



Oregano: the mountain of joy on taste buds



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Abstract: *Oregano is a wonderful herb, both to use in cooking and to use therapeutically as needed. Its name means **mountain joy** and oregano was revered as a symbol of happiness by the ancient Greeks and Romans. This is why drawings often depict brides and grooms of the time crowned with a laurel of oregano, which was a widespread tradition. Although oregano is popular in Mediterranean cuisine, in the US, it's often associated primarily with a pizza spice. This does this medicinal herb a great disservice, since today we know that oregano contains vitamins A, C, E and K, as well as fiber, folate, iron, magnesium, vitamin B₆, calcium and potassium. Additionally, oregano, which is sometimes called wild marjoram in Europe and is closely related to the herb sweet marjoram, contains potent phytochemicals that provide potential health benefits.*

The Top 5 Health Benefits of Oregano: 1. Antioxidants for Immune System Support 2. Antifungal, Antibacterial and May Even Kill MRSA (Methicillin Resistant Staphylococcus Aureus) 3. Anti-inflammatory Properties 4. Useful for Upper Respiratory Infections 5. Cancer-Fighting Effects

Keywords: Carvacrol, Thymol, Limonene, Pinene, Ocimenes, Caryophyllene, p-Cymene, Terpinenes, Germacrenes, Fenchol, Terpineol

INTRODUCTION

Oregano (*Origanum vulgare*) is a common species of Origanum, a genus of the mint family (Lamiaceae). It is native to temperate western and southwestern Eurasia and the Mediterranean region. Oregano is a perennial herb, growing from 20–80 cm (7.9–31.5 in) tall, with opposite leaves 1–4 cm (0.39–1.57 in) long. Oregano will grow in a pH range between 6.0 (mildly acidic) and 9.0 (strongly alkaline), with a preferred range between 6.0 and 8.0. The flowers are purple, 3–4 mm (0.12–0.16 in) long, produced in erect spikes.^[1] It is sometimes called **wild marjoram** and its close relative *Origanum majorana* is known as sweet

marjoram. Oregano is the anglicized form of the Italian word origano, or possibly of the medieval Latin organum; this latter is used in at least one Old English work. Both were drawn from the Classical Latin term origanum, which probably referred specifically to sweet marjoram, and was itself a derivation from the Greek origanon, which simply referred to an acrid herb. The etymology of the Greek term is often given as oros mountain+ganos brightness. Oregano is related to the herb marjoram, sometimes being referred to as wild marjoram. Oregano has purple flowers and spade-shaped, olive-green leaves. It is a perennial, although it is grown as an annual in colder climates, as it often does not survive the winter.

Oregano is planted in early spring, the plants being spaced 30 cm (12 in) apart in fairly dry soil, with

full sun. It prefers a hot, relatively dry climate, but does well in other environments.^[2]



Figure-1: Mediterranean Oregano and Mexican Oregano & Powder

Many subspecies and strains of oregano have been developed by humans over centuries for their unique flavours or other characteristics. Tastes range from spicy or astringent to more complicated and sweet. Simple oregano sold in garden stores as *Origanum vulgare* may have a bland taste and larger, less-dense leaves and is not considered the best for culinary use, with a tasteless remarkable and pungent. It can pollinate other more sophisticated strains, but the offspring are rarely better in quality.^[3] The related species, *Origanum onites* (Greece, Turkey) and *Origanum syriacum* syriacum (West Asia), have similar flavours. A closely related plant is marjoram from Turkey, which differs significantly in taste though, because phenolic compounds are missing from its essential oil. Some varieties show a flavour intermediate between oregano and marjoram.

Subspecies: *Origanum vulgare* subsp. glandulosum (Desf.) Ietsw. - Tunisia, Algeria; *O. v.* subsp. gracile (K.Koch) Ietsw. (*Origanum tyttanthum*) has glossy green leaves and pink flowers. It grows well in pots or containers, and is more often grown for added ornamental value than other oregano. The flavor is pungent and spicy.-Central Asia, Iran, India, Turkey, Afghanistan, Pakistan.

Origanum vulgare subsp. hirtum (Link) Ietsw. - (Italian oregano, Greek oregano) is a common source of cultivars with a different aroma from those of *Origanum vulgare* gracile. Growth is vigorous and very hardy, with darker green, slightly hairy foliage. Generally, it is considered the best all-purpose culinary subspecies. - Greece, Balkans, Turkey, Cyprus.

