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Manuka Oil

Applications of Manuka Oil in Personal Care

Manuka Oil is a highly effective natural ingredient when formulating for Personal Care hygiene products, including body washes and deodorants.

Manuka Oil has demonstrated particularly strong antibacterial activity against gram-positive bacteria including *Staphylococcus aureus* and *Staphylococcus hominis* in Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) tests. Manuka Oil offers potency greater than 12 times the bactericidal capability of Tea Tree Oil against *Propionibacterium acnes* (0.102% vs 1.25%, respectively).

A review of the MINTEL Global New Products Database (GNPD) suggests significant market opportunities exist for products containing Manuka Oil.





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WHAT IS MANUKA OIL?

Manuka Oil is a relatively new botanical ingredient for the Personal Care Market. Manuka Oil is an essential oil, steam distilled from the leaves of the scrub tree *Leptospermum scoparium*, native to both New Zealand and Australia. It is the same plant from which bees make Manuka Honey. While many people are familiar with the nutritional and antibacterial properties of Manuka Honey, Manuka Oil has a different chemical profile and different antimicrobial properties to the honey.

Manuka Oil has been referred to as 'New Zealand's Tea Tree', however, the chemical profiles of Manuka Oil and Australian Tea Tree Oil (*Melaleuca alternifolia*) are very different. Like Australian Tea Tree Oil, Manuka Oil contains therapeutic constituents that can be used in very low concentrations to achieve significant antimicrobial effects.

WHAT MAKES MANUKA OIL SO EFFECTIVE AGAINST GRAM-POSITIVE BACTERIA?

Scientists have related Manuka Oil's efficacy to its β -Triketone components. These unique compounds occur naturally and are found in the highest abundance in Manuka Oil.

The specific β -Triketones found in Manuka include flavesone, leptospermone, isoptospermone, and grandiflorone. Higher levels of Triketones are known to have stronger antibacterial properties, with therapeutic qualities being reached at a total composition of 20+%.ⁱ

Manuka chemotypes found in the East Cape area of the North Island of New Zealand tend to contain higher levels of β -Triketones than oil sourced from other regions in New Zealand, as well as plants from Australia. A study of Manuka Oil sourced from 36 individual plants on the East Cape of New Zealand all showed similar high triketone contents (>20% total β -Triketones) with little seasonal variation.ⁱⁱ

The mechanism by which Manuka Oil exerts its effect on gram-positive bacteria, is yet to be fully understood. However, it is hypothesized that Manuka Oil disrupts the bacterial cell wall causing cell lysis.



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MANUKA OIL AND GRAM-POSITIVE BACTERIA

Manuka exerts an antibacterial action against a broad range of bacteria, however, its effect on gram-positive is far superior, doing so at extremely low concentrations. Manuka Oil can have an antimicrobial effect on gram-negative bacteria as well, such as *E. coli*. However, a higher concentration is required according to Alnaimat *et al.* (2015).

Manuka Oil's efficacy on gram-positive bacteria was confirmed by MBC testing conducted on *S. aureus*, *C. acnes*, *S. pyogenes*, and *S. hominis*.

