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A REVIEW OF MICROSCOPY, MORPHOLOGY, PHYTOCHEMICAL PROFILE, AND PHARMACEUTICAL APPLICATION OF CAYRATIA TRIFOLIA LINN (VITACEAE)

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ABSTRACT

Cayratia trifolia Linn. Domain Syn. Vitistrifoliataa (Family: Vitaceae) is commonly known as Fox grape in English; Amlabel, Ramchana in Hindi, and Amlavetash in Sanskrit. It is native to India, Asia, a, d Australia. It is a perennial climber having trifoliated leaves with 2-3 cm long petioles and ovate to oblong-ovate leaflets. Flowers are small greenish white and brown in color. Fruits are fleshy, juicy, dark purple or black, nearly spherical, and about 1 cm in diameter. It is found throughout the hills in India. This perennial climber is also found in the hotter part of India from Jammu and Rajasthan to Assam extending into peninsularular India to 600 minn eight. The whole plant of *Cayratia trifolia* has been reported to contain yellow waxy oil, steroids/terpenoids, flavonoids, and tannins upon preliminary phytochemical screening. Leaves contain stilbenes (piceid, resveratrol,viniferan, ampelopsin). Stem, leave and s, roots are reported to possess hydrocyanic acid, delphine n, and several flavonoids such as cyanidinares reported in the leaves. This plant also contains kaempferol, myricetin, quercetin, triterpenes and epifriedelanol. Infusion of seeds along with extract of tubers is traditionally given orally to diabetic patients to check the sugar level of blood. Paste of tuberous is applied on the affected part in the treatment of snbitesbite. The whole plant is used s a diuretic, in tumors, neu, moral, and plexopathy. Its climbers wrapped around the neck of frantic bullocks and poultices of leaves are used to yoke sores of bullock block. The bark extract s antiviral, antibacterial, antiprotozoal, hypoglycemic, anticancer, and diuretic activity. This article focuses on the upgraded review of the chemical and biological properties of *Cayratia trifolia* Linn. and triggers further investigation on this plant.

Keywords: Biological, *Cayratia trifolia*, chemical, review

1] INTRODUCTION

Cayratia trifolia Linn. Domain Syn. Vitis trifolia belongs to Fathe Emily: Vitace a. It is commonly known as Fox grape in English; Amlabel, Rachana i, Hindi, and Amlavetash in Sanskrit. It is native to India, Asia, a and Australia. [Dinesh Kumar et al,2012]. it has been reported to contain huhugeumber of bioactive compounds such as yellow waxy oil, steroids, terpenoids, flavonoid,d,s a, and tannins Whole plant is used in the treatment of tumors, neuralgia, and hepatic problems). This plant extract has also been reported to have antibacterial, antioxidant, antiviral, antiprotozoal, hypoglycaemic activity, etc (. Therefore, the present study aims to isolate, structurally characterize and

analyze the anti-prostate cancer potential of the so ompoundspoundthe om stem ethanolic extract of *Cayratia trifolia*.. (A.K. Gupta et a, 2012). Cayratia trifolia is a tropical plant belonging to the Vitaceae family and includes types of wild plants easily found in the forest, especially in the riversareasarea. Cayratia trifolia parts are often used by the community, namely the fruit, stems, and leaves. Catrifoliaterifolia leaves, empirically[Muchammad Yunus1 et al 2021] According to WHO, traditional medicine is defined as diverse health practices, approaches, and known beliefs believes incorporating plant, animal, and/or mineral-based medicines, spiritual therapies, manual techniques, and exercises applied singularly or in combination to maintain well-being as well as to treat, diagnose or prevent illness More than 35,000 plant species are being used in various human cultures around the world for medicinal purposes Crude drugs are usually the dried parts of medicinal plants that form the essential raw materials for the production of traditional remedies in various systems of medicines like Ayurveda, Siddha, Unani, Homeopathy, Tibeta,n, etc.[Nakuleshwer , et al 2019]

Cayratia trifoliata (L.) is a medicinal plant that belongs to the family of Vitaceae, and it has been reported to contain a huge number of bioactive compounds such as yellow waxy oil, steroids, terpenoids, flavonoid, ds, and tannins Whole plant is used in the treatment of tumors, neuralgia, hepatic problems This plant extract has also been reported to have antibacterial, antioxidants, antiviral, antiprotozoal, hypoglycaemic activity [Sundaram Somy a, et al *2021]*

Plant name: Cayratia trifolia L. Common name: Bush grape Family: Vitaceae Plant part used: Fruit (berry) Color: Purple [Kothari, Saloni et al 2021]

Fig. 1: *Cayratia trfolia* plant. (Neelakshi Dutta,et al 2020).

