JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Eucalyptus leaves(eucalyptus globulus) :- Taxonomy, Phytochemistry, Medicinal uses and Pharmacology

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Abstract

Introduction:-The Blue gum scientifically called "Eucalyptus globulus" it is a plant belonging to the myrtaceae family, has numerous medicinal properties found in its leaves, steam, and foundation. Its primary components exhibit Anti-inflammatory,Antimicrobial,Antibacterial,Antidiabetic,and Anti-histaminic properties.

Objective:-Eucalyptus leaves are useful for improve human health,relief muscle pain and also relief respiratory issues.

Methods :-Literature has been collected through SciFinder, Web of Science, Google Scholar,Pubmed,and a library.Collection of eucalyptus leaves, Chemical extraction, Biological Testing and Ecological Assessment.

Result:- Eucalyptus leaves contain High levels of essential oil with eucalyptol (70.5%)and Linonene(12.1%). Heavy metal absorption -75%Cu,60%Pb,50%Zn

Discussion and Conclusion :-Eucalyptus leaves have been extensively studied for their medicinal, insecticidal, and environmental benefits. The leaves contain bioactive compounds like eucalyptol, citronellal, and limonene.Eucalyptus leaves are a valuable resource with diverse applications. Their medicinal properties make them an effective natural remedy for various health issues. The insecticidal properties offer a sustainable alternative to synthetic pesticides, reducing environmental pollution. Eucalyptus leaves also contribute to environmental well-being through air purification and soil remediation.

Keywords:- Anti-inflammatory, Eucalyptus globulus, Antimicrobial, Eucalyptol.

1. Introduction

Eucalyptus globulus is flowering tree that belong to myrtaceae family[1]. Which includes 900 species and sub species among them more than 300 contains volatile oil in their leaves[2]. They are rich in bioactive compound such as eucalyptol (1,8- cineole) which imparts distinctive therapeutic properties. These evergreen tall tree is native from Australia and Tasmania and is the second largest genera after acacia[4]. Eucalyptus leaves have been used historically for their antiseptic, Anti- inflammatory and respiratory benefits[5].

Fig 1: Eucalyptus leaves

Eucalyptus globulus, also known as Australia Fever Tree, Tasmanian Blue Gum, Southern Blue Gum, Blue Gum Tree, and "Stringy Bark", is also referred to as "turpentine gas".[6]

Eucalyptus globulus Labill leaves contain compounds like quercetin, d-limonene, and dipentene, used for headache relief. However, pharmacognostic parameters are not yet established, so this study evaluates these compounds.[7]

Scientific classification:[8]

Kingdom	Plantae
Super Kingdom	Tracheobionta
Super Division	Spermatophyta
Division	Magnoliophyta
Class	Dicotyledons
Subclass	Rosidae
Order	Myrtales
Family	Myrtaceae
Genus	Eucalyptus
Species	*Eucalyptus globulus Labill*

Table 1: A taxonomic account of Eucalyptus globulus

Material and methods :[9],[10],[11]

1. Collection and Preparation of Eucalyptus Leaves:

Plant Material

Species: Eucalyptus globulus, Eucalyptus camaldulensis, or other relevant species, depending on the study's objective.

Collection: Leaves are typically collected from healthy, mature trees. Collection should occur during a specific season (e.g., autumn or spring) to standardize phytochemical content.

Identification: The plant material is botanically identified by an expert or taxonomist, and a voucher specimen is deposited in a herbarium for future reference.

Storage: Leaves are dried in the shade (at room temperature) for 1-2 weeks or by using a controlled drying method (e.g., a drying oven at 40–50°C) to prevent degradation of active compounds.

2. Preparation of Eucalyptus Leaf Extracts:

Drying and Grinding:

The dried eucalyptus leaves are ground into a fine powder using a mechanical grinder. Extraction Solvents**:**

Hydroalcoholic Extraction: Leaves can be extracted using solvents like ethanol (70%) or methanol to extract both polar and non-polar compounds.

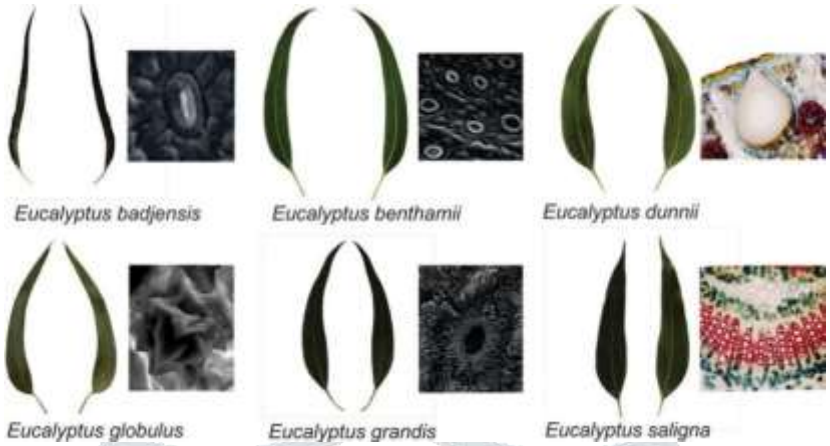
Water Extraction: For aqueous preparations, distilled water can be used to extract water-soluble compounds.

