

Tamanu Oil: A Tropical Topical Remedy

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Many remedies sold today in the markets of developed nations contain ingredients that have a long history of use by indigenous peoples in their countries of origin. Such is the case with tamanu oil (*Calophyllum inophyllum* L., Guttiferae), a traditional remedy with a history of native use in Polynesia and Southeast Asia.¹⁻⁴ Only within the past few years has tamanu oil begun to penetrate the European and U.S. markets, primarily in the cosmetic sectors. Since the 1930s the effectiveness of tamanu oil has been studied in hospitals and by researchers in Europe, Asia, and the Pacific islands.^{2,5} This research has revealed that tamanu oil is a significant topical healing agent with skin healing,^{2,5,6} antineuralgic,^{2,5} anti-inflammatory,^{2,7-11} antimicrobial,^{2,12-14} and antioxidant¹³ properties.

Tamanu and Its Dispersal

The name of the genus *Calophyllum* means "beautiful leaf," from the Greek *kalos* (beautiful) and *phullon* (leaf). The tree is indigenous to Southeast Asia, and it is found in Thailand, Vietnam, Myanmar, Malaysia, South India, Sri Lanka, and throughout the numerous islands of Melanesia and Polynesia.^{1-3,15} In the Society Islands this species is known by the names *tamanu* and *ti*. In Hawaii it is known as *kamanu* or *kamani*; in Samoa *fetau*; and in Fiji *dolno* (meaning "no pain") or *dilo*.^{1,2} Tamanu grows up to 25 or even 30 meters in height, with long, spreading limbs. The tree trunk is typically thick with dark, grayish-brown cracked bark. The branches are covered with shiny, dark-green oval leaves, and small white flowers with yellow centers. The blossoms give off a delightful, sweet perfume. The inedible mature green fruit of the tree, about the size of an apricot, has a thin flesh and a large nut hull inside.^{2,4,16}

Though the tree can be successfully grown inland, tamanu naturally occurs abundantly along coastal areas. The nut-containing fruits disperse throughout the Pacific islands by dropping from the trees and floating on the seas to other coastal areas where they sprout and root.¹⁷ Tamanu is unusual in that, unlike most other trees, it favors salty, sandy soil.

Indigenous Polynesians interviewed by the author claim that the oil from coastal tamanu trees is more beneficial for topical and cosmetic uses than oil from inland trees. To date no studies have been conducted to compare the oil from coastal and inland populations. Nonetheless, at this time tamanu oil processors tend to favor the use of nuts from coastal trees, due primarily to the ease of collecting nuts on sandy coastal areas.

Oil in Tamanu Nuts

When the fruits of the *C. inophyllum* tree are collected and cracked open, the blonde nut kernel inside contains little evident oil upon pressing or grinding. But when the kernel is dried on a rack for a month or so, it turns a deep, chocolate brown, and becomes sticky

with a rich oil. Once this transformation has taken place, the oil can be easily extracted from the dark kernels using only mechanical pressing. The resulting tamanu oil has a rich texture and greenish-amber color. The means by which the tamanu kernel becomes oily remains unknown. At present, no studies explain this process.

Tamanu Oil and Cicatrization

Tamanu oil applied to wounds possesses the capacity to promote the formation of new tissue, thereby accelerating healing and the growth of healthy skin. This process of forming new tissue is known as cicatrization.^{2,6} Tamanu oil is a widely used traditional topical aid. In Pacific island folk medicine, tamanu oil is applied liberally to cuts, scrapes, burns, insect bites and stings, abrasions, acne and acne scars, psoriasis, diabetic sores, anal fissures, sunburn, dry or scaly skin, blisters, eczema, and herpes sores, and to reduce foot and body odor. Tamanu oil reputedly relieves sore throat when it is applied topically to the neck. The oil also demonstrates pain-relieving properties and has been used traditionally to relieve neuralgia, rheumatism, and sciatica. Polynesian women apply tamanu oil topically to promote healthy, clear, blemish-free skin, and massage it onto babies to prevent diaper rash and skin eruptions.^{2,6,18}

