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The extraction and benefits of tea tree oil

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Abstract



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In recent times, there has been a surge in the popularity of complementary as well as alternative therapies, like tea tree (melaleuca) oil. Now available everywhere as both a pure oil and an active ingredient in numerous products, this essential oil has been utilised for almost a century in Australia. In the past, the main applications of tea tree oil have been to treat infections and inflammations. This review outlines the latest advancements in our comprehension of the antibacterial, anti-inflammatory, and therapeutic effectiveness properties of the oil and its constituents. A brief discussion of the oil's toxicity is included, along with a description of the specific mechanisms of antibacterial as well as anti-inflammatory effect. Tea tree oil balances the scalp's natural oil production, making it useful for combating oily hair. Its antifungal properties make it effective in fighting dandruff and dry scalp conditions. This essential oil can be mixed with carrier oils or added to your regular shampoo for easy use.

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INTRODUCTION

Alopecia areata (AA) has a long history dating back to about 1500 before the Common Era (BCE), although the number of published scientific studies on hair loss has increased recently. While hair does not provide biological protection for humans, hair loss affects everyone on a social, psychological, and emotional level. As a result, treating hair loss and enhancing hair health are essential [1].

A hair shaft's lifecycle averages 3.5 years, with growth occurring at a pace of 0.05 inches per month. Humans have 1,000,000,000 scalp hair shafts with varied degrees of hair growth. Hair

consists of three layers: the cortex (middle layer), which contains the medulla (innermost layer, formed from transparent cells and varies among hair types), and the hair follicle, which is divided into the lower, middle (isthmus), and upper (infundibulum) segments. The bulb as well as suprabulb areas are part of the lower segment. The area from the point of insertion of the arrector pili muscle to the opening of the sebaceous gland duct comprises the middle segment of the follicle. The area between the follicular orifice and the sebaceous gland opening is known as the upper section of the follicle [2].

The ageing process of hair affects hair colour, density, curvature, and diameter, all of which are factors in the overall appearance as well as manageability of hair. Numerous factors influence the growth cycle and overall health of hair.

Some of the main elements affecting hair health are heredity, stress, smoking, menopause, lifestyle, nutrition, heavy metals (such as arsenic, mercury, and thallium), toxins (such as botulinum and podostromacornu-damae), pharmaceuticals, medications, and genetics. gives the hair shaft—which is made of keratin protein—strength and the cuticle, which is its outer coat [3].

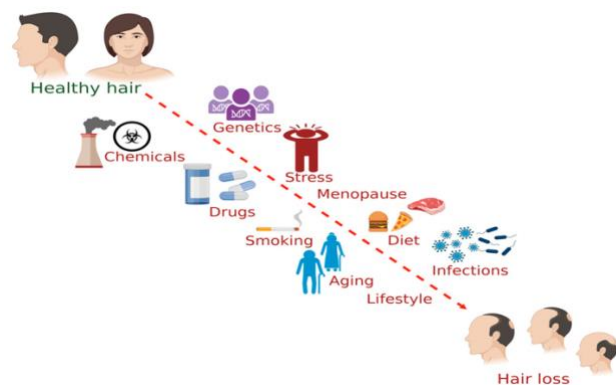


Figure 1: Hair Fall Cycle
EXTRACTION

Steam distillation of *M.alternifolia* leaves as well as terminal branches yields tea tree oil. The clear to pale yellow oil is extracted from the aqueous distillate after it has condensed. Usually, 1 to 2% of the moist plant material yields oil.

Although there are other extraction techniques like distillation, CO₂ supercritical extraction, and solvent extraction, the majority of essential oils that are currently on the market are extracted via

steam distillation. It's the most traditional way of extracting essential oils, quite easy to use, and ideal for distilling leafy materials.

Furthermore, this procedure not only results in minimal changes to the content of the essential oil during extraction, but it also produces steam that is easily accessible, affordable, safe, as well as recyclable. Thus, crude TTO (35–45% of the volume of Terpinen-4-ol) is collected via steam distillation [4].

