INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

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Research Paper

Phytochemical And Anti-Microbial Analysis of Mangifera Indica Leaves

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ARTICLE INFO

Published: 08 May 2025
Keywords:
Phytochemical And Anti-Microbial Analysis, Mangifera Indica Leaves
DOI:
10.5281/zenodo.15365302

ABSTRACT

This study investigates the phytochemical constituents and antimicrobial properties of Mangifera indica (mango) leaves. Qualitative phytochemical screening revealed the presence of bioactive compounds such as alkaloids, flavonoids, tannins, saponins, and phenolic compounds. The antimicrobial activity was evaluated against selected bacterial and fungal pathogens using agar well diffusion and disc diffusion methods. The leaf extracts demonstrated significant inhibitory effects, particularly against Escherichia coli, Staphylococcus aureus, and Candida albicans, suggesting broad-spectrum antimicrobial potential. These findings support the traditional use of Mangifera indica leaves in folk medicine and highlight their potential as a source of natural antimicrobial agents.

INTRODUCTION

It is a known fact that in order for a plant to Protect itself, it produces some chemicals Which can also protect humans against Diseases. As many as over 4000 different Phytochemicals having potential to affect Diseases such as cancer, stroke or metabolic System are in existence today (Arts and Hollman, 2005). Phytochemicals are chemical Compounds that naturally occur in plants Which are responsible for many attributes of The plants such as smell, taste, colour and Other organoleptic properties of the plant. They are classified into curative (or nutritive) Such as alkaloid, saponnins, tannins, Flavonoids, phenols, glycosides, isoflavones, Cartenoids, sulfides, and non-curative (or non-Nutritive) such as cyanide, oxalates, terpenes,Terpenoids. Though some phytochemicals May have their biological significance Because of their established essential Nutritional values, however many have been Considered as potential drugs because of their Therapeutic potentials (Levin et al., 1979). Plants with such phytochemicals are regarded As medicinal plant because they have similar Properties as conventional pharmaceutical Drugs. The local use of natural plants as Primary health remedies, due to their Pharmacological properties

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

is quite common. In many part of the world especially in West Africa plant extracts are still widely used in The treatment of malaria and other ailments (World Health Organization, 2002). As a Matter of fact, every plant is medicinal on the basis of the contents of their phytochemicals, Hence pharmaceutical industries rely heavily On their therapeutic purpose so as to be used As precursors for drug synthesis (Bouayed et Al., 2007).This is because every plant has medicinal Value based on the active compounds that can Be extracted from its part such as leaves, Stems, barks, roots, bulks, rhizomes, woods, Flowers, fruits or the seeds for therapeutic Purposes. Most phytochemicals such as Sulfides (in onions, leeks, and garlic), Carotenoid (in carrots), flavonoids (in fruits, Vegetables), polyphenols (in tea, grapes) have Antioxidant activity and protect our cells Oxidative damage and reduce the risk of Developing certain types of cancer. Some Exhibit hormonal actions such as isoflavones (in soy) which imitate human estrogen and Help to reduce menopausal symptoms. Some Also stimulate enzyme such as indoles (in Cabbages) which makes the estrogen less Effective and reduces the risk of breast cancer. Caspacin (in hot pepper) protects DNA from Carcinogens while allicin (in garlic) has anti Bacteria properties (Manach, 2004).Alkaloids are naturally occurring organic Bases which contain a pyridine ring, invoke a Bitter taste and are used in making anti-Malaria, hypertension and anti-cancer drugs (Manske, 2009; Kittakoop et al.,2014).Flavonoids have 15-carbon skeleton Which consists of two phenyl ring and Heterocyclic ring and are known for their anti-Inflammatory and anti-allergic effects (Yamamoto and Gaynor, 2001). Glycosides Are molecules in which sugars are bound to Another functional group via a glycosidic Bond (either O- or S-). Digitalis glycosides Have served as cardiac drugs in case of heart Failure (Brito-Arias and Marco, 2007). Phenols are a class of aromatic organic Compound which possess antiseptic properties And may be used as disinfectant (Amorati and Valgimidi, (2012). Saponnin are plant Glycosides which serve as anti-feedant and Protects plants against microbes and fungi. Some plant saponin aids in nutrient Absorption and digestion (Francis, et al.,2002). Steroids are polycyclic compounds Which have alkanol functional group and they Include cholesterol, the sex hormones (Desmond and Gribaldo, 2009).Tannin refers Are phenolic compounds characterized by Their ability to precipitate proteins, amino Acids and alkaloids. They protect the plant From predation perhaps as pesticides and Regulate its growth and helps in the ripening Of fruits (Drabble and Nierenstein, 2001).An antimicrobial is an agent either kills Microorganisms or inhibits their growth but Causes little or no damage to the host. Antimicrobial therapy refers to the use of Antimicrobial medicines to treat infection While antimicrobial prophylaxis refers to the Use of antimicrobial medicines to prevent Infection (Amyes 1996).In formulation of animal feed, plant materials Are used because they contain phytochemicals Which can serve as antibiotic to the animals. Hence there is need to investigate common Plants which are easily available, cheap, Renewable and nutritive source of material as Feed supplements. Mangiferaindica and Carica papaya being edible they have been Reported along with the roots and leaves to be Of medicinal value (Fowomola, 2010). Mangifera indica also known as mango Whose chemical constituent include Pharmacologically active hydroxyl-Atedxanthone C-glycoside which is extracted From the leaves and bark (Jonathan, 1993) and Allergenic urushiols which is extracted from The fruit peel (Cuadra, Pablo, 2007).

