

An Overview of Herbal Plant: Peppermint

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ABSTRACT: Peppermint (*Mentha piperita* L.) is a prominent medicinal herb and largely acknowledged by medicinal and food processing industries due to its excellent health benefits. It is mostly known for its antioxidant and antibacterial properties. The oil of *mentha piperita* is antimicrobial, cooling receptor trigger, pesticidal, anticancer, hack, asthma, and use in painkiller, exercises of enthusiasm for the sustenance and corrective enterprises just as in the human well-being field in pharmaceutical. These plants and their essential oils are used in medicine, cosmetics, and the food industry. Generally speaking, sweets, teas, mouth fresheners, toothpaste, alcoholic liqueurs, jellies, syrups, ice creams, cough drops, chewing gum, confections, soaps, detergents, and insect repellents are made with peppermint oil and its numerous byproducts. Cadmium (Cd) is a heavy metal presence in soil induces oxidative

are produced by peppermint. Essential oils are the subtle aromatic and volatile liquids extracted from any part of plants through distillation. Stem distillation is a basic.

Essential oils of this genus has also been reported to display several biological effects including anti-inflammatory, anti-microbial, anti-hypertensive, anti-oxidant, antiallergic and anti-viral activities due the presence of specialized metabolites such as aromatic compounds and terpenoids. When they were first identified, their special qualities—such as being diaphoretic, stomachic, anti-spasmodic, antimicrobial, and refreshing—were recognized. It relief carvings against cold, flu, fever, anorexia, nausea, motion sickness, food poisoning, rheumatism, hiccups, wounds, cramping, diarrhea, earaches, gassiness, esophagus and sinus illnesses.

I. INTRODUCTION:

Throughout most of human history, medicinal remedies have been derived from plants. A hybrid mint created by crossing spearmint and water mint, peppermint (*Mentha piperita*) is a kind of mint. Peppermint is a herb that is grown and marketed around the world. The genus *Mentha* is mostly found in North America, Europe, Africa, Australia, and Asia, among other places where natural healing resources are abundant. This is mostly cultivated in countries with cold climates and hillsides. Peppermint was first described in 1753 by Carl Linnaeus from specimens collected in England. It is cultivated in a temperate region of Europe, Asia, United States, India and Mediterranean countries. and there are almost 600 different species.

The genus *Mentha* comprises more than 25 species and among all these species, peppermint is the most common one. Peppermint belongs to the family Lamiaceae. It is a herbaceous rhizomatous perennial plant. With smooth stems and a square cross shape, the plant grows to a height of 30 to 90 cm. Vast and meaty, the rhizomes have fibrous roots and spread widely. The leaves have a maximum length of 4–9 cm and a maximum width of 1.5–4 cm. Purple blooms that are 6–8 mm long



Fig1; Peppermint plant

Constituents and applicability of peppermint: Peppermint (*Mentha piperita*, also known as *Mentha balsamea*) is a perennial herbal medicine and belongs to the mint family Lamiaceae. The peppermint plant is a cross hybrid between watermint (*Mentha aquatica*) and spearmint. Peppermint has smooth dark green leaves with squared stems and blunt oblong bunches of pink lavender flowers. The leaves of peppermint have a strong, spicy smell that becomes more fragrant after chewing. A vibrant and good source of several minerals, including Na, Mg, K, Ca, Cr, Fe, Co, Cu, Zn, and Se, is peppermint. It comprises around 0.5% to 4% essential oils, that are having the composition of about 25% to 78%

menthol, 14% to 36% menthone, 1.5% to 10% isomenthone, 2.8% to 10% menthyl acetate.

Botanical Taxonomy, Distribution, and Description: *Mentha × piperita* L. is the only accepted name for this peppermint plant with 19 other synonyms which are summarized in Table 1.

Table 1: *Mentha × piperita* L S synonyms.

