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Review Article

Extensive Study of Formulation and Bryophyllum Pinnatum Plant

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ABSTRACT

Bryophyllum pinnatum, also called as the airplant, lifeplant, or leaf of miracle, is a succulent herb belonging to the Crassulaceae family. Originally from Madagascar and South Africa, it has spread to hot and cold regions across globe. have long been valued in traditional medicine for treating conditions such as urinary stones, hypertension, skin ailments, asthma, and insect bites. This perennial plant features thick, serrated leaves that produce small plantlets along their edges, allowing easy propagation. It typically developes between 11inch to 4 foot tall and bears bell-shaped flowers in shades of yellow-green to deep red, which bloom mainly in winter and spring. This study explores the formulation of an herbal shampoo and gel incorporating Bryophyllum pinnatum leaves, known for their antimicrobial properties. While synthetic shampoos and gel may cause adverse effects on the scalp eyes and skin. Herbal alternatives offer a safer option, and Bryophyllum pinnatum has been traditionally used in folk medicine for various ailments. This research aims to develop a natural shampoo and gel that leverages its benefits for improved hair and skin care.

INTRODUCTION

Plant: Bryophyllum Pinnatum

Common name: Air plant, goodluck leaf, green mother of millions, leaf of life, liveleaf, love plant of mexico, sproughting leaf.

Origin: Native to Madagascar and South Africa. (1) Bryophyllum pinnatum (Lam.) Oken, is part of Crassulaceae family, That recognized as an environmental weed but is widely used in medicine across various regions traditionally in India, particularly for treating urinary stones. Additionally, it is valued in traditional healing practices worldwide for managing conditions like

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hypertension, skin disorders, asthma, colds, insect stings, and abscesses.[2] Bryophyllum pinnatum is a succulent plant of Crassulaceae family, commonly identified as the airplant, cathedral bells, lifeplant, and leaf of miracle. Native to Madagascar, it is eternal herb has spread across various tropical and subtropical regions, where it is cultivated both for its ornamental appeal and medicinal properties. It is distinguished by its thick, fleshy leaves, which grows in alternating manner with the stems. The leaves of Bryophyllum pinnatum are green and typically have serrated or lobed edges. A unique characteristic of this plant is the formation of small plantlets along the leaf margins, which can detach, fall to the ground, and establish themselves as new plants.[3]

Fig No. 1: Bryophyllum Pinnatum Plant

Official Names of Bryophyllum Pinnatum:

1. English: Kalanchoe pinnata, Bryophyllum pinnatum, Life Plant, Mother of Thousands, Miracle Leaf.
2. Hindi: Jakh Me Hayat, Panfuti.
3. Sanskrit: Parnabija.
4. Gujarati: Ghaymaari.
5. Telgu: Simahmudu.
6. Tamil: Ranakalli.

Biological Source:

Bryophyllum pinnatum (syn. Kalanchoe pinnata) is a luscious eternal plant local to Madagascar and it is introduced in the early 20th century into anthroposophic medicine.[4]

Geographical Source:

Bryophyllum pinnatum is local to Madagascar and has become naturalized at hot and cold areas, colonize high and temperate climates from sea level to 2,6Km, occupying sites on rock in hot evergreen and dry deciduous forests, also montane forests. found in Asia, Africa, Australia, New Zealand, the West Indies, Bermuda, Macaronesia, the Mascarenes, Brazil, Suriname, the Galapagos Islands, Melanesia, Polynesia, and Hawaii. [4].

