

Tea Tree Oil



DESCRIPTION

Tea tree oil is an essential oil distilled from the Australian plant *Melaleuca alternifolia*. It has been used medicinally by Australian Aborigines for centuries and was identified as an antiseptic by the New South Wales chief chemist in the 1920s. In the decades since, tea tree oil has also been found to have substantial anti-fungal, antibacterial, anti-viral and anti-inflammatory activity. The oil is steam-distilled and has been produced and marketed in Australia for the past 80 years. It is only in the past 20 years, however, that *Melaleuca alternifolia* has been cultivated intensively as a commercial agricultural crop.

The species is unique to Australia and plants with the genetic makeup necessary to produce the oil are native to northern New South Wales. Consequently, it is here that most commercial production occurs. There is currently around 3000 hectares of cultivated tea tree growing in Australia and about 100 producers. More than 80 per cent of the world's tea tree oil is produced in Australia. Almost 90 per cent of Australian tea tree oil is exported, principally to North America and Europe.

The major end-use of the oil is in antimicrobials and cosmetics, with much of it being sold as pure oil to manufacturers of these products. The oil of *Melaleuca alternifolia* has more than 100 components. The most abundant of these is terpinen- 4-ol which makes up at least 30 per cent and has an important role in the oil's antimicrobial activity. Levels of 15 components are stipulated in the International Standard for Oil of Melaleuca, Terpinen- 4-ol type (ISO 4730). These levels are shown in the table. An increasing number of other national and international standards apply to tea tree oil. The European Pharmacopoeia and the World Health Organisation have produced international monographs, and Australia, France and Germany have published national standards.

Component	ISO 4730 (range %)
α -pinene	1 – 6
sabinene	trace – 3.5
α - terpinene	5 – 13
limonene	0.5 – 1.5
p-cymene	0.5 – 8
1,8, cineole	trace – 15
γ -terpinene	10 – 28
terpinolene	1.5 – 5
terpinen-4-ol	30 – 48
α -terpineol	1.5 – 8
aromadendrene	trace – 3
ledene	trace – 3
δ -cadinene	trace – 3
globulol	trace – 1
viridiflorol	trace – 1

EFFICACY

Tea tree oil has a long history of use for medicinal purposes. It was identified as an antiseptic by the New South Wales chief chemist in the 1920s. Many tea tree oil products are listed as antiseptics by Australia's Therapeutic Goods Administration but the oil has not yet been registered as a pharmaceutical. However considerable research, much of it by the Tea Tree Oil Research Group at The University of Western Australia, has revealed tea tree oil to be effective as an antibacterial, antifungal, anti-viral and anti-inflammatory. The Rural Industries Research and Development Corporation has funded the bulk of this research.



MEDICINAL PROPERTIES

Antibacterial

A most promising new function of tea tree oil is countering methicillin-resistant *Staphylococcus aureus* (MRSA), also called a hospital super bug or golden staph. The spread of MRSA is an important infection control problem in hospitals worldwide as MRSA infections are resistant to most conventional antibiotics, except vancomycin. However, a clinical trial at Westmead Hospital in Sydney has shown that tea tree oil body wash can help eradicate golden staph from hospital patients. The 18-month trial involved 180 patients with golden staph infections who were treated with either tea tree oil-based

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products or the products routinely used in hospitals. Treatment took place for a minimum of three days and a series of swabs were taken to check for the presence of golden staph. Of the 96 patients who completed the trial, the final clearance rate was similar for both treatments. Twenty one per cent of those treated with tea tree oil products were no longer infected after the trial compared with 23 per cent who received the regular treatment. Professor Tom Riley from The University of Western Australia's Tea Tree Oil Research Group was involved in the study and said its outcome was an important step in developing tea tree oil-based products for use in a clinical setting. "Although clearance was low in both groups, and this is often the case, there was no statistical significant difference between the treatments, suggesting that tea tree oil products may be suitable for decolonizing patients carrying golden staph," Professor Riley said. These findings have been confirmed by an English study published in the *Journal of Hospital Infection* in 2004 . "If we can introduce some tea tree products such as hand washes, antiseptics and topical microbials into the hospital environment, what that will do, I believe, is reduce the pressure on antibiotic usage," Professor Riley said. "Once you reduce the pressure on antibiotic usage, even if it's only slightly, then you ultimately will have an impact on antibiotic resistance which is a worldwide problem."