Origanum vulgare subsp. virens (Hoffmanns. & Link) Ietsw. - Morocco, Spain, Portugal, Balearic Islands, Canary Islands, Azores, Madeira.

Origanum vulgare subsp. viridulum (Martrin-Donos) Nyman - widespread from Corsica to Nepal. *Origanum vulgare* subsp. vulgare -

widespread across Europe+Asia from Ireland to China; naturalized in North America+Venezuela.

Example cultivars of oregano include: Aureum – Golden foliage (greener if grown in shade), mild taste: It has gained the Royal Horticultural Society's Award of Garden Merit; Greek Kaliteri – *Origanum vulgare* hirtum strains/landraces, small, hardy, dark, compact, thick, silvery-haired leaves, usually with purple undersides, excellent reputation for flavor and pungency, as well as medicinal uses, strong, archetypal oregano flavor (Greek kaliteri: the best); Hot & Spicy – *Origanum vulgare*. hirtum strain; Nana – dwarf cultivar.^[4] Cultivars traded as Italian, Sicilian, etc. are usually hardy sweet marjoram (*Origanum majoricum*), a hybrid between the southern Adriatic *Origanum vulgare* hirtum and sweet marjoram (*Origanum majorana*). They have a reputation for sweet and spicy tones, with little bitterness, and are prized for their flavor and compatibility with various recipes and sauces.^[5]

Dried oregano for culinary use:

Oregano is an important culinary herb, used for the flavour of its leaves, which can be more flavourful when dried than fresh. It has an aromatic, warm, and slightly bitter taste, which can vary in intensity. Good-quality oregano may be strong enough almost to numb the tongue, but cultivars adapted to colder climates often have a lesser flavor. Factors such as climate, season, and soil composition may affect the aromatic oils present, and this effect may be greater than the differences between the various species of plants. Among the chemical compounds contributing to the flavour are carvacrol, thymol, limonene, pinene, ocimene and caryophyllene.^[6]

Carvacrol, or cymophenol, $C_6H_3CH_3(OH)(C_3H_7)$, is a monoterpene phenol. It has a characteristic pungent, warm odor of oregano. Carvacrol inhibits the growth of several bacteria strains, e.g. *Escherichia coli* and *Bacillus cereus*. Its low

toxicity together with its pleasant taste and smell suggests its use as a food additive to prevent bacterial contamination. In *Pseudomonas aeruginosa* it causes damages to the cell membrane of these bacteria and, unlike other terpenes, inhibits their proliferation. The cause of the antimicrobial properties is believed to be disruption of the bacteria membrane. It is a potent activator of the human ion channels transient receptor potential V3 (TRPV3) and A1 (TRPA1). Application of carvacrol on the human tongue, as well as activation of TRPV3, causes a sensation of warmth.

In addition, carvacrol also activates, but then rapidly desensitizes, the pain receptor TRPA1; this explains its pungency. It activates PPAR and suppresses COX-2 inflammation. In rats, carvacrol is quickly metabolized and excreted. The main metabolic route is esterification of the phenolic group with sulfuric acid and glucuronic acid. A minor pathway is oxidation of the terminal methyl groups to primary alcohols. After 24 hours, only very small amounts of carvacrol or its metabolites could be found in urine, indicating an almost complete excretion within one day.^[7-9]