Tea tree oil (TTO) should be refined to meet tea tree oil standards and boost its commercial worth, as it has a low value after steam distillation.

A few techniques for refining include vacuum distillation, crystallisation, and chromatography columns. The goal of this experiment is to lower the TTO boiling point using vacuum distillation, which will minimise the amount of heat-sensitive volatiles that degrade.

For centuries, tea tree oil has been valued for its biological properties. TTO is therefore found in a variety of cosmetic goods, including antiseptics, deodorants, shampoos, as well as soaps, and is used as an antiseptic and antifungal to treat cuts, burns, abrasions, along with acne. In this work, we employed TTO as a germicidal preservative in two cosmetic products: body lotion as well as hand cleaner [5].

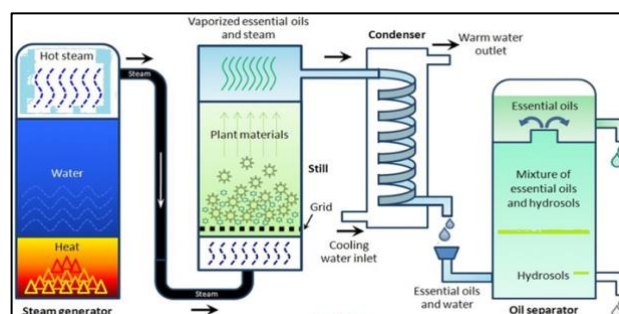


Figure 2: Schematic Representation of Extraction Process

SPECIAL PRECAUTIONS AND WARNING

When taken orally: Avoid taking tea tree oil orally as it may be dangerous. When taken orally, tree tea oil can have major adverse effects such as unconsciousness, rash, confusion, as well as difficulty walking [6]. For the majority of people, tea tree oil may be safe to apply topically. It could result in edoema along with skin discomfort. It can occasionally result in skin dryness, itching,

stinging, burning, as well as redness in those who have acne.

Applying tea tree oil topically may be safe during pregnancy and nursing. Nonetheless, ingesting it by mouth is probably dangerous. Tea tree oil ingestion can be harmful [7].

BENEFITS OF TEA TREE OIL [8]

Promotes glowing skin.

Helps to get rid of acne.

Reduces hair fall.

Prevents dandruff and lice.

Act as a natural deodorant.

Reduce acne.

To improve scalp health.

TEA TREE EXTRACTION OF ANTI FUNGAL

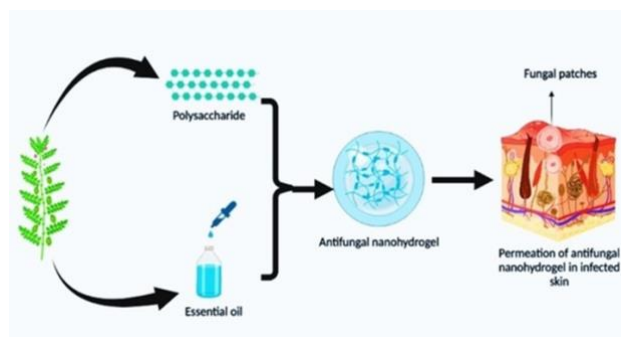


Figure 3: Tea Tree Extraction of Anti Fungal

In vitro tests have been conducted to assess the antifungal activity of tea oil, the essential oil derived from *Melaleuca alternifolia*, against 26 strains of different dermatophyte species, 54 yeasts, including 32 strains of *Candida albicans* and other *Candida* sp. and 22 strains of *Malassezia furfur*. The agar dilution method was used to determine the minimum inhibitory concentrations (MIC) of tea tree oil. The growth of every clinical fungal isolate was found to be inhibited by tea tree oil [9]. A geometric mean of 1,431.5 micrograms/ml was found for the dermatophytes under investigation, with MIC values ranging from 1,112.5 to 4,450.0 micrograms/ml. In vitro, strains of *Candida albicans* as well as strains from the genera *Trichosporon* as well as *Candida* seemed to be somewhat less sensitive to tea tree oil. Their geometric mean of 4,080 micrograms/ml and range of 2,225.0 to 4,450.0 micrograms/ml,

respectively, suggested a considerable susceptibility to *M. alternifolia*'s essential oil [10].