Anti-neuralgic and Skin Healing Activity

Traditionally tamanu oil has a history of topical use for relieving the pain of sciatica, shingles, neuralgia, rheumatism, and leprosy neuritis.⁵ In the late 1920s, Sister Marie-Suzanne, a nun in the Society of Mary stationed in Fiji, became aware of a local topical aid for neuritis known locally as *dolno*, i.e., tamanu oil. The nun began to administer tamanu oil topically to leprosy victims for the relief of neuritis associated with that disease, with apparent positive results. Her reports of success with this treatment attracted the interest of scientists in France.^{2,5}

As a result of its effective use in Fiji, tamanu oil was further investigated by French researchers in the 1930s for its anti-neuralgic effects. But they quickly became more interested in tamanu's cicatrizing properties, which subsequently received the most attention. French medical literature on tamanu oil reports several instances of its successful use in cases of severe skin conditions, with photographs showing before and after use.^{2,19} In one of the most remarkable instances, a woman was admitted to the St. Louis Hospital in Paris with a large gangrenous ulcer on her leg that would not heal. Though doctors were sure that amputation was inevitable, she was given regular dressings of tamanu oil. The wound eventually healed completely, leaving a smooth, flat scar.² In other cases, tamanu oil has been reportedly employed successfully to heal severe burns caused by boiling water, chemicals, and X-rays.^{2,19}

Lipid Composition of Tamanu Oil

The oil of tamanu contains basic classes of lipids (fats), enumerated below.

General lipid composition	
Neutral lipids	92%
Glycolipids	6.4%
Phospholipids	1.6%
Neutral lipids	

Monoacylglycerols	1.8%
<i>sn</i> -1,3 – Diacylglycerides	2.4%
<i>sn</i> -1,2 (2,3) – Diacylglycerides	2.6%
Free fatty acids	7.4%
Triacylglycerols	82.3%
Sterols, sterolesters and hydrocarbons	3.5%
Glycolipids	
Monogalactosyldiacylglycerol	11.4%
Acylated sterolglucoside	13.1%
Monogalactosylmonoacylglycerol	22.2%
Acylmonogalactosyldiacylglycerol	53.3%
Phospholipids	
Phosphatidylethanolamine	46.3%
Phosphatidylcholine	33.8%
Phosphatidic acid	8.1%
Phosphatidylserine	6.1%
Lysophosphatidylcholine	5.7%

Source: References 2, 15, 22

Anti-inflammatory Activity of Tamanu Oil

Tamanu oil demonstrates anti-inflammatory activity. This activity is due partly to the 4-phenyl coumarin calophyllolide^{8,11,20} and to a group of xanthenes in the oil, including dehydrocycloguanandin, calophyllin-B, jacareubin, mesuaxanthone-A, mesuaxanthone-B, and euxanthone. All the xanthenes in tamanu oil show anti-inflammatory activity,¹⁰ which explains reductions of rashes, sores, swelling, and abrasions with topical application of the oil.²

Antibacterial and Antifungal Activity of Tamanu Oil

Tamanu oil demonstrates significant antimicrobial activity, as demonstrated in antibacterial and antifungal tests.^{2,13,14} The oil contains several powerful bactericide/fungicide agents, which demonstrate efficacy against various human and animal pathogens. These antimicrobial phytochemical agents include friedelin, canophyllol, canophyllic acid, and inophynone.¹³

In antibacterial studies conducted in Karachi, Pakistan, researchers discovered the following:

Canophyllic acid demonstrated moderate antibacterial activity, compared with ampicillin and amoxicillin, against *Proteus mirabilis* (a cause of bladder infections, wound infections, septicemia, and pneumonias, mostly in hospitalized patients).²¹

Canophyllol demonstrated good activity, compared with ampicillin and amoxicillin, against *Staphylococcus aureus* (a cause of inflammation, suppuration, abscesses, boils, infected wounds, septicemia, and conjunctivitis), *Cornebacterium diphtheriae* (the cause of diphtheria), *Klebsiella pneumonia* (a cause of septicemia, infected wounds, and infected burns), and *Proteus mirabilis* (a cause of urinary tract infection, septicemia, and infected wounds).²¹

Friedelin demonstrated good activity, compared with ampicillin and amoxicillin, against *S. aureus*. In antifungal tests, the same researchers discovered the following:

