



ETHANOBOTANY, PHYTOCHEMISTRY AND PHARMACOLOGY OF *SYZYGium CARYOPHYLLATUM* (L) ALSTON

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ABSTRACT

Syzygium caryophyllatum (L) Alston of family Myrtaceae is a tree up to 6 m tall, with thick and reddish-brown barks. Present in evergreen forests, semi-evergreen forests and in the plains of Kerala, Coimbatore, Karnataka and Maharashtra. Syn, *Syzygium caryophyllaeum* Sensus Gamble. Bark, leaf and fruit has been used in folk herbal medicine for the treatment of diarrhoea, diabetes, leucorrhoea, fever, skin diseases and general debility. This present study reveals that wide range of novel phytochemical constituents have been isolated from this plant with diverse chemical properties and deals with enormous data that has been generated due to recent wide spread research in phytochemical, pharmacological aspect of this plant also include on its ethanobotany.

KEYWORDS: *Syzygium caryophyllatum* (L) Alston, Ethanobotany, Phytochemistry, Pharmacology.

INTRODUCTION

Plant kingdom is a source of large variety of active ingredients capable in the management of many acute and chronic diseases. Proper identification of plant species and extraction of active constituents play an important role. *Syzygium caryophyllatum* belonging to the family Myrtaceae is a traditionally important medicinal plant. Primary metabolites are involved in normal growth, development, and reproduction of plants. Whereas secondary metabolites are used as medicines,

flavorings, pigments, and recreational drugs and also provides self defense for the plants. Myrtaceae family contains 140 genera and 3,400 species distributed mainly subtropical and tropical regions of the world. *Eugenia* and *Syzygium* contains around 1000 and 500 species respectively. It is common in forest area^[3] In Ayurveda, *Syzygium caryophyllatum* bark, leaves and fruits are used for the treatment of *vata*, *pitta*, diarrhoea diabetes, leucorrhoea, fever, skin diseases and general debility.^[2]

Distribution

Sr.No.	Global Distribution	Indian Distribution
1.	Peninsular India	Maharashtra (Kolhapur, Pune, Raigad, Ratnagiri, Satara and Sindhudurg)
2.	Sri Lanka	Karnataka (Chikmagalur, Coorg, Hassan, North Kanara, Shimoga, and South Kanara)
3.	Kerala	All districts
4.	Tamil Nadu	Coimbatore, Cuddalore, Kancheepuram, Kanniyakumari and Tirunelveli

Botany

- **Botanical Name:** *Syzygium caryophyllatum* (L) Alston.
- **Family:** Myrtaceae.
- **Synonym(s):** *Syzygium caryophyllaeum*, *Eugenia*

corymbosa, *Myrtus caryophyllata*.

- **Common Name(s):** Indian Blackberry, Dwarf Black Plum Tree [English].

Taxonomic Hierarchy

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Myrtales
Family	Myrtaceae
Genus	<i>Syzygium</i>
Species	<i>Caryophyllatum</i>

Common Name

- Malayalam : Cherujara, Karinjara, Kani, Njara, Pottinjaval, Shenjarel.
- Kannada : Kunta Nerale.
- Sanskrit : Kshdurajambu.

- Hindi : Chota Jambul.

Description

Trees, upto 6 m tall. Trunk and bark are grey, smooth and blaze brown (figure.1). Branchlets are glabrous (figure.2). Leaves are simple, opposite, decussate; petiole up to 0.3 cm long, canaliculate, glabrous; lamina 5-10 x 1.5-4 cm, obovate, apex obtuse, base attenuate to acute, margin entire, pellucid gland dotted, coriaceous, drying brown; midrib canaliculate above; intramarginal nerve present; secondary nerves many, parallel and slender (figure.3). Inflorescence terminal corymbose cymes; flowers white (figure.4). Fruit a berry, black globose, crowned with calyx lobes, glabrous and one seeded.^[1]

**Figure.1****Figure.2****Figure.3****Figure.4****Ethno pharmacology**

Tribal people consider this plant as a boon of nature and its fruits and seeds were consumed by Paniya tribal community of Waynad district, Kerala, India. The seeds and bark were dried and its decoction was used in the ailment of diabetes mellitus. The leaf and bark extracts of this plant are well known for its antibacterial and antioxidant efficacy. The bark extract of this plant was used in veterinary medicine.^[4] Tender leaves were used in the treatment of diarrhoea, blood mixed with stools, blood and mucous mixed with stools, wounds and ulcers.^[5] In Ayurveda, *Syzygium caryophyllatum* bark, leaves and fruits are used for the treatment of *vata*, *pitta*, diarrhoea diabetes, leucorrhoea, fever, skin diseases and

general debility.^[2]