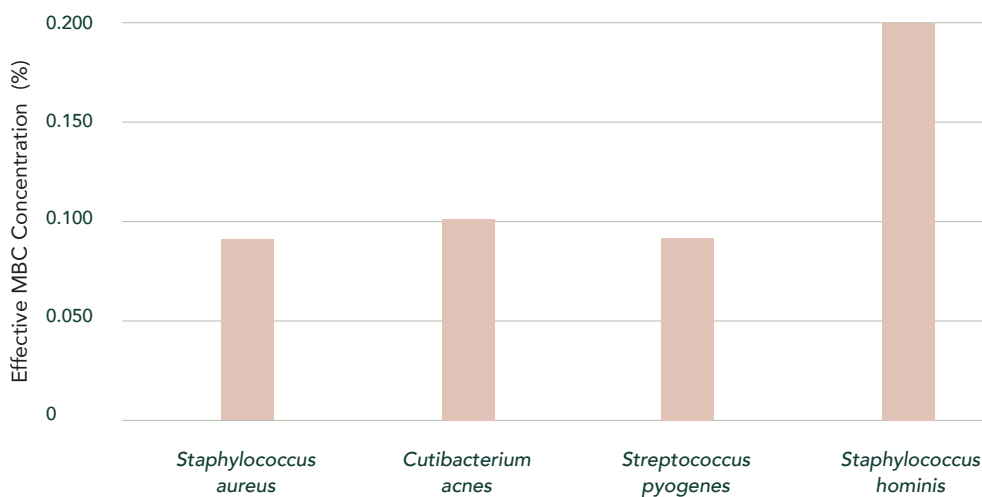
MINIMUM BACTERICIDAL CONCENTRATIONS (MBCS) OF GRAM-POSITIVE BACTERIA

PATHOGEN	SAMPLE	MBC (% V/V)
<i>Staphylococcus aureus</i>	Manuka Premium Grade (20+%)	0.091
<i>Cutibacterium acnes</i>	Manuka Premium Grade (20+%)	0.102
<i>Streptococcus pyogenes</i>	Manuka Premium Grade (20+%)	0.094
<i>Streptococcus hominis</i>	Manuka Premium Grade (20+%)	0.200

SOURCE: Internal Testing – Data available on request

MANUKA OIL ON GRAM-POSITIVE BACTERIA

Minimum Bactericidal Concentrations (MBC)





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MANUKA OIL MIC V POPULAR NATURALS

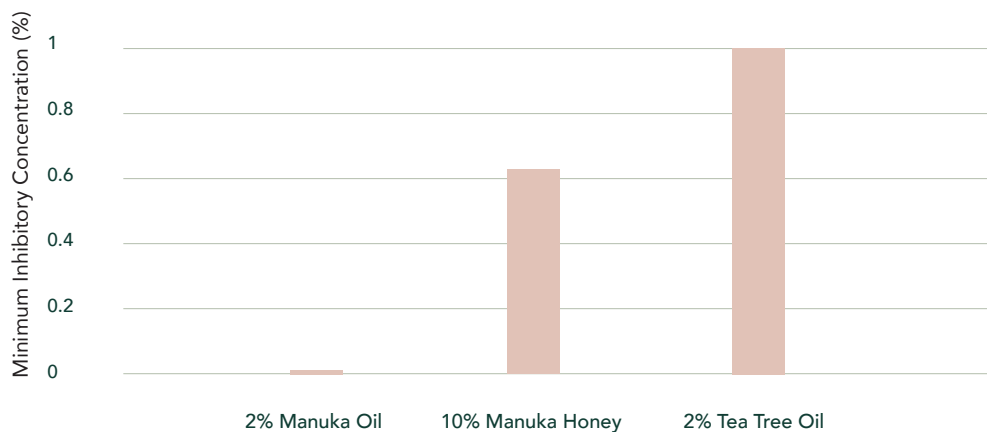
Tea Tree Oil and Manuka Honey are popular natural products, well known around the world for their strong antimicrobial efficacy. While Tea Tree Oil and Manuka Oil are concentrated extracts - essential oils - of the plant itself, Manuka Honey is produced by bees. The honey's chemical and therapeutic profiles are quite different from either essential oil.

Manuka Oil's natural affinity for targeting gram positive Staph bacteria was put to the test in a comparison with Manuka Honey and Tea Tree Oil. Unsurprisingly, the MIC result for 2% Manuka Oil was significantly lower at 0.0156% compared to 10% Manuka Honey (UMF 20+) with a MIC of 0.626% and 2% Tea Tree Oil with a MIC of 1% against *S.aureus*.

PATHOGEN	SAMPLE	MIC (% V/V)
<i>S. aureus</i>	2% Manuka Oil (20+)	0.0156
	10% Manuka Honey (UMF 20+)	0.626
	2% Tea Tree Oil	1.0

MANUKA OIL, MANUKA HONEY, AND TEA TREE OIL

MIC Comparison for *Staphylococcus aureus*



SOURCE: Manuka Bioscience, 2020.

An area of considerable scientific interest is the synergistic effects of essential oils, used in combinations, or to enhance the performance of synthetic ingredients.ⁱⁱⁱ In fact, while Manuka Oil is significantly more potent against gram-positive bacteria, Tea Tree Oil is stronger against gram-negative bacteria, fungi, and viruses.



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THERAPEUTIC POTENTIAL

Manuka Oil has demonstrated an affinity for targeting gram-positive bacteria as reflected in MBC values from extensive internal testing conducted.

This presents exciting opportunities for the development of products utilizing Manuka Oil to target specific microbes, especially in consideration of antibiotic resistance, and in the personal care industry, to meet consumer demands for more efficacious natural and sustainable ingredients.

