A review on chemical and biological properties of *Cayratia trifolia* Linn. (Vitaceae)

Dinesh Kumar, Sunil Kumar, Jyoti Gupta, Renu Arya, Ankit Gupta

Division of Pharmacognosy and Phytochemistry, Institute of Pharmaceutical Sciences, Kurukshetra University, Kurukshetra, 1G.S. College of Pharmacy, Yamuna Nagar, Haryana, India

Submitted: 09-04-2011 Revised: 18-07-2011 Published: 23-12-2011

**Abstract**

*Cayratia trifolia* Linn. Domin Syn. *Vitis trifolia* (Family: Vitaceae) is commonly known as Fox grape in English; Amlabel, Ramchana in Hindi and Amlavetash in Sanskrit. It is native to India, Asia and 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, 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 the peninsular India upto 600 m height. Whole plant of *Cayratia trifolia* has been reported to contain yellow waxy oil, steroids/terpenoids, flavonoids, tannins upon preliminary phytochemical screening. Leaves contain stilbenes (piceid, reveratrol, viniferin, amelopsin). Stem, leaves, roots are reported to possess hydrocyanic acid, delphinidin and several flavonoids such as cyanidin is 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 sugar level of blood. Paste of tuberous is applied on the affected part in the treatment of snake bite. Whole plant is used as diuretic, in tumors, neuralgia and splenopathy. Its climbers wrapped around the neck of frantic bullock and poultice of leaves are used to yoke sores of bullock. The bark extract shows the antiviral, antibacterial, antiprotozoal, hypoglycemic, anticancer and diuretic activity. This article focuses on the upgraded review on chemical and biological properties of *Cayratia trifolia* Linn. and triggers further investigation on this plant.

**Key words:** Biological, *Cayratia trifolia*, chemical, review

**Introduction**

According to World Health Organization, traditional medicine is defined as diverse health practices, approaches, and knowledge and 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.[1,2] More than 35,000 plant species are being used in various human cultures around the world for medicinal purposes.[3] Crude drugs are usually the dried parts of medicinal plants (roots, stem wood, bark, leaves, flowers seeds, fruits and whole plants, etc) that form the essential raw materials for the production of traditional remedies in various systems of medicines like Ayurveda, Siddha, Unani, Homeopathy, Tibetan, etc.

*Cayratia trifolia* Linn. Domin syn. *Vitis trifolia* Linn. (Family: Vitaceae) is a native of India, Asia and Australia.[4] It is a perennial climber, found in the hotter parts of India from Jammu and Rajasthan to Assam, Tripura and West Bengal extending into peninsular India up to 600 m.[5,6]  

**Synonyms**

*Cayratia trifolia* is also known by various synonyms[7,13] such as: *Vitis trifolia* Linn.  
*Cissus cariosa* Lamk.  
*Vitis cariosa* (Lamk.) Wall.ex M. Lawson  
*Cissus trifolia* (Linn.) K. Schaum  
*Cayratia cariosa* (Lamk.) Gagnep

**Local names**

Different vernacular names[8] of *Cayratia trifolia* have been reported in Table 1.
**Pharmacognosy Reviews** | July-December 2011 | Vol 5 | Issue 10


---

**Taxonomical hierarchy**

The taxonomical hierarchy\(^{[4,13]}\) of *Cayratia trifolia* has been mentioned in Table 2.

**Botanical distribution**

*Cayratia trifolia* is a weak herbaceous climber, woody at base, 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, pointed at the tip. Flowers are small greenish white 2.5mm, and brown on solitary cymes in leaf axils.\(^{[12,14,15]}\) Fruits are fleshy, juicy, dark purple or black, nearly spherical and about 1 cm in diameter [Figure 1]. Seeds are triangular, apex rounded, ventral holes and ribs obtuse along margin, slightly raised.\(^{[17]}\)

**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.\(^{[17,18]}\) This perennial climber also grows wildly in Jammu, Rajasthan, Assam, Tripura and West Bengal extending into peninsular India up to 600 m.\(^{[24]}\) This plant is also distributed in Bangladesh, Burma, Ceylon, Cambodia, Indonesia, Laos, Makaysia, Malacca, Pakistan, Thailand and Vietnam.\(^{[19,20]}\) It is found in tropical and subtropical areas of Asia, Africa, Australia and Island of the Pacific Ocean.\(^{[21]}\)

