



BPM LABS

TERPENE SERIES

FUNCTIONAL FOOD FORMULATIONS

****Disclaimer:** The information listed & referenced is for general educational purposes ONLY and does not provide any professional medical advice. Please consult a health care professional before using any products. These products are not intended to diagnose, prevent, treat or cure any disease.

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SAFETY & PRECAUTIONS

- When using terpenes as you would anything else, always read the safety instructions and consult a healthcare professional.
- Never use undiluted or concentrated terpenes.
- Most flavour and aroma compounds have a GRAS (Generally Regarded as Safe) status with the compounds being discoverable in the FEMA (Flavour Extract Manufacturers Association) library with a Safety Assessment, Food and Chemical Toxicology report.
- WHO Food Additives series 54, 2006 – Safety Evaluation of Certain Food Additives
- Terpenes can be toxic in concentrated form and can cause low blood pressure or dizziness if not handled with care.

GOVERNING BODIES FOR FOOD FLAVORS & ADDITIVES

- FSANZ Food Standard 1.3.1 (Food Additives) & 1.4.4 (Prohibited and restricted plants and fungi)
- FEMA Number 2252 (Beta Caryophyllene)
- The FEMA GRAS assessment of aliphatic and aromatic terpene hydrocarbons used as flavor ingredients. Food and Chemical Toxicology. 49, 2471
- FEMA Number 2762 (Myrcene)
- "GRAS" (Generally Recognized as Safe) status
- Joint FAO/WHO Expert Committee on Food Additives (JECFA) safety evaluation



WHAT ARE TERPENES?

- Ever walked past a herb garden with a strong smell of thyme, mint or basil ? Or how about the strong citrus smell that radiates from the lemon or orange tree in the backyard? These very distinctive smells in the air are terpenes! Chances are at some point in your day you would have inhaled terpenes.
- Terpenes are produced in the glandular trichomes of plant, mushroom like buds on the surface of the plants leaves, the purpose of terpenes is to attract pollinators as well as warding off any predators. Terpenes much like some of there other phytochemical constituent counterparts harbor some amazing properties that can be of use to us today and are also well known for increasing cellular permeability.
- Terpenes are not just isolated to the Cannabaceae species. They are also found in other plants sources.
- Terpenes have been appointed a “generally recognized as safe status (GRAS) by the US Food and Drug Administration and other regulatory agencies such as Flavor Extracts Manufacturers Association (FEMA) .

TERPENE CLASSIFICATIONS

Terpene Type	Number of isoprene rings	Number of Carbon Atoms	Examples
Hemiterpene	1	C5	Available upon request
Monoterpene	2	C10	Limonene, myrcene, eucalyptol
Sesquiterpene	3	C15	Humulene, caryophyllene
Diterpene	4	C20	Taxadiene, Phytol
Sesterpene	5	C25	Ophiobolene
Triterpenes	6	C30	Cholesterol, squalene
Tetraterpenes	8	C40	b-carotene
Polyterpene	8	>C40	Rubber

DIFFERENCE BETWEEN TERPENES & ESSENTIAL OILS

- The main difference is between essential oil & terpenes is that, terpenes are isolated removing all the other compounds found in an essential oil.
- Essential oils contain oxides, ketones, phenols, esters, alcohols etc.
- Terpenes are one of the main active components in the oil eliciting its therapeutic properties.

3 DELIVERY METHODS OF TERPENES

- Olfactory system (Inhalation, processing of smells)
- Integumentary System (The Skin, topical)
- Gastrointestinal system (Oral ingestion)

OLFACTORY SYSTEM

- Inhalation mainly uses the olfactory system & the skin to some degree
- Pheromones & aromas can affect the behaviour & physiological condition of the person inhaling these odours. These can have a profound effect on both physiological and psychological health conditions.
- As we already know with aromatherapy oils, the effects via inhalation have a profound effect. For example in aromatherapy it is common practice to use lavender oil for sleep and relaxation. The active terpene in lavender is Linalool.
- Olfactory receptors are also found non olfactory tissue, this includes the gastrointestinal system & skin that are also activated by odours.