BACTERIUM	SAMPLE MANUKA OIL (20+ β -TRIKETONE LEVEL)
<i>Staphylococcus aureus</i> MBC (% v/v): 0.091	<p>A problematic microbe in hospital settings is <i>Staphylococcus aureus</i>. It has an outstanding ability to acquire resistance to most classes of antimicrobial agents. <i>S. aureus</i> is both a commensal bacterium and a human pathogen and it can cause a range of infections from mild skin infections to life-threatening conditions. It is often the cause of hospital-acquired infections and more serious infections such as bacteremia and infective endocarditis.^v</p> <p>Manuka Oil demonstrated an MBC of 0.091% (% v/v) during <i>in vitro</i> testing of <i>S. aureus</i>.</p> <p>Scientific evidence supports the use of Manuka Oil for dermatological conditions such as acne, impetigo, abscesses, boils, folliculitis, cellulitis, carbuncles, and wound infections.^{vi}</p>
<i>Cutibacterium acnes</i> (formerly <i>Propionibacterium acnes</i>) MBC (% v/v): 0.102	<p>Acne is estimated to affect 9.4% of the global population, making it the eighth-most prevalent disease worldwide.^{vii} A survey conducted with 4,000 US female beauty consumers by Global Cosmetic Industry Magazine in October 2020, found that a large percentage of respondents (78%) reported experiencing regular acne flare-ups.</p> <p>Furthermore, PPE and mask-related acne, a subtype of <i>acne mechanica</i>, related to the COVID-19 pandemic is now occurring in people who were previously unaffected by acne.^{viii}</p> <p>Manuka Oil (20+) demonstrated an MBC of 0.102% against <i>Cutibacterium acnes</i> (formerly <i>Propionibacterium acnes</i>) in <i>in vitro</i> tests.</p> <p>Other scientific data has reported Manuka Oil's ability against <i>P. acnes</i>, showing a reduction in acne and bactericidal effects.^{ix} Researchers investigating essential oils against <i>P. Acnes</i> and <i>Staphylococcus epidermidis</i>, another acne-causing bacterium, also reported Manuka Oil's activity against these pathogens. Interestingly, they noted that Manuka Oil showed the highest likelihood amongst a range of different essential oil combinations of being involved in synergist interactions against <i>S. epidermidis</i>.^x</p>



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BACTERIUM	SAMPLE MANUKA OIL (20+ B-TRIKETONE LEVEL)
<i>Staphylococcus pyogenes</i> MBC (% v/v): 0.094	<p><i>Streptococcus pyogenes</i> is a very important human pathogen, commonly associated with skin or throat infections but can also cause life-threatening situations including sepsis, streptococcal toxic shock syndrome, and necrotizing fasciitis.^{xi}</p> <p>Manuka Oil demonstrated an MBC of 0.094% against <i>S. pyogenes</i>. With further testing, Manuka Oil could be considered for clinical settings, topical skin creams, and throat lozenges.</p>
<i>Staphylococcus hominis</i> MBC (% v/v): 0.200	<p><i>S. hominis</i> is a commensal bacterium, commonly found on human and animal skin. Its main claim to fame is producing thioalcohol compounds that contribute to body odor.</p> <p>Scientists investigating the underarm microbiome assessed 150 bacterial isolates from underarm skin samples to produce malodorants. They discovered a unique set of enzymes on the bacterium <i>S. hominis</i> responsible for producing thioalcohol. They then identified the genes encoding the proteins responsible for producing the thioalcohols. To confirm their findings, they transferred the genes to the bacteria <i>Escherichia coli</i>, which was also then able to produce the body odor smell when exposed to human sweat molecules.^{xii}</p> <p>The mode of action of traditional deodorants and antiperspirants is to either non-selectively kill underarm bacteria or block sweat glands.</p> <p>The targeted effect of Manuka Oil on <i>Staphylococcus</i> bacteria such as <i>S. hominis</i> can counter body odor with minimal reduction of other commensal flora and without blocking sweat glands.</p>

MODE OF ACTION

The mechanism by which Manuka Oil acts on gram-positive bacteria is not yet conclusive, however it is hypothesized that it disrupts the bacterial cell membrane causing cell lysis.