Applications of Mangifera indica Leaves The leaves of Mangifera indica (mango) have a wide range of applications, Particularly in traditional

medicine, modern herbal practices, and natural Product development. These applications are largely attributed to the presence Of bioactive compounds such as flavonoids, tannins, saponins, phenolics, and Alkaloids. Some key applications include:

1. **Medicinal Uses:**

Antimicrobial Agent: Mango leaves have shown activity Against various bacterial and fungal pathogens, making them Useful in treating infections.

O Anti-diabetic Effects: Traditionally used to manage blood sugar Levels; some studies support their ability to enhance insulin Sensitivity and reduce glucose absorption.

O Anti-inflammatory and Antioxidant: Rich in antioxidants, Mango leaves help reduce oxidative stress and inflammation, Which can benefit conditions like arthritis and heart disease.

O Respiratory Health: Used in folk medicine to relieve coughs, Asthma, and bronchitis by acting as a natural expectorant.

2. **Wound Healing:**

O Crushed mango leaves are applied to wounds and cuts for faster Healing and to prevent infection, thanks to their antimicrobial and Astringent properties.

3. **Oral Care:**

O Mango leaves are sometimes used to strengthen gums and Prevent oral infections. In rural areas, they are used as a natural Toothbrush (chewing sticks).

4. **Gastrointestinal Relief:**

O Decoctions made from the leaves are used to treat diarrhea, Dysentery, and other stomach disorders due to their astringent And antimicrobial properties.

5. **Cosmetic and Skincare:**

O Extracts are used in natural skincare products for their Antibacterial and soothing properties, especially in treating acne And skin irritation

➢ **Scientific classification :**

Family: Anacardiaceae

Genus: Mangifera

Species: Mangifera indica

Common Name:

Mango, Amra (Hindi)

Aam (Bengali)

Ma-praang (Thai)

OBJECTIVE:

1. To identify bioactive compounds present in different parts of Mangifera Indicaleaves.
2. To determine the presence of secondary metabolites such as alkaloids, Flavonoids, tannins, saponins, terpenoids, and phenolics.
3. To explore potential applications of Mangifera indica extracts in Pharmaceuticals, food preservation, and natural medicine.
4. To evaluate the antimicrobial activity of Mangifera indica extracts Against Bacteria and fungi.

PLAN OF WORK

Collection & Preparation of Plant Material
⬇
Authentication (Preparation of Herbarium)
⬇
Extraction of Phytochemicals
⬇
Phytochemical Screening
⬇
In-vitro anti- microbial analysis
⬇
Data Analysis & Interpretation

MATERIAL AND METHODS

Collection and identification of Sample of mangifera indica were obtained, from Kopargaon they Were authenticated in the Department of Applied Biology, SSGM college of Kopargoan.