TERPENE OLFACTORY TARGETS

- OR2AT4 is a human odorant receptor that was found in the outer root sheath of hair follicles. Through stimulation of this human odorant receptor OR2AT4, apoptosis of the hair follicle was suppressed which extended the hair growth and points to the possibility of using OR2AT4 for avoiding the thinning of hair.
- Human olfactory receptor OR51E2, was found in epidermal melanocytes. Melanocytes give skin its colour. The compound that had affinity to the olfactory receptor was the sesquiterpene beta ionone. Activation of this olfactory receptor OR51E2, beta ionone stimulated melanin synthesis. This leads to the possibility of using it for pigmentation disorder.

INTEGUMENTARY SYSTEM (SKIN)

- Terpenes have been proven to be highly absorbent through skin layers
- Increases the permeability of other substances through the skin. Used in transdermal delivery technology
- Antiaging and skin rejuvenation benefits
- Some not all terpenes will reach bloodstream with less metabolism and minimal loss of potency

GASTROINTESTINAL SYSTEM

- Uptake through the digestive system is really important this is where nutrients are broken down and released into organs
- A large amount of cannabinoid receptors are located in this region and are responsible for achieving homeostasis. (Overall Balance of the body's systems, i.e.: respiratory, cardiovascular, endocrine etc.)
- Up to 80% of our immunity comes from the gut, when this is compromised it can lead to gastrointestinal upset or vulnerability to harmful bacteria and or viruses.
- With the effect on the endocannabinoid system and trying to achieve balance this can help also to properly regulate heart rate, temperature, immune function, brain signaling and more.

CANNABINOID RECEPTORS

G Protein Coupled Receptors
(Cannabinoid Receptors)

Two types:

CB1 – mostly present in the brain (hypothalamus) and nervous system. This is the receptor THC has affinity for.

CB2 – These are found concentrated in immune cells and in peripheral tissues, and work to reduce inflammation. Beta caryophyllene has an affinity for this receptor and is a full CB2 agonist.

These receptors are involved in a variety of physiological & psychological processes.

ENDOCANNABINOIDS

- Endocannabinoids are produced naturally from within the body.

The 2 major endocannabinoids are:

- 2 AG (2-Arachidonyl glycerol) - Higher concentrations found in the brain
- Anandamide – concentrations found throughout the body

Both capable of binding to the CB1 & CB2 receptor but may differ in how they bind and activate these receptors.

These endocannabinoids are only produced on demand when the body needs.

LIPIDS (FATS)

Terpenes are Lipids. Better known as Non Saponifiable Lipids because of their structure and not containing a fatty acid chain. Saponifiable Lipids can be hydrolyzed. Terpenes are lipids derived from the isoprene (C₅) This is why steroids, lipid soluble vitamins A, D, & E, chlorophyll and some plant hormones are classified as terpenes.

Four main groups of lipids:

- Glycerides (these contain glycerol)
- Fatty Acids (unsaturated & saturated)
- Complex lipids (glycolipids, lipoproteins)
- Non Glyceride lipids (sphingolipids, waxes & steroids)

Main function of Lipids (Fats):

- Energy storage
- Protection & Insulation (protect organs & maintain body temperature i.e.: warmth)
- Vitamin absorption
- Hormone function
- Cell membrane structuring

SAPONIFIABLE LIPIDS (FATS)

These types of lipids have long carboxylic acid chains allowing them to be hydrolyzed.

Saponifiable Lipids include:

- Glycolipids
- Sphingolipids
- Triglycerides
- Phospholipids
- Certain waxes

NON SAPONIFIABLE LIPIDS (FATS)

These cannot be hydrolyzed the same way as saponifiable fats and do not contain fatty acid chain, because these are not esters and cannot be turned into fatty acids.

Types of Non-Saponifiable Lipids

- Cholesterol
- Terpenes
- Steroids
- Fat soluble Vitamins A D E & K

WHY DO WE CARE ABOUT FATS & TERPENES ?

- We care because they have the ability to cross cell membranes. Not only is this important for efficacy but important in the overall delivery.
- This will help understand to some degree the mechanics of terpenes and their relationship with receptor sites.
- This is also crucial in the formulation process and key point of difference for future developments in this area and delivery efficacy.