**Chemical constituents**

This plant also contains kaempferol, myricetin, quercetin, triterpenes and epifriedelanol.\(^{[22]}\) Whole plant of *Cayratia trifolia* has been reported to contain yellow waxy oil, steroids/terpenoids, flavonoids, tannins.\(^{[6]}\) Leaves contain stilbenes such as piceid, reveratrol, viniferin and ampelopsin.\(^{[35]}\) Stem, leaves and roots are reported to possess hydrocyanic acid and delphinidin. Several flavonoids such as cyanidin are reported in the leaves.\(^{[23,24]}\) Its seeds and fruits showed presence of cyanogenic compounds. Fruits also contain calcium oxalate responsible for severe irritation in the mouth.\(^{[6]}\)

**Ethnomedicinal uses**

Whole plant is used as diuretic and is also useful in tumors, neuralgia and splenopathy, leucorrhea,\(^{[6,30]}\) astringent.\(^{[13]}\) Leaves, root and seeds are used as poultice to ulcers and boils.\(^{[8,14,16]}\) Fermentation of hot decoction of leaves and root is used as diaphoretic\(^{[8]}\) and recommended in high fever\(^{[14]}\). Sap of stems and juice of leaves are used as aphrodisiac.\(^{[25]}\) Root is used to reduce anemic condition, stomachic diseases, as an astringent\(^{[27]}\) and paste as an antidote in snake bite, also in complained of carencules.\(^{[16,25,26]}\) 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.\(^{[25,26]}\) Leaves are Rubifacient\(^{[29]}\) used to stop bleeding of injuries.\(^{[29,34]}\) Root bark reduces the muscular pain.\(^{[31]}\)

---

**Table 1: Vernacular names of *Cayratia trifolia***

<table>
<thead>
<tr>
<th>Language</th>
<th>Vernacular names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>Ghepeta-lat, Chepeta iota</td>
</tr>
<tr>
<td>Bengali</td>
<td>Amla-lata</td>
</tr>
<tr>
<td>English</td>
<td>Fox-grape</td>
</tr>
<tr>
<td>Gujarati</td>
<td>Khat-khatumbo</td>
</tr>
<tr>
<td>Hindi</td>
<td>Amal-bel, Ramchana, Teen panya kand, Amar chattoo, khatta-limbo, Tamnaya, Gidardrak</td>
</tr>
<tr>
<td>Karnataka</td>
<td>Heggoli</td>
</tr>
<tr>
<td>Malayalam</td>
<td>Sorivali</td>
</tr>
<tr>
<td>Marathi</td>
<td>Ambat-vel</td>
</tr>
<tr>
<td>Punjabi</td>
<td>Armal-bel</td>
</tr>
<tr>
<td>Sanskrit</td>
<td>Amlavetash, Atyamlaparni, Gandiran.</td>
</tr>
</tbody>
</table>

**Table 2: Taxonomical hierarchy of *Cayratia trifolia***

<table>
<thead>
<tr>
<th>Taxonomical hierarchy</th>
<th>Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td>Eukaryota</td>
</tr>
<tr>
<td>Subkingdom</td>
<td>Viridaeplantae</td>
</tr>
<tr>
<td>Kingdom</td>
<td>Plantae</td>
</tr>
<tr>
<td>Phylum</td>
<td>Tracheophyta</td>
</tr>
<tr>
<td>Subphylum</td>
<td>Euphyllyphyta</td>
</tr>
<tr>
<td>Infrafamily</td>
<td>Radiatopses</td>
</tr>
<tr>
<td>Class</td>
<td>Magnolipsida</td>
</tr>
<tr>
<td>Subclass</td>
<td>Rosidae</td>
</tr>
<tr>
<td>Suborder</td>
<td>Vitanae</td>
</tr>
<tr>
<td>Order</td>
<td>Vitales</td>
</tr>
<tr>
<td>Family</td>
<td>Vitaceae</td>
</tr>
<tr>
<td>Subfamily</td>
<td>Vitoideae</td>
</tr>
<tr>
<td>Genus</td>
<td>Cayratia</td>
</tr>
<tr>
<td>Species</td>
<td>trifolia</td>
</tr>
</tbody>
</table>

---

**Figure 1:** Major phytochemical constituents of *H. spinosa*
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 pepper and applied as poultice on boils. Root paste is mixed with coconut oil and applied as decoction for 3 days. Leaf paste of *Gymnema sylvestris* and *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-medical uses
Fruits are edible, pleasantly acidic in taste. Stem bark is used to make net and ropes.

