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Review On: Guide to Grow Piper Betel Plant and its Pharmacological, Nutritional Value in Health Management

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Abstract: *The betel, Piper betel, is a species of flowering plant in the pepper family Piperaceae. It is mainly grown in Sri Lanka, India, Thailand, Taiwan & other Southeast Asian countries. The leaves are nutritive and contain anticarcinogens showing promise for manufacturing a blood cancer drug. Betel leaves are the most valued part of the plant, in the past were routinely used as a chewing agent to restrict offensive breath and they contain tannins, chavicol, phenyl, propane, sesquiterpene, cineole, alkaloid, sugar, and some essential oil and found various medicinal value, digestive, appetizer, aromatic, expectorant, stimulant, anti-bacterial, antiprotozoal, carminative, anti-fungal and aphrodisiac, etc. This review for the first time provides information on therapeutic effects and also addresses the various mechanisms which might be involved.*

Keywords: Piper betel, Chemical constituents, Collection & cultivation, Pharmacological activity.

I. INTRODUCTION

Piper Betel Plant:-

In India, Betel leaf (BL) has played an important role since ancient culture. Its use in India dates back to 400 BC. As per ancient books of Ayurveda, Charaka, Sushruta Samhitas, and Kashyapa Bhojanakalpa, the practice of chewing BL after meals became common between 75 AD and 300 AD.

In these citations, the the significance of the leaves has been explained about every sphere of human life including social, cultural, religious, and even day-to-day life, which is very much relevant even these days. The fresh leaves of betel leaves have been wrapped together with the areca nut, mineral-slaked lime, catechu, flavoring substances, and spices that have been chewed since ancient times.

The Essential oil isolated from the leaves is supposed to be useful in treating respiratory catarrhs and as an anti-septic. Piper betel is claimed to be useful to improve learning and memory, in the Indian traditional system of medicine yet it is not documented scientifically in this regard.

It is broadly fed on in India with inside the shape of 'Paan' orbetelquid. A quidisreadywith inexperienced ordecolorizedbetel leaf incorporating many other ingredients, together with slakedlime, arecanutchips, catechu, aniseed, clove, sweeteners, tobacco, etc.

TAXONOMIC CLASSIFICATION:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnolipsida
Order	Piperales
Family	Piperaceae
Genus	Piper
Species	Betel

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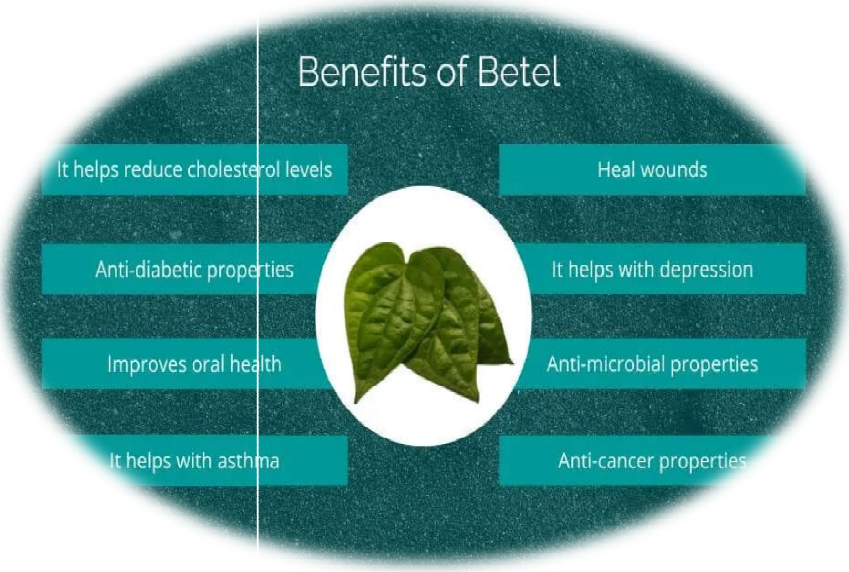
VERNACULAR NAMES/ SYNONYMS:

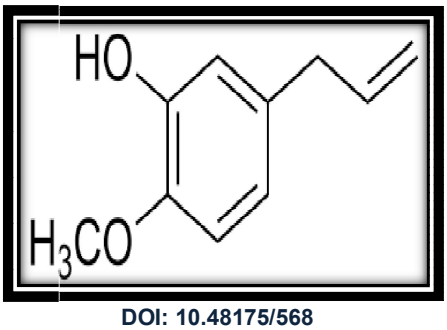
Latin name	Piper Betel
English	Betel, Betel pepper, Betel-vine
Hindi	Paan
Gujarati	Tanbolaa
Marathi	Paan
Tamil	Vetrilai
Telugu	Nagballi, Tamalapaku
Sanskrit	Tambool, Mukhbhushan, Varnalata

IMPORTANCE/ BENEFITS OF BETEL LEAF:-



PHYTOCHEMICAL CONSTITUENTS:

Chemical constituents	% of chemical constituents
Chavibetol	53.1
Chavibetol acetate	15.5
Eugene	0.32
Chavibetol methyl ether	0.48
a-pinene	0.21
f-pinene	0.21
Safrole	48.7



Chavibetol

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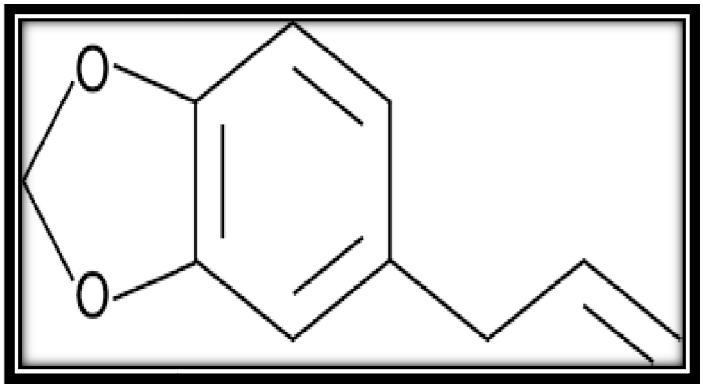
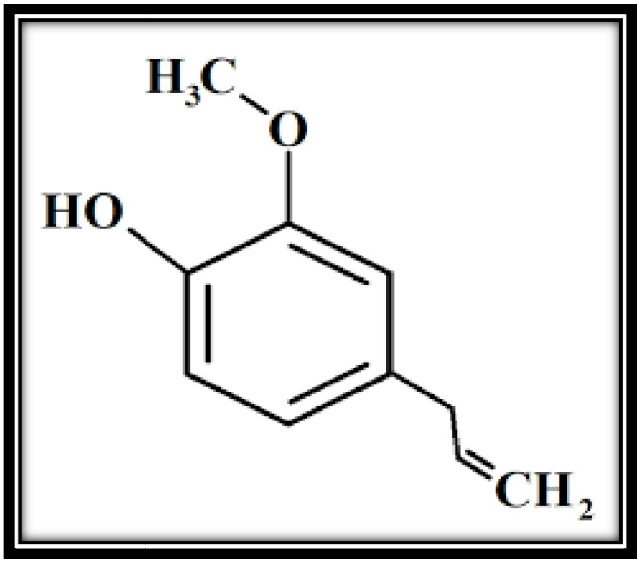


Safrole



Eugenol

HOW TO GROW PIPER BETEL PLANT:

The betel leaf plant, also known as Piper betel, is a tropical plant that is often used in traditional medicine. The leaves of the plant are used to make a chewable stimulant that is popular in many parts of the world. The plant is also used to make tea that is said to have detoxifying properties.

The betel leaf plant (Piper betel) is a tropical evergreen vine that is widely grown throughout Southeast Asia for its leaves. Betel quid is typically made by combining the leaves with areca nut, slaked lime, and sometimes spices. It is a stimulant and is used to improve digestion and relieve pain.

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Variety

Bangla, Mitha, Sanchi, Korpuri, Ujani, Maghi, Deshi, Barisal, Jali, BARI Paan 1, BARI Paan 2, BARI Paan 3

Climate

Betel leaf grows very well in a tropical climate with high rainfall, and shady places are the best for its vigorous growth. It flourishes in areas with a rainfall of 225 to 475 cm.

Soil

Betel Leaf can be grown in a wide range of soils such as sandy loam, heavy clayey loam. Supplementing the soil with good organic matter results in the best growth and higher yield. Soil should have good drainage as well. Land should be raised by 5 to 10 cm from the adjacent areas.

Land Preparation

Land should be prepared by 4-5 plowing. Land should provide proper drainage. Afterward, field beds of sizes (15 cm in height and 30 cm wide) are prepared. Soil should be sterilized thoroughly before planting the betel leaf cuttings

Soil Sterilization

When the soil temperature rises from March to May, the soil is covered by polyethylene sheets to eradicate the inoculum of soil-borne pathogens.

Planting time

The monsoon season is ideal for planting betel leaves plants under closed system cultivation. However, the planting season of betel leaves varies from region to region. November – December, and January – February is optimum for cultivation.

Propagation and Cultivation

In betel leaf propagation, stem cuttings having 3 to 5 nodes are used, and these are planted in such a fashion that 2 to 3 nodes are buried in the soil. A single node cutting with a mother betel leaf is also cultivated. Apical and middle portions of cuttings of the betel vine are used for planting. There are 2 types of betel leaf cultivation practiced in India and Bangladesh.

Open system cultivation using support plants.

Closed system cultivation using rectangular structures (artificial) called boroj.

Planting of Betel Leaf cuttings

Basically, planting is done in rows, and spacing between plants varies from region to region. The average spacing is 75 cm to 100 cm. 42,000–75,000 cuttings are planted per hectare under the open cultivation system whereas 1,00,000–1,25,000 cuttings per/ha are sufficient in a rectangular closed cultivation system.