SYNONYMS [Dinesh Kumar, et al 2011]

Synonyms Cayratia trifolia is also known by various synonyms such as:

Vitis trifolia Linn . Cissus carnosa Lamk . Vitis carnosa (Lamk.) Wall.ex M. Lawson

Cissus trifolia (Linn.) K. Schaum, Cayratia carnosa (Lamk.) Gagnep

Table no 1: Taxonomical Classification of Cayratia trifolia (Neelakshi Dutta,et al 2020).

Taxonomical hierarchy	Names
Domain	Eukaryota
Subkingdom	Viridaeplantae
Kingdom	Plantae
Phylum	Tracheophyta
Subphylum	Euphyllophytina
Infraphylum	Radiators
Class	Magnolipsida
Subclass	Rosidae

Suborder	Vitanae
Order	Vitals
Family	Vitaceae
Subfamily	Vitoideae
Genus	Cayratia
Species	Trifolia

Table 2: Vernacular names of Cayratia trifolia.[, Nakuleshwer et al 2019;]

The vernacular name of Cayratia trifolia	
Language	**Vernacular Name**
English	Fox-grape Bush-grape
Hindi	Amal-bel, Tamnya, Ramchana,
Marathi	Ambatvel
Tamil	Kattuppiranti
Malayalam	Amarcakkoti
Sanskrit	Amlavetasah

2]Geographical distribution: -

Cayratiatrifolia is known as kalitkalit in the Philippines, which is found at low altitudes. It is also found from India to southern China, through the Malaya to the Moluccas and the Caroline Islands. It is also found throughout the hilly regions in India. This perennial climber also grows wildly in Jammu, Rajasthan, Assam, Tripura, and West Bengal extending into peninsular India up to 600 m. This plant is also distributed in Bangladesh, Burma, Ceylon, Cambodia, Indonesia, Laos, Malaysia, Malacca, Pakistan, Thailand, and Vietnam. It is found in tropical and subtropical areas of Asia, Africa, Australia, and the Island of the Pacific Ocean.[Kapil Sharma et al 2020]

3]Botanical distribution: -

Cayratiatrifolia is a weak herbaceous climber, woody at the base, the stem is more or less succulent, compressed, and densely. Leaves are trifoliolate with petioles 2-3 cm long. Leaflets are ovate to oblong-ovate, 2-8 cm long, 1.5-5 cm wide, and pointed at the tip. Flowers are small greenish white 2.5mm, and brown on solitary cymes in leaf axils.10-12 Fruits are fleshy, juicy, dark purple or black, nearly spherical, and about 1 cm in diameter. Seeds are triangular, apex rounded, ventral holes, and ribs obtuse along the margin, slightly raised. .[Kapil Sharma et al 2020]

4]]Microscopical Characters: -

Stems: - The stem is composed of cork cells on the outer side and composed of small size sclerenchymatous cells. The cortex is wide and has parenchymatous cells. Numbers of sclereids are widely distributed in the cortex region. The cortex also shows the presence of calcium oxalate crystals.[Kapil Sharma et al 2020]

Fig 2 Wild climbing vine, Cayratia trifolia Linn. Domain

Fig no 03: Trifolia fruits

- C. trifoliata is a weak herbaceous climber.
- Leaves are trifoliolate with petioles (2–3 cm) long.
- Leaflets are ovate to oblong-ovate, (2–8 cm) long, (1.5–5 cm) wide, and pointed at the tip.
- Leaves are green in color with an agreeable odor and bitter taste[Sunil Kumar, et al 2012]

5] Morphological and organoleptic characters

5.1] Powder characteristic

The organoleptic evaluation of the leaf powder revealed the following characteristics.

The leaf powder is pale green in color, with a characteristic odor and bitter taste.

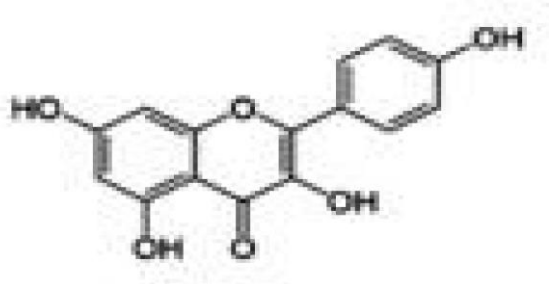
Fibers are elongated and distributed Trichomes are unicellular, dagged shaped, warty, and sometimes are in fragments or multicellular [Dinesh Kumar et al 2012]

