



ISSN: 2320-2831

# International Journal of Pharmacy and Analytical Research (IJPAR)

IJPAR | Vol.14 | Issue 3 | Jul - Sept -2025

www.ijpar.com

DOI : <https://doi.org/10.61096/ijpar.v14.iss3.2025.543-550>

Review

## Green Gold on the Wall: Unveiling the Therapeutic Spectrum of *Epipremnum aureum*

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	<b>Abstract</b>
Published on: 27 Aug 2025	<p>(Linden &amp; Andre) <i>Epipremnum aureum</i> G.S. Bunting is a perennial climbing vine that belongs to the Araceae family and is prized for both its decorative and therapeutic qualities. Its phytochemical makeup, pharmacognostical properties, and a variety of pharmacological actions, such as anti-inflammatory, anti-cancer, anti-ulcer, antioxidant, and anti-arthritis effects, are all examined in this study. A variety of solvents, including methanol, ethanol, chloroform, and acetone, were used to make extracts of various plant sections, which were then screened for phytochemicals both qualitatively and quantitatively. To discover bioactive chemicals, sophisticated analytical methods such as GC-MS, FTIR, and UV-VIS spectroscopy were used. Significant biological activity were found in both in vitro and in vivo tests, especially in methanol and aqueous extracts. The findings demonstrate the therapeutic potential of <i>E. aureum</i> and bolster traditional ethnomedicinal claims, indicating the need for more research on its isolation and creation of innovative herbal formulations.</p>
Published by: Futuristic Publications	
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	<p><b>Keywords:</b> Phytochemicals, antioxidant activity, antimicrobial, anticancer, anti-arthritis, antiulcer, <i>Epipremnum aureum</i> and traditional medicine.</p>

## INTRODUCTION

Traditional medicine includes healing practices, methodologies, knowledge, and beliefs that utilize treatments derived from plants, animals, and minerals, as well as spiritual therapies, manual procedures, and physical exercises. These methods are used separately or in combination to prevent, identify, and cure diseases as well as to enhance general health.<sup>[1]</sup>

Natural therapy has proven to be successful in treating a wide range of ailments in recent years. Natural ingredients are the source of many pharmacological medications utilized today. However, because many of these natural resources have not yet been fully investigated and analyzed, their full potential is still mainly unrealized. This emphasizes how important it is to continue studying traditional healing systems in order to fully understand their advantages and take into account using them as primary or supplemental treatments.<sup>[2]</sup>

Pothos is a broadleaf evergreen, herbaceous perennial, low-maintenance houseplant that is a member of the Araceae family. Grown for its glossy green or variegated leaves that fall along sloping stems, it is native to the Society Islands. It usually reaches a length of 6 to 8 feet as a groundcover, but its climbing or hanging vines can reach up to 40 feet, which makes it perfect for hanging baskets. It typically keeps its juvenile leaf structure when in containers. The species name, meaning "golden" in Latin, reflects the plant's common variegation.

Growing pothos is quite simple. Although it can withstand prolonged periods of low light, it prefers bright, indirect light. Regularly spritz the leaves to maintain humidity levels, and let the well-drained soil dry out in between waterings. With the exception of the plant's dormant winter phase, fertilize every other month. To get rid of dust, periodically wipe the leaves with a gentle cloth. The foliage will concentrate at the tips of the stems as older leaves eventually turn yellow and die off. To promote a broader, bushier form, trim stems. The vines use brown aerial roots to climb and readily root in water. Large, mature leaves can grow on the plant with the right amount of light and support.<sup>[3]</sup>

### Taxonomical classification

- Kingdom : Plantae
- Division : Angiosperms
- Unranked : Monocots
- Order : Alismatales
- Family : Araceae
- Subfamily : Monsteroideae
- Tribe : Monstereae
- Genus : *Epipremnum*
- Species : *aureum*
- Binomialname : *Epipremnum aureum* ( L.) Engl.

### Pharmacognostic description <sup>[3]</sup>

#### Attributes

- **Genus:** *Epipremnum*
- **Species:** *aureum*
- **Family:** Araceae
- **Life Cycle:** Perennial
- **Recommended Propagation Strategy:** Stem Cutting
- **Country Or Region of Origin:** Society Islands
- **Climbing Method:** Clinging
- **Dimensions:** Height: 0 ft. 6 in. - 0 ft. 8 in. Width: 13 ft. 0 in. - 40 ft. 0 in.