TEA TREE EXTRACTION OF ANTI MICROBIAL

The use of tea tree extract as a topical antiseptic has a long history (Markham, 1999). In recent years, tea tree extract has acquired recognition as a safe, natural, and efficient antiseptic. Tea tree essential oil's chemical makeup is widely known, and it mostly consists of cyclic monoterpenes, of which half are hydrocarbons as well as the other half are oxygenated.

The broad spectrum antibacterial action of tea tree essential oil can be primarily attributed to its terpinene-4 concentration. Antimicrobial activities are recognised to exist in a broad range of essential oils. The most focus has been paid to the antibacterial activity. The traditional use of the *M. alternifolia* plant by the Bundjalung Aborigines of northern New South Wales is the first documented use that likely took advantage of this feature. "Tea tree" crushed leaves were sprinkling over wounds as well as placed as a poultice, or inhaled to alleviate colds and coughing. Furthermore, tea tree leaves were soaked to create an infusion that was used to cure skin conditions or sore throats [11].

Australian Aborigines' oral history also mentions "healing lakes," which were lagoons into which fallen leaves of *M. alternifolia* had rotted over time. The oil itself was not widely used until Penfold published the first findings of its antibacterial efficacy in a series of publications in the 1920s and 1930s, rather than the unextracted plant material. Using a test called the Rideal-Walker (RW) coefficient, he compared the antibacterial activity of *M. alternifolia* oil and other oils to that of the gold standard disinfectant of the day, carbolic acid or phenol. TTO was shown to be 11 times more active when its activity was directly compared to that of phenol. A number of TTO components were also reported to have RW coefficients: 3.5 for cineole, 8 for cymene, 13 for linalool, 13.5 for terpinen-4-ol, along with 16 for terpineol.

TTO was consequently marketed as a medicinal substance. Numerous additional articles as well as this one detail the various medical applications of TTO. They are, however, of limited use as proof for the therapeutic benefits of TTO because, by

today's standards, the majority of the data they present would be regarded as anecdotal [12].

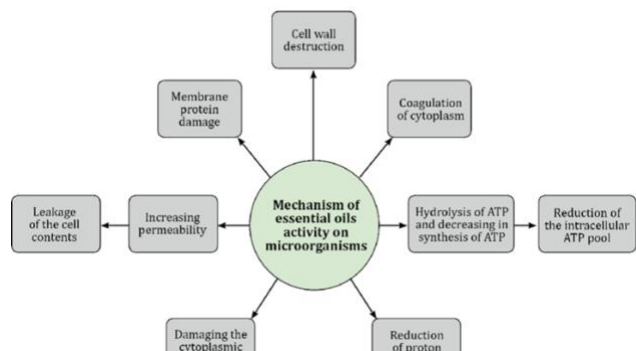


Figure 5: Mechanism of essential oils and activity on microorganisms.

CONCLUSION

The international standard ISO 4730's standards are met by both TTO kinds. Regarding the amount of terpinene-4ol, the concentrations of crude as well as cleaned TTO are approximately 35–48%, respectively. Out of all of them, cleaned TTO has a greater market value and is roughly 1.5 times more valuable than the ROR of crude TTO. These processes use low-cost, basic technology and produce TTO that is of excellent quality. Additionally, TTO's commercial value rose because its antibacterial action in cosmetic items was maintained. For this reason, Vietnamese farmers who depend on agriculture in acidic environments benefit from TTO along with its cosmetic goods.

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Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

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