Ethnobotanical Studies and Phytochemical Analysis of *Flemingia strobilifera* (L.) W.T.Aiton of Jorhat, Assam, India.

Kalyan Das

Assistant Professor, Department of Botany, J.B. College (Autonomous), Jorhat- 785001, Assam, India.

Corresponding Author Email: mekalyandas@rediffmail.com

ABSTRACT

The present study deals with ethnobotanical and phytochemical analysis Flemingia strobilifera (L.) W.T.Aiton of Jorhat, Assam, India. Ehnobotanical study reveals that the plant is used by different ethnic communities of study site to cure various ailments including tuberculosis, epilepsy, diarrhea and dysentery, hysteria, insomnia, rheumatism and to relieve in other body pain etc. Preliminary phytochemical screening of leaf and root exhibit positive test for different phytoconstituents like tannin, phenols, flavonoids , alkaloidas , terpanoids, saponins, amino acids etc. Total phenol and flavonoid contents in Leaf is 21.36 mg/g, gallic acid equivalent and 11.07 mg/g, quercetin equivalent respectively and in root it is 29.68 mg/g, gallic acid equivalent and 12.19 mg/g, quercetin equivalent respectively.

Key words: *Flemingia strobilifera,* Ethnomedicine, phytochemicals, Jorhat, Assam.

I. INTRODUCTION

Man is using lots of plants as drugs in curing diseases or to relieve physical sufferings since the earliest times. The use of various plants as drugs can also be obtained from the earliest literature written in Sanskrit, Hebrew and Greek etc. The medicinal value of drug plants is mainly due to the presence of some chemical substance or substances in the tissues. Phytochemical investigations are most important chemical as well as biological investigation in modern day plant research. It helps us to know about the presence of various chemical constituent in a specific plant or plant parts. Assam is rich in flora; there is an estimated 3895 species of flowering plants found in Assam, [1]. In the rural areas of Assam, there has been the

practice of using some plants formulation though in crude forms for different diseases. Peoples of the rural areas of Assam possessed remarkably accurate knowledge about the medicinal use of the plants around them. Biological screening of few such plants has convincingly demonstrated their role in the treatment of diseases [2]. Assam is inhabited by a number of ethnic tribes; Plants around them are an integral part of their livelihood. *Flemingia strobilifera* is a widely used but less studied ethnomedicinal plants of Assam. The plant is an erect shrub growing up to 2 m tall.Wild Hops is a shrub growing to 2 m tall. Leaves are ovate to oblong with a wavy leaf margin with pinnate venation. Flowers occur in at branch-ends or in leaf-axils branched racemes 8-15 cm long. Flowers are small, initially green in colour, but eventually turn light brown and are enclosed in large leaf-like bracts. Fruits are Small, cylindrical pods release tiny seeds by explosive dehiscence.

Various ethnic communities of Assam use this plant against different ailments including tuberculosis, epilepsy, diarrhea and dysentery, hysteria, insomnia, rheumatism and to relieve in other body pain etc. This plant is an integral part of Rongali bihu festival of Assam, especially in cow's worship or Cow's Bihu (Goru Bihu). During this festival cow's are washed and gently beaten with twigs of *Flemingia strobilifera* with a wishing of their healthy growth. Keeping in view on the traditional and cultural uses of this plant in Assam, the present study deals with qualitative and quantitave phytochemical analysis of leaves and root of *Flemingia strobilifera.*

II. MATERIALS AND METHODS

About the study site: Jorhat, is the second largest city of Assam in North-East India included under Upper Brahmaputra Valley zone of Assam, with a geographical area of 2859.3 sq. km lies between 26°46′ N latitude and 96°16′ longitude. The climate of the region is typically tropical to sub-tropical with the average annual rainfall, temperature and humidity of 272.84 mm, 23°C and 82.1% respectively [3]

Ethnobotanical study: For ethnobotanical study informal interview with the selected traditional practitioners, locally called Bez and elderly peoples of different ethnic communities which have experience to used this plant against different ailments of the study area were carried out with a structured questionnaire. Frequent field visit was conducted in different villages under Jorhat district of Assam.