Friedelin exhibited good antifungal activity against *Pseudallescheria boydii*, (a cause of fungal keratitis and Madura Foot, a disease in which the foot swells and suppurates, with multiple open sinuses).²¹

Friedelin exhibited moderate activity against *Trichophyton schoenleinii* (cutaneous fungus occurring in hair, skin and nails, and associated with "jock itch," ringworm, athlete's foot, and dermatophytosis of the scalp and beard).²¹

The n-butanol fraction of tamanu oil was examined against various fungal cultures, showing significant activity against *Trichophyton semii* and *T. metagrophyte* (both cutaneous fungi occurring in hair, skin and nails, and associated with "jock itch," ringworm, athlete's foot, and dermatophytosis, a fungal disease usually transmitted from animals to humans in the scalp and beard).²¹

Researchers concluded that the antimicrobial agents in tamanu oil could be used effectively to treat a range of infections of the skin and eyes and to treat ringworm.¹³

Antioxidant Activity of Tamanu Oil

Xanthenes and coumarins in tamanu oil demonstrate antioxidant properties, specifically inhibiting lipid peroxidation. Cell membranes are made of lipids. Lipids are organic compounds that are oily to the touch and are insoluble in water but are soluble in nonpolar organic solvents (e.g., chloroform, ether). Lipids include fats, oils, waxes, sterols, and triglycerides. The antioxidant activity of tamanu oil helps to protect skin cells from damage by reactive oxygen species (ROS) and other oxidative antagonists.¹³

Current Tamanu Oil Popularity

Though investigations into tamanu oil have been conducted continuously since the 1930s, only in the last decade has tamanu oil gained any market visibility for general first aid and cosmetic use. Throughout the 1990s much of this market activity was confined to Tahiti, where the pure oil is marketed in bottles for first aid and beauty purposes. In Europe general market interest in tamanu is relatively new, and cosmetic companies are currently marketing products containing this oil. In the U.S. bottled tamanu oil is now also marketed in pure and dilute forms, and it appears as an ingredient in a limited number of cosmetic products.

Tamanu for Topical First Aid

Due to its cicatrizing, anti-inflammatory, and antimicrobial activities, oil of tamanu is a versatile topical aid suitable for use in a broad range of skin conditions. Oil of tamanu can

be applied undiluted directly to skin. There are no reports of adverse effects due to such application of tamanu.

Tamanu for Cosmetics

Oil of tamanu is suitable for general skin and cosmetic purposes. The oil's mild and pleasant aroma and luxurious feel make it ideal for use in lotions, creams, ointments, and other cosmetic products. Oil of tamanu absorbs readily, leaving the skin feeling smooth and soft. The oil adds a glow to skin, without any residual greasiness or oiliness. Tamanu oil has the potential to be a significant ingredient for companies wanting to develop beneficial natural products.

Tamanu Oil and Sustainable Harvesting

In indigenous communities, nut-containing tamanu fruits are collected from the ground after they have dropped from the tree. Because the fruits are collected after they drop, no negative impact upon the life or ecology of the tamanu trees is caused by the harvest of the fruits. The trees themselves are neither touched nor harmed. Habitat is not negatively impacted, as neither the land nor any surrounding plants are disturbed as a result of collection. If not collected, the fruits and nuts simply decompose. Thus, tamanu collection is a low impact, environmentally sustainable activity.

In the Republic of Vanuatu, South Pacific, harvesting of tamanu fruits from beach areas is a small but growing source of income for native people who collect the fruits and are typically paid by weight. Relative ease of collection, and abundance of fruits on beaches, makes tamanu harvesting a desirable income-producing activity. The development of tamanu oil production in Vanuatu has turned a natural forest product of no prior significant local use into a commodity of financial value. Revenues from collection contribute positively to small village economies.

Summary

Tamanu oil is an excellent example of a traditional remedy that has percolated to broader attention due to a combination of effective use in traditional settings and scientific research supporting its traditional uses. Tamanu oil offers relief for common skin problems and has demonstrated significant benefit in hospital settings as a first aid treatment in cases of serious burns.

Tamanu oil fulfills three significant ideals: a healing benefit to users; the collection of the nuts and manufacture of the oil cause no damage to the environment; and the collection and processing of the nuts provides income to indigenous people, enhancing the local economies of small communities.

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