6]PHYTOCHEMICAL PROFILE

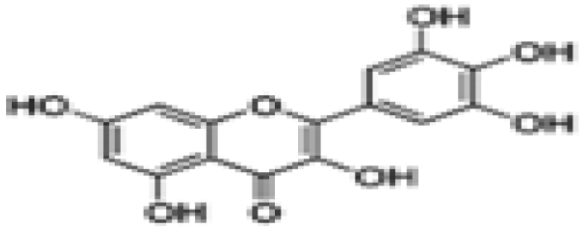
6.1] CHEMICAL CONSTITUENTS

It consists following chemical constituent [Neelakshi Dutta, et al 2020]

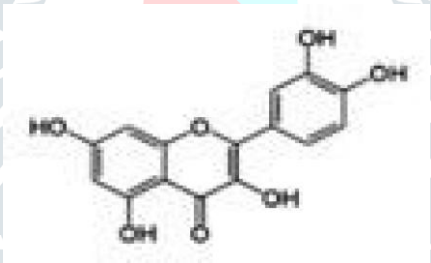
kaempferol,



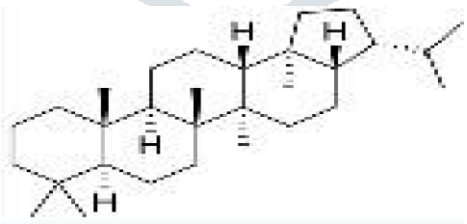
myricetin,



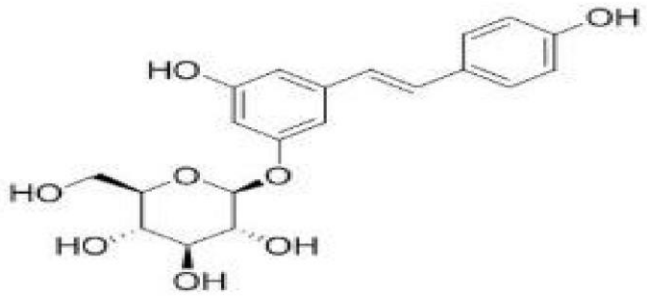
quercetin,



triterpenes



Piceid



The whole plant of Cayratia trifolia has been reported to contain

yellow waxy oil, steroids/terpenoids, flavonoids, and tannins. [Dinesh Kumar et al 2011]

6.2] chemical and biological properties of Cayratia trifolia Linn. (Vitaceae)

It has been provided. The plant was reported to exhibit antibacterial, antifungal, antiprotozoal, antiviral, hypoglycemic, anticancer, antioxidant, anti-inflammatory, and diuretic properties. The aerial parts of the plant contain kaempferol, myricetin, quercetin, triterpenes, and epifriedelanol; the leaves also contain stilbenes such as price, resveratrol, vinifera, and ampelopsin; and the seeds and fruits contain cyanogenic compounds [Consolacion Y. Ragasa et al,2014]

The basic chemical constituent of the colorant is due to anthocyanins. The blueblue-to-redor imported by the fruit is due to the various anthocyanins. The grape skin extracts consist of glucosides, mo mono glucosidesacylated mono glucosides & acylated glucosides of peonidin, malvidin, cyanidin, petunidin & delphinidin. [Kothari, Saloni et al 2021]

6.3] Qualitative Analysis of Secondary Metabolites [Sundaram Sowmya et al 2015]

The qualitative analysis of secondary metabolites was carried out by following the methods

Test for alkaloids

a) 2 ml aliquot of the extract was treated with Dragenderoff's reagent. An orange-red precipitate is formed immediately indicating
the presence of alkaloids.

b) 1 ml aliquot of the extract was added with a few drops of Mayer's reagent. The formation of a white or pale-yellow precipitate indicates the
presence of alkaloids.

Test for flavonoids

a) 1 ml of the extract was treated with magnesium turnings and 1-2 drops of concentrated HCl. Development of pink or red color
shows the presence of flavonoids.

b) 1 ml of the extract treated with 1 ml of ferric chloride and the formation of brown color confirms the presence of flavonoids.

Test for tannins and phenolic compounds

a) 1 ml of the extract was treated with a few ml of 5% neutral ferric chloride. A dark blue or bluish-black color produce shows the
presence of tannins.

b) 1 ml of the extract treated with a few ml of gelatin solution; a white precipitate is formed revealing the presence of tannins and
phenolic compounds

c) 1 ml of the extract was treated with a few ml of lead tetra acetate solution. A precipitate shows the presence of tannins and phenolic
compounds.

Test for amino acids and proteins

a) To 1 ml of extract, 2 drops of freshly prepared 0.2% ninhydrin reagent was added and heated. Development of purple color
confirms the presence of proteins.

b) The extract was added with one ml of 40% sodium hydroxide solution and two drops of 1% copper sulfate reagent. Formation of
the violet color indicates the presence of proteins.