Essential Oil Extraction: Essential oils are extracted from fresh or dried eucalyptus leaves using steam distillation or solvent extraction methods. The oil is then separated and stored under inert conditions (e.g., in amber glass vials).

Macroporous Resin Extraction**:** This method may be used to concentrate certain bioactive compounds, particularly when looking at specific pharmacological properties.

Morphology :[12],[13],[14]

Six species of Eucalyptus, namely E. Badjensis Beuzev. & Welch, E. Benthamii Maiden & Cambage, E. Dunnii Maiden, E. Grandis W.Hill, E. Globulus Labill. And E. Saligna Sm., Myrtaceae.



Morphological characteristics :[15]

Character A/Qualitative	Details
Stem color	Green,reddish etc
Leaf arrangement	Opposite,close alternate etc.
Leaf color	Dark green, greyish green,light green
Leaf odor	Aromatic,lemon scented.
Leaf Shape	Ovate,broad lanceollate, lanceollate
Leaf texture	Smooth,very smooth (silky),thick leathery.
Leaf margin	Entire, dentate
Leaf venation	Parallel (from midrib), prominent beneath,unseen
B/Quantitative	
Seedling height	Shoot height (cm)
Leaf length	(cm)
Leaf width	At mid length (cm)
Petiole length	(cm)

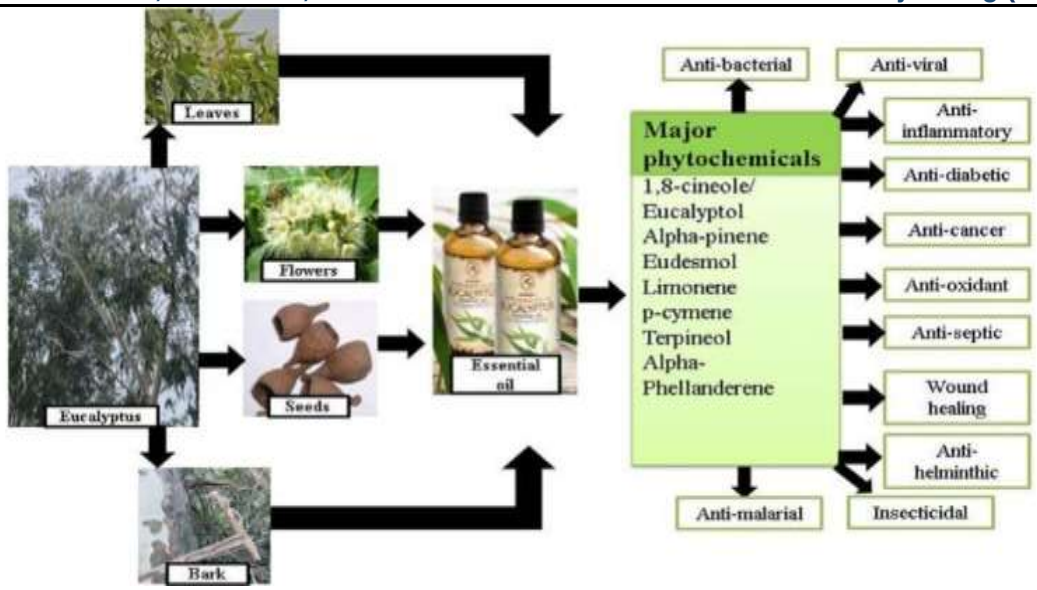


Fig 2: Pictorial representation of the major parts of eucalyptus, their phytochemicals and related health benefits.[16],[17],[18]

Mode of administration :[19],[20] Oral, inhalation and Topical application.**Important Considerations:**

Essential Oils: Eucalyptus oil should always be diluted before topical application to avoid skin irritation. It should never be ingested in undiluted form

Children and Pregnant Women: Care should be taken when administering Eucalyptus oil to children, especially under the age of 2, as it can cause respiratory issues if inhaled in large amounts. Pregnant or breastfeeding women should consult a healthcare provider before using Eucalyptus oil.

Allergic Reactions: Some individuals may be allergic to Eucalyptus oil or its components. It's advisable to do a patch test before widespread topical use.

Chemical constituents:[21],[22],[23]

Eucalyptus leaves contain various of chemical constituents. Most of the chemical constituents are present in theirleaves.
Eucalyptol (1,8-cineole): This is the primary compound responsible for the characteristic aroma of eucalyptus.
Flavonoids: These are antioxidants that may contribute to the leaves' anti-inflammatory, anti-allergic, and anti- cancer properties.
Tannins: Known for their astringent properties, tannins in eucalyptus may contribute to antimicrobial and anti-inflammatory effects.