Alnaimat *et al.* conducted disc diffusion assays, and electron microscopy to determine the mechanism of antibacterial action of Manuka Oil on methicillin-resistant 137 *Staphylococcus aureus* (MRSA) and *E. coli*. They observed that untreated cells, (never exposed to Manuka Oil) retained their coccal morphology and appeared normal, while MRSA cells treated with 1.5% v/v Manuka Oil for 4 hours underwent considerable morphological alterations including severely damaged cells and free cellular contents. Furthermore, the internal morphology of MRSA as observed by transmission electron microscopy (TEM) showed marked cellular lysis and complete disruption to the MRSA cells.^{xiii}



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CONSUMER TRENDS - DEODORANT AND SOAP & BATH

The impact of COVID-19 on the antiperspirant and deodorant (APDO) segmented resulted in lower levels of growth in 2020 as consumers felt less obliged to prevent body odor and perspiration when isolated at home.^{xiv}

However, the APDO and Soap & Bath categories, as hygiene essentials, benefit from strong market penetration, helping to buoy the market despite the pandemic according to a MINTEL report.^{xv}

Relevant consumers trends reported by MINTEL include:

- Consumers used their time in self-isolation to try out a natural deodorant
- 20% of consumers reported using natural deodorants because they're concerned that antiperspirants can lead to health issues
- Personal care habits and usage behaviors will move back to pre-COVID patterns (e.g., using APDO regularly); however, using natural deodorant instead of antiperspirant may persist due to newfound consumer beliefs about health issues posed by antiperspirants
- 58% of adults are interested in using deodorant with mood-boosting fragrances, especially scents that signal cleanliness and freshness

Earlier this year, researchers reported in an issue of *Molecules Chemistry Journal* on the continued high growth of Essential Oils in the global fragrance market. The report states that *"the global essential oils market size was found to exceed USD 7.51 billion in 2018 and is expected to grow at greater than 9% compound annual growth rate (CAGR) between 2019 and 2026."*

The growing demand for Essential Oils was attributed to a "back to nature" trend that favors natural botanicals over synthetics, which many consumers consider hazardous to their health.^{xvi}

MARKET OPPORTUNITIES

A review of the MINTEL Global New Products Database (August 2021) suggests an opportunity exists for Personal Care Product formulators in the Deodorant and Soap & Bath categories to utilize Manuka Oil's efficacy, particularly on the body-odor-causing bacterium, *S. hominis*.

- A global product search returned only 27 products in the Beauty and Personal Care category containing Manuka Oil across Europe, Australia, and the North America.
- A global product search of the Health & Hygiene category returned only 10 products containing Manuka Oil across Europe, Australia, and Asia.

The MINTEL review also revealed that there are no products currently on the market (outside of New Zealand) in the Deodorant and Soap & Bath categories that contain Manuka Oil.



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CONSIDERATIONS FOR FORMULATING WITH MANUKA OIL

IFRA STATEMENT

When formulating with Manuka Oil for deodorants or body wash, please refer to the latest IFRA Quantitative Risk Assessment (QRA) categories 2 and 9. Contact Down Under Enterprises for a copy of our Manuka Oil IFRA Certificate.

IFRA QRA CATEGORY	SAF	CATEGORY CONSUMER EXPOSURE1 MG/CM ² /DAY	PRODUCT TYPE	MAXIMUM PRAGMATIC LEVEL
Category 2	300	9.1	Deodorants/ Antiperspirants	Not Necessary Acceptable Exposure Level derived from QRA
Category 9	100	0.2	Body Wash	5% The maximum concentration will not exceed 5% and may be lower if determined by the QRA.

SOURCE: IFRA RIFM QRA Information Booklet Version 7.1 Revised July 9, 2015

ALLERGEN AND SAFETY STATEMENT

There are no known allergens within Manuka Oil. Contact Down Under Enterprises for a copy of our Manuka Oil Allergen Statement.

ABOUT MANUKA OIL FROM DOWN UNDER ENTERPRISES

Down Under Enterprises sources Manuka Oil under a fair share partnership model with Māori Kaitiaki and Mānuka Biologicals in the East Cape region of New Zealand, who are working the land of their ancestors. This partnership model provides shares and a fair and open return of the revenue gained from the Manuka Oil sourced from their land.

About Down Under Enterprises

Down Under Enterprises grows, produces, exports, and markets traceable and sustainable native Australian essential oils and botanicals. We source from our farm, Buhlambar, and also from small growers across Australia.

Founded in 2001 in a spare bedroom to sell Tea Tree Oil from Dee-Ann's parents' farm, Down Under Enterprises has since grown to support over three dozen Australian farming families.

We operate our own farms producing 100% pure, 100% natural, and 100% traceable Australian botanicals and supply our wholesale essential oils to hundreds of manufacturers in the personal care, home care, pet care, medicinal care, and industrial markets each year.

Our business and life philosophy encompasses three driving principles: traceability, sustainability, and the empowerment of our staff.



