



FORMULATION AND EVALUATION OF ANTI FUNGAL CREAM BY USING PSIDIUM GUAJAVA

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ABSTRACT

Fungal infections are a significant global health concern, ranging from superficial to systemic infections. *Psidium guajava* (Guava) leaf extract has demonstrated antifungal activity against a wide variety of fungi. This research focuses on the development and evaluation of a cream containing guava leaf extract. Ethanolic, methanolic, and hydroalcoholic extracts of the leaves were assessed for total flavonoid content, thin layer chromatography (TLC), high-performance thin layer chromatography (HPTLC), and antifungal activity against *Candida albicans*. The cream formulation was optimized using a 3² factorial design, with beeswax and Tween 80 selected as independent variables. Their effects on viscosity and cumulative drug diffusion were studied. The optimized cream was evaluated for its appearance, pH, washability, spreadability, in-vitro. The hydroalcoholic extract exhibited the highest flavonoid content and showed a superior zone of inhibition (27 ± 1 mm) against *Candida albicans*. HPTLC confirmed the presence of key flavonoids. A cream containing 6% beeswax and 5% Tween 80, with a viscosity of 10,420 P and 70% drug diffusion, was identified as the optimal formulation. This cream met evaluated criteria and displayed an antifungal zone of inhibition (25 mm), which was larger than the standard formulation (23 mm). No signs of skin irritation were observed in the study, making this formulation a promising alternative to existing topical antifungal treatments. drug diffusion, antifungal efficacy, and potential for skin irritation in Wistar rats.

KEYWORDS: *Psidium guajava*, Antifungal, HPTLC, Topical formulation.

INTRODUCTION

Psidium guajava L. known as Guava is a medicinal plant Belonging to the family Myrtaceae. *P. guajava* is a well Known traditional medicinal plant used in various Indigenous systems of medicine. It is widely distributed Throughout India.^[1] The leaves and bark of *P. guajava* tree Have long history of medicinal uses, that is still employed Today. It is a native of Central America but is now widely Cultivated, distributed and the fruits enrich the diets of Millions of people in the tropics of the world.^[2,3] It is a Genus of about 133 genera and more than 3,800 species of Tropical shrubs and a small tree of about 10m high with Spreading branches that thrives on all kinds of soils. It is One of the most gregarious fruit trees and is widely known By its common English name (guava).



Fig. 1: *Psidium guajava*.

In Nigeria, it is Called guava (Hausa), gurfa (Yoruba) and Gwaibwa (Igbo).^[3] *P. guajava* also known as the 'poor man's apple' Of the tropics has a long history of traditional use, and a Good proportion of which have been validated by scientific Research⁴ Nutritional

value of guavas are often included among Superfruits, being rich in dietary fiber, vitamins A and C, Folic acid; and the dietary minerals, potassium, copper and Manganese.

Having a generally broad, low calorie profile of essential nutrients, a single common guava fruit Contains about four times the amount of vitamin C as an Orange. The food value and contents of guava fruit is listed In the. However, nutrient content varies across Guava cultivars.



Fig. 2: Psidium guajava.

Psidium guajava Linn. (Guava) is a popular dietary plant Used for medical purposes from several decades. It belongs To Myrtaceae family and is grown extensively in India, Bangladesh, Florida, and West Indies. Guava leaves has Shown therapeutic benefits in many diseases and disorders. It Is available in various dosages like capsule, tablet, liquid, and Powder forms in market to treat diarrhoea, gastroenteritis, Diabetes, dysentery, caries, hypertension, oral ulcers pain relief, and cough to improve liver damage inflammation and Locomotor coordination. It also been found to be effective in Treating different conditions like lowering sugar level, boosting Heart health, relieving the painful symptoms of menstruation, Aiding of weight loss, and boosting immunity.

Recent study reveals antifungal potential of guava leaf Extracts due to different types flavonoids viz. isoflavonoids, Isoflavanones, isoflavane, flavonoids, Flavonol (Rutin), Quercetin, quercitrin, myricitrin, morin, guaijaverin, wogonin, kaempferol, baicalin, licoflavone C, catechin, gallic Acid, dorsmanin and carvacrol. Extract showed antifungal Potential against fungi like *Candida albicans*, *Cryptococcus Neoformans*, *C. krusei*, *C. glabrata*, *C. tropicalis*, *Trichophyton Rubrum*, *Trichosporon Beigelii*, *C. parapsilosis*, *Aspergillus Niger* etc fungi. Extract of guava leaf showed 21 to 30 mm zone of inhibition against *C. albicans* which is the causative agent For 'candidiasis. Guava leaf extract has been found to exhibit Antifungal properties through multiple mechanisms. These Include inhibiting the synthesis of cell walls, impeding cell Division, disrupting RNA

and protein synthesis, and inducing Failure in mitochondrial function.

Taxonomical profile

Kingdom: Plantae.

Order: Myrtales

Family: Myrtaceae

Subfamily: Myrtoideae

Genus: *Psidium*

Species: *Guajava*

Binomial Name: *Psidium Guajava* Linn



Fig. 3: Psidium guajava.

