

Ravintsara

Cinnamomum camphora ct 1,8 cineole



Botanical origin and production

The species *Cinnamomum camphora*, a member of the Lauraceae family, is native to China, Taiwan, Japan and Indochina. In 1822 it was planted as an ornamental tree in Australia, where it was called 'camphor laurel'. Ravintsara (*Cinnamomum camphora* ct cineole) is a variety that was introduced into southern Madagascar in the mid-19th century, and grown initially as an ornamental and for its timber and camphor (a naturally-occurring waxy, white or transparent aromatic solid). Confusingly, it became known as 'ravensara' by many essential oil sellers, and was incorrectly described as *Ravensara aromatica*.

Ravintsara is a tree that grows to the height of 20-30 metres, favouring a humid environment approximately 70-100 metres above sea level. The bark is pale in colour and rough in texture, and is serrated vertically. The leaves are glossy and waxy in appearance, and exude a mildly camphoraceous aroma. Blooming in spring, the tree produces masses of small white flowers and clusters of blackberry-like fruit (Wikipedia).

Ravintsara has long been misidentified as *Ravensara aromatica*, which also belongs to the Lauraceae family, and is an endangered species in Madagascar. The botanical name of the genus *Ravensara* was derived from the latinisation of the Malagasy word 'ravintsara' (Rasonaivo and de la Gorce, 1998). Essential oil of *Ravensara aromatica* is known locally as oil of 'havoza', while essential oil derived from the bark has been incorrectly labelled '*Ravensara anisata*' (Rosonaivo, 1997).

The Ravensara genus contains about 30 endemic Malagasy species (Rohwer, 1993).

There are six chemotypes of *Cinnamomum camphora*: ct camphor; ct 1,8-cineole; ct linalol; nerolidol; ct safrole and ct borneol. The chemotype 1,8-cineole is known as 'ravintsara' Madagascar (Lawrence, 1997).

Behra et al (2005), Jeannot et al (2007) and Juliana et al (2005) have analysed the composition of essential oil of *Cinnamomum camphora* ct 1,8-cineole, and have identified the principal components to be 1,8-cineole (over 50%), sabinene (13-15%) and α -terpineol. The absence of camphor has led to the conclusion that the plant has become adapted to the Malagasy climate.

Ravintsara essential oil is produced through steam distillation. The criteria used for the standardization of the oil's quality have been set by ISO, AFNOR and the British Pharmacopoeia (Battaglia, 2007).

Steam distillation is used to separate volatile organic substances that are immiscible with water from a mixture of involatile substances (Lewis and Evans, 1997). The leafy plant material is placed on a grill above boiling water, allowing the steam to pass through. The leaves are carefully distributed on the grill to allow for a thorough extraction process (Chernat et al, 2007). The distillation of ravintsara leaves requires a duration of about three hours, depending on the quantity of leaves distilled (Ramsnoelina et al, 2006).

A bulletin produced in 1907 by the Royal Botanic Gardens states that to prevent camphor escaping, there must be absolute condensation, and slow distillation with a minimum of heat. Chernat et al reinforce this principle when stating that "the elevated temperatures and prolonged extraction time can cause chemical modifications of the essential components and often a loss of the most volatile molecules" (2007).

In 2008, Zu-guang Li et al found that the extraction of essential oil of *Cinnamomum camphora* through microwave-assisted hydro-distillation (MAHD) yielded 1.15%: significantly more than the standard hydro-distillation of the oil, which only yielded 0.96%.

History and culture

Historically, ravintsara has been used by the people of Madagascar for medicinal purposes. The name, meaning 'good leaf', is derived from *ravina*, meaning 'leaf', and *sara* meaning 'good' (Ranarivelo et al, 2009).

There has been much confusion surrounding the essential oil's correct botanical identification, leading to the fact that it has been sold commercially under the names of both 'ravintsara' and 'Ravensara aromatica'. In recent years, investigations have been carried out to clarify the differences between the two species and their essential oils.

Essential oil of 'Ravensara anisata' is isolated from the bark of *Ravensara aromatica*, and comprises 90-95% methyl chavicol. The anise-flavoured bark has long been employed in the production of rum. Traditionally, the leaves were macerated in peanut oil for eight days, thereby providing an infused oil used in massage to treat pulmonary congestion (Jeannot et al, 2007).

Andrianoelisa et al (2010) analysed twenty samples of *Ravensara aromatica* leaf oils and found four different chemotypes:

1. methyl chavicol (90%)
2. methyl eugenol (70-72%)
3. terpene (25-28%)
4. sabinene (25-34%)

They concluded that ravensara bark oil was high in methyl chavicol (83%-98%) and was similar to the oil of 'Ravensara anisata'.

Ramanoelina et al (2006) analysed essential oils that were steam-distilled from leaves of five *Ravensara aromatica* trees, harvested between November and December. The yield of the fresh leaves was 0.95%, and for the dried leaves, 3.0 %. The results of GC/MS analysis showed a high percentage of methyl chavicol (79.7%), followed by methyl eugenol (8.5%) and limonene (3.1%).