Phytochemical analysis:

Collection of plant materials: The leaves and root of *F. strobilifera* were collected locally from different localities of Jorhat, Assam, India. The plant samples were washed and unwanted materials were discarded, and the collected plant materials were shade dried for 30 days, after that the dried small pieces of plant parts were grinded into small particles by using mortar & pestle. The powder were stored in an air tight container and kept in a cool dark place until analysis concerned.

Preparation of plant extract: 20 gm of leaf and root powder was macerated overnight with 150 ml of ethanol, methanol and ethyl acetate separately. Then, the macerated material was kept for extraction in Soxhlet apparatus at 50º C for 5 hours. Then, the extract was collected and concentrated by evaporating and the extracts were kept in refrigerator at 4ºC until use.

Preliminary phytochemical screening: Preliminary phytochemical screening were done by using standard procedures [3],[4],[5] for the detection of the presence of alkaloid, flavonoid, phenol,tannin terpenoid, saponin, cardiac glycoside and amino acid etc.

Test for Alkaloids: Extracts were dissolved individually in dilute HCl and filtered. Then performed following tests -

a) **Mayer's Test:** Filtrates were treated with Mayer's reagent. Formation of a yellow colored precipitate indicates the presence of alkaloids.
b) **Wagner's Test:** Filtrates were treated with Wagner's reagent. Formation of brown/reddish precipitate indicates the presence of alkaloids.

Test for flavonoid: 0.2 g of the extract was dissolved in 10% NaOH solution, yellow coloration indicates the presence of flavonoid.

Test for phenol: To 2ml of extract solution, added 2ml of alcohol and few drops of ferric chloride solution and observed for coloration. Formation of green or blue color indicates the presence of phenols.

Test for tannin:

a) To 0.5 ml extract solution, added 1 ml distilled water and 1-2 drops of ferric chloride solution to it and observed for blue black coloration which indicates presence of tannin.

b) 2ml of plant extract was combined with 2ml of distilled water. 0.01g lead acetate was added to this combined solution and shaken well. Development of white turbidity and precipitate indicates the presence of tannins.

Test for terpenoid and steroid: 5ml of extract solution was mixed in 2ml of chloroform, and 3ml of conc. sulphuric acid was added to form a layer. A reddish brown colouration of the interface was formed to show positive results for the presence of terpenoid. Red colour at the lower surface indicates presence of steroid.

Test for saponin: About 2g of the plant extract was mixed with 10ml of distilled water and shaken vigorously. Frothing shows the presence of saponin.

Test for cardiac glycoside: To the plant extract few ml of glacial acetic acid, ferric chloride and concentrated H2SO4 were added. Green color indicates the presence of cardiac glycosides

Test for Amino acids: Two drops of Ninhydrin Reagent was added to the plant extract. Purple colour indicates the presence of amino acids.

Quantitative phytochemical analysis:

Determination of Total Phenolic Content: Estimation of total phenol content in the plant extract was measured spectrophotometrically by Folin–Ciocalteu colorimetric method, [7], [8], [9] , using Gallic acid as the standard and Total phenol value is expressed in terms of gallic acid equivalent (GAE) as mg/g of of sample. For this purpose, the calibration curve of gallic acid was drawn (FigureII). 1ml of standard solution of concentration0.01, 0.02, 0.04, 0.06, .08 and 0.1 mg/ml of gallic acid were prepared in methanol. Concentration of 0.1 and 1mg/ml of plant extract were also prepared in methanol and 0.5ml of each sample were introduced into test tubes, Folin-Ciocalteu reagent 5ml (1:1 diluted with distilled water) and mixed thoroughly. After five minutes 5ml of 10% Na2CO3 solution was added. The solution was warmed for one minute, and then cooled. The absorbance of the reaction mixtures were measured at 760 nm with UV Visible spectrophotometer.

