

Provenance

Kānuka essential oil produced by Hikurangi Bioactives Limited Partnership (HBLP) is steam distilled from wild-harvested kānuka from Tairāwhiti, the East Coast region of New Zealand's North Island. The kānuka brush (a mixture of leaves and twigs) is harvested from Māori-owned land blocks who are part of a collective exploring the bioactive potential of kānuka essential oil, and who seek to create a sustainable kānuka industry that will provide jobs and new economic opportunities for Māori communities.

There are currently reported to be ten species of kānuka growing in New Zealand (de Lange 2014). HBLP's kānuka essential oil is extracted from *Kunzea robusta*, the most widespread species of Kunzea. Typically, *Kunzea robusta* is a forest tree, reaching as high as 30 metres. It grows profusely in Tairāwhiti and is the dominant native plant across much of the East Coast. As a pioneer and nursery species, kānuka is often the first to recolonise cleared land, and kānuka stands shelter and protect other native plants that require more specialised conditions in which to thrive.

Since 2016, HBLP has been working with Māori landowners to learn more about the distinctive bioactivity of kānuka essential oil. Work is currently underway to understand more about the

unique chemotypes of kānuka essential oil from Tairāwhiti, and to determine how it may differ to kānuka essential oil from other regions of New Zealand; and to see if these chemotype variations translate into bioactivity.

HBLP has completed a stage 2 clinical trial on an eczema product using kānuka essential oil from Tairāwhiti, and the results will be published within the next six months. As well, a stage 2 clinical trial on an acne product using kānuka essential oil is still underway.

In partnership with Māori landowners, HBLP is currently working on plans for the Kānuka Centre of Excellence in Ruatōria, a small town on the East Coast in the heart of the region where kānuka grows. The Centre of Excellence will have a commercial-scale steam extraction plant to produce a consistent, high-quality kānuka essential oil that captures the unique chemical profile and bioactivity of *Kunzea robusta* on the East Coast.

In tandem, HBLP is leading national efforts to establish grading standards and an associated testing regime for kānuka essential oil, as well as a certification trademark that guarantees kānuka essential oil is grown and made in New Zealand and harvested and extracted to high environmental standards.

Properties and Uses

Physical Description

Kānuka essential oil is a light, amber-coloured oil.

Aromatic Description

Kānuka essential oil smells sweet, herbaceous and earthy. Also described as having a distinctive woody, green and fresh coniferous scent.

Kānuka Essential Oil Uses

Kānuka has been used by Māori as a traditional rongoā to treat burns, dysentery, colds, and as a sedative. Additionally, there is good scientific evidence that kānuka essential oil has antimicrobial properties (antibacterial, antifungal, antiviral), anti-inflammatory, antispasmodic, insecticidal and herbicidal properties.

Kānuka essential oil has a high concentration of α -Pinene (greater than 20%) as well as good amounts of eucalyptol, limonene, p-cymene and viridiflorol.

Safety

Kānuka essential oil is non-toxic for external use, with a low toxicity score of 1 (on a scale of 1 low – 5 high).

Modern Uses

- » Cosmetics
- » Aromatherapy
- » Massage therapy
- » Health products (toothpaste, mouthwash)

Potential Benefits for Kānuka Essential Oil Use in Face Masks

Eczema:

Stage 2 clinical trials of an eczema kānuka essential oil product have been completed, and the results will be published within the next six months.

Anti-inflammatory:

Reduces TNF α release and may inhibit matrix metalloproteinase (MMP-1) in the skin.

Potential inhibition of MMP-1 expression in the skin has been shown to reduce UV-induced photo-aging.

Skin Lightening:

Limonene and eucalyptol via tyrosinase inhibition.

Similar to other light essential oils, has excellent skin penetration properties.

Anxiolytic:

Due to α -Pinene.

Antimicrobial:

Antibacterial:

Effective against *Staphylococcus aureus* (MRSA), *Propionibacterium acnes*, generally against Gram positive bacteria.

Antifungal:

Effective against *Candida albicans*.

Antiviral:

Effective against Herpes simplex Type 1, Polio virus 1, Influenza virus Type A.