1. Willd. var. *balsamea* (*Mentha piperita*) Rouy
2. *Mentha × piperita* var. *beckeri* Briq.
3. *Mentha × piperita* var. *braousiana* (Pérard) Briq.
4. *Mentha × piperita* var. *calophylla* Briq.
5. *Mentha × piperita* var.
6. *calvifolia* *Mentha piperita* subsp. *citrata* (Ehrh.) Briq.
7. *Citrato* *Mentha × piperita* var. (Ehrh.) Briq
8. *Citrato* *Mentha piperita* var. (Ehrh.) Briq.
9. *Citrato* *Mentha piperita* subsp. *citrata* (Ehrh.) Briq.
10. *Mentha × piperita* var. *crispa* (L.) W.D.J. Koch
11. *Mentha × piperita* var. *crispula* (Wender.) Heinr. Braun
12. *Mentha × piperita* var. *durandoana* (Malinv. ex Batt.) Briq.
13. *Mentha × piperita* var. *globosiceps* Briq.
14. *Mentha × piperita* var. *hercynica* (Röhl.) Briq.
15. *Mentha × piperita* var. *heuffelii* (Heinr. Braun) Topitz
16. *Mentha × piperita* var. *hispidula* *Mentha piperita* var. *hudsoniana* is listed as Briq.
17. Heinr. Braun
18. *Mentha × piperita* var. *inarimensis* (Guss.) Briq.
19. *Mentha × piperita*

a). Botanical description: The peppermint is aromatic rhizomatous perennial herb reaching up to 30–90 cm and its stems erect, quadrangular. The generally branched stems are frequently tinged violet or purplish. The dim or light green leaves are oblong-ovate, opposite, serrate and short-petioled with their toothed margins and its range between 4 and 5 cm long. Flowers are purple or reddish, 8 mm long, false spikes with many bracts inconspicuous. Fruit consists of four ellipsoidal

nutlets. Peppermint generally grows best in shaded.

b). Geographic distribution: The species peppermint (*M. × piperita*) is indigenous to Europe and widely distributed in eastern and northern Europe, United States of America and Africa. It has, nevertheless, been grown continuously all over the planet. Generally speaking, peppermint grows in wet environments. In Nepal, peppermint is referred to as “pudina”. It is widely distributed in Himalayan region to Terai region of Nepal.

c). Taxonomy: Peppermint belongs to Lamiaceae family known as mint or sage family. Lamiaceae family consists of over 7,200 species and around 260 genera of trees and shrubs. The genus comprises about 61 species and 13 natural hybrids.

Grouping:

DOMAIN: Eukarya
KINGDOM: Plantae
SUBKINGDOM: Tracheobionta
SUPERDIVISION: Spermatophyta
PHYLUM: Angiospermophyta
CLASS: Dicotyledon, Magnoliopsida
LISTING: Lamiales Lamiaceae is the family of mints. *Mentha × piperita* is a species belonging to the genus *Mentha*.
COMMON NAME: Peppermint

Method of extracting peppermint:

Chemicals:

- Hydrochloric acid
- Sodium hydroxide
- Aluminum chloride
- Dimethyl sulphoxide (DMSO)
- Neomycin

Tools:

- Oven;
- Soxhlet;
- Weighing apparatus;
- Heating mantle
- Incubator

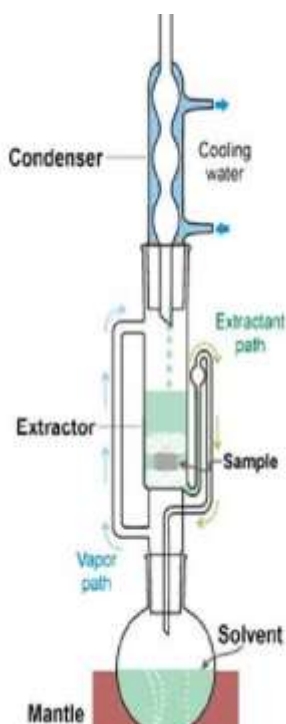


Fig2: Soxhlet Apparatus for Extraction of peppermint.

Extraction by Soxhlet method: Sample collection and drying. The fresh green leaves of *Mentha piperita* was collected from Bhaktapur in September 2018. After washing the leaves with water to get rid of any epiphytic hosts that would typically be on the surface, they were let to dry for two weeks in the shade. The powder was made by hand-grinding these dried leaves. After that, it was kept cold.