#### Whole Plant Traits

- **Plant Type:** Ground Cover, Herbaceous Perennial, Houseplant, Poisonous, Vine.
- **Woody Plant Leaf Characteristics:** Broadleaf Evergreen.
- **Habit/Form:** Climbing, Creeping, Spreading.
- **Growth Rate:** Medium
- **Maintenance:** Low

#### Cultural Conditions

- **Light:** Dappled Sunlight (Shade through upper canopy all day), Deep shade (Less than 2 hours to no direct sunlight), Partial Shade (Direct sunlight only part of the day, 2-6 hours).

- **Soil Texture:** High Organic Matter, Loam (Silt), Shallow Rocky.
- **Soil Drainage:** Good Drainage, Occasionally Dry.
- **Available Space to Plant:** 12 inches-3 feet, 3 feet-6 feet, 6-feet-12 feet, 12-24 feet, 24-60 feet.
- **NC Region:** Coastal, Mountains, Piedmont.

#### **Fruit**

- **Fruit Color:** Orange, Red/Burgundy.
- **Fruit Type:** Berry
- **Fruit Description:** Red-orange when ripe. Houseplants rarely if ever produce fruits.

#### **Flowers**

- **Flower Color:** Gold/Yellow, Green, Purple/Lavender.
- **Flower Inflorescence:** Spadix
- **Flower Description:** Rarely flowers in a spadix surrounded by a spathe. Spadix shorter than spathe, stout; spathe boat-shaped, not forming tube, yellow to green or purple.

#### **Leaves**

- **Woody Plant Leaf Characteristics:** Broadleaf Evergreen
- **Leaf Color:** Gold/Yellow, Green, Variegated, White.
- **Leaf Feel:** Glossy, Leathery, Smooth.
- **Leaf Value to Gardener:** Long-lasting, Showy.
- **Leaf Type:** Simple
- **Leaf Arrangement:** Alternate
- **Leaf Shape:** Cordate, Deltoid, Elliptical, Ovate.
- **Leaf Margin:** Entire
- **Hairs Present:** No
- **Leaf Length:** 3-6 inches
- **Leaf Width:** 3-6 inches
- **Leaf Description:** Leaves heart-shaped to elliptic-ovate, glossy medium green variegated with paler green underside. Veins may be reddish. Alternate, simple, sheathing, cordate, acuminate, cordate base, entire, coriaceous, glossy, green or green variegated yellow, cream to white, 3-4 in long. Petioles slender, shorter than leaf blade, and grooved to clasp the stem; stipule fused to petiole, free edges whitish, turning brownish, drying & dropping.

#### **Stem**

- **Stem Color:** Gold, Yellow, Green, Variegated, White.
- **Stem Is Aromatic:** No
- **Stem Description:** Stems green and striped with white or yellow. Slender, with adventitious roots.

#### **Landscape**

- **Landscape Location:** Container, Hanging Baskets, Houseplants, Vertical Spaces.
- **Resistance To Challenges:** Deer, Dry Soil, Heavy Shade, Rabbits.

#### **Problems**

Poisonous to Humans, Problem for Cats, Problem for Dogs, Problem for Horses.

#### **Poisonous to Humans**

- **Poison Severity:** Medium
- **Poison Symptoms:** Oral irritation, pain and swelling of mouth, tongue, and lips, excessive drooling, vomiting (not horses), difficulty swallowing, skin irritation, diarrhoea.
- **Poison Toxic Principle:** Calcium oxalate crystals.
- **Causes Contact Dermatitis:** Yes
- **Poison Part:** Flowers, Fruits, Leaves, Roots, Seeds, Stems.

