Study of Morpho anatomial Phytocemical and Ethnobotany of *Cayratia trifolia*

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Abstract

Cayratia trifolia Fox grape (Linn. Domin. Syn. Vitis trifolia; Family: Vitaceae), also known as Amlabel, Ramchana, and Amlavetash in Sanskrit, is a popular name for this plant. It's a native of Australia, Asia, and India. Upon early phytochemical screening, the entire *Cayratia trifolia* plant was found to contain yellow waxy oil, steroids/terpenoids, flavonoids, and tannins. This article encourages future research on the plant *Cayratia trifolia* Linn. by highlighting its improved chemical and biological characteristics.

Key words: Cayratia trifolia, phytochemical, ethnobotany

Introduction

Cayratia trifolia Linn.Domin syn.Vitis trifolia(family vitaceae) is commonly known as fox grape in English ,Amlabel,Ramchanna in hindi & Amlavetash in Sanskrit. It is native to India,Asia ,& Australia. It is perennial climber having trifoliate leaves with 2-3 cm long petiole & ovate to oblong ovate leaflets. Flowers are small greenish white & brown in color. Fruits are flashy, juicy , dark purple or black , nearly spherical , 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 &rajasthan to Assam extending into the penisular India up to 600 meter height. Whole plant of *Cayratia trifolia* has been reported to contain yellow waxy oil, steroids/terpenoids, flavonoids, tannins upon preliminary phytochemical screening.

Stem, root, leaves are reported to hydrocyanic acid, delphinidin & several flavonoids such as cyanidin is reported in the leaves. Infusion of seeds along with extract of tubers is traditionally given orally to diabetic patient to check sugar level of blood. Whole plant is used as diuretic in tumors, neuralgia & splenopathy.More than 35,000 plant species are being used in various cultures around the world for medicinal purposescrude drugs are usually the dried part of medicinal plants(root, stem, leaf, fruit etc.) that form the essential raw materials for the production of traditional remedies in various system of medicines like Ayurveda, siddha, Unani, homeopathy, Tibetan, etc.

Botanical description

Cayratia is a weak herbaceous climber, woody at base. Stem is more or less succulent, compressed & densely. Leaves are trifoliate with petioles 2-3cm long.Leaflets are ovate to oblong ovate 2-8 cm long, 1.5- 5 cmwide, pointed at the tip. Flowers are small greenish white 2.5 mm & brown on solitary cymes in leaf axils. Fruits are flashy, juicy, a dark purple or black , nearly spherical & about 1 cm in diameter. Seeds are triangular , apex rounded , ventral holes & ribs obtuse along margin , slightly raised.

Geographical distribution

Cayratia trifolia is known as kalit--kalit in Philippines where it 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 also found throughout the hilly regions in India. This perennial climber also grows wildly in Jammu, Rajasthan, Assam, Tripura and West Bengal extending into peninusular India up to 600 m. This plant is also distributed in Bangladesh, Burma, Ceylon, Combodia, Indonesia, Laos,

Makaysia, Malacca, Pakistan, Thailand and Vietnam. It is found in tropical and subtropical areas of Asia, Africa, Australia and Island of the Pacific Ocean.

Material and method

Identification and selection of plant – fresh part of stem of *C. trifolia* was collected in summer in the month of October from near the cmp college of university of Allahabad .

Procedure for making permanent slide –

Step 1- first of all took a small piece of stem & cut a thin transverse section of stem. Transfer the t.s. of stem in to dehydration tube & washed 2-3 times with water.

Step 2- Add 10 drops of safranin & keep this dehydration tube for 10 min.. After this drain the stain carefully preventing the section & add 50% alcohol for 10 min.

Step 3- Again drain the 50% alcohol & add 70% alcohol for 7 min.