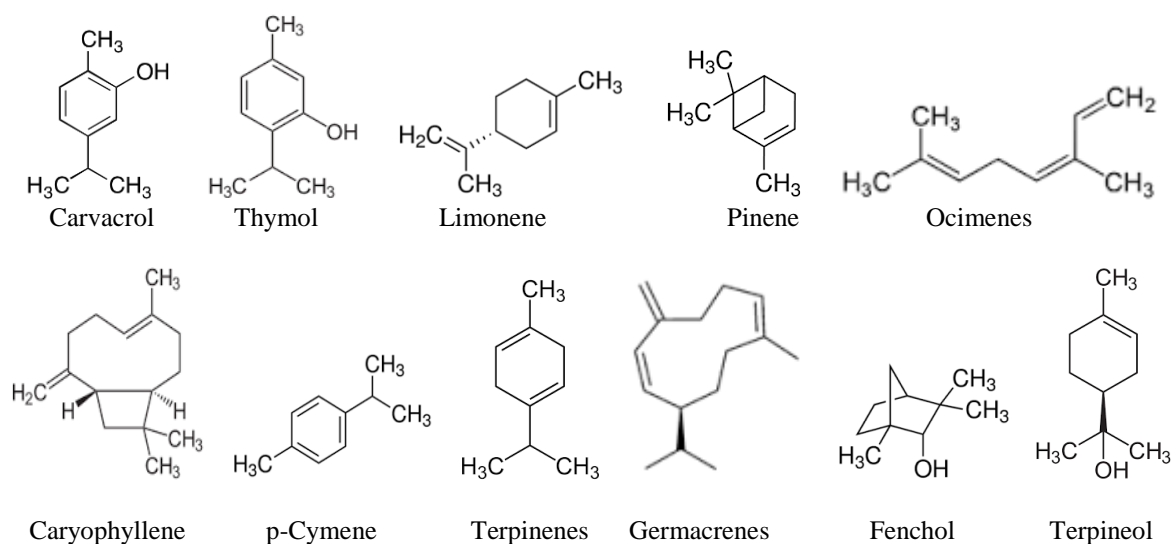


Figure-2: Chemical constituents of oregano

Thymol (2-isopropyl-5-methylphenol) is a natural monoterpene phenol derivative of cymene, $C_{10}H_{14}O$, isomeric with carvacrol, found in oil of thyme, and extracted from *Thymus vulgaris* and various other kinds of plants as a white crystalline substance of a pleasant aromatic odor and strong antiseptic properties. Thymol also provides the distinctive, strong flavor of the culinary herb thyme, also produced from *Thymus vulgaris*. Thymol is part of a naturally occurring class of compounds known as biocides, with strong antimicrobial attributes when used alone or with other biocides such as carvacrol. In addition, naturally occurring biocidal agents such as thymol can reduce bacterial resistance to common drugs such as penicillin. Numerous studies have demonstrated the antimicrobial effects of thymol, ranging from inducing antibiotic susceptibility in drug-resistant pathogens to powerful antioxidant properties. Research demonstrates that naturally occurring biocides such as thymol and carvacrol reduce bacterial resistance to antibiotics through a synergistic effect and thymol has been shown to be an effective fungicide, particularly against fluconazole-resistant strains. This is especially relevant to *Candida* infections. Compounds in the

essential oils of one type of oregano have demonstrated antimutagenic effects, and in particular carvacrol (isomeric with thymol) and thymol were demonstrated to have a strong antimutagenic effect. In addition, there is evidence that thymol has antitumor properties. Though the exact mechanism is unknown, some evidence suggests thymol effects at least some of its biocidal properties by membrane disruption. Thymol has been shown to act as a positive allosteric modulator of $GABA_A$ *in-vitro*. Thymol is chemically related to the anesthetic propofol.

Thymol is only slightly soluble in water at neutral pH, but it is extremely soluble in alcohols and other organic solvents. It is also soluble in strongly alkaline aqueous solutions due to deprotonation of the phenol. Synonyms include isopropyl-*m*-cresol, cymene, 1-methyl-3-4-isopropylbenzene, 2--1-isopropyl-4-methylbenzene, 3-*p*-cymene, 3-methyl-6-isopropylphenol, 5-methyl-2-(1-methylethyl)phenol, 5-methyl-2-isopropyl-1-phenol, 5-methyl-2-isopropylphenol, 6-isopropyl-3-methylphenol, 6-isopropyl-*m*-cresol, Apiguard, NSC 11215, NSC 47821, NSC 49142, thyme camphor, *m*-thymol and *p*-cymen-3-ol. Thymol has a refractive index of 1.5208 and an experimental dissociation exponent