Test for carbohydrates

a) Fehling's test

The extract was treated with 5 ml of feelings solution (A and B) and kept in a boiling water bath for 5 min. Formation of
yellow or red color precipitate indicates the occurrence of reducing sugar.

b) Benedict's test

To 1 ml of the extract, added 5 ml of Benedict's solution and kept a boiling water bath for 5 min. Red, yellow, or green
precipitate indicates the presence of reducing sugars.

Test for glycosides

The extract was mixed with glacial acetic acid, a few drops of ferric chloride and concentrated sulphuric acid are added, and
observed for a reddish-brown coloration at the junction of two layers and a bluish-green color in the upper layer which indicates the
presence of glycosides.

Test for saponins

a) About 1 ml of alcoholic extract was diluted individually with 20 ml of distilled water and shaken in a graduated cylinder for 15
minutes. A 1 cm layer of foam indicates the presence of saponins.

b) To 1 ml of the extract, 1 ml of alcoholic vanillin solution was added, followed by a few drops of
concentrated sulphuric acid. A deep violet color confirms the presence of saponins.

Test for fixed oils and fats

a) Spot test:

A small quantity of extract is pressed between two-filter papers. Oil stains on the filter paper indicate the presence of fixed oil.

Test for terpenoids

b) Horizon test

To 1 ml of extract, 2 ml of trichloroacetic acid was added. The formation of yellow to red precipitate shows the presence of
Terpenoids

c) Libermann test

To 1 ml of extract, 3 ml of acetic acid and a few drops of concentrated sulphuric acid were added. The color changed from red to blue
indicating the presence of terpenoids.

Test for steroids

a) Libermann-Burchards test

1.0 ml of Cayratia trifolia plant extract and 1.0 ml of concentrated sulphuric acid were added, followed by 2.0 ml of acetic
anhydride solution. A greenish color developed and it turned blue indicating the presence of steroids.

b) Salkowski reaction

To 2.0 ml sample extract, 1.0 ml of concentrated sulphuric acid was added carefully along the sides of the tube. A red color was
produced in the chloroform layers.

7] PHARMACEUTICAL APPLICATION

- The whole plant is used as
- A diuretic,
- in tumors, neuralgia, and plexopathy.
- Its climbers wrapped around the neck of frantic bullocks and poultices of leaves are used to yoke the sores of the bullock.
- The bark extract shows antiviral, antibacterial, antiprotozoal, hypoglycemic, anticancer, and diuretic activity. [Dinesh Kumar et al 2011]

7.1]Ethnomedicinal uses: - [Kapil Sharma et al 2020]

The whole plant is used as a diuretic and is also useful in tumors, neuralgia, and plexopathy, leucorrhea, astringent. Leaves, roots, and seeds are used as poultices for ulcers and boils. Fermentation of hot decoction of leaves and roots is used as a diaphoretic and recommended in a high fever. Sap of stems and juice of leaves is used as an aphrodisiac. The root is used to reduce anemic conditions, and stomachic diseases, as an astringent, and paste as an antidote for snake bites, and also in complaints of caruncles. Extract of tuber along with an infusion of Cayratiatrifolia seeds is given orally to diabetic patients to check the sugar level of blood whereas powder of tuberous root is taken orally with the milk for the early recovery of the fractured bone. Leaves are Rubifacient, used to stop the bleeding from injuries. Root bark reduces muscular pain.

7.2] Therapeutic uses

Paste of *Cayratia trifolia* is applied locally by the tribal′s to cure wounds and edema early [Chen Z et al 2010]. Roots are grounded with black pepper and applied as a poultice on boils.[Pulliah T 2006] Root paste is mixed with coconut oil and applied as a decoction for 3 days.[Patil VM.2006]Leaf paste of *Gymnema Sylvestre* and *Cayratia trifolia* is applied locally in eczema.[Jain A, 2008] 7.3] Pharmacological uses

The 50% ethanolic extract of the plant (excluding root) in a preliminary biological screening showed gross behavioral effects and hypothermia. The bark extract showed 40-59.9% inhibition of potato virus. The plant is reported to have antibacterial, antifungal, antiprotozoal, hypoglycemic, anticancer, and diuretic actions.[K. Gupta 2007]

7.4] NON-MEDICINAL USES

Fruits are edible and pleasantly acidic in taste.[Nazimuddin S,] Stem bark is used to make a net and ropes.[Ayyanar M 2010]

CONCLUSION

Cayratia trifolia Linn. is a medicinally important plant used to treat various diseases in the Indian system of medicine. This paper provides valuable plant information. Such information may serve as a base for new pharmacognostic, phytochemical, pharmacological, toxicological, and clinical research

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