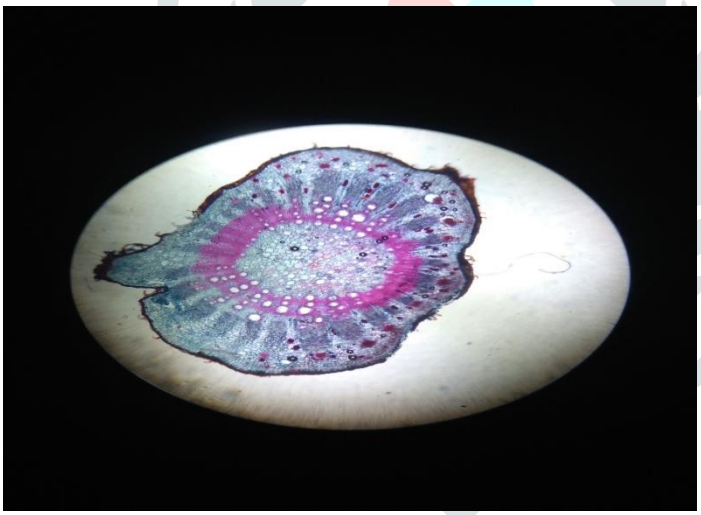
Step 4- then again drain the 70% alcohol & 90%alcohol keep for 3 min.

Step 5- after this add absolute alcohol & 4-5 drops of fast green keep for 1 min. again drain the mixture & add absolute alcohol for 30 second.

Step 6- transfer the material in to the solution of xylene & absolute alcohol having ratio 1:1 & keep for 1 min. Then material is transferred in the pure xylene .

Step 7- remove the t. s. from dehydration tube & transfer it on the slide. Mount the section with the help of DPX & observed it under microscope.

Internal structure of plant



Stem anatomy

The anatomy of young stem shows initial stage of secondary growth. The epidermal layer iscontinuous all around the stem, and it is cylindrical in shape. The epidermal cells are thin walled. Dense epidermal trichomes are seen on the epidermal layer. The cortex is wider and is differentiated into outer zone of about 8 layers of collenchyma cells and inner zone of 3 or 4 layers of parenchyma cells. In the middle, the vascular cylinders of several, wide, and wedge-shaped xylem segments are present which interlinked by thin layer of sclerenchyma tissue. The xylem segments have 1–3 radial short rows of wide, circular, thin-walled vessels, and thick blocks of phloem with sclerenchyma caps on the outer part. The pith is wide, parenchymatous, thin-walled, and compact. Calcium oxalate druses are sparsely seen in the cortical cells .

Leaf anatomy

The leaf surface shows the epidermis layer. Leaf surface contents including veins, vein islet and vein termination were also determined. Transverse section of leaf shows the epidermis layer followed by cuticle layer and vascular bandles (xylem and phloem). The mesophyll is differentiated into palisade and spongy parenchyma. Abundant covering trichomes emerge from the upper epidermis. Trichomes are uniseriate and multicellular. Strips of collenchyma are present below and upper layer of epidermis.

Ethnomedicinal uses

Whole plant is used as diuretic and is also useful in tumors, neuralgia and splenopathy, leucorrhea, astringent. Leaves, root and seeds are used as poultice to ulcers and boils. Fermentation of hot decoction of leaves and root is used as diaphoreticand recommended in high fever. Sap of stems and juice of leaves are used as aphrodisiac. Root is used to reduce anemic condition, stomachic diseases, as an astringentand paste as an antidote in snake bite, also in complained of carencules. Extract of tuber along with infusion of *Cayratia trifolia* seeds is given orally to diabetic patients to check sugar level of blood whereas powder of tuberous root is taken orally with the milk for the early recovery of fractured bone. Leaves are Rubifacient, used to stop bleeding of injuries. Root bark reduces the muscular pain.

Therapeutic uses

Paste of *Cayratia trifolia* is applied locally by the tribal′s for early cure of wounds and edema . Roots are grounded with black peeper and applied as poultice on boils. Root paste is mixed with coconut oil and applied as decoction for 3 days. Leaf paste of *Cayratia trifolia* is applied locally in eczema.

Pharmacological uses

The 50% ethanolic extract of the plant (excluding root) in a preliminary biological screening showed gross behavioral effect 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.