(pKa) of 10.59 ± 0.10 . Thymol absorbs maximum UV radiation at 274 nm. Thymol has antimicrobial activity because of its phenolic structure and has shown antibacterial activity against bacterial strains including *Aeromonas hydrophila* and *Staphylococcus aureus*. In addition, thymol demonstrates considerable post antibacterial effect against some microorganisms. This antibacterial activity is caused by inhibiting growth and lactate production and by decreasing cellular glucose uptake. Thymol has been used in alcohol solutions and in dusting powders for the treatment of tinea or ringworm infections, and was used in the United States to treat hookworm infections. People of the Middle East continue to use za'atar, a delicacy made with large amounts of Thyme, to reduce and eliminate internal parasites. It is also used as a preservative in halothane, an anesthetic and as an antiseptic in mouthwash. When used to reduce plaque and gingivitis, thymol has been found to be more effective when used in combination with chlorhexidine than when used purely by itself. Thymol is also the active antiseptic ingredient in some toothpastes, such as Euthymol. The antifungal nature of thymol is caused by thymol's ability to alter the hyphal morphology and cause hyphal aggregates, resulting in reduced hyphal diameters and lyses of hyphal wall. Additionally, thymol is lipophilic, enabling it to interact with the cell membrane of fungus cells, altering cell membrane permeability permitting the loss of macromolecules. Recent medical research on rats concludes that Thyme extract had relaxing effects on organs possessing β_2 -receptors (uterus and trachea). In a 1994 report released by five major cigarettes companies, thymol was listed as one of 599 additives to cigarettes. Thymol has been used to successfully control varroa mites and prevent fermentation and the growth of mold in bee colonies. Thymol is also used as a rapidly degrading, non-persisting pesticide. Derivatives of thymol and carvacrol with increased antimicrobial activities have been developed. The preparation of methacrylic and p-styrenesulfonic acid esters of thymol could lead to less toxic macromolecular biocides, which can be attached to a polymeric backbone. A minor use of thymol is in book and paper conservation: Paper with mold damage can be sealed in bags with thymol crystals to kill fungal spores. However, this practice is not currently recommended due to apparent accelerated degradation suffered by these objects. Thymol can also be used as a medical disinfectant and general purpose disinfectant. For instance, thymol is used as the starting material used to synthesize biclotymol. Thymol can be brominated to bromothymol, which is a recognized anthelmintic drug.^[10-12]

Limonene is a colorless liquid hydrocarbon classified as a cyclic terpene. The more common d-isomer possesses a strong smell of oranges. It is used in chemical synthesis as a precursor to carvone and as a renewables-based solvent in cleaning products. The less common l-isomer is found in mint oils and has a piney, turpentine-like odor. Limonene takes its name from the lemon, as the rind of the lemon, like other citrus fruits, contains considerable amounts of this compound, which contributes to their odor. Limonene is a chiral molecule and biological sources produce one enantiomer: the principal industrial source, citrus fruit, contains d-limonene ((+)-limonene), which is the (R)-enantiomer. Racemic limonene is known as dipentene. d-Limonene is obtained commercially from citrus fruits through two primary methods: centrifugal separation or steam distillation. The principal metabolites of limonene are (+)- and (-)-trans-carveol, a product of 6-hydroxylation) and (+)- and (-)-perillyl alcohol, a product of 7-hydroxylation by CYP2C9 and CYP2C19 cytochromes in human liver microsomes. The enantiomers of perillyl alcohol have been investigated for their pharmacological activities as dietary chemotherapeutic agents. They are viewed as novel therapeutic options in some CNS neoplasms and other solid tumours, particularly for the treatment of gliomas. The cytotoxic activities of perillyl alcohol and limonene metabolites are likely due to their antiangiogenic activities, hyperthermia inducing effects as well as negative apoptosis regulation and Ras pathways. Limonene is common in cosmetic products. As the main odor constituent of citrus (plant family Rutaceae), d-limonene is used in food manufacturing and some medicines, e.g. as a flavoring to mask the bitter taste of alkaloids and as a fragrance in perfumery, aftershave lotions, bath products and other such products that include fragrance; it is also used as botanical insecticide the d enantiomer is most active as an insecticide. It is added to cleaning products such as hand cleansers to give a lemon-orange fragrance and because of its ability to dissolve oils. In contrast, l-limonene has a piney, turpentine-like odor.^[13]

