



International Journal of Chemistry and Pharmaceutical Sciences

ISSN: 2321-3132 | CODEN (USA): IJCPNH

Available online at: <http://www.pharmaresearchlibrary.com/ijcps>



Phytopharmacological Review on *Epipremnum Aureum*

G. Sindhu*, P. Joshna, D. Ravinanda, T. Usha Kiran Reddy, Ch. Appa Rao

SVU College of Pharmaceutical Sciences, S.V. University, Tirupati, A.P, India

ABSTRACT

Plants belonging to Araceae family are commonly known as “aroids” as they contain crystals of calcium oxalate and toxic proteins which can cause intense irritation and poisoning if the raw plant tissue is eaten. They range from tiny floating aquatic plants to forest climbers. Many are cultivated for their ornamental foliage. The present article critically reviews the Origin, Distribution, Morphology, Cultivation and medicinal uses of *Epipremnum aureum* commonly known as money plant having indoor air pollution removing capacity.

Keywords: *Epipremnum aureum*, Aroids, Araceae, Money plant, climbers.

ARTICLE HISTORY: Received 20 February 2020, Accepted 29 March 2020, Available Online 27 April 2020

©2020 Production and hosting by International Journal of Chemistry and Pharmaceutical Sciences, All rights reserved.

Citation: G. Sindhu. Phyto pharmacological Review on *Epipremnum Aureum*. *International Journal of Chemistry and Pharmaceutical Sciences*, 8(4), 2020: 91-95.

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

CONTENTS:

1. Introduction	91
2. Pharmacological Activities of <i>Epipremnum Aureum</i>	93
3. Conclusion	94
4. References.	94

*Corresponding author

G. Sindhu

SVU College of Pharmaceutical Sciences,
S.V. University, Tirupati, A.P, India



1. Introduction

Epipremnum aureum is a species of flowering plant in the arum family Araceae, native to Moorea in the Society Islands of French Polynesia. The species is a popular houseplant in temperate regions, but has also become naturalised in tropical and sub-tropical forests worldwide, including northern Australia, Southeast Asia, South Asia, the Pacific Islands and the West Indies, where it has caused severe ecological damage in some cases. The plant has a multitude of common names including golden pothos., Ceylon creeper [1] Hunter's robe, ivy arum, money plant, silver vine, Solomon Islands ivy, marble queen, and taro vine. It is also called devil's vine or devil's ivy because it is almost impossible to kill and it stays green even when kept in the dark,[2]it is sometimes mistakenly labelled as a

Philodendron in plant stores. It is commonly known as money plant in many parts of the Indian sub –continent. It rarely flowers without artificial hormone supplements; the last known spontaneous flowering was reported in 1964 [3]

Other Species of *Epipremnum aureum* includes

- ✓ *Epipremnum amplissimum*
- ✓ *Epipremnum carolinense*
- ✓ *Epipremnum ceramense*
- ✓ *Epipremnum dahlia*

Epipremnum aureum species with its varieties:

Epipremnum aureum:

Heart-shaped leaves with yellow or white variegation.

Epipremnum aureum ‘NeoN’: Solid yellow-green leaves with no variegation.

***Epipremnum aureum* ‘Marble Queen:** Fine variegation in white colour.

***Epipremnum aureum* ‘Jade Pothos’:**Un-variegated, dark green colour leaf.

Biological Classification of *Epipremnum aureum*:

Kingdom	: Plantae
Division	: Angiosperms
Unranked	: Monocots
Order	: Alismatales
Family	: Araceae
Subfamily	: Monsteroideae
Tribe	: Monstereae
Genus	: <i>Epipremnum</i>
Species	: <i>Aureum</i>
Binomial name	: <i>Epipremnum aureum</i>

Morphology:

PLANTS: Young plants feature bright, waxy, heart shaped green leaves that are variegated with yellow or white on large mature veins, however, the leaves become much larger with deep lobes. *E. aureum* is an ever green vine growing to 20 meters tall, with stems up to 4cm in diameter.

Leaves: Leaves are colourful and ever green. They are alternate, heart-shaped, entire on juvenile plants, but irregularly pinnatifid on mature plants up to 100 cm long and 45cm broad. Juvenile leaves much smaller, typically under 20cm long.

Flowers: Pothos plants do not flower under green house and flowering is seldom reported even within native habitats. The flowers are produced in spat he up to 23cm long.

Stems:This plant is easily propagated from stem cuttings. These plants produce trailing stems when it climbs up trees and these takes root when they reach the ground and grow along it.