Veterinary uses

Poultice of leaves are used for yoke sores of bullock and also used to cure swelling, injury and infection. Climbers are wrapped around the neck of a frantic bullock.

Non-medicinal uses

Fruits are edible, pleasantly acidic in taste.Stem bark is used to make net and ropes.

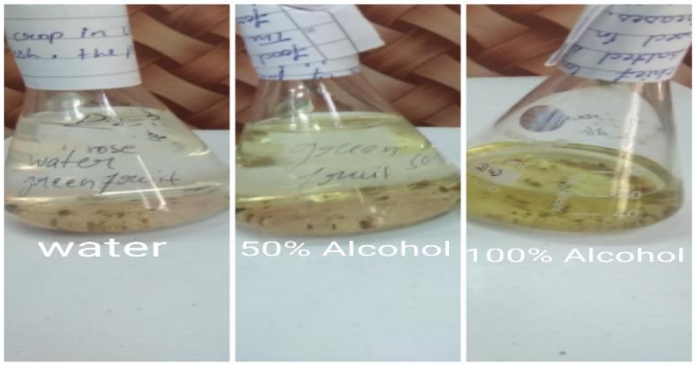
Phytochemistry

Procedure for preparation of plant extract

Firstly I collected the appropriate amount of fresh plant material. It was cleaned. Then it was shade dried at room temperature for 15-20 days. After drying ,the plant material were grounded to make a powder. Weight the 5 gm of powder of each part of plant(leaf, stem, fruit) & put in to 9 conical flask separately containing solvent (distil water , 50% alcohol, 100% alcohol). Leav it for 24 hours. filter the solution & collect the solvent extract for phytochemical analysis.

solvent extraction of stem

solvent extraction of leaf



Solvent extraction of fruit

Qualitative analysis of secondary metabolites

Test for alkaloid: 2 ml of plant extract was treated with few drop of iodine solution & HCl. Development of brown ring shows the presence of alkaloid.

Test for amino acid: 2 ml of plant extract was treated with ninhydrin. Development of blue or violet color shows the presence of amino acid.

Test for phenolic compound : 2 ml of plant extract was treated with FeCl3 solution. Development of deep blue color is shows the presence of phenolic compound.

Test for cardiac glycosides: 2 ml of plant extract was treated with FeCl3, hydrogen sulphate & glacial acetic acid . development of yellow color shows the presence of glycosides.

Test for tannin: 2 ml of plant extract was treated with lead acetate. The development of white precipitate shows the presence of tannin.

Test for saponin : 2 ml of test solution was treated with 2 ml of H2O& shake vigorously. Appearance of foamy layer shows the presence of saponin.

Result & Discussion

dicinal plants demonstrate a great importance to the health of individuals and communities. Phytochemicals naturally occurring in the medicinal plants have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Secondary compounds are terpenoid, alkaloids and phenolic compounds. Phytochemical screening is the first step in herbal medicine research to identify bioactive and novel lead compounds. Plant material consists of many different kindsof natural products with nature of different polarities leading to a different mode of solubility. Various phytochemicals that are present in different parts of *Cayratia trifolia* are responsible for therapeutic effect. Presence of these phytochemicals was analysed by the qualitative test which has showed in the following results. Distil water extract confirms the presence of alkaloid & tannin. 50% alcoholic extract indicates the presence of alkaloid and tannin. 100% alcoholic extract indicates the presence of alkaloids, phenolic compound, glycosides, & tannin.