#### **Screening of phytochemicals**

Methanol, ethanol, and acetone were the three distinct solvents used in a sequential extraction of the aerial portions of *Epipremnum aureum*, including the leaves, stems, and aerial roots. There were alkaloids, saponins, carbohydrates, glycosides, amino acids, and phenols in the different extracts, according to a preliminary qualitative phytochemical screening.<sup>[4]</sup>

Compounds were extracted from three *Epipremnum aureum* explants (leaf, root, and stem) using methanol as the solvent. Using a variety of chemical assays, phytochemical screening was conducted to verify the presence of amino acids, proteins, carbohydrates, steroids, glycosides, alkaloids, and saponins. Additionally, a UV-VIS spectrophotometer was used to measure the total amounts of flavonoids and phenolic compounds. The observations suggested that the methanol extract of *Epipremnum aureum* leaves included higher quantities of alkaloids, phenolics, flavonoids, and terpenoids. The presence of the enzymes catalase and peroxidase was responsible for the leaves' significant antioxidant activity.<sup>[5]</sup>

Gas Chromatography-Mass Spectrometry (GC-MS) was used to detect phytochemical elements for possible therapeutic applications after chromatographic purification of the methanolic extract of *Epipremnum aureum* (Linden and André) G. S. Bunting. The investigation identified thirty different phytochemical substances. Dibutyl phthalate (16.75%),  $\alpha$ ,2,6,6-tetramethyl- (19.28%), 8-Octadecanone (7.27%), Phytol (4.28%), Vitamin E (8.00%),  $\gamma$ -Sitosterol (8.07%), and 12-Methyl-E, E-2,13-octadecadien-1-ol (4.56%) were among the main constituents.<sup>[6]</sup>

#### **Extraction of *Epipremnum aureum***

The Soxhlet extraction method was used to create the plant's leaf extracts. This procedure involved filling a thick filter paper thimble with 20 grams of dried and cleaned leaves, which were then put into the Soxhlet extractor. The extractor was fitted with a condenser and connected to a round-bottom flask that held the solvent, which could be either methanol or distilled water. The vapor rose, condensed, and dripped onto the plant material when the solvent was heated to 90°C. The siphon arm automatically drained the chamber back into the flask as it filled. This cycle was carried out eighteen times. A rotary evaporator was used to remove the solvent after extraction, and the finished extract was gathered for additional examination. The thimble's insoluble residue was thrown away.<sup>[7]</sup>

#### **Ethnomedicinal uses**

**Southeast Asian Traditional Uses:** In Malaysia, it has long been used to cure cancer, ascites, and several skin conditions.<sup>[8]</sup>

**Local Decoctions:** In several parts of Southeast Asia, traditional medicine has utilized decoctions produced from fresh leaves, which are frequently mixed with meat, eggs, or drunk as tea.<sup>[9]</sup>

#### **Pharmacological activity**

##### **Anti oxidant activity**

Using methanol as the extraction solvent, the current study assessed the phytochemical components and in vitro antioxidant potential of several *Epipremnum aureum* explants. Carbohydrates, proteins, steroids, glycosides, alkaloids, saponins, and amino acids were all detected by phytochemical screening. UV-VIS spectrophotometry was utilised to quantify the total amounts of flavonoids and phenolic compounds.

Using DPPH and FRAP assays, antioxidant enzyme activities (catalase, glutathione peroxidase, and superoxide dismutase) and the ability to scavenge free radicals were evaluated. Alkaloids, phenolics, flavonoids, and terpenoids were most abundant in the leaf methanol extract, which also demonstrated the highest level of antioxidant activity, especially through catalase and peroxidase activity. The leaf extract had the strongest free radical scavenging activity, whereas the stem extract had the highest IC<sub>50</sub> value, suggesting the lowest scavenging capacity.

In conclusion, compared to the stem and aerial roots, the leaf extract of *E. aureum* has higher antioxidant and enzyme activity and is rich in secondary metabolites, indicating that it may be a useful natural source for drug development.<sup>[5]</sup>

##### **Anti bacterial and antifungal activity**

The objective of this work intended to screen the phytochemicals and evaluate the antifungal and antibacterial properties of methanolic and aqueous extracts of *Epipremnum aureum* Linn. Using the well diffusion method, antifungal activity was evaluated against *Candida albicans*, while antibacterial activity was tested against *Escherichia coli* and *Staphylococcus aureus*. Using Gentamycin and Ketoconazole as standards, zones of inhibition and minimum inhibitory concentration (MIC) were measured to assess the effectiveness of the antibiotic.