Phenolic acids: These include compounds like caffeic acid and chlorogenic acid, which have antioxidant and anti-inflammatory effects

Terpenes: Other terpenes besides eucalyptol, such as alpha-pinene and limonene, also contribute to the leaf's aroma and have potential anti-inflammatory and antimicrobial properties.

Pharmacological Impact:[24]

Eucalyptus leaves have diverse chemical properties due to presence of bioactive compounds Like eucalyptol (1,8-cineole), flavonoids, tannins, and terpenes.

Antimicrobial Activity-

Antibacterial: Eucalyptus oil and extracts exhibit significant antibacterial effects against a wide range of bacteria, including Staphylococcus aureus and Escherichia coli. Eucalyptol, in particular, has been shown to disrupt bacterial cell membranes.[25]

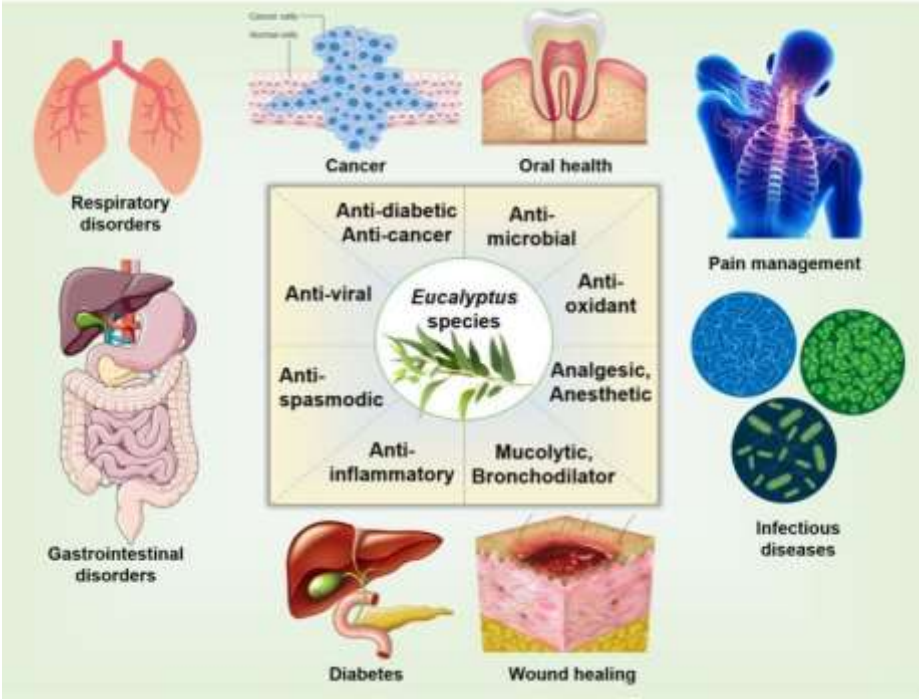
Antifungal: Eucalyptus extracts also demonstrate antifungal properties, making them useful in treating fungal infections like candidiasis[26]

Antioxidant Activity- Flavonoids and phenolic compounds in eucalyptus leaves, including quercetin and kaempferol, have strong antioxidant effects. They help neutralize free radicals, thus protecting cells from oxidative stress and reducing the risk of chronic diseases like cardiovascular disease and cancer.[27]

Medicinal uses :[28],[29]

Eucalyptus leaves and their oil have many medicinal uses, including:

1. Cough and cold relief
2. Pain relief
3. Skin treatment
4. Anti-septic
5. Insect repellent
6. Wound healing
7. Fever reduction
8. Antioxidant agent



Result :

It is well known that eucalyptus leaves have both therapeutic and fragrant qualities. These are a few of their noteworthy outcomes or impacts:

1. Antibacterial and Antiviral Properties: The leaves of the eucalyptus plant are used to make oil, which is used extensively to combat germs and viruses. Products like disinfectants and antiseptics frequently contain it. [31],[32]

2. Respiratory Relief: Eucalyptus leaf medicines are frequently used to treat respiratory conditions. The leaves' oil is frequently used as an ingredient in congestion-relieving goods like cough syrups, lozenges, and inhalers. To unclog obstructed airways, steam inhalation is another use for it.[33],[34]

3. Anti-inflammatory Effects: The anti-inflammatory qualities of eucalyptus leaves may aid in lowering the body's level of inflammation. Because of this, they can be used to treat ailments including arthritis and muscular.[35]

4. Pain Relief: When applied topically in diluted form, eucalyptus oil's analgesic qualities provide relief from headaches, muscle soreness, and joint stiffness. Frequently used as a natural insect repellent, eucalyptus leaf oil works well against mosquitoes and other pests.[36],[37]

5. Antioxidant Properties: Compounds with antioxidant properties found in eucalyptus leaves aid in the body's defence against free radicals.[38]

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