Roots: In its native habitat, it climbs tree trunks by aerial rootlets and tumbles along the ground as a ground cover, reaching up to 40, or more in length. [4]

Distribution:

Originally, it was endemic to the island of Mo'orea from the Society Islands. However, it is now wild in many tropical countries. The following ranges are indicated: Bangladesh, India (Andaman Islands), Myanmar ,Thad ,Vietnam, People's Republic of China (Hainan, Hong Kong) , Taiwan, Japan (Ryukyu Islands, Ogasawara Islands, Bonin Islands), Malaysia (the peninsula, Sabah and Sarawak), Singapore, Indonesia (Java, Maluku Islands, Nusa Tenggara, Sulawesi, Sumatra), Philippines, Solomon Islands, Vanuatu, New Caledonia, New Guinea, Australia (Queensland) Marshall Islands, Hawaii, Palau, Fiji, Tonga, Cook Islands and Western Samoa[5]

Cultivation:

In temperate regions it is a popular houseplant with numerous cultivars selected for leaves with white, yellow or light green variegation. It is often used in decorative displays in shopping centres, offices, and other public locations largely because it requires little care and is also attractively leafy. In tropical countries, it is found in many parks and gardens and tends to go wild there. As an indoor

plant it can reach more than 2 m in height if it is given the adequate support to climb but hardly develops adult-sized leaves. The best results are achieved by providing indirect light; it tolerates an intense luminosity, but long periods of direct sunlight burn the leaves. It lives well with a temperature between 17 and 30 °C. Generally the plant will only need watering when the soil feels dry to the touch. A liquid fertilizer can be added in the spring and it must be replanted every two years. However, it is a very robust plant that supports bad growing conditions. The plant grows rapidly in hydroponic culture. It can be cultivated from a cutting a part of a plant used in plant propagation .It can be cultivated from a cutting, a part of a plant used in plant propagation. Cuttings however, can carry various diseases such as Erwina leaf spot, Pythium root rot, Rhizoctonia foot rot, Pseudomonas leaf spot, Southern blight and Xanthomonas blight. [6] The plant is also efficient at removing indoor pollutants such as formaldehyde, trichloroethene, toluene, xylene, and benzene [7] a study found that this effect declined as the molecular weight of the polluting substance increased. [8] The plant is sometimes used in aquariums, placed on top of the aquarium and allowed to grow roots in the water. This is beneficial to the plant and the aquarium as it absorbs many nitrates and uses them for growth.

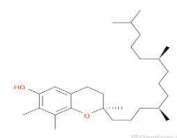
Chemical constituents:

It contains alkaloids, Saponins, Terpenoids, Phyto sterols, Tannins, Phenols , Flavonoids, 1, 1, 4, 7-Tetramethyl decahydro-1cycloprop [e] azulen -4-ol, 1-Pentadecene, 8-Penta-decanone,cis -sesquisabinene hydrate, α-Bisabolol, Lanceol, cis - 1-Heptadecene, Isopropyl myristate,1-Cyclohexene-1-butanal,α,2,6,6-tetramethyl- 10-Methylundecan-4-olide, Methyl 2-tert-butylpentanoate , Hexadecanoic acid, methyl ester, Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, methylester, Di butyl phthalate, 1-Heneicosanol , 7,9-Di-tert-butyl-1-oxaspiro(4, 5)deca-6, 9-diene-2, 8-dione, 10-Nonadecanone 9, 12-Octadecadienoic acid, methyl ester, Linoleic acid, methyl ester, Phytol, 1, 2-Benzenedicarboxylic acid, Squalene and γ-Tocopherol .

Phytol:



Tocopherol:



Squalene:



Medicinal Properties:

- ✓ The leaves are used as anti –rheumatic tonic, anti-inflammatory, anti –termite, anti- oxidants, anti -bacterial, anti -fungal and analgesic activity.

