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PHARMACOLOGICAL POTENTIAL AND ANALYTICAL REVIEW ON EMBELIA TSJERIAM-COTTAM

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ABSTRACT

Embelia tsjeriam-cottam, also known as Vidanga, is a shrub climber native to India's Western Ghats and a member of the Myrsinaceae family. It is well-known for its therapeutic properties, particularly its anti-fertility, anti-estrogenic, and anti-helminthic effects. Embelia tsjeriam-cottam contains bioactive substances such as embelin, a phenolic compound with antioxidant and anti-inflammatory activity. This little shrub has an important role in the treatment of various ailments. Its fruit, albeit rarely eaten, has the most beneficial compounds. The plant is sometimes confused with Embelia ribes due to their strong likeness and therapeutic characteristics, and it is also known as "False Black Pepper" because to its resemblance to Piper nigrum.. Pharmaceutical research offers promise in treating inflammation, diabetes, bacterial infections, and liver damage. Nonetheless, its habitat is threatened, thus conservation is a top priority.

Key words: Embelia tsjeriam-cottam, Embelin, Phytochemicals, Traditional Medicine

INTRODUCTION

Embelia tsjeriam-cottam, or Vidanga, is a climbing shrub indigenous to the Western Ghats, which occurs in the states of Karnataka, Kerala, and Malabar. It is classified under the Myrsinaceae family, a family which consists of more than 1,000 species distributed over 30 genera. It is a plant with medicinal qualities and has been utilized in traditional medicine in the treatment of a variety of diseases. It is most notably known for its anti-fertility, anti-estrogenic, and anti-helminthic activity, and is thus useful in the treatment of several disorders.^{[10][1]}

One of the most important bioactive compounds of Embelia tsjeriam-cottam is embelin, which is renowned for its antioxidant and anti-inflammatory activities. The compound is responsible for the medicinal activity of the plant, which has been used for centuries in Ayurvedic medicine.^[1]

The plant itself is a small shrub with characteristic red, globose fruits and pale, greenish-yellow flowers. The fruit, although not eaten widely, is the most medicinally active part of the plant. Because it has a similar appearance and medicinal properties, Embelia tsjeriam-cottam is confused with another plant, Embelia ribes, or Vidang. Both are used interchangeably in traditional medicine, but Embelia tsjeriam-cottam is found more frequently in South India.^[11]

It has also been known as "False Black Pepper" because it so closely resembles *Piper nigrum* (black pepper), and on occasion is adulterated to black pepper preparations. This reflects its close appearance to a far more recognized spice, yet remaining a separate species with its own medicinal attributes. ^{[1] [12]}

PLANT PROFILE

Table 1: plant profile

PLANT NAME	<i>Embelia tsjerium cottam</i>
Kingdom	Plantae
Division	Angiosperms
Family	Myrsinaceae
Class	Eudicots
Oder	Ericales
Genes	<i>Embelia</i>
Species	<i>tsjerium cottam</i>

GEOGRAPHICAL DISTRIBUTION

Embelia tsjeriam-cottam, often known as Baibidanga, is a medicinal plant found throughout Asia. Its range encompasses the Indian subcontinent, Sri Lanka, Myanmar, Thailand, Malaysia, southern China, Nepal, Bangladesh, Laos, Vietnam, and Cambodia.

In India, this species is primarily found in the southern states of Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, and Mumbai. It has also been documented in central regions, such as Madhya Pradesh. ^[8]

COMMON NAMES AND SYNONYMS

Common names include

- Hindi -Babrang
- Kannada-Vaivaling
- Malayalam –Ammimuriyan , Cheriyanattam

Synonyms include:

- *Ardisia basaal* Roem. & Schult.
- *Ardisia tsjeriam-cottam* Roem. & Schult.
- *Embelia acuta* (Dennst.)
- *Embelia ferruginea* Wall.

PHYTO-CONSTITUENTS

The principal phytochemical constituent found in its fruits is embelin (2,5-dihydroxy-3-undecyl-2,5-cyclohexadiene-1,4-benzoquinone), a phenolic molecule that accounts for many of the plant's medicinal benefits.

In addition to embelin, *Embelia tsjeriam-cottam* contains cardiac glycosides, phenols, and flavonoids. The plant's seeds have been claimed to have antibacterial, anthelmintic, antituberculosis, alterative, and stimulant qualities.