Classification And Morphological Characteristics of Bryophyllum Pinnatum

Bryophyllum pinnatum is a succulent herbaceous plant that typically grows to a height ranging from 11inch to 4foot. Its stem is four-angled, join older stems exhibiting a faint appearance, while newer stems possess a reddish with subtle white color. The leaves of this plant can be either simple or compound, with those in the upper region usually comprising 3 to 5, or occasionally 7, foliolate leaves attached to long petioles. At terminal ends of that stem, the plant produces drooping, bell shaped flowers that can reach up to 7centimeters in length. These flowers are arranged in branching clusters, forming terminal inflorescences. Every flower is borne on a pedicel measuring between 10 and 25 mm, which is partially attached to the tubular calyx. The calyx itself is adorned with patches of pink or reddish coloration, adding to the plant's ornamental appeal. The petals, which range in length from 3 to 6 centimeters, display a color spectrum that varies from yellow green to intense red. These petal is partially fused, forming corolla pipe like structure that extends upward before splitting into four distinct petal lobes near the

apex. This plant is known for its striking floral display, which primarily occurs during the winter and spring seasons. During this time, its vibrant flowers enhance its visual appeal while also playing a significant role in its reproductive cycle. The combination of its uniquely structured flowers, fleshy leaves, and distinctive coloration makes Bryophyllum pinnatum a notable species both for its medicinal properties and its ornamental value.

Table No: 1. Taxonomical Classification

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Super division	Spermatophyta
Division	Angiosperms
Class	Eudicots
Subclass	Rosidae
Order	Saxifragales
Family	Crassulaceae
Genus	Bryophyllum
Species	Bryophyllum pinnatum

The meaning of word Bryophyllum pinnatum: Derives from Greek Bryo refers to sprout & phyllon refers to leaf having ability to grow from leaf cut, pinnatum is from Latin feathered, winged. [5].

Collection of Plant

Leaves of Bryophyllum pinnatum were cultivated and collected from the local nursery. The botanical identification and authentication of the B. pinnatum type was performed by Dr. U. H. Patil Head Department of Botany Bhogawati Mahavidyala, Kurukali. The collection of plant material was conducted under the guidance of Ms. Sipora S. Gaikwad. Assistant professor at Genesis Institute of Pharmacy, Radhanagari by using "The flora of presidency of Bombay". The legitimate scientific name of the species is Bryophyllum pinnatum (Lam).[6]

firstly after collecting the plant leaves they was clean of the dirt. Firstly Dedusting was done, and then the cloth is used to clean the area was cleaned where the cloth is made up of entire cotton. The cleaned leaflets were dried in shade once the leaves are dried then they were washed thoroughly. Size reduction process is done after the drying of leaves. the grinder is used to size reduction of the leave which provides the required sizes particle of powder.[7]

Phytochemical Constituents:

Bryophyllum pinnatum is known for its abundance of bioactive substances, like alkaloid, glycoside, triterpene, cardenolides, steroid, flavonoid, bufadienolide, also lipid. Among its significant constituents, bryophyllin A and B—major bufadienolides—have been isolated from its leaves. Additionally, various flavonoids have been identified in the leaves and their extracts, such as kapinnatoside, ,7-di-O-rhamnopyranoside, quercitrin, and 3',4'-dimethoxy quercetin, 8-methoxyquercetin-3. The plant has also been found to contain several phenolic acids, including syringic acid, caffeic acid, para cinnamic acid, para coumaric acid, ferulic acid, and protocatechuic acid. Furthermore, 2-(9-decenyl)-phenanthrene and 2-(9-undecenyl)-phenanthrene—have been reported in *B. pinnatum*. Additionally, a phenanthrene alkaloid, identified as 1-ethanamino-7-hex-1-yne-5'-oxophenanthrene, isolated from ethanolic extract of leaves.[11]

Phytochemical Screening.

Phytochemical screening is the process of examining and detecting the chemical constituents found in plants, particularly secondary metabolites, through a simple and cost-efficient assay.

Importance Of Phytochemical Screening.

Drug Development: Phytochemical screening helps identify compounds in plants that can be used to develop new drugs.

Dietary Supplements: Phytochemical screening can help identify bioactive agents for dietary supplements.

Quality Control: Phytochemical screening can help ensure the safety and efficacy of herbal products, including cosmetics.

Medicinal Plant Research: Phytochemical screening can help identify medicinal plants, determine their value, and preserve them.