Preparation of samples

Temperature for 10 days to remove the residual moisture. The dried leaves Were then ground to powder using an electrical blender while the bark portions Were first pulverized in a mortar before using a mechanical grinder.

Preparation of ethanolic extracts

50grams of the dried powered samples were weighed and soaked in 250ml of Ethanol contained in two different 250ml flasks and stirred for five minutes. The flasks were covered with foil and then allowed to stand for 48 hours. After 48 hours, the suspensions were shaken vigorously and filtered using filter Paper.

Extract yield (%) = Weight o f dried extract (g) × 100 ----------

Weight o f lea f material (g)

Preparation of Mayer's reagent

1.3g of mercuric chloride and 5.0g of potassium iodide were dissolved in Distilled water in a 100ml volumentary flask and the solution was made up to 100ml.

EXPERIMENTAL WORK

Phytochemical Screening:

Qualitative tests will be performed to detect the presence of:

•Alkaloids (Mayer's test)

•Flavonoids (Shinoda test)

•Tannins (Ferric chloride test)

•Saponins (Frothing and Terpenoids test)

•Glycosides

•Phenols (Ferric chloride test)

In- vitro anti-microbial analysis :

A. Agar Well Diffusion Method

1] Prepare Mueller-Hinton Agar (for bacteria) or Sabouraud Dextrose Agar (for fungi).

2] Inoculate the plate with test microorganisms.

3] Punch wells and fill with extract (various concentrations).

4] Incubate and measure the inhibition zone.

B. Disc Diffusion Method

1] Sterile paper discs are impregnated with extracts and placed on Inoculated agar plates.

2] Measure inhibition zones after incubation.Phytochemical screening

Testing for alkaloid

3ml of the extract was pipette into a test tube and to the extract was added 1ml Of 1% HCl, it was heated for twenty minutes in a water bath and then allowed To cool. After cooling 0.5ml of Mayer's reagent was added. The appearance Of creamy white color indicates the presence of alkaloid.

Test for flavonoid

3mls of the extract was pipette into a test tube to it was added 10mls of Distilled water, and then to it was added 10mls of distilled water, then 1ml of 10% NaOH. The change in the color of the mixture to yellow indicates a Positive.

Test for phenols

1ml of the extract was pipette into a test tube, to it was added 1ml of distilled Water and 3-4 drops of 5% NaOH. An orange coloration indicates the presence Of phenol .

Test for saponin: (Frothing test)

3ml of the extract was pipette into a test tube, to it was added 2ml of distilled Water, it was shook vigorously, and a persisting frothing movement indicates The presence of saponin.

Result:-

PHYTOCHEMICAL PARAMETERS	OBSERVATIONS	INFERENCE
Test for alkaloid 3ml of the extract was pipette into a test tube and to the extract was added 1ml of 1% HCl, it was heated for twenty minutes in a water bath and then allowed to cool. After cooling 0.5ml of Mayer's reagent was added.	The appearance of creamy white color indicates the presence of alkaloid.	present
Test for flavonoid 3mls of the extract was pipette into a test tube to it was added 10mls of distilled water, and then to it was added 10mls of distilled water, then 1ml of 10% NaOH.	The change in the color of the mixture to yellow indicates a positive.	Present
Test for phenols 1ml of the extract was pipette into a test tube, to it was added 1ml of distilled water and 3-4 drops of 5% NaOH.	An orangecoloration indicates the presence of phenol.	Present
Test for saponin: **(Frothing test)** 3ml of the extract was pipette into a test tube, to it was added 2ml of distilled water, it was shook vigorously,	persisting frothing movement indicates the presence of saponin	Present

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HOW TO CITE: Akash Dagale*, Monali Hon, Phytochemical And Anti-Microbial Analysis of Mangifera Indica Leaves, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 5, 1250-1257. https://doi.org/10.5281/zenodo.15365302