



REVIEW OF LITERATURE: PHYTOCHEMICAL AND PHARMACOLOGICAL STUDIES ON *MUNTINGIA CALABURA*

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ABSTRACT

Key Words

Muntingia,
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Muntingiaceae, the family of the rose order (Rosales), with about 3 genera. The family Muntingiaceae, here described, includes the Neotropical, monotypic genera *Muntingia* and *Dicraspidia*, and probably *Neotessmannia*, which have previously been included in *Elaeocarpaceae*, *Tiliaceae*, or *Flacourtiaceae*. Morphological data and molecular data published elsewhere indicate that none of these families can be regarded as closely related to these genera. Muntingiaceae belong to a clade that comprises core Malvales (*Sterculiaceae*, *Tiliaceae*, *Bombacaceae*, and *Malvaceae*) and several other families. Within this alliance, relationships are presently unresolved. It is native to Western Ghats of India, Malaysia and also found in central and eastern Africa, south-eastern Asia, the Caribbean, Florida, Brazil, Australia, Puerto Rico and many Pacific Islands. It is a large, evergreen tree, 10-15m in height, indigenous to the evergreen forests at altitude of 450-1,200m and cultivated throughout the hotter parts of India. It requires a soil which is well drained but moist, with a pH of 4.3 to 8.0 and with medium soil fertility. The optimum temperature is 19 to 29c, altitude at approx. Sixteen Hundred meters above sea level and the annual rain fall between 1000 and 2400 mm.

INTRODUCTION:

Muntingia calabura is a fast-growing slender tree, native to the American continent and commonly cultivated in the warm areas of Asian region. This plant is a fast-growing tree of slender proportions, reaching a height of approximately 7.5-12 m with nearly horizontal spreading branches. The 23 leaves of *M. calabura* are evergreen approximately 5-12.5 cm long, alternate lanceolate or oblong, long pointed at the apex, oblique at the base with dark green color and minutely hairy on the upper surface, gray- or brown-hairy on the underside and irregularly toothed.

The flowers are approximately 1.25-2 cm wide, borne singly or in 2's or 3's in the leaf axils with 5 green sepals and 5 white petals and many prominent yellow stamens. The fruits are abundant, in round shape

Taxonomical Classification of *Muntingia calabura*:

Kingdom : Plantae
SubKingdom: Viridiplantae
InfraKingdom: Streptophyta
SuperKingdom: Embryophyta
Division : Tracheophyta
Sub Division : Spermatophyta
Super order : Rosales

Order : Malvales
Family : Muntingiaceae
Genus : *Muntingia*
Species : *calabura*

Vernacular Names:

English : Jamaican cherry
Telugu : Nakkea Regu
Tamil : Tenpazham
Kannada : Gasagase hannina mara
Malayalam : Paanchara

Botanical Description: It is a large, evergreen tree, 10-15m in height, indigenous to the evergreen forests at altitude of 450-1,200m and cultivated throughout the hotter parts of India.

Leaves: Leaves are dark green, alternate, entire, simple, glossy, leathery, stiff, large (up to 16 cm [6 in] in length), and elliptic to oval in form. Leaves are often deeply lobed when juvenile and on young shoots.

Flowers: This species is monoecious, having male and female inflorescences (or "spikes") on the same tree. Male and female spikes are borne separately on short, stout stems that sprout from older branches and the trunk. Male spikes are found on younger branches above female spikes. Male spikes are dense, fleshy, cylindrical to club shaped, and up to 10 cm (4 in) in length. Flowers are tiny, pale green when young, turning darker with age. Female flowers are larger, elliptic or rounded, with a tubular calyx. The flowers are reportedly pollinated by insects and wind, with a high percentage of crosspollination.

Fruit: Jamaican cherry has a compound or multiple fruit (syncarp) with a green to yellow brown exterior rind that is composed of hexagonal, bluntly conical carpel apices that cover a thick, rubbery, whitish to yellowish wall. The acid to sweetish (when ripe) banana flavoured flesh (aril) surrounds each seed. The heavy fruit is held together by a central fibrous

core. Fruits are oblong cylindrical in shape, typically 30-40 cm (12-16 in) in length.

Bark: The bark is grey, fibrous becomes rough and eventually peeling.

Traditional Uses: Flowers and bark are used as antiseptic to reduce swelling in lower extremities. Leaves either boiled or steeped in water, are used to reduce gastric ulcer prostrate gland swelling and to alleviate headache and cold. Bark decoction is used as a wash to reduce swelling in lower extremities. Infusion of flowers is used as tonic and tranquillizers, antispasmodic anti-dyspeptic. The roots are used as emmunogouage and as an abortifient. The leaf infusion is drunk as tea like beaverage. Fruits sometimes eaten fresh and sometimes cooked as tarts and jams.