<u>Organism</u>	<u>MIC(%)</u>
Staphylococcus aureus (NCTC 4163)	0.20%
Coryneform spp (NCTC 231)	0.20%
Propionibacter acnes (ATCC 6919)	0.40%
Escherichia coli (ATCC 8739)	0.25%
Pseudomonas aeruginosa (ATCC 9027)	1.00%
Aspergillus niger (ATCC 16404)	0.3 – 0.4%
Pityrosporum ovales (M. furfur)(AMRL86.1)	0.2%
Trichophyton mentagrophytes (ATCC9533)	0.3 – 0.4%
Trichophyton rubrum (AMS041)	0.6%

Tea tree oil hand washes

Hospitals in Australia and overseas are evaluating tea tree oil-containing products for routine hand washing following a study that revealed them to be effective in eliminating bacteria.

Death and disease due to hospital-acquired bacterial infections is a significant problem in health care worldwide. Most infections are thought to be caused by bacteria that have been passed from the hands of hospital staff to patients or from patient to patient.

In the study, Professor Tom Riley from The University of Western Australia tested a 5% tea tree oil hygienic skin wash, a 5% tea tree oil alcohol hygienic skin wash, and a 3% tea tree oil alcohol hand rub. The effectiveness of these products against four bacterial species was compared to that of povidone iodine, a commonly used hospital hand wash.

The study, published in the *Journal of Hospital Infection* in 2005, showed that some tea tree oil formulations could play a role in reducing hospital-acquired infections such as those caused by *Staphylococcus aureus*, or 'golden staph'. Encouragingly, it has been demonstrated that hospital staff with access to tea tree oil hand washes show greater compliance with hand washing procedures.

Antifunga

Fungi are significant human pathogens, causing common superficial infections such as tinea and vaginal thrush. A study conducted in 2002 found that tea tree oil can inhibit and kill yeasts, dermatophytes (which cause superficial nail and skin infections) and other filamentous fungi. Of particular note was its effectiveness against *Candida albicans*, a common cause of vaginal thrush.

The study authors concluded that the sorts of infections or conditions that are associated with fungi and which may be suitable for treatment with topical tea tree oil included oral or vaginal candidiasis (caused predominantly by *C. albicans*), tinea and ringworm (caused by dermatophytes) and dandruff and seborrhoeic dermatitis (caused by *Malassezia* yeasts).

Anti-inflammatory potential

The ability of tea tree oil to reduce two types of human skin inflammation has been shown in studies conducted by researchers at Flinders University in South Australia⁴. Team leader Professor John Finlay-Jones, now assistant director of the Telethon Institute for Child Health Research in Western Australia, said the first type of inflammation tested was related to 'immediate' hypersensitivity responses in skin, which includes responses such as hives and the skin reaction to bee stings.

"In this type of hypersensitivity, mast cells in the skin release histamine which is responsible for many of the symptoms in skin that can be seen within minutes of exposure," Professor Finlay-Jones said.

The Flinders University study showed that the application of 100% tea tree oil significantly reduced skin inflammation in a group of volunteers injected with the irritant histamine.

"These were the first studies in humans to show experimentally that tea tree oil can reduce histamine skin inflammation," said Professor Finlay-Jones.

The second type of inflammation reaction tested was 'contact' hypersensitivity such as the sensitivity to nickel displayed by up to one in 10 people, particularly women who are exposed to nickel, for example, in jewellery. A clinical trial found that applying 100% tea tree oil to nickel-induced rashes also reduced skin inflammation in some, but not all, patients.