Table No 2: Tests For Alkaloids

Sr. No.	Tests	Observations	Inferences
1.	Dragendorff's Test	Orange Color	Present
2.	Tannic Acid Test	Yellow Color	Present

1. **Dragendorff's Test**: Extract solution + Dragendorff's reagent (Potassium Bismuth Iodide), the orange red color formed shows presence of Alkaloids.

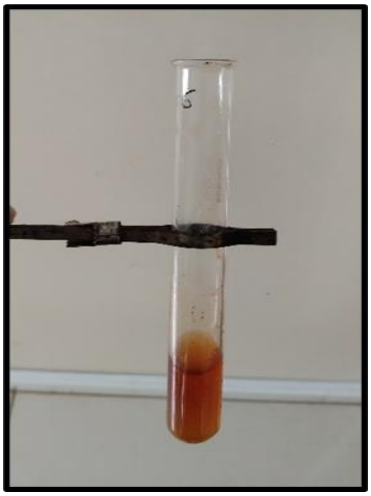

Fig. No:2. Dragendorff's Test

2. **Tannic acid test:** some drop of tannic acid was added to extract and mix. yellow color formed alkaloids confirmed by formation of crystalline solids.

Fig No:3. Tannic Acid Test

Table No 3: Test For Tanning

Sr. No.	Tests	Observations	Inferences
1.	Ferric Test	Bluish Black Ppt	Present
2.	Bromine Water Teat	Decolorization	Present

1.Ferric test: Hydrate the sample with water, remove excess water with filter paper, and add three drops of ferric reagent. If the solution turns gray or black, tannins are present.

Fig. No:4. Ferric test

2. B**romine water test:** Bromine water test is a qualitative test that can detect availability of condensed tannins in extract

of Involves adding bromine water to a plant extract solution.

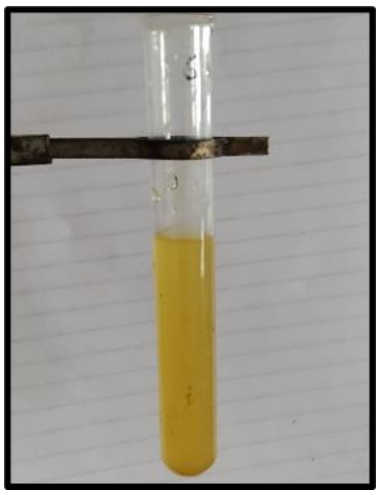

Fig. No:5. Bromine Water Test

Table No 4: Test For Flavonoids

Sr. No	Tests	Observations	Inferences
1.	Lead Acetate Test	Yellow PPt	Present
2.	NaOH Test	Dark Yellow	Present

1. **Lead Acetate Test:** To test for flavonoids using lead acetate, add asome drops of lead acetate liquid to the extract of plant; a yellow precipitation indicates the flavonoids presence**.**

Fig. No:6. Lead Acetate Test

2. **NaOH Test:** The sodium hydroxide test is a preliminary test for the presence of flavonoids in a sample. The test involves adding a few drops of sodium hydroxide to a sample extract and observing the color change.

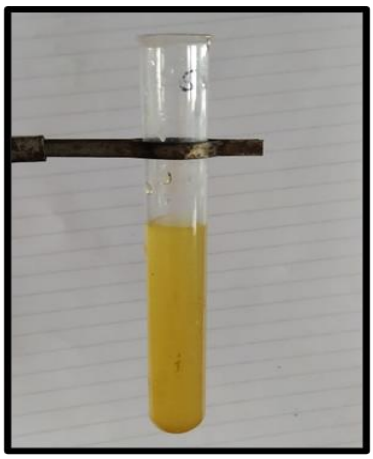

Fig. No: 7. NaOH Test

Extraction Procedure for Bryophyllum Pinnatum.[14]

The extraction of bioactive compounds from Bryophyllum pinnatum follows a systematic approach, including collection, drying, grinding, and solvent extraction. Below is a general method for obtaining plant extracts:

1. Collection of plant and Preparation of Plant Material

- Fresh leaves of the Bryophyllum pinnatum are gathered from a reliable source.
- The leaves are washed thoroughly with distilled water to eliminate dirt and debris.
- Excess moisture is eliminated by patting the leaves dry with a clean cloth or allowing them to air dry.