According to the results, the methanolic extract had no antibacterial or antifungal action, but the aqueous extract had strong antibacterial and antifungal activity. The aqueous extract's minimum inhibitory concentration (MIC) for the bacterial and fungal strains was 50 µg/ml and 25 µg/ml, respectively.<sup>[10]</sup>

**Anticancer activity****Chloroform extract**

This study assessed the aerial component extracts of *Epipremnum aureum* against MCF-7 breast cancer cells to determine their in vitro anti-cancer activities. The Soxhlet method was used to prepare extracts using a variety of solvents. Flow cytometry was used to measure the amount of apoptosis. With IC<sub>50</sub> values of 32.9µg/mL and 45.8µg/mL, respectively, the chloroform and ethanol portions of the extracts demonstrated notable cytotoxicity in comparison to 5-fluorouracil (IC<sub>50</sub> = 19.2µg/mL). The chloroform and ethanol extracts were examined under a microscope, which showed apoptotic bodies, nuclear fragmentation, and condensed chromatin all of which are indicators of apoptosis. These results suggest that *E. aureum* chloroform extract has greater anti-cancer potential against MCF-7 cells.<sup>[11]</sup>

**Ethanol extract**

Using both *in vitro* and *in vivo* models, this work sought to assess the antitumor activity of *Epipremnum aureum* Linn.'s ethanolic leaf extract (EEEE). Bioactive substances including flavonoids, glycosides, tannins, phenolics, steroids, and triterpenoids were detected by phytochemical screening.

EEEE showed strong anti-cancer efficacy when tested for in vitro cytotoxicity on DAL (Dalton's lymphoma ascites) cell lines utilizing the MTT and Trypan Blue exclusion tests. EEEA at 200 and 400 mg/kg was administered orally to DAL tumor bearing mice for 14 days in order to perform in vivo experiments. In comparison to the untreated control group, the treatment dramatically decreased the tumor's weight, volume, and viable cell count as well as the percentage rise in body weight. EEEA also assisted in bringing hematological parameters back to normal. Both *in vitro* and *in vivo* studies, such as a higher average lifetime in treated mice and a noticeable slowdown in tumor progression, demonstrate that EEEA has strong antitumor capabilities.<sup>[12]</sup>

**Antiulcer activity**

Numerous bioactive phytochemicals found in the plant kingdom are being investigated for potential use in medication development. Originating in Southeast Asia and New Guinea, *Epipremnum aureum* has long been used in Malaysia and Singapore to treat skin conditions, ascites, and cancer. The purpose of this study was to assess the ethanolic stem extract of *E. aureum*'s anti-ulcer properties in Wistar rats.

Pylorus ligation and ethanol-induced stomach ulcers were the two experimental models that were employed. At doses of 100, 200, and 400 mg/kg body weight, the extract was taken orally. Sucralfate (100 mg/kg) used as the standard for evaluating parameters including ulcer index and percentage inhibition in the ethanol-induced ulcer model.

Omeprazole (30 mg/kg) was used as the reference when evaluating gastric volume, pH, free acidity, total acidity, and ulcer index in the pylorus ligation model.

The extract showed a dose-dependent, substantial ( $p < 0.05$ ) decrease in ulcer indicators. It offered 73.94% gastroprotection at 400 mg/kg, which was equivalent to 87.9% for sucralfate. At doses of 200 and 400 mg/kg, the extract dramatically raised the pH of the stomach while decreasing the ulcer index, free and total acidity, and gastric volume in the pylorus ligation model. At 400 mg/kg, the greatest gastroprotective impact (71.3%) was noted, in contrast to Omeprazole's 81.5%.

According to these findings, *Epipremnum aureum* has long been used to treat stomach ulcers, and it may also be used to create plant-based anti-ulcer medications.<sup>[13]</sup>

**Antiinflammatory and analgesic activity**

Aqueous and alcoholic extracts of *Epipremnum aureum* were tested for their acute anti-inflammatory and analgesic properties in Albino Wistar rats weighing 100–150 g. The dosage of the extracts was 200 mg/kg, and they were taken orally. The plethysmometer method was used to measure anti-inflammatory activity, while the hot plate test was used to measure analgesic action.