"The results suggest that tea tree oil can be used for the treatment of inflammatory reactions of the skin including those following insect bites and in those sensitive to nickel," Professor Finlay-Jones said. "It may be possible to extend that treatment to sensitivity reaction to other chemicals including plant components and other irritants."

Herpes and cold sore treatment

Until 2005 there was scant data on the activity of tea tree oil. However a study by Dr Christine Carson and her colleagues at The University of Western Australia was the first to show that tea tree oil has significant activity against herpes.

The study clearly demonstrated that tea tree oil and several of its components can inactivate the herpes virus

AUSTRALIAN TEA TREE OIL in vitro. Further, evidence gained from this study suggested that tea tree oil may be effective in the treatment of cold sores. There is strong interest in cold sore treatments because 20 to 40 per cent of people are prone to developing them, yet there is no cure.

COSMETIC PROPERTIES

Treating young skin

The antibacterial and antifungal properties of tea tree oil prompted an investigation of its effectiveness in treating acne prone skin. A clinical trial involving 124 teenage patients evaluated the effectiveness of 5% tea tree oil gel in treating mild to moderate acne prone skin when compared with 5% benzoyl peroxide lotion (a commonly used topical young skin treatment).

The results showed that both 5% tea tree oil gel and 5% benzoyl peroxide lotion had a significant effect in ameliorating the patients' skin by reducing the number of inflamed and non-inflamed lesions. Encouragingly, fewer side effects (such as skin dryness, itching, stinging, burning and redness) were experienced by patients treated with tea tree oil.

Tea tree oil and oral care

A study by the Tea Tree Oil Research Group at UWA examined the susceptibility of a range of oral bacteria to tea tree oil.

The tests on 162 different bacterial types showed all were inhibited and killed by concentrations of 2% tea tree oil. Two bacterial species – *Streptococcus mutans* and *Lactobacillus rhamnosus* – that are associated with dental caries were quite rapidly killed by 0.5% tea tree oil.

APPLICATIONS

The cosmetics to which tea tree oil is added – and its typical concentration in the formulation – are moisturisers (1.25%), body lotions (1.25%), shampoos and conditioners, mouth washes (0.2%), face cleansing washes (0.7%), hand washes (0.7%), soaps (2%), foot sprays (2%), foot powders (1%), shaving products (2%), post-waxing treatments (1.25%) and deodorants (2%). Because of its anti fungal, antibacterial, and anti-inflammatory activity, tea tree oil is also sold over-the counter as neat oil or in 10-15% tea tree oil solutions.

BENEFITS

- Broad spectrum activity
- Anti-inflammatory
- Natural product
- Consistent quality

BIBLIOGRAPHY

Dryden MS, Dailly S, Crouch M (2004). A randomized, controlled trial of tea tree topical preparations versus a standard topical regimen for the clearance of MRSA colonization. *Journal of Hospital Infection*, Volume 56, Issue 4, pages 283-286. of *Hospital Infection*, Volume 56, Issue 4, pages 283-286.

Bassett IB, Pannowitz DL, Barnetson R StC (1990). A comparative study of tea tree oil versus benzoyl peroxide in the treatment of acne. *Medical Journal of Australia* 153:455-458.

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Riley, TV (2003). Antimicrobial activity of tea tree oil against oral microorganisms. RIRDC Report #03/019.

Messenger S, Hammer KA, Carson CF, Riley TV (2005). Assessment of the antibacterial activity of tea tree oil using the European EN 1276 and EN 12054 standard suspension tests. Journal of Hospital Infection, Volume 59, Issue 2, pages 113-125.

Carson CF, Riley TV (1995). Toxicity of the essential oil of *Melaleuca alternifolia* or tea tree oil. Journal of Toxicology – Clinical Toxicology, Volume 33, pages 193-195.

Bassett IB, Pannowitz DL, Barnetson R StC (1990). A comparative study of tea tree oil versus benzoyl peroxide in the treatment of acne. Medical Journal of Australia 153:455-458.

Riley, TV (2003). Antimicrobial activity of tea tree oil against oral microorganisms. RIRDC Report #03/019.