2. Drying Process

- The washed leaves are shade dried at room temperature for 1 to 2 weeks until they become brittle.
- To speed up the drying process, an oven can be used at a controlled temperature of 40–50°C.

3. Grinding/Pulverization

- The dried leaves are ground into a fine powder using a mechanical grinder, blender, or mortar and pestle.
- The powdered material is stored in an airtight container to protect it from moisture and light.

4. Extraction Methods

Various extraction techniques can be employed depending on the desired bioactive compounds:

A. Maceration (Cold Extraction)

- The powdered leaves are soaked in an appropriate solvent (such as ethanol, methanol, water, or a hydroalcoholic mixture) in a 1:10 (w/v) ratio.
- The mixture is left undisturbed for 24 to 72 hrs at room temperature with occasional agitation.
- After extraction period, the solution is filtered using muslin cloth or Whatman filter paper.
- The filtrate is then concentrated through evaporation or drying.

B. Soxhlet Extraction (Hot Extraction)

- A measured quantity of dried leaf powder is placed inside a Soxhlet extractor.
- A suitable organic solvent (ethanol, methanol, or petroleum ether) is added to the apparatus.
- The extraction process is carried out for 6 to 8 hours at a controlled temperature.
- The obtained extract is concentrated by evaporating the solvent using a rotary evaporator.

C. Aqueous Extraction (Traditional Decoction)

- The leaf powder is boiled in water at 100°C for 30 to 60 minutes.
- The mixture is then cooled and filtered.
- The filtrate is evaporated to obtain a concentrated extract.

Marketed Preparation:

Shampoo:

Hair is an essential aspect of human beauty, and since ancient times, herbal remedies have been used for hair care and cleansing. In modern times, synthetic shampoos have largely replaced herbal alternatives; however, while these products effectively cleanse the hair, they may also cause adverse effects on the eyes and scalp. As a result, many people are now turning to herbal shampoos as a safer alternative. Bryophyllum pinnatum is traditionally utilised in folk medicine to cure various ailments. Therefore, the present study aims to formulate an herbal shampoo incorporating Bryophyllum pinnatum leaves for their antimicrobial properties.[12]

Gel:

The largest organ of the integumentary system is skin, plays crucial role in various physiological functions and accounts for approximately 15% of total body weight. This study was designed to evaluation of wound healing efficacy of gel formulated with Bryophyllum pinnatum extract and to investigate its mechanism using an experimental rat model for skin wound induction. Additionally, unlike synthetic drugs, the stability of the complex chemical mixtures in herbal-medicines presents a significant challenge. Therefore, this study aimed for quantify the total phenolic content also total flavonoid content in the healing formulation of gel while assessing its phytochemically and biologically stable.

Application-Wise Uses of Bryophyllum Pinnatum

- **Skin-Related Applications**

Wound Healing: The juice or pulp from the leaves is beneficial for wound care, helping to accelerate healing and minimize bleeding. This plant is widely recognized in traditional medicine for its hemostatic and wound-repair properties.

Inflammation: Bryophyllum pinnatum is known for its effectiveness in treating inflammation, infections, and ulcers. It has been traditionally used both externally and internally to manage wounds, burns, boils, ulcers, and gastritis, among other conditions.

Skin Disorders: Due to its antimicrobial, anti inflammatory, antiallergic, and anti-fungal properties, this plant is useful for treating various skin conditions, including boils and burns. It also exhibits antitumor, antihistamine, and antiulcer properties.

- **Applications Related to the Renal System**

Kidney Stones: This plant is used as a natural remedy for kidney stones. The increasing prevalence of urinary calculi, particularly calcium oxalate stones, is linked to lifestyle changes, including diet and industrialization. Medicinal herbs like Bryophyllum pinnatum provide a safer and more effective alternative to synthetic drugs. A combination of herbal and conventional treatments offers a holistic approach to managing urinary stones.