Biological profile

The pollen is viable for up to 42 hours and the stigmas are receptive for About 2 days. Bees are the principal pollinators. There is some self- and Cross-incompatibility but several cultivars have set fair crops of seedless or few- seeded fruit. Levels of 60-75% selfing have been found in natural Populations; this has been used to produce homozygotic varieties that can Be propagated from seed. It is not known to what extent erratic flowering Through the year affects pollination intensity. One of the most critical Botanical characteristics of guava is that flowers are borne on newly Emerging lateral shoots, irrespective of the time of year. The floral Structure, which makes emasculation difficult and with a juvenile period of 3-5 years limit conventional breeding. Seedlings may flower within 2 years; clonally propagated trees often begin To bear during the first year after planting. Trees reach full bearing after 5-8 years, depending on growing conditions and spacing. The guava is not a Long-lived tree (about 40 years), but the plants may bear heavily for 15-25 Years. Bats are the main fruit dispersal agents.



Fig. 4: Whole plant of *Psidium guajava*.

Botanical description

Psidium guajava is a large dicotyledonous shrub, or small evergreen tree, Generally 3-10 m high, many branches; stems crooked, bark light to reddish brown, thin, smooth, continuously flaking; root system generally superficial and very extensive, frequently extending well beyond the canopy, there are some deep roots but no distinct taproot.

MATERIAL AND METHODS

Psidium guajava L. leaves are collected from the farms located at Gangapur, Nashik, and Maharashtra, India. Liquid paraffin was obtained from Merck Pvt. Ltd, Mumbai. Beeswax and stearic acid were obtained from Research Lab Fine Chem. Mumbai. The remaining ingredients were of analytical grades.

Methods

Preparation of leaf powder for extraction: Collected leaves were thoroughly washed with water (3 times) and air dried for 72 hours under the sunlight. Leaves are incubated (24 hours; $37 \pm 2^\circ\text{C}$) and subjected for grinding using mixer. Prepared powder was passed from sieve number 120 and used for extraction.

Preparation of Extraction and Confirmation test for flavonoids

Prepared powder was subjected for extraction by the maceration process using three different solvents viz. methanol, ethanol and hydroalcoholic mixture.

Powder (10 g) was placed in a conical flask containing solvent (100 mL) and shaken for 24 hours. System was placed in dark for further 24 hours and then centrifugation was done for 15 minutes at 3000 rpm (Remi Centrifuge). The supernatant was collected in a flask and the residue was again subjected for maceration as described previously. The process of maceration on same powder was repeated to obtain 300 mL extraction. The obtained solution was concentrated to $1/10^{\text{th}}$ of its initial volume and used for further investigations. All extracts were confirmed for the presence of flavonoids by using standard chemical tests. Test 1: Reaction between extract (1-

mL) and ammonia solution (1%) forms the yellow color if flavonoids are present.



Fig. 5: Leaf of *Psidium guajava*.

Whereas it can be confirmed by test 2: If red color formed when extract heated with DMSO and further treated with magnesium chloride solution and concentrated hydrochloric acid.

Pharmacological activity

- 1) Antimicrobial:** Guava leaf extracts exhibit antibacterial, antifungal, and antiviral properties. Studies show efficacy against *Staphylococcus aureus*, *Escherichia coli*, and *Candida albicans*.
- 2) Antidiarrheal:** Guava leaves are used traditionally to treat diarrhea, likely due to their tannin content, which reduces gut motility and fluid loss.
- 3) Anti-inflammatory:** Flavonoids and terpenoids in guava leaves reduce inflammation by inhibiting enzymes like COX-2 and reducing pro-inflammatory cytokines.
- 4) Antioxidant:** The high vitamin C content and flavonoids act to neutralize free radicals, thus protecting cells from oxidative damage.
- 5) Antidiabetic:** Guava leaf extract has been shown to lower blood sugar levels by enhancing glucose uptake and inhibiting carbohydrate breakdown.
- 6) Cardioprotective:** The fruit is rich in potassium and soluble fiber, which help lower blood pressure and cholesterol levels.

- 7) **Analgesic:** Some studies suggest that guava leaves possess pain-relieving properties, likely through inhibition of inflammatory mediators.
- 8) **Anti-cancer:** The flavonoids and other antioxidants in guava have been shown to have potential anti-cancer properties, inhibiting the growth of cancer cells *in vitro*.



Fig. 6: Drying of Leaf.

Traditional uses

- Wound Healing: The leaves are used topically for treating wounds due to their antimicrobial and anti-inflammatory effects.
- Cough and Cold: Guava fruit and leaves are used in traditional medicine for treating respiratory ailments like coughs and colds due to their expectorant and antimicrobial properties.
- Menstrual Pain: Guava leaf extract has been shown to reduce menstrual pain intensity in clinical trials.

Toxicity and Safety

- *Psidium guajava* is generally considered safe, especially when consumed as food. However, some concentrated extracts may cause mild side effects, such as nausea or gastrointestinal discomfort, in sensitive individuals.
- In summary, the pharmacology of *Psidium guajava* highlights its broad therapeutic potential, with antimicrobial, anti-inflammatory, antidiabetic, antioxidant, and cardioprotective properties supported by both traditional use and scientific research.

CONCLUSION

- In this study, guava leaf extract was successfully turned into a stable cream, making it easier to apply to infected areas. After confirming that the guava leaf extract contained flavonoids, it was added to the cream, which was made using beeswax and tween. The cream passed all necessary tests for semisolid products. In antifungal tests, it showed better results than the standard treatment. Additionally, no signs of skin irritation were seen during tests on Wistar rats. Based on this evidence, the new cream is a good alternative to current antifungal treatments.

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