- ✓ They have high reputation in Chinese communities in the treatment of rheumatism, fractures and dysentery.
- ✓ A decoction of leaves is used as gargle and mouth wash to treat gum inflammation.
- ✓ The spadix of plant is used as emmenagogue.
- ✓ The plant is also efficient at removing indoor pollutants such as formaldehyde, Trichloro ethane, toluene, xylene and benzene.
- ✓ Leaves of *E.aureum* are also used to treat swelling and redness of thighs and legs accompanied by fever. [9]
- ✓ • The young shoots of *E. aureum* are reported to be used to treat intestinal worm infections in horses.
- ✓ The leaf extract of *E.aureum* finds use in the treatment of gonorrhoea, malaria, and diabetes. [10]

2. Pharmacological Activities of *Epipremnum aureum*

Anti Inflammation: *Epipremnum aureum* aerial parts were evaluated for anti-inflammatory activity as inflammation is a part of the complex biological responses of vascular tissues to harmful stimuli. Redness, swollen joints, joint pain, stiffness and loss of joint function are some of the indications. NSAIDs commonly used to treat inflammation can cause heart attack and stroke. Hence there is need for anti-inflammatory drugs from natural products which house hundreds of phytoconstituents. Aerial parts were evaluated for anti-inflammatory activity in Wister - albino rats and showed significant inhibition of carrageenan-induced rat paw oedema in comparison to standard drug indomethacin due to the inhibition of enzyme cyclooxygenase, leading to inhibition of prostaglandin synthesis. [11]

Anti – Microbial:

Objectionable side effects of few anti-biotics and drug resistance has necessitated the search for new anti-microbial drugs of plant origin. The plant exhibit broadspectrum anti-microbial activity against various pathogens. Various solvent extracts of *E.aureum* leaves and aerial roots revealed anti-bacterial activity against micro organisms. It has been found that water extracts of aerial root part showed clear and approximately similar zone of inhibition in comparison to standard disc against test organism in decreasing order *Escherichia coli* > *Micrococcus luteus* > *Bacillus cereus* > *B.subtilis*. Methanolic leaf extract of *E.aureum* showed anti-bacterial activity against *E. coli* and *Staphylococcus aureus*. [12] Acetone root extract showed anti-bacterial activity against *B. subtilis*. Methanolic root extract of *E.aureum* showed anti-bacterial activity against *B. subtilis*. The anti-fungal activity was evaluated against *Candida albicans*. [13]

Anti – Termite:

It has been first reported that all part of this plant prefer root extracts in ethanol was more potent 96 to 100% against termites. And significantly different from the % mortality in control that is 60% Studies have been conducted to show the in-vitro anti termite effect due to alkaloids isolated from *E.aureum* against Indian white termite *Odontotermes obesus*.

High mortality rate is reported in alkaloid isolated from leaves compared to roots and stems. Thus supporting the use of this plant for the development of herbal formulations to overcome synthetic termiticides borne problem [14] similarly in HPLC studies phenolic acids detected in the alcoholic extracts of the plant material by chromatograms. A number of peaks were detected, some of which could be identified in the presence of rare standards. In the *E. Aureum* plant, cinnamic acid and Quercetin dehydrates are commonly present in both leaf and root. While caffeic acid, sinapic acid and p-coumaric acid identified only in root explants thus plant can be cheaply harnessed in combating agricultural infections and can be used for pest control.

Anti-Cancer:

Plant based drugs have special place in anti-cancer therapy. Due to lack of effective drugs; cancer is a fatal disease rating the top three causes of death. Most of the chemotherapeutic agents for cancer treatment are highly expensive, mutagenic, and teratogenic. Hence the quest for effective cancer drugs with lesser side effects. The anti-cancer activity of Chloroform extracts of *E.aureum* showed significant growth inhibition against T-47D breast carcinoma cells and further cell death mechanism indicated that the extract elicited both apoptotic and non-apoptotic programmed cell deaths. [15]

Anti – Oxidation:

Anti-oxidants are good free radical trappers. Highly reactive oxygen species and free radicals present in biological systems from different sources. Oxygen free radicals induce DNA damage and cause peroxidation of bio-membranes. Subsequently this leads to tissue damages causing diseases. Anti-oxidants neutralize the adverse effects of free radicals in many ways and guard the body from diseases. Synthetic anti-oxidants like BHA are dangerous to human health. Anti-oxidant activity can be evaluated by several methods like reducing power assay, ABTS method, electrochemical methods etc. Anti-oxidant activity testing of different solvent like chloroform, aqueous, methanol ethanol and acetone with the aerial roots carried out by 1,1-diphenyl-2-picryl Hydrazyl radical scavenging assay and reducing power test show higher anti-oxidant potentials. The crude extracts of *E. aureum* both leaves and roots aerial roots have also been used for its anti-oxidative properties. Peroxidase, super oxide dismutase and catalase activity of the plant extracts showed positive results. The qualitative TLC analysis of different extracts of plant reveal the presence of phenolic compounds which contributes the anti-oxidant potential of the extracts. The methanol and aqueous extract of the leaves of *Epipremnum aureum* found to possess significant anti-oxidant activity. Nevertheless, the great anti-oxidant potential will be of immense benefit from the consumption of these medicinal plant extracts [16]