- **Applications Related to the Reproductive System**

Bleeding Disorders: Bryophyllum pinnatum is traditionally used to manage bleeding disorders, hemorrhoids, and excessive menstrual bleeding (menorrhagia). Ethnomedicinal studies highlight its anti-inflammatory and analgesic properties, as well as its ability to relax uterine muscles. Preliminary clinical observations suggest its potential for alleviating dysmenorrhea, supporting its role as a natural treatment option.

- **Applications Related to the Digestive System**

Diarrhea: The plant, commonly known as the "miracle leaf" or "lifeplant," is commonly used in medicine for treating burns traditionally, ulcers, insect bites, and diarrhea. It contains a unique compound, Bryophilin A, known for its strong antioxidant, antimicrobial, and anti-tumor properties. Additionally, this plant may help regulate blood pressure and blood sugar levels.

- **Applications Related to the Immune System**

Fever, Smallpox, and Otitis: Leaves are used in the fever treatment, smallpox, and ear infections. Bryophyllum pinnatum contains bioactive compounds like flavonoid, steroid, and terpenoid, which contribute its broad medicinal properties. It has been traditionally used to address fever, cough, asthma, and headaches while also demonstrating antimicrobial, anti-ulcer, antihypertensive, anticancer, and immune-boosting effects. Over the past three decades, research has further highlighted its therapeutic potential, encouraging continued scientific exploration.

REFERENCES

1. Priyanka Mule1 A Review on Bryophyllum pinnatum (Lam.) Oken Vol. 12 |Issue-02| April-June| 2020 DOI: 10.5958/0975-4385.2020.00019.9.
2. Prakash L Hegde A comprehensive review on Parnabeeja [Bryophyllum pinnatum (lam.) Oken] 29-08-2015.
3. Saurabh Dhumane1 exploring the Therapeutic Potential: Photochemistry and Pharmacology

of Bryophyllum pinnatum 15 Feb.2024 DOI: http://dx.doi.org/10.22270/jddt.v14i2.6282 .