In natural and alternative medicine, d-limonene is marketed to relieve gastro esophageal reflux disease and heartburn. Limonene is increasingly being used as a solvent for cleaning purposes, such as the removal of oil from machine parts, as it is produced from a renewable source (citrus oil, as a byproduct of orange juice manufacture). It is used as a paint stripper and is also useful as a fragrant alternative to turpentine. Limonene is also used as a solvent in some model airplane glues and as a constituent in some paints. All-natural commercial

air fresheners, with air propellants, containing limonene are used by philatelists to remove self-adhesive postage stamps from envelope paper. Limonene is also finding increased use as a solvent for filament-fused 3D printing. Printers can print the plastic of choice for the model, but erect supports and binders from HIPS, a polystyrene plastic that is easily soluble in limonene. As it is combustible, limonene has also been considered as a biofuel. In preparing tissues for histology or histopathology, d-limonene is often used as a less toxic substitute for xylene when clearing dehydrated specimens. Clearing agents are liquids miscible with alcohols (such as ethanol or isopropanol) and with melted paraffin wax, in which specimens are embedded to facilitate cutting of thin sections for microscopy. d-Limonene is used in the organic herbicide "Avenger".

Pinene (C₁₀H₁₆) is a bicyclic monoterpene chemical compound. There are two structural isomers of pinene found in nature: α -pinene and β -pinene. As the name suggests, both forms are important constituents of pine resin; they are also found in the resins of many other conifers, as well as in non-coniferous plants such as camphorweed and big sagebrush (*Artemisia tridentata*). Both isomers are used by many insects in their chemical communication system. The two isomers of pinene constitute the major component of turpentine. α -pinene is the most widely encountered terpenoid in nature and is highly repellent to insects. α -pinene appears in conifers and numerous other plants. Pinene is a major component of the essential oils of *Sideritis* spp. and *Salvia* spp. (sage). *Cannabis* also contains α -pinene. Resin from *Pistacia terebinthus* (commonly known as terebinth or turpentine tree) is rich in pinene. Pine nuts produced by pine trees contain pinene. Markut lime fruit peel contains an essential oil comparable to lime fruit peel oil; its main components are limonene and β -pinene. In chemical industry, selective oxidation of pinene with some catalysts gives many compounds for perfumery, such as artificial odorants. An important oxidation product is verbenone, along with pinene oxide, verbenol and verbenyl hydroperoxide. Pinenes are the primary constituents of turpentine. Pinene has also been used as anti-cancer agent in Traditional Chinese medicine, also for its anti-inflammatory, antiseptic, expectorant and bronchodilator properties.^[14]

Ocimenes are a group of isomeric hydrocarbons. The ocimenes are monoterpenes found within a variety of plants and fruits. α -Ocimene and the two β -ocimenes differ in the position of the isolated double bond: it is terminal in the alpha isomer. α -Ocimene is *cis*-3,7-dimethyl-1,3,7-octatriene. β -

Ocimene is *trans*-3,7-dimethyl-1,3,6-octatriene. β -Ocimene exists in two stereoisomeric forms, *cis* and *trans*, with respect to the central double bond. The ocimenes are often found naturally as mixtures of the various forms. The mixture, as well as the pure compounds, is oils with a pleasant odor. They are used in perfumery for their sweet herbal scent, and are believed to act as plant defense and have anti-fungal properties. Like the related acyclic terpenemyrcene, ocimenes are unstable in air. Like other terpenes, the ocimenes are nearly insoluble in water, but soluble in common organic solvents. The name is derived from the plant genus name *Ocimum*.^[15]

Caryophyllene or (-)- β -caryophyllene, is a natural bicyclic sesquiterpene that is a constituent of many essential oils, especially clove oil, the oil from the stems and flowers of *Syzygium aromaticum* (cloves), the essential oil of *Cannabis sativa*, rosemary and hops. It is usually found as a mixture with isocaryophyllene (the *cis* double bond isomer) and α -humulene (obsolete name: α -caryophyllene), a ring-opened isomer. Caryophyllene is notable for having a cyclobutane ring, as well as a *trans*-double bond in an 8-membered ring, both rarities in nature. The first total synthesis of caryophyllene in 1964 by E.J. Corey was considered one of the classic demonstrations of the possibilities of synthetic organic chemistry at the time. Caryophyllene is one of the chemical compounds that contributes to the spiciness of black pepper. Caryophyllene was shown to be selective agonist of cannabinoid receptor type-2 (CB₂) and to exert significant cannabimimetic antiinflammatory effects in mice. Antinociceptive, neuroprotective, anxiolytic and antidepressant and anti-alcoholism activity in *in-vitro* studies and in rodent models have been reported. Whether this compound is able to modulate inflammatory processes in humans *via* the endocannabinoid system is yet unknown. However, it is found to elicit significant neuroprotection by its anti-inflammatory and antioxidant activities mediated by activation of the CB₂ receptors in rats. Caryophyllene does not bind to the centrally expressed cannabinoid receptor type-1 (CB₁) and therefore does not exert psychoactive effects.^[16]