In comparison to the control group and standard medication, the results demonstrated that both aqueous and alcoholic extracts considerably reduced the volume of paw edema and greatly increased the latency to paw licking in a dose-dependent manner. One-way ANOVA was used for statistical analysis.

The results show that extracts from *Epipremnum aureum* have significant analgesic and anti-inflammatory qualities. To separate and describe the bioactive substances, comprehend their modes of action, and evaluate their safety for possible pharmaceutical usage, more research is necessary.<sup>[14]</sup>

**Antitermite activity**

The current work used Gas Chromatography-Mass Spectrometry (GC-MS), Fourier Transform Infrared (FTIR) spectroscopy, and UV-Visible (UV-VIS) spectroscopy to analyze the bioactive elements of the chloroform extract of *Epipremnum aureum* leaves and examine its anti-termite potential.

In comparison to the control, the chloroform extract demonstrated moderate termiticidal activity, with efficacy gradually rising from 19.33% to 24.33%. The existence of functional groups corresponding to alkanes, alkenes, alkyl halides, aromatics, nitro compounds, and amines was discovered by FTIR analysis after preliminary investigation under UV and visible light.

17 phytochemical components were found in the extract by GC-MS analysis. Among the main components were Z-5-nonadecene (10.05%), 2-Tert-butyl-4,6-bis(3,5-di-tert-butyl-4-hydroxybenzyl) phenol (8.46%), 1-heneicosanol (5.18%), Pentadecanoic acid (26.23%), Linolenic acid (22.80%), and Hexadecanoic acid (10.82%).

The existence of substances such alkaloids, flavonoids, polyphenols, carboxylic acids, esters, and alkanes was confirmed by the GC-MS data, which corroborated the FTIR findings. The study concludes by showing that the leaf extract of *E. aureum* includes bioactive chemicals that could be used as a natural termite control option, indicating the need for more investigation and development.<sup>[15]</sup>

#### **Antimicrobial activity and cytotoxicity :**

The purpose of this study was to assess the cytotoxicity and antibacterial activity of aqueous, ethanolic, and acetone extracts from different *Epipremnum aureum* components, including the petioles, stems, roots, and leaf blades. The effectiveness of antimicrobials was evaluated against the filamentous fungus *Aspergillus flavus*, the yeast *Candida albicans*, the Gram-negative *Escherichia coli*, and the Gram-positive *Staphylococcus aureus*. *A. flavus* was resistant to every sample that was tested ,however the acetone root extract showed the strongest antibacterial efficacy among the extracts. For *E. coli*, *S. aureus*, and *Candida albicans*, the acetone root extract's Minimum Inhibitory Concentration (MIC) was 3 mg/ml, 5 mg/ml, and 9 mg/ml, respectively.

The human liver cancer cell line (HEPG-2) was used to test the acetone root extract's cytotoxicity *in vitro*. An IC<sub>50</sub> value of 36.7 µg/ml indicated that the most effective concentration was 50 µg/ml. Using Gas Chromatography-Mass Spectrometry (GC-MS) for phytochemical screening of the acetone root extract, 21 organic substances were found, including alcohols, phenols, carbohydrates, fatty acids, vitamins, alkaloids, and flavonoids. The most prevalent substance was patchoulol, which was followed by palmitic acid and myristic acid.

These results imply that *E. aureum*'s acetone root extract has promising cytotoxic and antibacterial qualities, most likely as a result of the presence of bioactive phytochemicals.<sup>[16]</sup>

#### **Dose - mortality and repellent activity**

Adult beetles of *Tribolium castaneum* (Hbst.), *Sitophilus oryzae* (L.), and *Callosobruchus chinensis* (L.) were examined for insecticidal and repellent properties using petroleum ether, chloroform, and methanol extracts of *Epipremnum aureum* (Linden & André) G.S. Bunting.

For all three beetle species, the petroleum ether extract demonstrated dose-dependent death. At 6, 12, 18, 24, 30, 36, and 42 hours of exposure, the LD<sub>50</sub> values (in mg/cm<sup>2</sup>) against *T. castaneum* were 1.40, 1.21, 1.16, 1.10, 1.04, 0.96, and 0.84, respectively. Against *S. oryzae*, the values were 1.73, 1.66, 1.32, 1.08, 1.00, 0.99, and 0.90, and against *C. chinensis*, they were 2.95, 2.02, 2.01, 1.91, 1.82, 1.72, and 1.65 at the corresponding time points.