Detoxification:

According to the NASA / ALCA study on use of common indoor plants for indoor air purification golden pothos is one of the top 3 plants besides Philodendron and Spider plant that have been labelled the most effective in removing formaldehyde. One indoor contaminant of particular concern is formaldehyde, which released by many house

hold products, among them pressed woods, some types of foam insulation, paper products, some paint and varnishes and permanent –press fabrics. The National Toxicology program lists formaldehyde as reasonably anticipated to be a human carcinogen. Those studies fit well with evidence on the bio-chemical mechanisms involved in plant detoxification of formaldehyde. Golden pothos have been most effective plant in removing formaldehyde. It was found that the formaldehyde removing capacity of the plants depended on the dehydrogenase activity in roots and leaf systems-that is how, efficiently that plant could metabolize. It has been found effective in removing benzene and carbon mono oxide too. The detoxification potential of air pollutants by *Epipremnum aureum* exposed, absorption of nicotine on to the leaf surface without entering mesophyll, it is taken up by the roots of *E. aureum* the roots of *Epipremnum aureum* though not synthesizing nicotine themselves, take up exogenously fed nicotine as a xenobiotic. [17] Thus, *E. aureum* has detoxification potential for formaldehyde and nicotine and can be used self-generating bio-filter system for indoor air purification. [18]

Anti-Diabetic Activity:

The aqueous and alcoholic extracts of *Epipremnum aureum* at a dose 200mg/kg showed a significant effect on glucose tolerance and the extract also showed reduction in Fasting blood glucose level in normal and alloxan –induced rats. These findings indicate that the extracts might be producing hypoglycaemic effect by a mechanism independent from the insulin secretion for e.g. by the inhibition of endogenous glucose production or by the inhibition of intestinal glucose absorption and also presence of flavonoids, which are rich in the treatment of hypoglycaemia with fewer side effects. Flavonoids might be producing hypoglycaemic effect by a mechanism independent from insulin secretion. Alloxan mono hydrate is one of the chemical agents used to induce DM in animals. It induces diabetes in dose dependent destruction of B-cells of Islets of Langerhans. It is a generator of free radicals of oxygen which causes extensive DNA damage. [19]

Diuretic Activity:

Diuretics are drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and composition of body fluids in a variety of clinical situations. The diuretic activity was evaluated from aqueous and alcoholic extracts of the leaves of *Epipremnum aureum* on experimental rats. Both of the extracts having significant increase in urine volume as compared to control the standard drug [Furosemide] also showed significantly effect when compared to control. In the evaluation of diuretic activity, urea treated rats show significant effect increase in volume of urine and urinary excretion of sodium, potassium, chloride as compared to control. Alcoholic and aqueous extract [200mg/kg] showed significant change in urine excretion but effective in increasing the sodium ions and much less effect as diuresis. All tests showed significant Lipchitz values. [20]

3. Conclusion

There is a regular information regarding the *E. aureum* well known as ornamental plant. But last few years ethno-

botanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for efficacy and generally believed to be safe for human use. It is best classical approach in the search of new molecules for management of various diseases. It is thus concluded that leaves of *Epipremnum aureum* have shown great potential for pharmaceutical uses.