However, phytocannabinoid-terpenoid interactions that could produce synergy with respect to treatment of pain, inflammation, depression, anxiety, addiction, epilepsy, cancer, fungal and bacterial infections (including methicillin resistant *Staphylococcus aureus* MRSA) are found. Scientific evidence have been presented for non-

cannabinoid plant components as putative antidotes to intoxicating effects of THC (C₂₁H₃₀O₂) that could increase its therapeutic index.

***p*-Cymene** is a naturally occurring aromatic organic compound. It is classified as an alkylbenzene related to a monoterpene. Its structure consists of a benzene ring *para*-substituted with a methyl group and an isopropyl group. There are two less common geometric isomers. *o*-Cymene, in which the alkyl groups are *ortho*-substituted, and *m*-cymene, in which they are *meta*-substituted. *p*-Cymene is the only natural isomer. All three isomers form the group of cymenes. *p*-Cymene is insoluble in water, but miscible with ethanol and diethyl ether. It is a constituent of a number of essential oils, most commonly the oil of cumin and thyme. Significant amounts are formed in sulfite pulping process from

the wood terpenes. *p*-Cymene is a common ligand for ruthenium.^[17]

The **terpinenes** are a group of isomeric hydrocarbons that are classified as terpenes. They each have the same molecular formula and carbon framework, but they differ in the position of carbon-carbon double bonds. α -Terpinene has been isolated from cardamom and marjoram oils, and from other natural sources. β -Terpinene has no known natural source, but has been prepared synthetically from sabinene. γ -Terpinene and δ -terpinene (also known as **terpinolene**) are natural and have been isolated from a variety of plant sources. α -Terpinene is a perfume and flavoring chemical used in the cosmetics and food industries. Its use in both the pharmaceutical and the electronics semi-conductor manufacturing industries has also proven to be valuable.^[18]



Figure-3: Oregano makes yummy to taste buds (mountain of joy)

Germacrenes are a class of volatile organic hydrocarbons, specifically sesquiterpenes. Germacrene is typically produced in a number of plant species for their antimicrobial and insecticidal properties, though they also play a role as insect pheromones. Two prominent molecules are germacrene A and germacrene D.^[19]

Fenchol or 1,3,3-trimethyl-2-norbornanol is a terpene and an isomer of borneol. The naturally occurring enantiopure (1*R*)-endo-(+)-fenchol is used extensively in perfumery. Fenchol is also, a scent from basil.^[20]

Terpineol is a naturally occurring monoterpene alcohol that has been isolated from a variety of sources such as cajuput oil, pine oil and petitgrain oil. There are four isomers, *alpha*-, *beta*-, *gamma*-terpineol and terpinen-4-ol. *beta*- and *gamma*-terpineol differ only by the location of the double bond. Terpineol is usually a mixture of these isomers with *alpha*-terpineol as the major

constituent. Terpineol has a pleasant odor similar to lilac and is a common ingredient in perfumes, cosmetics, and flavors. α -Terpineol is one of the two most abundant aroma constituents of lapsang souchong tea; the α -terpineol originates in the pine smoke used to dry the tea. (+)- α -Terpineol is a chemical constituent of skullcap.^[21]

CONCLUSION

Oregano's most prominent modern use is as the staple herb of Italian-American cuisine. Its popularity in the U.S. began when soldiers returning from World War II brought back with them a taste for the pizza herb, which had probably been eaten in southern Italy for centuries. There, it is most frequently used with roasted, fried, or grilled vegetables, meat, and fish. Oregano combines well with spicy foods popular in southern Italy. It is less commonly used in the north of the country, as marjoram generally is preferred. The herb is widely used in cuisines of the

Mediterranean Basin, the Philippines and Latin America. In Turkish cuisine, oregano is mostly used for flavoring meat, especially for mutton and lamb. In barbecue and kebab restaurants, it can be usually found as a condiment, together with paprika, salt and pepper.

