed
Powder as such	Slight Green
Powder + 1N NaOH in methanol	Dark Green
Powder + 1N NaOH in water	Green
Powder + 50% Hydrochloric acid	Yellowish Green
Powder + 50% Sulphuric acid	Slightly Green
Powder + 50% Nitric acid	Faint Green
Powder + Petroleum ether	Faint Green
Powder + Chloroform	Light Green
Powder + Picric acid	Yellow
Powder + 5% Ferric chloride solution	Greenish brown
Powder + 5% Iodine solution	Dark Green
Powder + Methanol	Green
Powder + (HNO ₃ + NH ₃)	Green

Table 4: Physical Evaluation Parameters

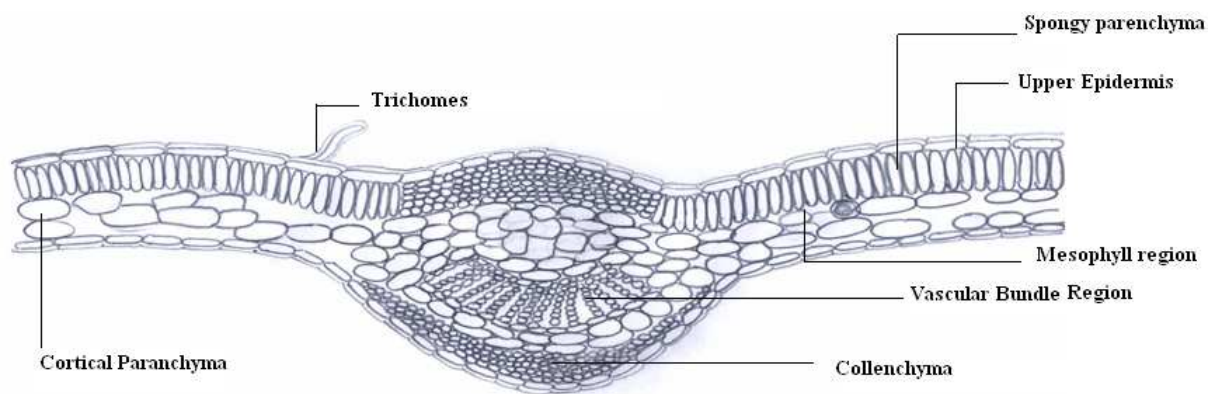
Sl. No.	Parameter	Values (%) (w/w)
1.	Loss on Drying	18.8
2.	Extractive Values	
	A. Water soluble extractive	5.8
	B. Carbinol soluble extractive	5.4
	C. PetEther soluble Extractive	1.6
	D. Benzene soluble Extractive	1.6
	E. Chloroform soluble Extractive	3.6
3.	Swelling Index	5.4
4.	Ash Value	3.4

Table 5: Report of Chemical Test of Leaf Extract of *Atrocarpus Hetrophyllus*

PLANT CONSTITUENTS TEST/REAGENT USED	POWDERED DRUG	ETHANOLIC EXTRACT
TEST FOR CARBOHYDRATES		
Molisch's Test	–	+
Fehling's Test	–	–
Benedict's Test	–	–
Barfoed's Test	–	–
Test for Starch	–	–
TEST FOR GUMS & MUCILAGE	+	–
TEST FOR PROTEINS & AMINO ACIDS		
Ninhydrin Test	–	–
Biuret Test	–	–
Millon's Test	+	+
Xanthoproteic Test	–	–
Tannic Acid (10% w/v)	+	+
TEST FOR FIXED OILS & FATS		
Spot Test	–	–
Saponification Test	–	–
Salkowski's test	-	-
Liebermann burchad's test	–	–

TEST FOR ALKALOIDS	POWDERED DRUG	ETHANOLIC EXTRACT
Dragendroff's Test	+	+
Mayer's Test	+	+
Wagner's Test	+	+
Hager's Test	+	+
Tannic Acid	+	+
Legal's Test	–	–
Baljet's Test	–	–
Borntrager's Test.	–	–
Keller-Killiani's Test	–	–
Liebermann's test	+	+
Salkowski's test	-	-
Liebermann burchad's test	–	–
PLANT CONSTITUENTS TEST/REAGENT USED	POWDERED DRUG	ETHANOLIC EXTRACT
FeCl ₃ Test	+	+
Fluorescence Test	+	+
Reaction with alkali and acid	–	–
5% FeCl ₃ solution	–	–
Reaction with copper sulphate	+	+
Reaction with lead acetate	+	+
Reaction with Potassium dichromate	–	–
Drug + K ₃ Fe(CN) ₆ + NH ₃	-	–

The acid insoluble ash consist mainly silica and indicate contamination with earthy material. The water soluble ash is used to estimate the amount of inorganic elements present in drugs. The extractive values are useful to evaluate the chemical constituents present in the crude drug and also help in estimation of specific constituents soluble in a particular solvent



T.S. of Leaf Of *Atrocarpus hetrophyllus*

Figure .1

'-' indicates absence, '+' indicates presence.

