

Mini review

Camphor tree, *Cinnamomum camphora* (L.); Ethnobotany and pharmacological updatesRavindra B. Malabadi^{1*}, Kiran P. Kolkar², Neelambika T. Meti³, Raju K. Chalannavar¹¹Department of Applied Botany, Mangalore University, Mangalagangothri 574199
Mangalore, Karnataka, India^{1*}Adjunct Professor, Miller Blvd NW, Edmonton, Alberta, Canada²Department of Botany, Karnatak Science College, Dharwad, Karnataka, India³Plant Biotechnology Laboratory, Rajiv Gandhi Institute of IT and Biotechnology, Bharati Vidyapeeth University, Pune-Satara Road, Katraj, Pune, 411046, Maharashtra, India

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Corresponding author: **Ravindra B. Malabadi**. Email: rbmalabadi_b3g@yahoo.com**ABSTRACT**

This review paper highlights the recent updates of the fragrant camphor tree (*Cinnamomum camphora*) and camphor oil is used as a medicine for controlling many human diseases, relief of pain, inflammation and irritation in the body and skin. It can also be very effective in treating and preventing some serious, life threatening diseases. Recently medicinal plants (sweet worm wood; *Artemisia annua*) containing camphor essential oil has been tested against corona virus (SARS-CoV-2) disease (Covid-19). Commercially, camphor is very important with many biological properties and is used as a topical ointment since camphor is a very toxic substance and oral consumption of camphor should be avoided.

Keywords: Antiviral; camphor; herbal medicine; skin disease; poisonous tree; traditional medicine.

INTRODUCTION

Camphor tree, (Karpura) *Cinnamomum camphora* (L.) J. Presl belonging to the family Lauraceae occurs naturally, and native to India, China, Japan, Mongolia, Taiwan, and Bhutan, but has been naturalised in other parts of the World (1-8). *Cinnamomum* belongs to the family Lauraceae with about 200-350 species found throughout South East Asia (9-14). India accounts for about 40 species of the genus *Cinnamomum* distributed in Western Ghats, Eastern Himalayas and Andaman Nicobar Islands. Among the total 18 species recorded from south India, 16 are endemic to Western Ghats region (2-14). Now, a new species of the genus *Cinnamomum* has been identified from Kollam and Thiruvananthapuram districts of Kerala, India (4, 6-11, 14).

Cinnamomum agasthyamalyanum Robi, Sujanapal & Udayan has been reported from Western Ghat Forests of Kerala (4, 6). The exact distribution range of *Cinnamomum agasthyamalyanum* population is between Attayar and Chemungi areas of Agasthyamala Hills, Kerala, India (4, 6). At present, there are only two known species with camphor smell namely *Cinnamomum camphora* is cultivated in china, Taiwan, Japan and Korea and *C. capparucoronide* is very common tree found in forests of Sri Lanka (14-17).

Cinnamomum camphora is used as a plasticizer in the preparation of explosives and disinfectants. The camphor tree is large with pale brown bark, dark green to yellowish leaves and small white flowers followed by small purple berries. The camphor tree is

very attractive with camphoraceous odour and grows in tropical rain forests at different altitudes (18-22).

Synthetic and natural herbal camphors

Basically, there are two camphors; One is chemically, and synthetically manufactured camphor is known as karpura which is burnt during puja ceremonies, religious rituals in temples in India due to aromatic smell. It is practically insoluble in water, but soluble in alcohol, ether, chloroform and other organic solvents. It is a terpenoid (1,7,7-trimethylbicyclo [2.2.1]-2- heptanone) with a chemical formula of C₁₀H₁₆O and exists in two enantiomeric forms: (1S)-(-)-and (1R)-(+)-camphor (11-21). The synthetic production of camphor involves using turpentine oil as a starting material (15-23). The isobornyl acetate subsequently formed is hydrolysed to isborneol, which is finally converted to camphor through dehydrogenation (1-14). The synthetic route from α -pinene produces a racemic mixture, i.e., a 1:1 ratio of (-) and (+)-camphor (19-24).

The second camphor is a natural herbal camphor extracted from camphor tree *Cinnamomum camphora* and *Cinnamomum agasthyamalyanum* used as a herbal medicine for many diseases (12-23). Camphor, traditionally obtained through the distillation process of the wood. The camphor tree is famous for the characteristic 'camphor' formed in the oil cells of different plant parts (6-14). It is a major source of natural camphor used commonly in the indigenous medicine and in a variety of confectionaries (20-25). Camphor is used for the topical applications in order to reduce the muscular pain and inflammations (12-24).