Plant material extraction: We ground 90 grams of dry leaves into a powder. Then, the 50 gram of powdered form of leaves of *Mentha piperita* was extracted by Soxhlet extraction method using methanol. Methanol (250 ml) was utilized as the solvent. The apparatus was repeatedly warmed using a heating mantle. The sample was placed in an extraction thimble, but that thimble was then submerged straight into a boiling solvent. The solvent used for Soxhlet extraction, which has undergone several cycles for about 6-7 hours was collected and the obtained solvent was concentrated by rotary evaporator under the reduced pressure, maintaining temperature lower than the boiling point of the solvent used i.e. methanol. The extracts were kept in the vile tubes at very low temperature.

Analysis of phytochemistry: This method requires the selective and successive extraction of the plant phytochemical. The analysis of the presence of main group of natural constituents present in the plant extract was done using different specific reagents. Using conventional techniques, chemical tests were conducted to discover bioactive chemicals of pharmacological significance. phytochemicals include phenols, flavonoids, alkaloids, saponins, tannins, and terpenoids, among others.

Phytochemical screening of extract of leaves of *Mentha piperita*

S.N	Phytochemicals	Methanol Extract
1.	Tannins	+
2.	steroids	-
3.	Glycosides	+
4.	Flavonoids	+
5.	Anthraquinone	-
6.	Alkaloids	+

presence = (+) & (-) = absence

Drying methods: The hot air drying is the most commonly used method, but it leads to thermal damage and severely reduces the volatile compounds of herbs as well as the color. However, in the recent decade, many researchers have reported some advanced methods of drying aromatic herbs such as microwave drying, infrared drying, freeze-drying, and fluidized bed drying, which may have the potential to overcome these problems.

Sun drying: The open-air sun drying of thyme and mint leaves was investigated by Ismail and Beyribey. They obtained the drying times as 440 minutes for thyme and 420 minutes for mint from the initial moisture content (73.80% for thyme and 84.70% for mint) to the final moisture content (7.6% for thyme and 4.85% for mint). The value ranges for fresh and dried herbs were found as 40.25 and 35.70 for thyme and as 44.01 and 33.08 for mint, respectively.

Tray drying: The thin-layer drying behavior of mint leaves for a temperature range of 35-60 °C in a cabinet dryer. It was observed that the effective diffusivity varied from 3.067×10^{-9} to 1.941×10^{-8} m²/s and increased with the air temperature.

Traditional uses: *M. × piperita* is reported for its therapeutic use in Chinese traditional medicine and its dried leaves were found in Egyptian pyramids. In the Arab region and northern African, Peppermint is utilized as an aromas and flavoring ingredient in a famous drink "Touareg tea". It is

utilized as a carminative, stimulant, tonic, antiviral, and antifungal drug in traditional Iranian medicine. *M. × piperita* and its essential oil are used in Western and Eastern traditional drug as a remedy against anti-spasmodic, anti-septic, aromatic and also for treatment of colds, nausea, sore throat, cancers, toothaches, cramps and indigestion Traditional Greek, Roman, and Egyptian medicine and cookery all employed peppermint. In traditional medicine, peppermint leaf and oil are used as a flavoring and cosmetic agent.

Uses of peppermint oil: Peppermint oil is commonly used as flavoring in foods and beverages and as a fragrance in soaps and cosmetics. Peppermint oil also is used for a variety of health conditions and can be taken orally in dietary supplements or topically as a skin cream. Additionally, usage as an antioxidant and an antiviral antiseptic and antimicrobial anticarcinogenic Anti-allergic and antic Antitumorinogenic Antispasmodic

The side effects of peppermint oil include:

- Heartburn,
- Allergic reactions such as flushing, headache, and mouth sores and
- Anal burning during bouts of diarrhea.

Characteristics of peppermint:

- a. Antiviral properties of peppermint
- b. Anti-bacterial properties of peppermint
- c. Anti-fungal properties of peppermint
- d. Allelopathic properties of peppermints
- e. Anti-inflammatory properties of peppermint
- f. Spasmolytic properties of peppermint
- g. Anti-headache properties of peppermint
- h. Radioactive features of peppermint.