IN VIVO AND IN VITRO RESEARCH AND PHARMACOLOGICAL ACTIONS

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-picrylhydrazyl) radicals. The crude extract of *Cayratia trifolia* showed the ED$_{50}$ values of 10.24 and 11.36 g/ml, respectively.

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. aeruginosa*. Precleaned extract was also investigated for their ability to inhibit protein kinase and tyrosine-specific protein kinase of epidermal growth factor.

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 μg/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.

Neuroprotective effect
The dietary supplementation with resveratrol significantly reduced plaque formation in animal brains, a component of Alzheimer and other neurodegenerative disease. In mice, oral resveratrol produced large reductions in brain plaque in the hypothalamus(-90%), Striatum(-89%) and redial cortex (-48%) section of the brain in humans. In humans it is theorized that oral doses of resveratrol may reduce β-amyloid plaque associated with aging changes in the brain.

Anti-inflammatory effect
In a rat model of carrageenan-induced Paw edema, resveratrol inhibited both acute and chronic phases of the anti-inflammatory process.

Cardioprotective effects
- It inhibits the vascular cell adhesion molecular expression.
- Inhibition of vascular smooth muscle cell proliferation
- Stimulation of endothelial 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.

Antiviral effect
It inhibits herpes simplex virus types 1 and 2 replication by inhibition of an early step in virus replication cycle. In vivo studies in mice shows that resveratrol inhibits or reduce HSV replication in the vagina and limits extra-vaginal disease. Studies also show that resveratrol inhibits varicella-Zoster virus, certain influenza viruses, human cytomegalovirus. Furthermore, resveratrol synergistically enhances the anti-HIV-1 activity of several anti-HIV drugs.

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

ACKNOWLEDGMENTS
The authors are thankful to UGC, New Delhi for financially supporting the study [F.No. 39-955/2010].

REFERENCES
1. Lewington A. Medicinal plants and plant Extracts: A review of their importation into Europe. Cambridge, UK: Traffic


9. Chen Z, Ren H, Wen J. Vitaceae, Flora of china. (Beijing) and


19. Chen Z, Ren H, Wen J. Vitaceae, Flora of china. (Beijing) and

20. Lee CC, Houghton P. Cytotoxicity of plants from Malaysia and

21. De


25. Choudhary K, Singh M. Ethnobotanical Survey of Rajasthan-An


How to cite this Article: Kumar D, Kumar S, Gupta J, Arya R, Gupta A. A review on chemical and biological properties of Cayratia trifolia Linn. (Vitaceae.). Phcog Rev 2011;5:184-8.

Source of Support: UGC, New Delhi for financially supporting the study [F.No. 39-955/2010]., Conflict of Interest: None declared

New features on the journal’s website

Optimized content for mobile and hand-held devices
HTML pages have been optimized of mobile and other hand-held devices (such as iPad, Kindle, iPod) for faster browsing speed. Click on [Mobile Full text] from Table of Contents page. This is simple HTML version for faster download on mobiles (if viewed on desktop, it will be automatically redirected to full HTML version)

E-Pub for hand-held devices
EPUB is an open e-book standard recommended by The International Digital Publishing Forum which is designed for reflowable content i.e. the text display can be optimized for a particular display device. Click on [EPub] from Table of Contents page. There are various e-Pub readers such as for Windows: Digital Editions, OS X: Calibre/Bookworm, iPhone/iPod Touch/iPad: Stanza, and Linux: Calibre/Bookworm.

E-Book for desktop
One can also see the entire issue as printed here in a ‘flip book’ version on desktops. Links are available from Current Issue as well as Archives pages.
Click on [View as eBook]