The dried and ground leaves are most often used in Greece to add flavor to Greek salad and is usually added to the lemon-olive oil sauce that accompanies fish or meat grills and casseroles. Oregano is used in the southern Philippines to eliminate the odor of carabao or water buffalo when boiling it, while simultaneously imparting flavor. Oregano oil and oregano have been used in folk medicine since ancient times. Although oregano or its oil may be used as a dietary supplement, there is no clinical evidence to indicate either has any effect on human health. Oregano contains polyphenols, including numerous flavones. The essential oil of oregano is composed primarily of monoterpenoids and monoterpenes, with the relative concentration of each compound varying widely across geographic origin and other factors. Over 60 different compounds have been identified, with the primary ones being carvacrol and thymol ranging to over 80%, while lesser abundant compounds include p-cymene, γ -terpinene, caryophyllene, spathulenol, germacrene-D, β -fenchyl alcohol and δ -terpineol. Drying of the plant material affects both quantity and distribution of volatile compounds, with methods using higher heat and longer drying times having greater negative impact. A sample of fresh whole plant material found to contain 33 g/kg dry weight (3.1 g/kg wet) decreased to below a third after warm-air convection drying. Much higher concentrations of volatile compounds are achieved towards the end of the growing season. Oregano is an important culinary and medicinal herb that has been used in medicine and cooking for thousands of years - with a number of potential health benefits. It is a species of *Origanum*, belonging to the mint family (*Lamiaceae*). Its name comes from the Greek words *oros* (mountain) and *ganos* (joy). Oregano typically grows 50 cm tall and has purple leaves around 2 to 3 centimeters in length. The chemicals that give the herb its unique and pleasant smell are thymol, pinene, limonene, carvacrol, ocimene and caryophyllene. Not only does oregano provide food flavor, there are also a substantial number of health claims associated with its potent antioxidants and anti-bacterial properties.

Possible health benefits of Oregano

Oregano has a very pleasant aromatic scent. The herb is used to treat respiratory tract disorders, gastrointestinal (GI) disorders, menstrual cramps, and urinary tract disorders. The herb is also applied

topically to help treat a number of skin conditions, such as acne and dandruff. Oregano contains: fiber, iron, manganese, vitamin E, iron, calcium, omega fatty acids, manganese and typtophan.

Oregano is also a rich source of:

- Vitamin K - an important vitamin which promotes bone growth, the maintenance of bone density, and the production of blood clotting proteins.
- Dietary antioxidants - a report published in the *Journal of Nutrition* revealed that oregano contains very high concentration of antioxidants (i.e., >75 mmol/100 g). Antioxidants help protect your cells against the effects of free radicals and improve your ability to fight infection.

1. Antioxidants for Immune System Support:

One active agent in oregano is rosmarinic acid, which is a strong antioxidant that may support immune system health. Oregano has one of the highest antioxidant activity ratings, with 42 times the antioxidant punch of apples.

2. Antifungal, Antibacterial and May Even Kill MRSA (Methicillin Resistant Staphylococcus Aureus):

Carvacrol and thymol, two phytochemicals in oregano, are powerful antimicrobials. Research has shown essential oils from oregano may kill the foodborne pathogen *Listeria* and the superbug MRSA (making it a useful addition to hand soaps and disinfectants).

3. Anti-inflammatory Properties: Oregano contains β -caryophyllin, a substance that inhibits inflammation and may also be beneficial for conditions including osteoporosis and arteriosclerosis, as well as metabolic syndrome.

4. Useful for Upper Respiratory Infections:

Oregano also has potential anti-viral activity and a spray containing aromatic essential oils from five plants, including oregano, was found to significantly relieve symptoms immediately in those with upper respiratory infections. If you come down with a cold or the flu, oregano oil can also be useful. Generally, the higher the carvacrol concentration, the more effective it is. Interestingly, oregano encourages sweat production as a mode of detox and ingesting it may help your body to get rid of unwanted phlegm in your lungs.