Table:1 Qualitative analysis of secondary metabolites present in different solvent extract of stem part of Cayratia trifolia:

Test	Distil water	50% alcohol	100%alcohol
Alkaloid	+	++	+++
Amino acid	-	-	-
Phenolic compound	-	-	+
Glycosides	-	-	+
Tannin	+++	++	+

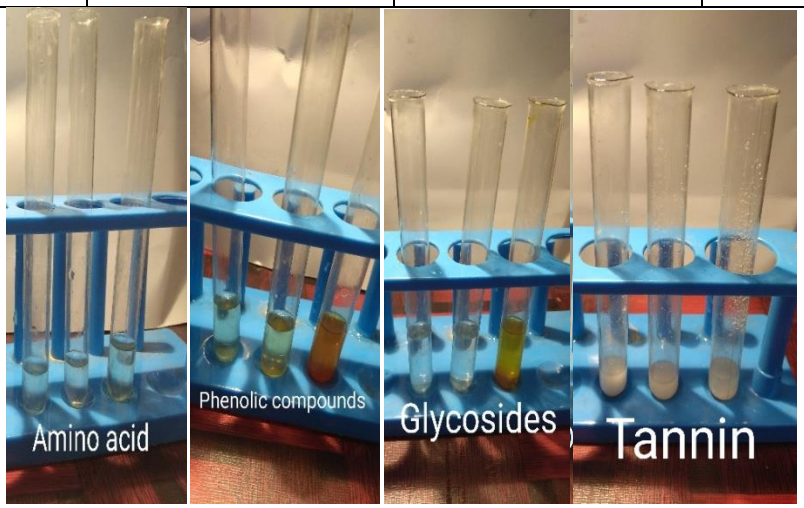


Table:2 Qualitative analysis of secondary metabolites present in different solvent extract of leaf part of Cayratia trifolia:

Test	Distil water	50% alcohol	100% alcohol
Alkaloid	+	-	+
Amino acid	-	-	-
Phenolic compound	-	-	+
Glycosides	+++	++	+
Tannin	+++	+	-

Distil water extract shows presence of alkaloid, glycosides & tannin. 50% alcoholic extract indicates presence of glycosides & tannin. 100% alcoholic extract indicates presence of alkaloid, phenolic compound, glycosides.

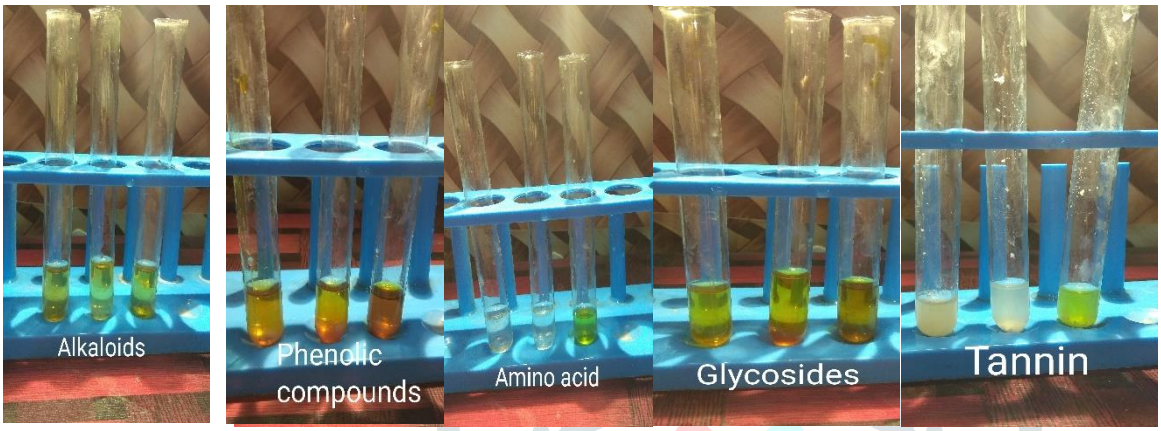
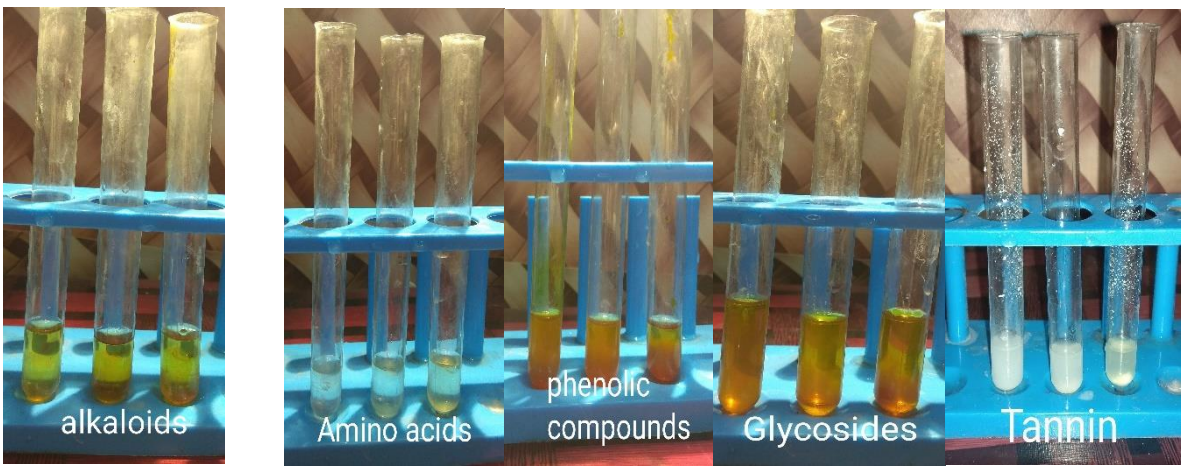