Medicinal effects:

1. Peppermint in diabetes: Hemalakshmi described diabetes as a disorder of metabolism, in which serum glucose level is high due to either lack of the glucose-anabolic enzyme. With oral administration of 2 mM infusion extract of peppermint - salicylic acid on diabetic rats for 4 weeks there was a decrease in the blood and urine glucose level as well as the albumin, urea and uric acid levels in urine. The extract of peppermint leaves has significant effect on the reduction of blood glucose level and simultaneously increase insulin level in blood.

2. Neuro-psychiatric effects of peppermint: Peppermint is famously known as one of the

central nervous system stimulants. The benefits of fragrances on cognitive performance, perceived stressful physical work, and pain responses were conducted, depending on possible changes of brain's activity.

3. Cardiovascular properties of peppermint: Vasodilating property in some animals and thus is related to lowering of blood pressure, especially systolic and reduction in heart rate as well. These cardiovascular effects of peppermint oil may possibly be due to reduced arterial smooth muscle tonicity.

4. Fever reducing activities of peppermint: Peppermint is used in tea as a herbal infusion, includes healing of fever. This may be due to the presence of menthol which has a cooling effect on the body naturally. The menthol lowers fever by acting inside. Furthermore, menthol naturally soothes muscles, which helps lessen the aches and pains brought on by elevated body temperature.

5. Nausea preventing activities of peppermint: The anti-spasmodic properties of peppermint tea treat nausea and prevent puking. The fragrance of peppermint can increase feelings of nausea while organic compounds in the mint help to relax stomach muscles which contract and lead to retching.

6. Covid-19 and peppermint: Essential Oils of peppermint contain several bioactive compounds like menthone and menthanol, which are able to inhibit the replication of some viruses even including covid19 virus. *Mentha piperita* L., or peppermint, inhibits the capacity of viruses such as SARS CoV to spread. As a result, peppermint stops the COVID-19 virus from interacting with the host body. As well as vapour of peppermint, hot peppermint tea and other peppermint-containing products give relief from various nasal problems.

Antibacterial Activity: Antibacterial activity of peppermint, the diameter of zone of inhibition (ZOI) produced by plant extract on particular bacteria was measured. *Mentha piperita* leaf methanol extract was investigated. The extract's antimicrobial analysis yielded the following tabular results.

Antibacterial evaluation of methanolic extract of leaves of *Mentha piperita*

S.N	Name of the Bacteria	ZOI (mm) of extract
1.	<i>Pseudomonas aeruginosa</i>	0
2.	<i>Salmonella typhi</i>	0
3.	<i>Escherichia coli</i>	0
4.	<i>Staphylococcus aureus</i>	0

II. CONCLUSION:

Since ancient times, herbs have fascinated the scientific attention of the biotechnology, cosmetic, pharmaceutical, and food industries and subsequently used for many purposes such as medicinal, flavoring, beverages, dyeing, fragrances, and other industrial practices. Concerning to wellbeing prosperities of peppermint, it can be stated that peppermint herb has enormous capabilities to handle human ailments, besides it has a great career in global trade. *M. × piperita* has a significant healing effect and covers enormous medicinal values in the traditional uses. The traditional medicine of *M. × piperita* use to treat coughs, bronchitis, respiratory diseases, rheumatism, muscle pain and nervous diseases have not yet scientific evidence-based research. A simple extraction system is constructed using steam distillation technique for peppermint plant. Peppermint oil is used orally and extract and tea also pragmatic outwardly as a burnish or embrocation. In addition to its pharmacological properties, which include anti-inflammatory, anti-allergenic, antioxidant, fungicidal, antiviral, anti-radiation, and anti-toxic properties, peppermint is beneficial against a variety of noncommunicable disorders, such as diabetes, fever, nausea, and so on. In some cases it has shown antinocidative effects also and even possesses antipesticide effects. After analyzing the data, we conclude that the Cd is having a negative oxidative stress effect on the peppermint plants. In the past, peppermint was utilized as a rubefacient.

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