4. References

- [1] Wolver ton BC, McDonald RC, Watkins, Quality control methods for herbal materials. Updated edition of Quality control methods for medicinal plant materials, 2000, WHO 2011.
- [2] Mesh ram, Srivastava, Anjou, Nidhi (Apr–Jun 2014). "Molecular and physiological role of *Epipremnum aureum*". *International Journal of Green Pharmacy*. 8 (2): 73–76.
- [3] Boyce, Peter. "A Review of *Epipremnum* (Araceae) in Cultivation" (PDF). *aroid.org*. Retrieved 12 January 2017. 1. "*Epipremnum aureum*". *Royal Horticultural Society*. Retrieved 25 July 2013.
- [4] Mayo SJ, Bogner J, Boyce pc . the genera of araceae., *Royal Botany Gardens Kew 2004*],., Khandelwal KR. *Practical Pharmacognosy : Techniques and Experiments*. 20th Ed. Nirali Prakashan, Pune. 2010. EA. Foliage plants for removing indoor air pollutants from energy-efficient homes. *Economic Botany*. 32, 2002, 224–228
- [5] D. Moodley, J.R.U Wilson , ' Assessing and managing the threat posed by *Epipremnum aureum* in south Africa. ' *South Africa Journal of Botany* . January 2017 .
- [6] Wolver ton, BC (2000) *How to Grow Fresh Air*. New York: Penguin Books. Quality control methods for herbal materials. Updated edition of Quality control methods for medicinal plant materials, 2000, WHO 2011.
- [7] QU, Luping; Chen jianjn; Hnny , Richard J; Huang, Ying feng ; Caldwell, Russel I D; Thi diazuron promotes adventitious shoot regeneration from pothos leaf and petiole explants. *In vitro cellular and developmental biology*[2001].
- [8] Wolver ton, BC. *How to grow Fresh air*, penguin books, New York, 2007. . Mc. Clatchey, 2006,. Holds worth, *Traditional Medicine Database*, 2002 .
- [9] Sawada, Ayako; Oyabu , Takashi. Purification characteristics of *Epipremnum aureum* for air borne chemicals in growing conditions and its evaluation. , 2007.
- [10] Lalitha P, Arathi KA, Sripathi SK, Hemalatha S, Jayanthi P . Antimicrobial activity and *E. aureum* phytochemical screening of an ornamental foliage plant, *Pothos aurea* (Linden ex Andre). *Alfa Universal* . *An Int J Chem* 2010;1(2):63-71.19.
- [11] Linnet A, Latha PG, Gincy MM, Anuja GI, Suja SR, Shyamal Setal . Anti-inflammatory, analgesic and anti-lipid peroxidative effects of *Raphidophora pertusa* (Roxb.) Schott. And *Epipremnum pinnatum* (Linn.) Engl. aerial parts. *Ind J Nat Prod Res* 2010;1(1):5

- [12] Sonawane CS, Jagdale DM, Patil SD, Patil LJ, Kadam VJ. Phytochemical screening and in- vitro antimicrobial activity of *Epipremnum aureum* Linn . Leaves extracts . *PharmSin* 2011;2:267-72.24.
- [13] Lan TM, Sulaiman SF, Najimudin N, Muhammad TST. Anticancer medicinal plant *Epipremnum pinnatum* (L.) Engl .chloroform extracts elicited both apoptotic and non-apoptotic cell deaths in T-47D mammary carcinoma cells. *KMITL SciTechJ* 2007;7:24-43.27.
- [14] Meshram A, Srivastava N. In vitro antitermite activity of alkaloids from *Epipremnum aureum* (Linden and Andre)Bunting (Araceae) against
- [15] Indian White termite *Odonto termesobesus*. *Asian J Pharm Tech Innov* 2015;3(10):27-31.26.
- [16] W. De Costa, Hitanayake and I. Dharmawardena, 'A Physiological investigation into the invasive Behaviour of some plant species in a Mid – country Forest reserve in Srilanka [2011]
- [17] Hemalatha S, Lalitha P, Arulpriya P. Antioxidant activities of the extracts of the aerial roots of *Pothos aurea* (Linden ex Andre). *Pharma Chem* 2010;2:84-9.28.
- [18] Weidner M, Martins R, Muller A, Simon J, Schmitz H. Uptake,transport and accumulation.. *Lippschitz WL, Haddian Z, Kerpscar A. Bioassay of Diuretics . J Pharmacol. Exp. Ther .,2005*
- [19] Linnet A, Latha PG, Gincy MM, Anuja GI, Suja SR, Shyamal Setal . Anti-inflammatory, analgesic and anti-lipid peroxidative effects of *Raphidophora pertusa* (Roxb.) Schott. And *Epipremnum pinnatum* (Linn.) Engl. aerial parts. *Ind J Nat ProdRes* 2010;1(1):5
- [20] Sonawane CS, Jagdale DM, Patil SD, Patil LJ, Kadam VJ.Phytochemical screening an in - vitro antimicrobial activitys of *Epipremnum aureum* Linn. Leaves extracts. *PharmS in* 2011;2:267-72.24.
- [21] Arul priya P, Lalitha P. Assessment of the antioxidant activity of acetone, ethyl alcohol and aqueous extracts of the aerial roots of *Pothos aurea* (Linden ex Andre) climbed over *Lawsonia inermis* and *Areca catechu* *J Chem Pharm Res* 2012;4:1042-7.25.