Table:3 Qualitative analysis of secondary metabolites present in different solvent extract of fruit part of Cayratia trifolia:

Test	Distil water	50% alcohol	100% alcohol
Alkaloid	-	+	-
Amino acid	-	-	-
Phenolic compound	-	-	+
Glycosides	-	+	+
Tannin	+	+	-

Distil water extract indicates the presence of tannin. 50% alcoholic extract shows the presence of alkaloid, glycosides & tannin. 100% alcoholic extract shows the presence of phenolic compounds & glycosides.



Pharmacological action

Antioxidant activity

The powdered plants were continuously extracted with petroleum ether, chloroform, ethyl acetate and methanol. The crude extract of ethyl acetate and methanol were tested for their biological activity including antioxidant activity by scavenging effect on DPPH (1,1-diphenyl-2-picryl hydraryl) radicals.

Antimicrobial activity

Crude extract of this plant was tested in preliminary biological screening for their antimicrobial activity against *Escherichia coli*, *Bacillus subtilis*, *Micrococcus luteus* and *P. oxalium*.

Anticancer activity

A large variety of phytochemical constituents that have been reported from natural product research has been proven successfully as anticancerous agent. The finding from the study reveals that methanolic extract is more potent than aqueous extract in exerting antineoplastic effect in both cell lines as evident by a dose dependent decrease in cell growth. The effect was analysed at different concentration level ranging from 50 to 500 ˝g/ml. Delphidin and cyaniding which are anthocyanin and showed antiproliferative and proapoptotic properties in gastric adenocarcinoma and were also found to be protective against esophageal cancer in rodents.

Cardioprotective effects

- It inhibits the vascular cell adhesion molecular expression.
- Inhibition of vascular smooth muscle cell proliferation
- Stimulation of endolethelial nitric oxide synthase activity.
- Inhibition of platelet aggregation.

Antidiabetic effect

It possesses hypoglycemic and hypolipidemic effect in both Streptozotacin-induced diabetes rats and STZ-Nicotinamide-induced diabetes rats. Other diabetic animal model studies by different researches have also demonstrated the antidiabetic effect of resveratrol.

conclusion

Thus, from the results it can be concluded that *Cayratia trifolia* showed significant antioxidant potential in terms of phytochemical screening studies which identified the presence of alkaloids, flavanoids, tannins, phenols, amino acids, proteins, terpenoids, saponin and steroids. These phytochemicals were reported to possess important biological activity such as anti cancer, antiinflammation,hepatoproductive and antioxidant effect. So these plants chemical compounds potentially serve as drugs and also provide newer leads and clues for modern drug discoveries.

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