Figures of Microscopic Study Of Atrocarpus hetrophyllus Leaf

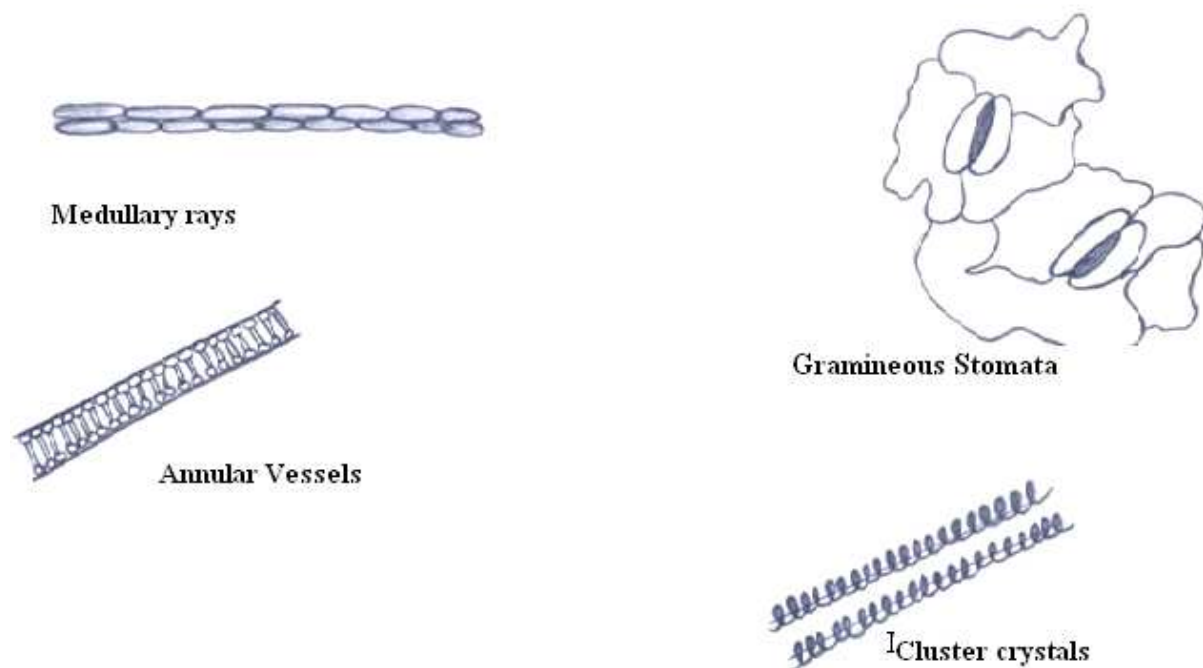


Figure.2.

CONCLUSION

The Phytochemical analysis of the plant has stated about the presence of alkaloids, proteins, tannins, flavanoids etc. The ethanomedicinal documentation confirms about the potent activity of the leaf part of *Atrocarpus hetrophyllus*. The dietary consumption of this plant not only provides

protein carbohydrates and essential amino acids to our body as well as also gives a remarkable taste. The plant is blessed with immense potent activities in combating different types of diseases the requirement is to explore it the most for its active constituents and further more regarding its mode of action and structural analysis so that a better and more advanced formulation can be prepared for the main stream administration of the drug.

Acknowledgement

Authors are thankful to the all the members of department of Pharmacognosy, Gayatri College of Pharmacy, Sambalpur, Orissa, for their co-operation during the whole research work. Authors are also thankful to B.B.Mallick, H.O.D, Department of Botany, Government Womens College, Sambalpur, Orissa for authentication and identification of this plant.

REFERENCES

- [1] Om Prakash, Rajesh Kumar, Anurag Mishra, Rajiv Gupta; *Phcog Rev.* 2009; 3(6), 353-358.
- [2] A.M. Buddhika Priyadarshani, E.R. Jansz and H. Peiris, *J.Natn. Sci. Foundation Sri Lanka* **2007** 35(4): 259-262
- [3] A.P.Jain, M.V.Tote, N.B.Mahire, V.R.Undale, A.V.Bhosale; *Journal of Pharmacy Research*; **2009**, 2(6), 1004-1007
- [4] Sailor Girish U, Ghanshyam Parmar, Ashvin V.D., N.R.Seth, A.K.Seth; *International Journal Of Pharmaceutical Research* ; **2010**;1(2),14-21.
- [5] Priyanka Ingle And Arvind Dhabe; *Pharmacognosy Journal* ; **2011** ; 20(3) ,63-65.
- [6] Ashish J. Modi, S. S. Khadabadi¹, I.A.Farooqui², S.L.Deore¹ ; *Argyreia Speciosa Linn.F. : International Journal Of Pharmaceutical Sciences Review And Research* ;**2010**; 2(2); 14-21.
- [7] Sandhya S, Chandrasekhar J, David Banji, Rao KNV; *Archives of Applied Science Research*, **2010**, 2 (5):414-421
- [8] Sandhya S, Sudhakar K, David Banji, Rao KNV; *Annals of Biological Research*, **2010**, 1 (4) : 85-94.
- [9] Surendra Kr Sharma, Naveen Goyal; *Der Pharmacia Lettre*, **2010**, 2(5): 308-315