VOLATILE OILS

(MENTHA, CLOVE, CINNAMON, FENNEL AND CORIENDER)

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VOLATILE OILS

- **Definition :**
- The odorous, volatile principles of plant and animal sources are known as volatile oils. They are liquid, volatile oils will evaporate or volatize when exposure at an ordinary temperature and so they are called **ethereal oils.** They are also called as **essential oils** as they are essences or concentrated constituents of the plants.

General properties of volatile oils

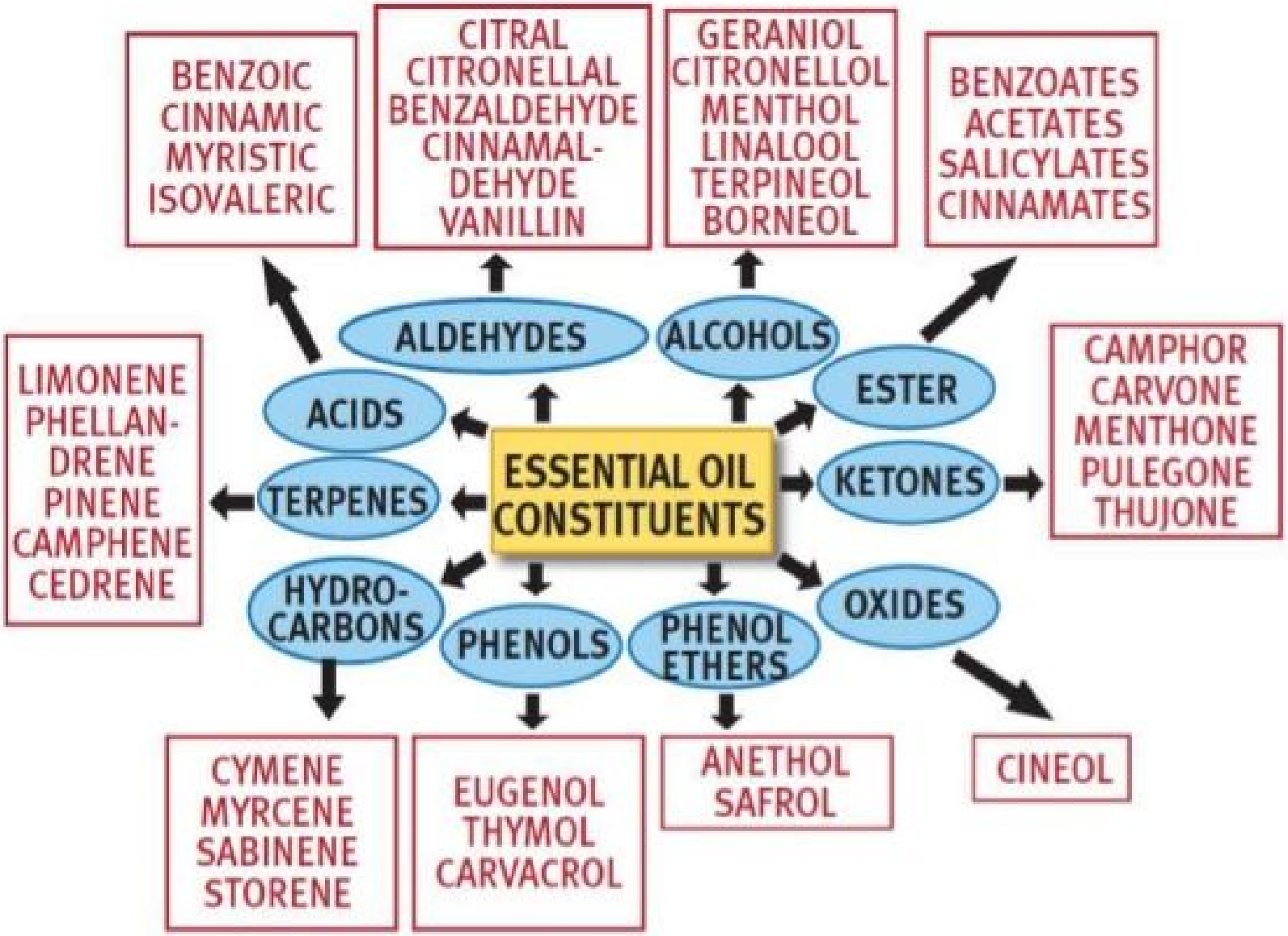
1. They are soluble in alcohol, ether and other lipid solvents and practically insoluble in water.