5. Cancer-Fighting Effects: Oregano extract has been shown to lead to growth arrest and cell death in a dose- and time-dependent manner in colon cancer cells. A phytochemical in oregano, carnosol, has also been evaluated for anti-cancer property in prostate, breast, skin, leukemia and colon cancer with promising results. It is used in: Cold, Dandruff, Bloating, Fatigue, Muscle pain, Bronchitis, Headaches, Intestinal parasites,

Repelling insects, Acne, Toothache, Heart conditions, Earache, Menstrual cramps.

More Than Flavor: Why Use Oregano in Your Cooking?

Oregano's warm, aromatic flavor works well with many foods (not just Italian). Try adding it to salad dressings, vegetables, or eggs, for starters. Beyond this, one of the best uses for oregano in your cooking is adding it to meat prior to cooking, which may help reduce the toxic compounds created during the cooking process. One study found that adding an antioxidant-rich spice blend that included oregano to meat prior to cooking reduced the level of malondialdehyde (a chemical marker for oxidation) in the meat by 71% and levels in participants' urine by 49%. The researchers used a blend of: Cloves, Ginger, Cinnamon, Black pepper, Oregano, Paprika, Rosemary, Garlic powder. When purchasing oregano, you'll likely find two varieties: Mediterranean oregano (also known as Greek oregano, Turkish oregano and European oregano) and Mexican oregano. Although their flavors are similar, Mediterranean oregano and Mexican oregano come from two different plants. Mexican oregano is actually most closely related to lemon verbena and has a stronger, more pungent and also less sweet flavor than Mediterranean oregano. In choosing which one to use in your cooking, Mexican oregano works well in spicy, intensely flavored dishes alongside spices like cumin and chili powder. Mediterranean oregano works well with Italian dishes, fish, lamb, salads, vegetables and other dishes with more mild flavors.

Oregano Oil Is a Wonderful Addition to Your Natural Medicine Chest

In addition to its culinary uses, oregano oil may be useful for fighting off many types of infections, making it a useful home remedy. For instance, the anti-bacterial, anti-viral, and antifungal properties in oregano oil may be useful for:

- Inhibiting the growth of *Klebsiella pneumoniae* and *Staphylococcus aureus*, which may cause respiratory infections. It may also fight multi-drug resistant bacteria.
- Urinary tract infections (UTIs), because it inhibits the growth of *Escherichia coli*, *Proteus* and *Pseudomonas aeruginosa*, bacteria that may cause UTIs.

- Yeast infections, including those that are resistant to the commonly used drug Diflucan.
- Parasitic infections. Oregano oil has been shown to be more effective against the parasitic amoeba *Giardia* than the drug tinidazol.
- Food-borne illness. Many food-borne pathogens, including *Listeria*, *Salmonella*, *Escherichia coli* and *Shigella dysenteriae* are inhibited by oregano oil. Not only may adding the oil to foods help to kill such bacteria, but using the oil if you have food poisoning may help to alleviate your symptoms.

You can use oregano oil in a variety of ways, depending on your health needs:

- Topically for athlete's foot or nail fungus. Try soaking your feet in a basin of water with a few teaspoons of oil, or rubbing the diluted oil (1 drop of oil in a teaspoon of olive or coconut oil) on your nails/skin.
- Inhaled to treat sinus infections or colds. Simply put a few drops of oregano oil in a pot of steaming water. Carefully inhale the steam, being careful not to get burned.
- Under your tongue to help treat infections or parasites. Dilute the oil (1 drop of oil with 1 drop of carrier oil) and place one or two diluted drops under your tongue. Hold it for a few minutes, then rinse your mouth with water. Repeat up to four times a day.

Other possible health benefits of oregano: Cold, Muscle pain, Acne, Dandruff, Bronchitis, Toothache, Bloating, Headaches, Heart Conditions, Allergies, Intestinal parasites, Earache, Fatigue, Repelling insects, Menstrual cramps.

However, it's important to note that further high quality study results are necessary to confirm these claims.

Food scientists have discovered that the popular culinary herbs rosemary, oregano and marjoram contain compounds that may have the potential to manage type 2 diabetes in a similar way to some currently prescribed drugs. Eating oregano can cause stomach upsets in some people. In addition, those who are allergic to plants belonging to the Lamiaceae family (such as including basil, lavender, mint and sage) should be cautious, as they may also develop an allergic reaction to oregano.

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