Other reported health benefits of kānuka essential oil may include:

- » Antispasmodic
- » Reduces eczema and psoriasis
- » Chronic inflammatory conditions including rheumatoid arthritis and fibromyalgia
- » Relieves sore muscles
- » Strains
- » Back pain
- » Relieves pain associated with burns
- » Intestinal complaints

Appendix One: Key Constituents and Benefits of Kānuka Essential Oil

Because of the absence of allergenic reactions (no cytokine release was observed in a model system), Chen et al., (2016) concluded that kānuka essential oil may be an effective ingredient to be used in human skin products. They also suggested that short-term nontoxic doses may be effective for treating inflammation. For example, for treating minor lesions such as insect bites and infectious wounds.

Chen et al., based these findings on studies that showed kānuka essential oil effectively inhibited growth, after only 5 seconds exposure in 10% oil, of *Staphylococcus aureus* (MRSA), *Streptococcus mutans*, *Streptococcus sobrinus* and *E. coli*. In their studies, kānuka essential oil (with a MIC = 0.78%) was superior to mānuka essential oil (MIC = 3.13%) for inhibiting the human pathogenic fungi *Malassezia furfur*, *Trichosporan mucoides*, *Candida albicans* and *Candida tropicalis*.

Kānuka essential oil also strongly inhibited inflammation by reducing TNF α release from monocytes/macrophages by regulating the Th1- mediated inflammatory response.

Earlier work by Bloor (1992 and 1995) identified extracts from kānuka leaves with antiviral activity against *Herpes simplex I*, Polio Virus I and Influenza type A viruses. Also, antifungal activity against *Candida albicans*.

α -Pinene

α -Pinene, a bicyclic monoterpene, is the most abundant compound in kānuka essential oil with up to 74% present in some oils (Maddocks 2021). α -Pinene is reported to have antibiotic resistance modulation, anticoagulant, anti-tumour, antimicrobial, antimalarial, antiviral (Yang et al., Wu et al., 2011), antioxidant (Bouzenna et al., Hfaiedh et al., 2017), anti-inflammatory, anti-Leishmania, and analgesic effects in association with other essential oils (Mathew et al., Tesfaye et al., 2020).

Of interest for aromatherapy (phytotherapy) applications is the significant anxiolytic capacity shown by α -Pinene. In a study where mice inhaled α -Pinene for 90 minutes per day for between 1 and 5 days there was a significant reduction in stress (anxiolytic activity) when the mice were challenged to a maze test. There was an accumulation of α -Pinene in the brain and liver which peaked on the third day (Satou et al., Kasuya et al., 2014). When tested on human subjects, gender differences were reported in the effect on altered brain activity post-inhalation (Kim et al., Sowndhararajan et al., 2018).

Eucalyptol (1,8-cineole)

Eucalyptol, a terpenoid oxide has mucolytic and spasmolytic activity as well as anti-inflammatory properties where it suppresses arachidonic acid metabolism and when used concurrently can reduce prednisolone dosage in asthma sufferers by up to 36% (Juergens et al., Dethlefsen et al., 2003, Juergens 2014, Juergens et al., Worth et al., 2020).

Eucalyptol can pass the blood-brain barrier and has been assessed for use as a carrier to deliver drugs to the brain via microemulsion systems (Seol and Kim 2016).

Recent evidence shows that eucalyptol has potential anti-COVID properties (Mitra et al., 2021 and Mandy et al., 2021).

p-Cymene

p-Cymene is a major constituent of extracts and essential oils from medicinal and food plants such as cinnamon and thyme. It has a range of bioactivities including analgesic, antinociceptive, anxiolytic, anticancer and antimicrobial properties and is used in foods and medical applications. It is used as an antimicrobial agent especially in topical applications for symptomatic treatment of common skin disorders and treatment of wounds (Marchese et al., 2017). p-Cymene enhances the activity of other antimicrobials through synergism, antagonism and additive effects.

p-Cymene is a promising phytochemical to be incorporated into advanced polymers for anti-infective and anti-inflammatory biomaterials and nanomaterials.

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