2. They are usually lighter than water.

3. They possess characteristic odours and they have high refractive index

- 4. Most of them are optically active.
- 5. They are secreted in special structuree such as duct, cell, schzogenous or lysigenous gland, trichomes.
- 6. They are commonly found in the species of Labiatate, Rutaceae, Piperaceae, Zingeberaceae, Umbellifereae, Myrtaceae and Lauraceae.

- **CHEMICAL NATURE:**
- Chemically , they are derived from terpenes and their oxygenated compounds. They are made up of isoprene units (C_5H_8) and are usually mono-, sesqui-, and diterpenes with empirical formulae as $C_{10}H_{16}$, $C_{15}H_{24}$, and $C_{20}H_{32}$ respectively.


ESSENTIAL OIL CONSTITUENTS
ALDEHYDES
ALCOHOLS
ESTER
KETONES
OXIDES
PHENOL ETHERS
PHENOLS
HYDRO-CARBONS
TERPENES
ACIDS
BENZOIC CINNAMIC MYRISTIC ISOVALERIC
CITRAL CITRONELLAL BENZALDEHYDE CINNAMAL-DEHYDE VANILLIN
GERANIOL CITRONELLOL MENTHOL LINALOOL TERPINEOL BORNEOL
BENZOATES ACETATES SALICYLATES CINNAMATES
CAMPHOR CARVONE MENTHONE PULEGONE THUJONE
LIMONENE PHELLAN-DRENE PINENE CAMPHENE CEDRENE
CYMENE MYRCENE SABINENE STORENE
EUGENOL THYMOL CARVACROL
ANETHOL SAFROL
CINEOL

Composition

Volatile oils generally composed of **two** portions:

- **Hydrocarbon** – terpene derived from acetate **mavelonic** acid pathway and are called **eleoptenes**.(Liquids)
- **Oxidized hydrocarbon** derived from **shikimic** acid phenylpropanoid pathway are called **steareoptenes**.(solids) Steareoptenes are water soluble but more alcohol soluble.
- The odour and taste of vol. oils is due to the oxygenated part
- Note: When eleoptenes and stereoptenes combine, result in vol. oils.

Significance / Uses

- Plants

1. **Citronella** oil, being a volatile oil, is an **insect repellent** obtained from plants thus preventing the destruction of the flowers and leaves.
2. **Insect attractant** volatile oils help in the **cross fertilization** of different species of plants.

- Humans

1. As a flavoring agent.
2. Used in perfume industries and in cosmetics
3. As starting material for synthesis of other compounds
4. Used as a therapeutic agent

Therapeutic uses:

THERAPEUTIC ACTIVITIES

a. As a counter irritant
b. Eucalyptus oil administered as an inhalant.
c. Improves local circulation
d. As carminative(relieve gas),shows anti-spasmodic.
e. Thymol is used in mouth washes and gargles
f. Local an anesthetic
g. Reduce secretion of lungs in cough and asthma.
h. Antiseptic,anti bacterial, anti fungal
i. Anti helminthes (destroy parasite worms)
j. Also used in aroma therapy(eg lavander rosemary)

Commercial Use

- Perfume & cosmetic Industry
- Masking agent in cleaning mixtures
- Polishes & insecticides
- Flavours for foods & confections (elaborate sweet/delicacy)

Classification of volatile oils

1. Hydrocarbon volatile oils
2. Alcoholic volatile oils
3. Aldehydic volatile oils
4. Ketonic volatile oils
5. Phenolic volatile oils
6. Phenolic ether volatile oils
7. Oxide volatile oils
8. Ester volatile oils
9. Miscellaneous volatile oils

Classification of volatile oils

- **Hydrocarbon vol oils** :cubeb ,terpentine oil
- **Alcoholic vol oils** :peppermint ,cardamom, corriander
- **Aldehyde vol oils:** cinnamon ,bitter orange peel,sweet orange peel, lemon peel
- **Phenolic vol oils:** clove,thyme
- **Ketonic vol oils**: camphor,spearmint,caraway,buchu leaves
- **Phenolic ether vol oils** :fennel ,anise ,myristica
- **Oxidized vol oils** :euclyptus ,chenopodium
- **Ester vol oils** :rosemary
- **Miscellaneous vol oil** :anethum ,allium