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Pest & Diseases
Pests: Aphids, mites, Scale insects, Nematode, Mealybug, etc.
Diseases: Foot rot, leaf spot, anthracnose, powdery mildew, etc.
Harvesting
Harvesting of leaves starts from 6 months to 18 months after planting, depending on soil and varieties; each vine is picked thrice or four times a year. Expert hands are needed for picking. Artificial nails are also used for harvesting. The crop yield is less in the first year, maximum in the middle, and less towards. The picked leaves arewashed, cleaned, and sorted in different grades according to size, color, texture maturity, and chewing quality
Yield
An average annual yield of a good betel leaves crop is about 60-75 leaves/plant and 6-7 million leaves/ha. This yield also depends on cultivation methods and the variety of betel leaves.

PHARMACOLOGICAL ACTIVITY:
Antioxidant
Anethylacetateextract showedthehighest ferric-reducing activity and radical scavenging activities against DPPH, superoxideanion, and NO radicals, whichwas attributed toits highphenolic content. Analysesyielded catechin, morin, and quercetinin the leaves. Theplant extractalsoshowed the highestinhibitoryeffectagainst the proliferationof MCF-7 cells, with increasedactivitiesof catalase and superoxide dismutase.

Antifertility effect
Ethanolicextractof Piper betel Petiolegiventofemale albinoratsata doselevelof 100 mg/kgcaused antiestrogenic effects Phytochemical analysis showed the presence of carbohydrates, alkaloids, gums, oils, steroids, glycosides, tannins, phenols, vitamins, organicacids, and inorganicconstituents. Extracttreatmentcaused a reduction in reproductive organ weights, circulating level ofestrogen, fertility, numberof litters, serumglucose concentration, and enzyme activity of acid phosphatase, SGOT, and SGPT Whereas, the concentration of cholesterol and ascorbic acid increased.

Anticancer potential
The study evaluatedanaqueousextractofleavesto cytotoxicitystudieson the Hep-2 cellline. Themean CTC50 was 96.25 ug/ml suggesting potentcytotoxicityand probableanticancerproperty. Piperbetelleafextract showed significant LC50 values of >100 µg/mL towards A. salina. Thepresenceofcytotoxiccompoundsalso suggests potential antitumor or anti-cancer properties.

Antimalarial
The study evaluatedthephytochemicalandantioxidant potentialsof a crudeextractforpossibleantimalarial effects. Phytochemicalscreeningyieldedantiplasmodial chemicalconstituents. Theextractexhibited the potent abilitytoscavengefreeradicalsanddemonstrated significantschizonticidal activityin allthreeantimalarial evaluation models.

Antiulcer
The studyshoweda significanthealingeffecton NSAID-induced peptic ulcers in albino rats. The healing action was attributedto the freeradicalscavengingactivityof the plantextract. APC, one of the phenol constituents showed significant protection against indomethacin-induced ulcers in Sprague-Dawley rats

Antifungal
Hydroxychavicol, isolated from the chloroform extraction of theaqueousextractof P. betel, was investigatedfor antifungalactivityagainst 124 strainsof selectedfungi. Hydroxychavicol exhibitedinhibitoryeffectson fungal speciesofclinicalsignificance. Italsoexhibitedan extended post-antifungal effectfor Candidaspecies and suppressionofmutantemergence.

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Antihistaminic
A study was done on P. betel ethanolic extract and essential oilonitseffectsonhistamineaerosol-induced bronchoconstrictioninwholeguineapigs. Results conclude the ethanolic extract and essential oil possess antihistaminic activity

Stabilizing
The study examined the effect of P. betel leaf extract on lipid peroxidation, antioxidantenzymes, andmembrane-bound ATPasesinmice. Results showedthe leafextract providedbetterdose-dependentantioxidantpotential andmembrane-stabilizingactionin Swissmiceover controls.

Anticarcinogenic effect
Hydroxychavicol, isolated from the chloroform extraction of theaqueousextractof P. betel, was investigatedfor antifungalactivityagainst 124 strainsof selectedfungi. Hydroxychavicolexhibitedinhibitoryeffectsonfungal speciesofclinicalsignificance. Italsoexhibitedan extended post-antifungal effectfor Candidaspecies and suppressionofmutantemergence.

Antidepressant
The studyevaluatedthe antidepressantactivityof ethanolic extractof P. betel leavesin Swissalbinomice. Results showed a significantantidepressant effect asindicated by a reduction in the durationofimmobility. The 100 mg extract dose effect was greater than that of imipramine

USES:
Anti-microbial
Anti-histaminic activity
Anti-inflammatory effects
Anti-oxidant effect
Anti-mutagenic effect
Anti-haemolytic effect
Anti-ulcer activity
Anti-fungal activity
Sore throat
Headache
Respiratory disorder
Constipation

II. CONCLUSION

This review is submitting to the great importance of medicinal and nutritional value. Piper betel leaf is consumed frequently as a mouth freshener. It has been shown to possess a lot of therapeutic activities such as ayurvedic and pharmacological. The collection, and cultivation of the piper betel leaf plant and effects are shown. In consideration of the proven therapeutic values of P. betel, proper characterization could be useful for long-term research for drug development

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