Determination of the Total Flavonoid: Aluminum chloride method was used for flavonoid determination **[9], [10],**. In this method Quercetin was used as standard and flavonoid contents were measured as quercetin equivalent. For this purpose, the calibration curve of quercetin was drawn (Figure II). 1ml of standard solution of concentration0.01, 0.02, 0.04, 0.06, .08 and 0.1 mg/ml of quercetin were prepared in methanol. Concentration of 0.1 and 1mg/ml of plant extract were also prepared in methanol. 1ml of standard or extract solution (concentration0.01, 0.02, 0.04, 0.06, .08 and 0.1 mg/ml) was taken into 10ml volumetric flask, containing 4ml of distill water. 0.3ml of 5%NaNO2 added to the flask. After 5min, 0.3ml 10%AlCl3 was added

to the mixture. At the 6th min add 2ml of 1M NaOH was added and volume made up to 10ml with distills water. The absorbance was noted at 510nm using UV-Visible spectrophotometer.

II. RESULT AND DISCUSSION

Ehnobotanical study reveals that *Flemingia strobilifera* (L.) W.T.Aiton is used extensively by different ethnic communities of study site to cure various ailments including tuberculosis, epilepsy, diarrhea and dysentery, hysteria, insomnia, rheumatism and to relieve in other body pain etc. (Table – 1).

Table: 1 : Ethnomedicinal uses of *Flemingia strobilifera* (L.) W.T.Aiton by different ethnic communities of Jorhat Assam.

Ailments	**Mode of use**	**Communities use the plant formulation.**
Tuberculosis	Infusion of leaves and flower juice are taken three times a day for 7-10 days.	Ahom Deuris, ,Kaibartta, Kalita, Mishing, Tea tribes
Epilepsy, hysterea and swellings	Root juice is used	Kaibartta, Chutiya, Tea tribes.
Diarrhea and dysentery	Root juice is taken twice daily for 7 days	Ahom, Chutiya, Deuris, , Kalita, Mishing.
Kidney problems	Root juice is taken in empty stomach for 15-30 days.	Ahom,Kaibartta, Mishing.
Body swellings	Root paste applied externally	Ahom, Chutiya, Deuris,Kaibartta, Koch, Kalita.
Ringworm	Root paste applied externally	Mishing, Deori.
Skin diseases (Fungal infection)	The ash of the root/leaf of the plant is made into paste with coconut oil and applied over the affected part.	Ahom, Chutiya, Deuris, Koch, Kalita, Missing, Tea tribes.
Worm infection	The outer skin of the tubers is used as an anthelmintic	, Mishing, Tea tribes
Leucorrhoea	The root juice are taken in vagianal discharges.	Kaibartta, Mishing, Deuri,Tea tribes
Eye pain	Leaf juice mixed with seven drops of mustard oil and a little amount of jaggery is used in eye pain	Ahom, Kaibartta, Koch, Kalita, Mishing

The preliminary phytochemical screening of the leaf and root of *Flemingia strobilifera* (L.) W.T.Aiton exhibit the positive tests for alkaloids, flavonoids , phenols , tannins in almost all the extracts and shows positive tests for terpanoids, saponins,

amino acids and Glycosides in certain extracts as well as negative tests in other extracts. (Table – 2)

Table- 2: Qualitative Phytochemical screening of leaf and root of *Flemingia strobilifera* (L.) W.T.Aiton.

Plant Parts	Solvents	Phytochemicals							
		Alka.	**Flav..**	**Phen.**	**Tan.**	**Terpa.**	**Sap.**	**Glyc.**	**Amin.**
Leaf	Petroleum Ether	+	+	+	_	_	+	_	_
	Chloroform	+	+	+	+	+	+	+	_
	Ethyl acetate	+	+	+	+	+	+	_	_
	Ethanol	+	+	+	+	+	+	+	_
	Methanol	+	+	+	+	+	+	_	+
Root	Petroleum Ether	+	+	+	_	+	_	_	_
	Chloroform	+	+	+	+	+	+	+	_
	Ethyl acetate	+	_	+	+	+	_	_	_
	Ethanol	+	+	+	+	+	+	+	+
	Methanol	+	+	+	+	+	+	+	+