Difference between volatile oil and fixed oil

VOLATILE OILS	FIXED OILS
Evaporate from source when exposed to room temperature.	Remain fixed on the source when exposed to room temperature.
Color less liquid, or crystalline or amorphous solid.	Some of these oils possess colors i.e. castor oil, shark liver oil.
Do not form permanent stains on paper.	Form permanent stain on paper.
Do not rancidify.	Rancidified on exposure to air.
Having distinct odor.	May or may not possess odor.
Can be distilled from natural sources.	Can not be distilled.
On exposure to air and light, they oxidize and resins are formed.	On exposure to air or light, it becomes rancid developing a disagreeable odor.
Can not be saponified.	Can be saponified.
Mixture of mono sesquiterpenes.	They are esters of glycerol with lo fatty acid chain.
Immiscible in water but soluble in	Soluble in water, sparingly soluble

Methods of Extraction

The method of obtaining volatile oils depends upon the condition of plant materials.

Oil production can be divided into three major ways

i. Distillation (Hydro-distillation)
ii. Solvent extraction
iii. Mechanical expression

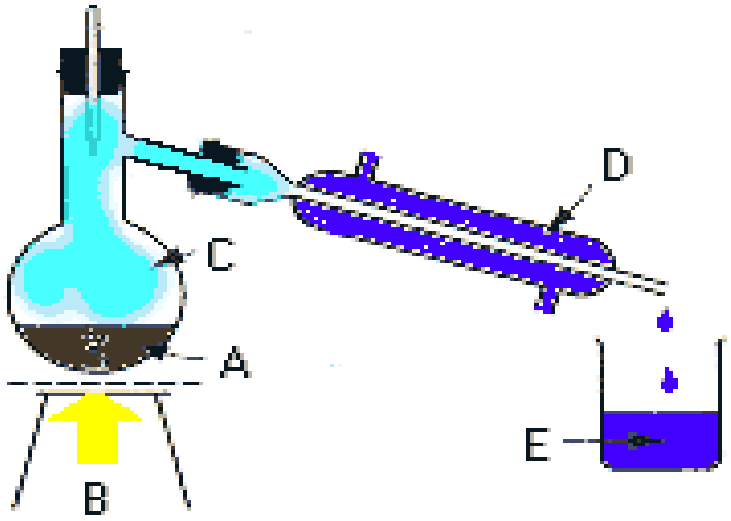
Specialized methods are:

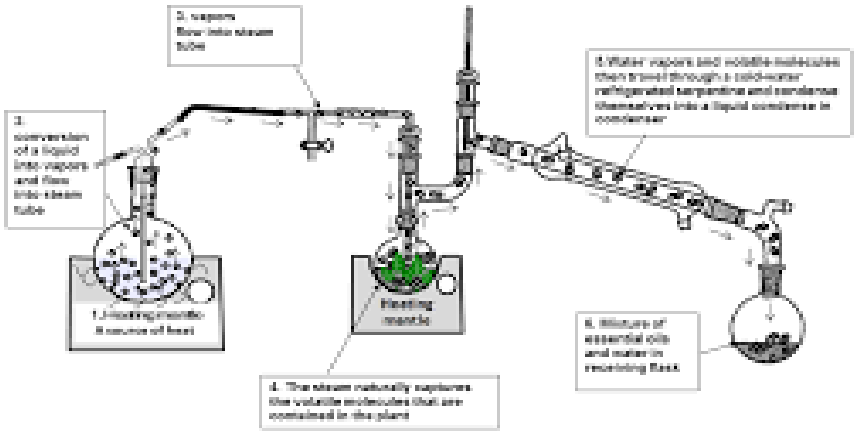
i. Ecuelle Method
ii. Enfleurage
iii. Destructive distillation

i. Distillation

- Three types of distillation are used

a. Water distillation
b. Water and steam distillation
c. Direct steam distillation





Steam distillation process

a. Water distillation

- Applied to plant material that is **dried** and is not **destroyed** by **boiling**.
- **Turpentine oil** is obtained by this method.
- The crude turpentine oleoresin is introduced into the distilling chamber.
- It is subjected to heat until all volatile matter, both oil and water, is condensed in the condensing chamber.
- Turpentine oil is not affected by this amount of heat.

b. Water and steam distillation

- Applied to plant material that may be dried or fresh and can be destroyed by boiling.
- In case of dried material e.g. cinnamon or clove, the drug is ground.
- It is then covered with a layer of water.
- Steam is passed through the macerated mixture.
- As the oil can be damaged by direct boiling; therefore, steam is generated elsewhere and is conveyed into the container that keeps the drug.
- Oily layer of condensed distillate is separated from the aqueous layer.
- The oil is then marketed with or without further processing.