Juliani et al (2006) analysed *Ravensara aromatica* oils sold in the USA, comparing them to samples obtained from Madagascar. They also analysed 10 samples of ravintsara, using 20 components including 1,8-cineole, sabinene and α -terpineol as reference point for cross-validation. They found that that the two commercial essential oils sold as *Ravensara aromatica* were in fact *Cinnamomum camphora* ct 1,8 cineole. To confirm these findings of misidentification, they used additional analytical methods of including organoleptic testing.

Cinnamomum camphora ct 1,8-cineole: main chemical components

Components	Ess oil %	Constituent	Therapeutic property	Safety
1,8-cineole	51.6	oxide	expectorant	May cause skin irritation Hyperthermisant and may lead to irritation of the skin and mucus membrane.
sabinene	14.95	monoterpene		
β - pinene	3.62	monoterpene	anti-inflammatory	
terpinen-4-ol	2.27	monoterpenol	anti-microbial	
α - terpineol	8.01	monoterpenol	vasoconstrictor	
β - caryophyllene	1.01	sesquiterpene	anti-inflammatory	
myrcene	1.87	monoterpene	analgesic	
γ -terpinene	1.84	monoterpene	antiseptic	
α -humulene	1.28	sesquiterpene	antispasmodic, anti-inflammatory	

Therapeutic properties and uses

Essential oil of *Cinnamomum camphora* ct 1,8-cineole is rich in the oxide 1,8-cineole. 1,8-cineole is an oxygenated derivative of π -methane and is classed as an ether (Harris, 2007). The pharmacological activities of *Cinnamomum camphora* ct cineole are largely attributed to this oxide.

Cinnamomum camphora ct 1,8-cineole also produces a hydrolat. It contains the same chemical constituents as the essential oil, but in a weaker concentration (Jeannot et al, 2007).

Ravintsara oil possesses expectorant, mucolytic, antitussive, bronchodilatory, antiviral, anti-inflammatory and antiseptic properties. When compared to essential oil of *Eucalyptus globulus*, it is generally considered gentle in nature, and is well tolerated by the body. Its expectorant, mucolytic and antitussive actions make it useful in the treatment of bronchitis, rhinitis and sinusitis, while its antiviral activity makes it indicated for influenza.

As a mild neurotonic and stimulant, it is useful in the treatment of those complaining of physical and nervous fatigue (Battaglia, 2007).

A double-blind study carried out on 152 acute rhino-sinusitis patients demonstrated the positive effects of 1,8-cineole. Ingesting three 200 mg doses of 1,8-cineole daily for seven days, all symptoms relating to rhino-sinusitis resulted in marked improvement. Frontal headaches, pressure sensitivity of the trigeminal nerve, nasal obstruction and rhinological secretions were measurably reduced. The conclusion was that 1,8-cineole had mucolytic and mucociliary properties, and was a safe and effective treatment before antibiotics are prescribed (Harris, 2007).

Cinnamomum camphora ct 1,8-cineole has anti-inflammatory and anti-allergenic activities useful in the treatment of bronchial asthma. A double-blind placebo-controlled trial was carried out on 32 patients with steroid-dependent severe bronchial asthma. Each patient received a daily oral dose of 200 mg of 1,8-cineole. After 12 weeks of treatment, twelve subjects were able to reduce their oral steroid intake, demonstrating the anti-inflammatory and anti-allergenic effects of 1,8-cineole (Harris, 2007).

Considering the activity of α -terpineol, the compound has demonstrated an analgesic effect at low concentration in the presence of 1,8-cineole (Jeannot et al, 2007). As part of research into the essential oil treatment of the human papilloma virus (HPV), ravintsara essential oil was tested due to the alcohol-oxide partnership of its components α -terpineol and 1,8-cineole. Baudoux et al (2005) found that oral and genital formulations of the essential oil were effective and beneficial to patients.

The antitussive activity of 1,8-cineole is valuable in that it is able to inhibit the cough reflex. Inhalation of its aromatic vapours has a mucolytic and mucosecretory effect on the lungs. In aromatherapy, when someone is in an acute state, less is more, the concentrations for inhalation proving more effective at relatively low concentrations (Harris, 2007).

Essential oil of *Cinnamomum camphora* ct 1,8-cineole has been used to address nosocomial or hospital-acquired infection (HAI) in hospital, having been investigated for its antiviral and immunostimulant properties, its low potential toxicity, and its gentle aroma. However, the airborne diffusion of ravintsara oil did not stem the incidence of nosocomial pathologies, so that no formal conclusions were made as a result of the study. (Harris, 2007).

From the perspective of Oriental medicine, essential oil of *Cinnamomum camphora* ct 1,8-cineole tonifies the Lung-Qi, clears Phlegm-Cold and disperses Wind-Cold. Mojay (1996) recommends it for influenza and the common cold, acute and chronic bronchitis, and muscular aching. It further helps to tonify the Heart-Qi, circulate the Blood, restore the nerve and support the *Shen*, and is indicated from this perspective for nervous debility, chronic anxiety and depression involving a weak immune system.

The antiviral potential of the essential oil makes it an important constituent of gel-based applications for shingles, genital herpes and warts.

Conclusion

Cinnamomum camphora ct 1,8-cineole continues to be sold under the name *Ravensara aromatica*. It is important, therefore, that aromatherapists obtain this essential oil from a reputable supplier, and employ organoleptic testing as one way of ensuring that they are using the correct chemotype.

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