Studies using HPLC and GC-MS have revealed bioactive substances like eicosane, tetradecanoic acid, isopropyl myrsitate, mortenol, neophytadiene, β -sitosterol, and squalene. These chemicals are linked to antioxidant, anticancer, antibacterial, and cholesterol-lowering properties. ^[8]

PHARMACOLOGICAL ACTIVITIES

- **Anti-inflammatory:**

. Alcoholic fruit extract 200 mg/kg dose significantly suppressed paw edema and reduced granuloma formation by 35.50% compared to reference Diclofenac. In contrast, the review by Bohara and Nagalakshmi summarizes multiple pharmacological findings, including a study where ethanolic extract at 150 mg/kg reduced acute paw edema effectively and decreased granuloma by 28.93% ($p < 0.001$) and 25.42% ($p < 0.05$) at 300 mg/kg. Both sources support the plant's anti-inflammatory efficacy, with comparable outcomes in reducing inflammation. Collectively, they support the medicinal potential of *Embelia tsjeriam-cottam* and justify further investigation of its bioactive compounds and action mechanisms.^{[3][4]}

- **Antidiabetic:**

Embelia tsjeriam cottam is brought to light due to its possible anti-diabetic activity. The review covers different studies showing that the bioactive compounds of the plant, specifically embelin, have hypoglycemic activity. The compounds were found to modulate glucose metabolism, increase insulin sensitivity, and lower oxidative stress in diabetic models. Further, the review highlights the plant's capability to enhance lipid profiles and reverse pancreatic function, pointing to its use in controlling type 2 diabetes mellitus. This also identifies a requirement for clinical trials to support these observations and develop standard dosages for therapy.^[1]

- **Antibacterial and Antitubercular:**

Methanolic seed extracts exhibited high antibacterial activity against *Staphylococcus aureus*, *Salmonella typhi*, and *Corynebacterium diphtheriae* strains with inhibition zones of 18–30 mm, indicating broad-spectrum antimicrobial activity. The extract also exhibited anti-tubercular activity against *Mycobacterium tuberculosis* with effective concentrations ranging from 0.5–5.0 mg/ml. Such activities are due to bioactive phytochemicals such as embelin, thought to interfere with microbial growth and function. The discovery confirms the use of the plant in infections in traditional medicine and identifies its value as a natural drug candidate for bacterial and tuberculosis therapy. This still stresses the requirement for additional investigations to identify target active compounds, understand their mode of action, and perform clinical trials to authenticate efficacy and safety. In general, *Embelia tsjeriam cottam* seems to be a potential medicinal plant with significant antibacterial and anti-tubercular activity.^[1]

- **Hepatoprotective:**

The hepatoprotective activity of *Embelia tsjeriam-cottam* was assessed with aqueous and alcoholic fruit extracts in Wistar rats with isoniazid (INH)-induced liver injury. The treatment with these extracts at 200 mg/kg body weight significantly enhanced liver function, as indicated by decreased serum levels of liver enzymes ALT and AST. Furthermore, antioxidant parameters like glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT) activities were increased, while lipid peroxidation markers like malondialdehyde (MDA) were reduced. Histopathological examination also ensured the re-establishment of normal liver architecture. These observations indicate that *Embelia tsjeriam-cottam* has significant hepatoprotective activity, which may be attributed to the antioxidant-rich phytochemical composition containing substances like embelin, quercetin, and rutin. This vindicates its traditional application in the management of liver diseases.^[5]

- **Antioxidant:**

Methanolic leaf extracts had a DPPH radical scavenging activity of 93.90% at 517 nm, which shows high free radical neutralizing ability. The extracts also showed high reducing power and antioxidant capacity in the phosphormolybdenum assay. These observations indicate that the plant's bioactive constituents, like embelin, are responsible for its antioxidant activity, which is in favor of its use in traditional medicine for the management of oxidative stress disorders. Nonetheless, the review

highlights the importance of conducting additional research to purify individual active constituents and examine their mechanisms of action^[1]

CONCLUSION

Embelia tsjeriam-cottam is a medicinally valuable plant in traditional medicine, especially for its medicinal properties like anti-inflammatory, anti-diabetic, and anti-bacterial activities. Its major bioactive compound, embelin, is responsible for its medicinal value. Although it has positive uses, *Embelia tsjeriam-cottam* is threatened by habitat loss, highlighting the importance of conservation. Further research on its bioactive compounds and medicinal properties is necessary to unlock its maximum therapeutic potential and promote sustainable use. The plant's pharmacological significance, as well as its value in traditional medicine, is an indication of its significance in contemporary pharmacological research.

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