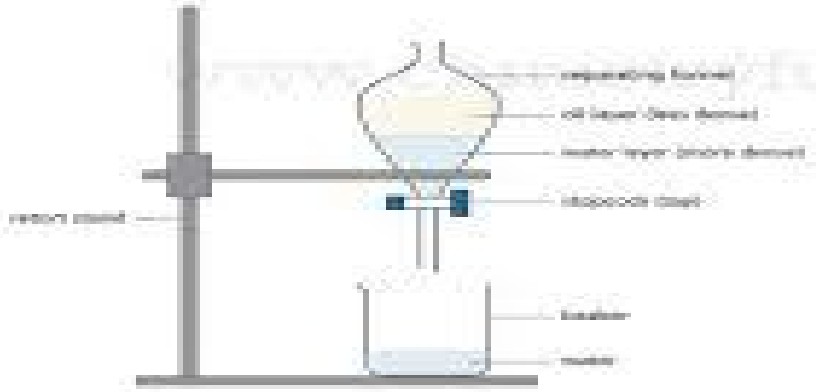
c. Direct steam distillation

- Applied to plant material that is fresh e.g. peppermint or spearmint.
- The plant is cut and is placed directly into a metal distilling tank on a truck bed.
- The truck is moved to a distilling shed, where steam lines are attached to the bottom of the distilling tank.
- The plant material is still green and contains natural moisture; therefore, maceration is not needed.
- Steam is passed through the fresh herb and carries the oil droplets through a vapor pipe that is attached to condensing chamber.
- During steam distillation, some components of a volatile oil are hydrolyzed while the other are decomposed due to high temperatures.

ii. Solvent extraction

Solvent extraction is either carried out by using various solvents or fats. It can be classified into three types.