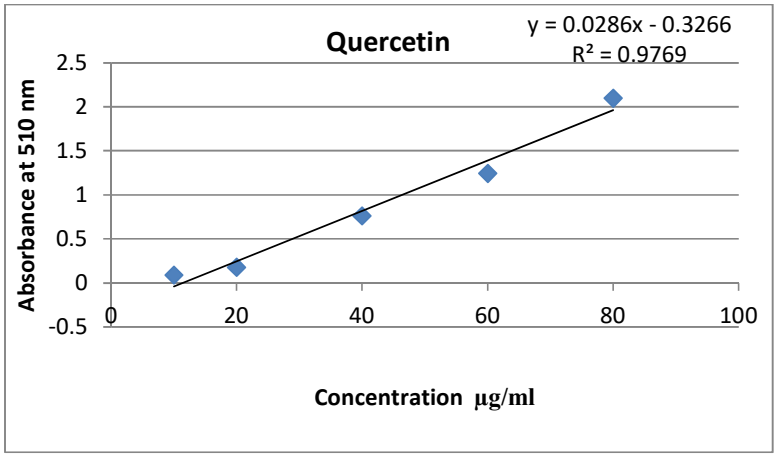
Alk.- Alkaloid; Flav.- Flavnoid; Phe. – Phenol; Tan.- Tanin; Terp.- Terpenoid; Sap.- Saponin; Glyc.-Glycoside; Amin.- Amino acids; '+' Positive; '-' Negative.

Total amount of phenol and flavonoid contents: Total amount of phenol and flavonoid contents were calculated from gallic acid ($y = 0.012x – 0.083$, $R2 = 0.977$) and quercetin ($y = 0.028x – 0.0326$, $R2 = 0.976$) standard curves (Figure I & II). The total phenol and flavonoid contents in Leaf is 21.36 mg/g, gallic acid equivalent and 11.07 mg/g, quercetin equivalent respectively and in root it is 29.68 mg/g, gallic acid equivalent and 12.19 mg/g, quercetin equivalent respectively.

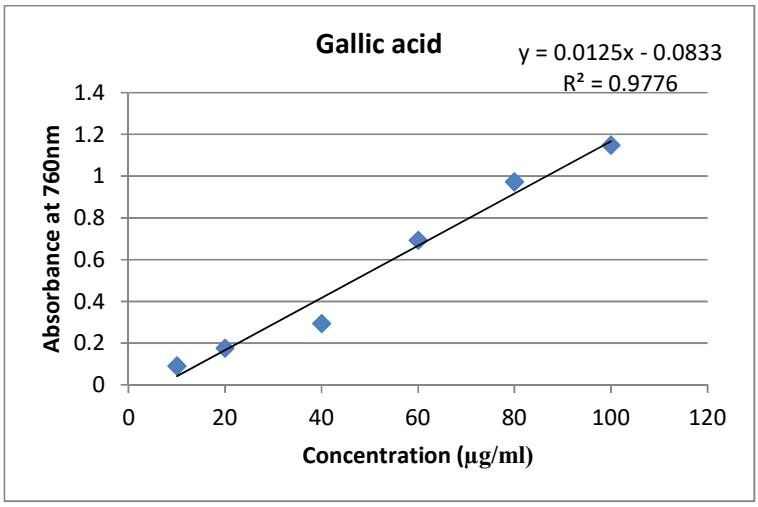
Table- 3: Total amount of Phenol and Flavonoid content in the leaf and root of *Flemingia strobilifera* (L.) W.T.Aiton

Plant parts	Extract name	Total phenol (in mg/g, gallic acid equivalent)	Total flavonoid (in mg/g, quercetin equivalent)
Leaf	Methanol extract	21.36	11.07
Root		29.68	12.19

Fig I : *Flemingia strobilifera* (L.) W.T.Aiton



FigII: Standard calibration curve of Quercetin



FigIII: Standard calibration curve of Gallic acid

IV. CONCLUSION

Flemingia strobilifera (L.) W.T.Aiton is a widely used but less attended medicinal plant of Assam. The plant is used widely by different ethnic communities of the study site to cure various ailments including tuberculosis, epilepsy, diarrhea and dysentery, hysteria, insomnia, skin diseases rheumatism, and to relieve in other body pain etc.Preliminary phytochemical screening exhibit positive test for different phytoconstituents like tannin, phenols, flavonoids, alkaloidas, terpanoids, saponins, amino acids etc in both leaf and root of the plant. Presence of important phytocostituents clearly indicates the medicinal value of the plant species, which validates the traditional knowledge of different ethnic communities of the study area which uses this plant as phytomedicines against different common and frequently occurring ailments.

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