Past Phyto-chemical Works:

Twelve flavanoids are isolated from the *M.calabura* roots methanolic extract (2*S*)-5'-hydroxy-7,3',4'-72 7 trimethoxyflavan, (2*S*)-7,8,3',4',5'-pentamethoxyflavan, (2*S*)-2'-hydroxy-(2*S*)-8-hydroxy-7,3',4',5'-tetramethoxyflavan, (2*S*)-8,2'-dihydroxy-7,3',4',5'- tetramethoxyflavan, (2*S*)-8,5'-dihydroxy-7,3',4'-trimethoxyflavan, 7,8,3',4',5'- pentamethoxyflavone, (M),(2*S*),(2''*S*)-(P),(2*S*),(2''*S*)-8,8''-5'-trihydroxy-7,7'-3',3'''- 4',4'''-5'''-heptamethoxy-5,5'''-biflavan, 5'-hydroxy-7,8,3'4'-tetramethoxyflavone, (M),(2*S*),(2''*S*)-(P),(2*S*),(2''*S*)-8,8''-5'-5'''-tetrahydroxy-7',7''-3',3'''-4',4'''-hexamethoxy- 5',5'''-biflavan, and 8,5'-dihydroxy-7,3',4'-trimethoxyflavone. From the leaves of *M. calabura*, methanolic extract was first partitioned into water, petroleum ether and ethyl acetate. Only the ethyl acetate partition was further subjected to the isolation procedures, which led to the identification of 25 compounds consisting of one new (2*R*,3*R*)-7-methoxy-85 3,5,8-trihydroxyflavanone,) and 24 known compounds [(2*S*)-7-hydroxyflavanone [(2*S*)-7-hydroxyflavanone, (2*S*)-5,7-dihydroxyflavanone (pinocembrin),

Past Pharmacological Works:

Plant Part Used	Activity Done	Reference
Leaves	Anti-Diabetic Activity Anti-Inflammatory Activity Anti- Oxidant Activity Anti-Microbial Activity Anti-Fungal Activity Anti- nociceptive Activity Anti proliferative Activity	Babu et al., Karthyaini et al., Ayesha Siddiqua et al., William Patrick et al., Ramasamy Rajesh et al., ZainulAmiryddin et al., Zakaria A et al.
Fruits and flowers	Anti bacterial activity Insecticidal activity Anti inflammatory activity Anti-platelet aggregation	William Patrick et al., Orejudos Rubio et al., Karthyaini et al., Chen JJ et al.,
Root	Abortifacient Activity Cardioprotective Activity Anti hypertensive Activity	Saxena et al., Nivethetha M et al., Shih CD et al.,

(2R, 3R)-3,5,7-trihydroxyflavanone (pinobanksin), pinostrobin, 7-hydroxyflavone, 5,7-dihydroxyflavone (chrysin), 3-methoxy-5,7,4'-trihydroxyflavone (isokaemferide), 3,3'-dimethoxy-5,7,4'-trihydroxyflavone, 3,8-dimethoxy-5,7,4'-trihydroxyflavone, 3,5-dihydroxy-7,4'-dimethoxyflavone (ermanin), 3,5-dihydroxy-7,8-dimethoxyflavone (gnaphaliin), 5-hydroxy-3,7,8-trimethoxyflavone, 5,4'-dihydroxy-3,7,8-dimethoxyflavone, 5-hydroxy-3,7,8,4'-tetramethoxyflavone, 2',4'-dihydroxychalcone, 4,2',4'-trihydroxychalcone (isoliquiritigenin), 7-hydroxyisoflavone, 7,3',4'-trimethoxyisoflavone (cabreuvin), (2S)-5'-hydroxy-7,8,3',4'-tetramethoxyflavan, 2',4'-dihydroxydihydrochalcone, 3,4,5-trihydroxybenzoic acid, lupenone, and 2 α ,3 β -dihydroxy-olean-12-en-28-oic acid.

Methanol extract of *M. calabura* stem bark was partitioned between H₂O-CHCl₃ prior to the isolation processes, where the CHCl₃-soluble fraction was collected for the isolation purposes. Isolation procedures carried out on the CHCl₃-soluble fraction led to the identification of 15 compounds of which two are new compounds 8-hydroxy-7,3',4',5'- tetramethoxy flavone and 8,4'-dihydroxy-7,3',5'-trimethoxy flavone and

13 are known compounds 6,7-dimethoxy-5-hydroxy flavone , 5,7-dimethoxy flavone, 3,5-dihydroxy-6,7-dimethoxy flavone, (2S)-5'-hydroxy-7,8,3',4'-tetramethoxy flavane, β -sitostenone, 6 β -hydroxystigmast-4-en-3-one, β -sitosterol, syringic acid, vanillic acid, 3-hydroxy-1-(3,5-dimethoxy-4-hydroxyphenyl)propan-1- one, tetracosyl ferulate, and, a mixture of 1-tetracosanol and 1- hexacosanol.

CONCLUSION

Muntingia calabura is an evergreen tree belonging to family Muntingiaceae, which is commonly known as Jamaican Cherry. The phytochemical evaluation of *Muntingia calabura* revealed the presence of various constituents such as Flavanoids, Flavanones, Biflavanoids and Steroids. Many other compounds with their active chemical constituents have been discussed. The pharmacological studies shown Anti-diabetic, Anti-inflammatory, Anti-ulcer, Hepato protective, Anti-oxidant, Insecticidal, Anti fungal, Abortifacient, Anti proliferative, and Cytotoxic properties.

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