TERPENE SOURCES

Plant Source		
Clove	Lemon	Juniper
Thyme	Orange	Lemongrass
Vervain	Tea Tree	Lavender
Black pepper	Peppermint	Rose
Frankincense	Cinnamon	Oregano
Mint	Pine trees	Parsley
Myrrh	Mullein	Dill
Cannabaceae	Ginger	Ginseng
Hops	Chamomile	Guava
Turmeric	Basil	Cranberry
Sage	Rosemary	Cardamom

TERPENE BENEFITS

- Terpenes have been a favorable alternative to other plant extract oils such as black seed oil, oregano oil, C60 & CBD.
- Diet formats such as “The Mediterranean diet” allow for a consumption

Terpenes elicit many health benefits such as :

- Anti inflammatory
- Analgesic
- Anxiolytic (Stress & Anxiety)
- Anti proliferative
- Anticonvulsant
- Gastroprotective
- Anti bacterial
- Muscle relaxant
- Antioxidant
- Anti mutagenic
- Anti microbial
- Hormonal imbalances
- Improved metabolic function
- Bone health (Osteoblast recruitment)
- Weight management

TERPENE FORMULATION

- The formulation process is everything. The key is understanding the relationships (synergism) these compounds have with not only each other, but also the body. What effects do these have on the body. Mixing a random selection of these compounds or trying to achieve a “strain profile” maybe ineffective and of no benefit and if done incorrectly can have negative effects.
- Knowing and understanding percentages %, conversion & synergism between other terpenes is critical in the formulation process. Sometimes less is more rather than the general concept of “ If I take more this will be stronger and work better for me”. On the other hand more can also lead to unwanted side effects, over saturation of receptors and even be toxic. Unfortunately every individual is different and will react differently as we do with different foods. Some people are lactose intolerant, some people cant wheat or gluten and some have reactions to certain plants or herbs.
- Dilution of terpenes is critical to ensure safety & efficacy.

CB2 ORIGINAL

(NEW IMPROVED FORMULA)

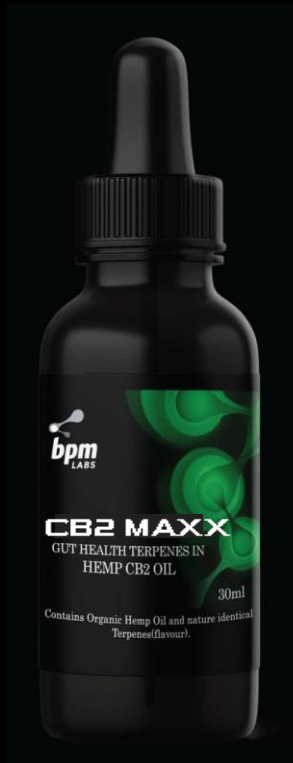


Formula Specifications:

Terpene Matrix 20%

- B-caryophyllene
- Myrcene
- Hemp oil

CB2 EXTRA STRENGTH



Formula Specifications:

Terpene Matrix 20%

- B-caryophyllene
- Myrcene
- Humulene
- A-Pinene
- α -Bisabolol
- Linalool
- d-Limonene
- Hemp Oil

BREATHE



Formula Specifications:

Terpene Matrix 16%

- B-caryophyllene
- α -Pinene
- 1,8 Cineole
- b-Pinene
- d-Limonene
- Hemp Oil



GUT-MAXX (RE-FORMULATED)



Formula Specifications:

Terpene Matrix 20%

- B-caryophyllene
- d-Limonene
- α -Pinene
- b-Pinene
- Hemp Oil

OSTEO-MAXX



Formula Specifications:

Terpene Matrix 16%

- B- Ionone
- Delta-3-Carene
- α -Bisabolol
- D-Limonene
- Hemp Oil



HAIR-MAXX



Formula Specifications:

Terpene Matrix 7%

- 1,8 Cineole
- α -Pinene
- d-Limonene
- Nerolidol
- b-Pinene
- α -Terpinene
- Menthol(Pending)
- Hemp Oil

SLEEPMAXX



Formula Specifications:

Terpene Matrix 19%

- B-caryophyllene
- Myrcene
- Linalool
- Terpinolene
- Nerolidol (Part of prototype SLP-V2)
- Hemp Oil

MIND-MAXX



Formula Specifications:

Terpene Matrix 14%

- B-caryophyllene
- α -Bisabolol
- 1,8 Cineole
- Myrcene
- Hemp Oil



FOOD CONCEPTS

(Conceptual/Application can vary)

The **RED** gummy or the **BLUE** gummy?
Which will you choose?