PHYTOCHEMISTRY

Tender leaves extract showed the presence of alkaloids, saponin, flavonoid and carboxylic acids.^[5] Leaf essential oil is rich in phytoconstituents. In winter, the essential oil has of α -cadinol (18.3%), myristicin (12.02%), δ -cadinene (8.4%) and τ -muurolol (6.65%) as major components followed by β -caryophyllene (5.33%), α -muurolol (5.11%), β -cis-ocimene (2.53%), β -elemen (2.52%) and calarene epoxide (2.31%), whereas in summer, the essential oil, has caryophyllene oxide (10.72%), α -pinene (10.55%), 4,8,13-duvatrene-1,3-diol (10.44%) and cadin-4-en-10-ol (8.27%) as major

components followed by γ -gurjunenepoxide-(1) (5.93%).^[6]

Fruit showed presence of flavonoids, carotenoids and other phenolic compounds.^[7] Fruit pulp and seeds contains amino acids, terpenoids, flavonoids, carotenoids, alkaloids, phenyl propanoids, phenolic acid, carboxylic acids, coumarins and saponins. Fruit pulp shows higher amount of fructose whereas, seed has presence of asparagine, cystine and serine. Fatty acids such as hexanoic acid, linoleic acid, linolenic acid and palmitic acid present in fruit pulp and α -linolenic and α -linoleic acid, palmitic acid, stearic acid and decanoic acid are present in seed.^[8]

Maximum amount of phytoconstituents such as phenol (420.60 ± 0.73), flavonoids (2.31 ± 0.01) and tannins (177.80 ± 3.18) are present in the acetone root extract. Whereas vitamin E (177.80 ± 3.18) concentration is more in methanol root extract.^[2]

PHARMACOLOGY

Antihyperglycaemic activity

Single dose of 0.25, 0.50, 0.75, 1.00, 1.25 and 2 kg/ml of bark extract showed antihyperglycaemic activity in alloxan induced diabetic Wistar rats (15.mg/kg). The antidiabetic activity of methanol extract of bark, leaf, fruit pulp and seeds confirmed by *in vitro* test methods such as alpha amylase inhibitory assay and alpha glucosidase inhibitory assay.

Antibacterial activity

The methanolic extracts of bark, leaf, fruit pulp and seeds were subjected to disc diffusion method for assessment of antibacterial activity. Six bacteria strains such as viz., *Bacillus cereus*, *B. licheniformis*, *Escherichia coli*, *Staphylococcus aureus*, *S. hominis* and *Aerococcus viridians* were analyzed. Mueller-Hinton agar medium (MHA) was used for antibacterial susceptibility tests.

Antioxidant activity

The free radical scavenging activity of ethyl acetate extract of leaves evaluated by measuring the scavenging activity of the sample on 2,2-diphenyl-1-picrylhydrazyl (DPPH). The extract shows about 84% of antioxidant activity at concentration of 400 μ g/ml.^[9]

Anticancer activity

Anticancer activity of the ethyl acetate extract of leaves measured using 3-(4, 5-dimethyl thiazol-2yl)-2, 5-diphenyl tetrazolium bromide (MTT) assay. The monolayer culture of Hep2 cells at a concentration of 10 cells/ml/well were used for analysis. The effect of extracts on cell growth inhibition was assessed as percent cell viability. The sample shows a percent cell viability of 52.94% at a concentration of 125 μ g/ml.

Larvicidal activity

Larvicidal activity of the leaf essential oil and methanol

extracts of bark, leaf, fruit pulp and seed of *S. caryophyllatum* was tested against two mosquito vectors namely *Aedes aegypti* and *Culex quinquefasciatus*.

CONCLUSION

Syzygium caryophyllatum commonly known as Indian Blackberry (English), Njara (Malayalam), of family of Myrtaceae, is a medicinally important plant. More detail study of ethanopharmacological effect of plant should be carried out with proper scientific knowledge, detail documentations should be done in order to explore the medicinal uses and to obtain proper identification extensively studied by various researchers based on its biological activities and therapeutic potential.

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