Medicinal properties of camphor

Camphor exhibits several biological properties such as antimicrobial, antibacterial, antiviral and antitussive effects, anti-mutagenic, anticancer activity, and insecticidal activity (13-22). It is also used in perfume and cosmetic industries. In addition to this, camphor is also used as an insect repellent, and pain reliver for the topical applications sine camphor is known for its antimicrobial properties. The composition of essential oil from the aerial parts of sweet wormwood (*Artemisia annua*) (23) includes camphor (44%), germacrene D (16%), trans-pinocarveol (11%), β -selinene (9%), β -caryophyllene (9%) and artemisia ketone (3%) (23-25).

The results of one the study demonstrated that the essential oil of Greek sage (*S. fruticosa*) and its four main components (1,8-cineole, α - and β -thujone, and camphor) exhibited high levels of virucidal activity against herpes simplex virus-1 (24-33). Mosquitoes are known as disease vectors of malaria, haemorrhagic dengue, yellow fever, Ebola, zika, and chikungunya (1, 25, 31-33).

Camphor has been used as a herbal medicine for the treatment of heart related health disorders (1, 26, 34). In addition, camphor also acts as a potential skin penetration enhancer (1, 27,35,36). The effect of camphor on the sexual activity of male rats was investigated by Love *et al.*, 2003 (1, 28,37) by measuring the parameters mount latency and frequency as well as intromission latency and frequency (28,37). Therefore, the administration of camphor at 50 mg/kg increased the sexual desire and performance of male rats (1, 28, 37).

The growth inhibition of one plant by another plant is known as Allelopathic activity which is one of the characteristic properties of the camphor laurel tree (*Cinnamomum camphora*) (12, 39-40). Among all the parts of the camphor tree, leaves had a direct inhibitory effect on germination and resulted in the reduced the competitiveness of the surrounding vegetations (12, 13, 39-40). Therefore, camphor could be used as a natural pesticide (12, 39-40).

Camphor (*Cinnamomum*) is traditionally used a herbal medicine against various ailments and insecticides (13, 14, 41-44). Due to its high healing significance, it has been used as antiemetic, antidiarrhoeal, antifatulent and stimulant agent in Ayurvedic medicine (13,14, 38-44). Camphor has been used for various therapeutic purposes as analgesic, antifungal, antiviral, antibacterial, antiseptic, antispasmodic, antipruritic, anti-inflammatory, anti-infective, expectorant and nasal decongestant (14, 40-44). Camphor is also used in balms, oils, liniments and creams (14, 39-44). Camphor has anthelmintic, and hepatoprotective activities, as a remedy for relief of pain,

inflammation and skin irritation, in the treatment of hysteria, epilepsy and chorea (14, 38-43, 41-44).

Camphor is very toxic in nature and toxicity has been confirmed. One of the major issues is the toxicity of camphor in humans is directly related to availability of camphor-containing products as unhazardous medicines rather than in the intrinsic toxicity of camphor. The oral consumption of higher concentrations of 3.5 g of camphor can cause death (1, 14, 36, 37). Further consumption of 2.0 g of camphor causes toxic effects in adults leading to congestion of the gastrointestinal tract, kidney and brain (1, 36-41). There is no antidote for Camphor poisoning (1, 25-30, 36, 37). Many medicinal plants contain camphor is a major component (1, 40). Lopes-Lutz *et al.*, (39) confirmed the antimicrobial properties.

The alcoholic extract of sweet wormwood (*Artemisia annua*) was the second most potent herbal medicine used on the 2005, SARS-CoV outbreak in China (18, 38, 39,41-44). The tonic, based on the plant *Artemisia annua*, belongs to a family of Asteraceae which has anti-malarial properties (18, 38, 39, 41-44). Antimalarial drugs have been isolated followed by artemisinin, a compound from *Artemisia annua* (43-44).

The plant parts have been used for the preparation of a tonic COVID-19 Organics; Malagasy Institute of Applied Research has been used as a immunity booster for the patients suffering from covid-19 (43-44). The clinical trials of this medicinal plant yet to be conducted. The composition of essential oil from the aerial parts of sweet wormwood (*Artemisia annua*) (18, 38, 39) includes camphor (44%), germacrene D (16%), trans-pinocarveol (11%), β -selinene (9%), β -caryophyllene (9%) and artemisia ketone (3%) (18, 38, 39,23-25). Aromatic plants, especially their essential oils, are known to exhibit antiviral properties. *Artemisia annua* extracts showed a very little toxicity and artemisinin-based drugs were widely used to treat malaria even in newborns (18, 38, 39, 41-44). Further pre-clinical and clinical trials need to be done for the evaluation of safety and efficacy of this polyherbal formulation.

CONCLUSION

Camphor is the most versatile molecule with a multitude of applications. Camphor is used to treat medical conditions in humans and a natural poison to kill insects. The antiviral property of camphor has been exploited for controlling coronavirus (SARS-CoV-2) disease (covid-19). Camphor is very toxic and higher concentrations of oral consumption can cause to death and used for external topical applications.

CONFLICT OF INTEREST

Authors declare no conflicts of interest.

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