“a choice between learning a potentially life changing truth, by taking the **RED**, or remaining ignorant to truth, taking the **BLUE**.”

We have heard what happens when you take the **RED** or do we?

Flavours:

- Red Colour (Raspberry flavour)
- Blue Colour (Blue Raspberry flavour)

Galactic Balls

Flavours:

- Chocolate
- Choc chip mint
- Hazelnut
- Peanut Butter
- Choc Honeycomb

CONCEPTS

BPM Labs Health
& wellbeing

Breathe – bronchodilator, open the airways

Edibles: Food based products, protein balls, gummies, snack items, PH Balance, Liposomals ie: Vitamin C, D3 & K2, Curcumin

BPM Labs
Personal care


Personal care: facial/ body creams (anti ageing skin rejuvenating, roll on's, atomizers etc., fragrances, hair serum

BPM Labs
Cleaning solutions

Residue remover, disinfectant, surface spray, air fresheners

REFERENCES

- 1.Cox-Georgian, D., Ramadoss, N., Dona, C., Basu, C. (2019). **Therapeutic and Medicinal Uses of Terpenes**. In: Joshee, N., Dhekney, S., Parajuli, P. (eds) Medicinal Plants. Springer, Cham. https://doi.org/10.1007/978-3-030-31269-5_15
- 2.Greco R, Demartini C, Zanaboni AM, Piomelli D and Tassorelli C (2018) **Endocannabinoid System and Migraine Pain: An Update**. Front. Neurosci. 12:172. doi: 10.3389/fnins.2018.00172
- 3.Sukanya Panikar, Gunasekaran Shoba, Muthukrishnan Arun, Jesudass Joseph Sahayarayan, A. Usha Raja Nanthini, Arunachalam Chinnathambi, Sulaiman A. Alharbi, Omaima Nasif, Hak-Jae Kim, **Essential oils as an effective alternative for the treatment of COVID-19: Molecular interaction analysis of protease (Mpro) with pharmacokinetics and toxicological properties**,Journal of Infection and Public Health,Volume 14, Issue 5,2021,Pages 601-610,ISSN 1876-0341,<https://doi.org/10.1016/j.jiph.2020.12.037>.(<https://www.sciencedirect.com/science/article/pii/S1876034121000368>)
- 4.Salehi B, Upadhyay S, Erdogan Orhan I, Kumar Jugran A, L.D. Jayaweera S, A. Dias D, Sharopov F, Taheri Y, Martins N, Baghalpour N, C. Cho W, Sharifi-Rad J. **Therapeutic Potential of α - and β -Pinene: A Miracle Gift of Nature**. *Biomolecules*. 2019; 9(11):738. <https://doi.org/10.3390/biom9110738>
- 5.Jha NK, Sharma C, Hashiesh HM, Arunachalam S, Meeran MFN, Javed H, Patil CR, Goyal SN and Ojha S (2021) **β -Caryophyllene, A Natural Dietary CB2 Receptor Selective Cannabinoid can be a Candidate to Target the Trinity of Infection, Immunity, and Inflammation in COVID-19**. Front. Pharmacol. 12:590201. doi: 10.3389/fphar.2021.590201
- 6.Duru, C.E., Duru, I.A. & Adegboyega, A.E. **In silico identification of compounds from *Nigella sativa* seed oil as potential inhibitors of SARS-CoV-2 targets**. *Bull Natl Res Cent* 45, 57 (2021). <https://doi.org/10.1186/s42269-021-00517-x>
- 7.Sukanya Panikar, Gunasekaran Shoba, Muthukrishnan Arun, Jesudass Joseph Sahayarayan, A. Usha Raja Nanthini, Arunachalam Chinnathambi, Sulaiman A. Alharbi, Omaima Nasif, Hak-Jae Kim, **Essential oils as an effective alternative for the treatment of COVID-19: Molecular interaction analysis of protease (Mpro) with pharmacokinetics and toxicological properties**,Journal of Infection and Public Health,Volume 14, Issue 5,2021,Pages 601-610,ISSN 1876-0341,<https://doi.org/10.1016/j.jiph.2020.12.037>.(<https://www.sciencedirect.com/science/article/pii/S1876034121000368>)



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