4. Snehal kothavale Review on Bryophyllum Pinnatum (Volume 02)06 Apr, 2024.
5. Pasha Khooshbu A Pharmacognostical And Pharmacological Review On Bryophyllum Pinnatum (Panphuti) Vol 12, Issue 1, 2019.
6. Araújo, E. R. D., Xavier-Santos, J. B., da Silva, V. C., de Lima, J. B. F., Schlamb, J., Fernandes-Pedrosa, M. de F., da Silva Júnior, A. A., de Araújo Júnior, R. F., Rathinasabapathy, T., Moncada, M., Esposito, D., Guerra, G. C. B., & Zucolotto, S. M. (2023). Gel formulated with Bryophyllum pinnatum leaf extract promotes skin wound healing in vivo by increasing VEGF expression: A novel potential active ingredient for pharmaceuticals. Frontiers in Pharmacology, 13. https://doi.org/10.3389/fphar.2022.1104705.
7. Yadav, P., Mishra, A. K., & Singh, H. (2023). Characterization of the Bryophyllum pinnatum leaf's Active Component and It's Antidiarrheal Potential. Oriental Journal of Chemistry, 39(3), 772–782. https://doi.org/10.13005/ojc/390330.
8. Priya Kamble et al .2024 Review On Pharmacological Avtivity Of Bryophyllum Pinnatum , Int. J. of Pharm. Sci., 2024, Vol 2, Issue 1, 587-597.
9. A. Latif et al.2019. PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE OF THE MEDICINAL HERB: BRYOPHYLLUM PINNATUM, The Journal of Animal & Plant Sciences, 29(6): 2019, Page: 1528-1534.
10. Sravan Hemant kumbhar.2024 Bryophyllum Pinnatum : A Miraculous Herb, International Journal of Creative Research Thoughts (IJCRT) Volume 12, Issue 11 November 2024 | ISSN: 2320-2882
11. Taiwo O. Elufioye et al.2022. A Review of the Traditional Uses, Phytochemistry and Pharmacology of Bryophyllum pinnatum (Lam.) (Crassulaceae). Journal of Biologically Active Products from Nature.
12. Kavya V. Reddy et al.2020. Formulation and Evaluation of Herbal Shampoo: Bryophyllum pinnatum. Asian Journal of Pharmaceutical Research. 10(2): April - June, 2020. Vol. 10 | Issue-02|
13. Marvin Moncada et al.2023. Gel formulated with Bryophyllum pinnatum leaf extract promotes skin wound healing in vivo by increasing VEGF expression: A novel potential active ingredient for pharmaceuticals. The journal Frontiers in Pharmacology
14. Sasidharan, S., Chen, Y., Saravanan, D., Sundram, K. M., & Latha, L. Y. (2011). "Extraction, isolation, and characterization of bioactive compounds from plants' extracts." African Journal of Traditional, Complementary and Alternative Medicines, 8(1), 1–10.
15. International Journal of Phytomedicine 2 (2010) 31-35 Chopra RN. Glossary of Indian Medicinal Plants, CSIR, New Delhi, 42 Harborne JB. Phytochemical Methods, Ed 3rd , Chapman and Hale Publishers, London, 2007: 4-9
16. Marini-Bettolo GB, Nicoletti M, Patamia M, Geleffi C, Messana I (1981). Plant screening by chemical and chromatographic procedures under field conditions. J Chromatogr 213: 113–127.
17. Otterness IG, Bliven ML (1985): Laboratory models for testing nonsteroidal anti-inflammatory drugs. In: Lombardino JG, ed., NSAID. New York, John Wiley & Sons, pp. 111–252.
18. Phcog.Net. (2009). Bryophyllum pinnatum (Lam.) Kurz.: Phytochemical and Pharmacological Profile : A Review. In Phcog.Net, Phcog Rev (Vol. 3, Issue 6, pp.

364-374). https://www.phcogrev.com/sites/default/files/PhcogRev-3-6-364.pdf

19. Chibli, L. A., Rodrigues, K. C. M., Gasparetto, C. M., Pinto, N. C. C., Fabri, R. L., Scio, E., Alves, M. S., Del-Vechio-Vieira, G., & Sousa, O. V. (2014). Anti-inflammatory effects of Bryophyllum pinnatum (Lam.) Oken ethanol extract in acute and chronic cutaneous inflammation. Journal of Ethnopharmacology, 154(2), 330–338. https://doi.org/10.1016/j.jep.2014.03.035.
20. Yadav, M., Gulkari, V., & Wanjari, M. (2016). Bryophyllum pinnatum leaf extracts prevent formation of renal calculi in lithiatic rats. Ancient Science of Life, 36(2), 90. https://doi.org/10.4103/asl.asl_90_16.
21. Zurfluh, L., Spinelli, M. G., Betschart, C., & Simões-Wüst, A. P. (2023). Repurposing of Bryophyllum pinnatum for dysmenorrhea treatment: a systematic scoping review and case series. Frontiers in Pharmacology, 14. https://doi.org/10.3389/fphar.2023.1292919.
22. Noor, H., Ayub, A., Dilshad, E., Afsar, T., Razak, S., Husain, F. M., & Trembley, J. H. (2024). Assessment of Bryophyllum pinnatum mediated Ag and ZnO nanoparticles as efficient antimicrobial and cytotoxic agent. Scientific Reports, 14(1). https://doi.org/10.1038/s41598-024-73092-6.
23. Elufioye, T. O., Oyedeji, A. O., & Habtemariam, S. (2022). A Review of the Traditional Uses, Phytochemistry and Pharmacology ofBryophyllum pinnatum(Lam.) (Crassulaceae). Journal of Biologically Active Products From Nature, 12(3), 190–222. https://doi.org/10.1080/22311866.2021.1988706.

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