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REFERENCES

- ⁱ Mathew C, Tesfaye W, Rasmussen P, Peterson GM, Bartholomaeus A, Sharma M, Thomas J. Mānuka Oil-A Review of Antimicrobial and Other Medicinal Properties. Pharmaceuticals (Basel). 2020 Oct 26;13(11):343. doi: 10.3390/ph13110343. PMID: 33114724; PMCID: PMC7694078.
- ⁱⁱ Douglas MH, van Klink JW, Smallfield BM, Perry NB, Anderson RE, Johnstone P, Weavers RT. Essential oils from New Zealand manuka: triketone and other chemotypes of *Leptospermum scoparium*. Phytochemistry. 2004 May;65(9):1255-64. doi: 10.1016/j.phytochem.2004.03.019. PMID: 15184010.
- ⁱⁱⁱ Bhattacharya R, Rolta R, Dev K, Sourirajan A. Synergistic potential of essential oils with antibiotics to combat fungal pathogens: Present status and future perspectives. Phytother Res. 2021 Jul 29. doi: 10.1002/ptr.7218. Epub ahead of print. PMID: 34324240.
- ^{iv} Nickerson EK, Hongsuwan M, Limmathurotsakul D, et al. Staphylococcus aureus bacteraemia in a tropical setting: patient outcome and impact of antibiotic resistance. PLoS One. 2009;4(1):e4308. doi:10.1371/journal.pone.0004308
- ^v Monegro AF, Muppidi V, Regunath H. Hospital Acquired Infections. [Updated 2020 Sep 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441857/>
- ^{vi} Orchard A, van Vuuren S. Commercial Essential Oils as Potential Antimicrobials to Treat Skin Diseases. Evid Based Complement Alternat Med. 2017;2017:4517971. doi: 10.1155/2017/4517971. Epub 2017 May 4. PMID: 28546822; PMCID: PMC5435909.
- ^{vii} Tan JK, Bhate K. A global perspective on the epidemiology of acne. Br J Dermatol. 2015 Jul;172 Suppl 1:3-12. doi: 10.1111/bjd.13462. PMID: 25597339.
- ^{viii} Rudd E, Walsh S. Mask related acne ("maskne") and other facial dermatoses. BMJ. 2021 Jun 7;373:n1304. doi:10.1136/bmj.n1304. PMID: 34099456.
- ^{ix} Kim, H.; Lee, H.; Lee, J.; Joo, C.; Choe, T. The effects of antimicrobial properties of manuka oil and improvement of acne. J. Korean Soc. Cosmetol. 2011, 17, 245–256.
- ^x Orchard A, van Vuuren SF, Viljoen AM, Kamatou G. The in vitro antimicrobial evaluation of commercially essential oils and their combinations against acne. Int J Cosmet Sci. 2018 Mar 24. doi: 10.1111/ics.12456. Epub ahead of print. PMID: 29574906.
- ^{xi} Stevens DL, Bryant AE. Severe Group A Streptococcal Infections. 2016 Feb 10. In: Ferretti JJ, Stevens DL, Fischetti VA, editors. Streptococcus pyogenes : Basic Biology to Clinical Manifestations [Internet]. Oklahoma City (OK): University of Oklahoma Health Sciences Center; 2016-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK333425/>
- ^{xii} Minhas GS, Bawdon D, Herman R, Rudden M, Stone AP, James AG, Thomas GH, Newstead S. Structural basis of malodour precursor transport in the human axilla. Elife. 2018 Jul 3;7:e34995. doi: 10.7554/eLife.34995. PMID: 29966586; PMCID: PMC6059767.
- ^{xiii} Alnaimat S., Wainwright M., Jaber S., Amasha R. Mechanism of the Antibacterial Action of (*Leptospermum scoparium*) Oil on Methicillin-resistant Staphylococcus aureus (MRSA) and *E. coli*; Proceedings of the 2nd Mediterranean Symposium on Medicinal and Aromatic Plants (MESMAP-2); Antalya, Turkey. 22–25 April 2015.
- ^{xiv} Mintel, Bodycare and Deodorant: Inc Impact of COVID-19 - US - June 2020
- ^{xv} Mintel, Bodycare and Deodorant: Inc Impact of COVID-19 – US 2021
- ^{xvi} Sharmeen JB, Mahomoodally FM, Zengin G, Maggi F. Essential Oils as Natural Sources of Fragrance Compounds for Cosmetics and Cosmeceuticals. Molecules. 2021 Jan 27;26(3):666. doi: 10.3390/molecules26030666. PMID: 33514008; PMCID: PMC7865210.

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100% Pure
Australian essential
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ISO14001:2015,
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Organic (USDA NOP, BIO-
CE, ACO), Halal

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