Methanol and chloroform extracts showed no insecticidal effect on the test species. The petroleum ether extract demonstrated strong repellent action against *T. castaneum* and *C. chinensis* in repellency tests ( $P < 0.05$ ). Significant repellency against *T. castaneum* ( $P < 0.01$ ) and *C. chinensis* ( $P < 0.05$ ) was demonstrated by the chloroform extract. All of the test insects were not repelled by the methanol extract.<sup>[17]</sup>

#### **Calming effect**

It was discovered that humans experienced an unconscious soothing response when they actively touched a leaf of natural pothos. The numerous earlier studies that found plants, nature, and materials of natural origin are supported by this research. The studies had concluded that the leaves of *Epipremnum aureum* gives them a sense of tranquillity. If leaves with alternative surface types had been utilized, the experiment's outcomes might have been different, and this needs more investigation. A fresh paradigm for comprehending the interaction between people and plants or the natural world is provided in this paper.<sup>[18]</sup>

#### **In cleaning air pollution**

Eliminating formaldehyde, a major indoor air contaminant, can help lower health risks in urban settings. Because of its exceptional capacity to absorb and metabolize formaldehyde, *Epipremnum aureum* is particularly well-suited for locations with frequent vehicle emissions, such as garages. Additionally, research indicates that *E. aureum* can lower concentrations of other dangerous contaminants, including trichloroethylene and benzene.<sup>[18]</sup>

### Antistress activity

This study evaluated the anti-stress effects of standardized *Epipremnum aureum* leaf extract in mice. Using tests like forced swimming and anoxic stress tolerance, along with markers such as cortisol, ascorbic acid, adrenal weight, and blood cell counts, the extract (400–600 mg/kg) significantly improved stress tolerance and reduced stress-related biochemical and hematological changes. Findings support its adaptogenic potential.<sup>[19]</sup>

### Antiarthritic activity

(Linden & Andre) *Epipremnum aureum* -The Araceae family includes the perennial, evergreen climbing vine known as G.S. Bunting. The pharmacognostical characteristics, phytochemical makeup, and *in-vitro* antiarthritic activity of the plant were assessed in this investigation. Physicochemical, microscopic, and macroscopic evaluations were all part of the pharmacognostical analysis. Following their preparation and phytochemical screening, ethanolic (EEEE) and aqueous (AEEA) extracts were found to include glycosides, alkaloids, flavonoids, carbohydrates, and phenolic substances.

Diclofenac was used as the reference in heat-induced bovine serum protein and egg albumin denaturation experiments to evaluate the anti-arthritis potential. Protein denaturation was markedly reduced by both extracts. Inhibition ranges for AEEA and EEEA were 96.52% to 98.26% and 92.22% to 97.02%, respectively. AEEA ranged from 19.01% to 69.61% inhibition in the egg albumin assay, whereas EEEA showed 18.10% to 67.85% inhibition.<sup>[20]</sup>

## CONCLUSION

The current study emphasizes *Epipremnum aureum* has extensive phytochemical content, pharmacognostical characteristics, and varied pharmacological potential. Significant antibacterial, anticancer, antiulcer, anti-inflammatory, anti-arthritis, anti-stress, and insect-repellent properties were shown by the plant. In a variety of bioassays, methanol and aqueous extracts especially those from the leaves performed well. The presence of multiple bioactive compounds that contribute to its therapeutic efficacy was confirmed by GC-MS analysis. The results support its potential as an affordable, environmentally friendly source for natural drug development and validate its traditional medicinal uses. To create standardized herbal formulations for human health care, more investigation into the separation, characterisation, and clinical assessment of its active ingredients is necessary.

### Funding

Authors wish to state that no funding is involved.

### Declaration of competing interest

The authors declare that they have no competing interests.

## ACKNOWLEDGEMENT

We express our deep sense of gratitude to Professor and faculty members of Department of Pharmaceutical Chemistry, College of Pharmacy, Madurai Medical College for providing the guidance to carry out the studies.

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