a. Absolute Solvent extraction
b. Supercritical fluid extraction



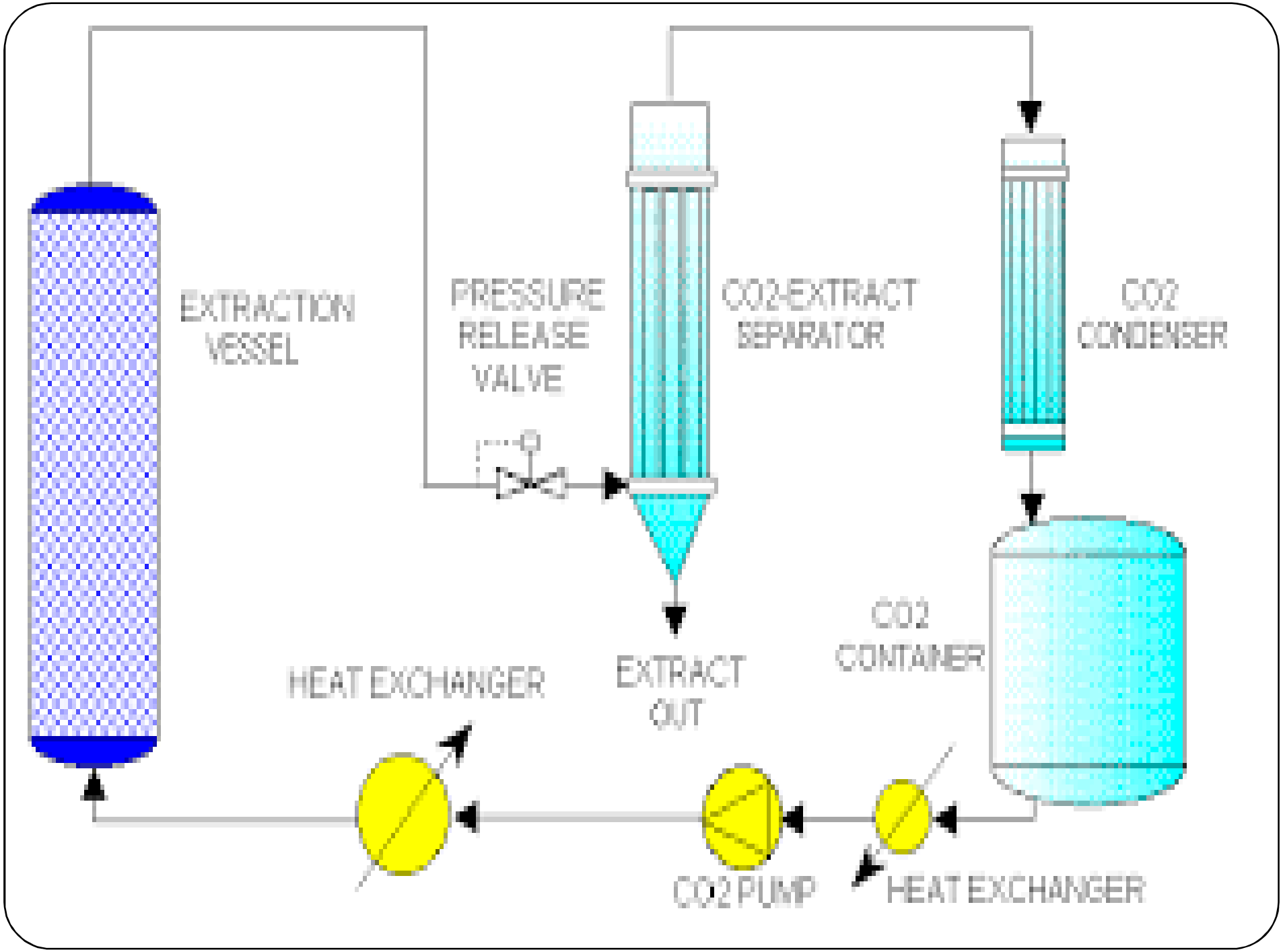
Seperatory funnels

a. ABSOLUTE SOLVENT EXTRACTION

- It is usually carried out for the extraction of volatile oil from rose flowers etc.
- The flowers are **agitated** in a vat(tub) with a solvent such as **hexane**.
- This solvents takes out the aromatic compounds as well as other soluble substances.
- The extract is then exposed to vacuum processing which removes the solvent for re-use.
- The remaining waxy mass is known as **concrete**.
- The concrete is then **mixed** with **alcohol** which dissolves the aromatic constituents and leaves behind the other substances.
- The alcohol is evaporated leaving behind the absolute.
- The absolute may be further processed to remove any

b. Supercritical fluid extraction

- It is the process of separating one component (the extractant) from another (matrix) using **supercritical fluids** as the extracting solvents.
- The system **must** contain a **pump** for **CO2**, a pressure cell that contains the sample, a mean of maintaining pressure in the system and a collecting vessel.
- The liquid is pumped to heated zone, where it is heated to supercritical conditions.
- It is then passed into extraction vessel. Here it diffuses into the solid matrix and dissolves the material to be extracted.
- The dissolved material is taken out from extraction vessel into a separator at **low pressure**.
- The extracted material then settles out


EXTRACTION VESSEL
PRESSURE RELEASE VALVE
CO2-EXTRACT SEPARATOR
CO2 CONDENSER
CO2 CONTAINER
EXTRACT OUT
HEAT EXCHANGER
CO2 PUMP
HEAT EXCHANGER

iii. expression

- Most citrus essences are extracted by means of expression.
- In the past, the fruit pulp was removed by hands.
- The rind and pith were then soaked in warm water.
- Pith of the fruit absorbed water and exerted pressure due to which it became more elastic.
- It was inverted which helped to rupture the oil cells on a sponge placed next to rind.
- As sponge became saturated with oil, it was then squeezed to release the volatile oil which was collected in a vessel and then decanted.

i. Enfleurage

- In this method, an odorless fixed oil or fat is spread in a thin layer on glass plates.
- The flower petals are placed on the fat for few hours.
- Then, repeatedly, the old petals are removed, and a new layer of petals is introduced.
- When the fat absorbs maximum fragrance, the oil may be removed by extraction with alcohol.
- It was formerly widely used in the production of perfumes and pomades.

Enfleurage Process

Flower Petals

↓ Add fat mixture (Lard & tallow (2 : 1))

1) Enfleurage Product

(Fat saturated with oil)

↓
- Add absolute alcohol
- Successive extraction
- Cooling to remove most of fat

2) Triple extract

(alc. solution of vol. oil + pigments + traces of fats)

↓ Evaporation of alcohol or fractional distillation

3) Absolute of Enfleurage

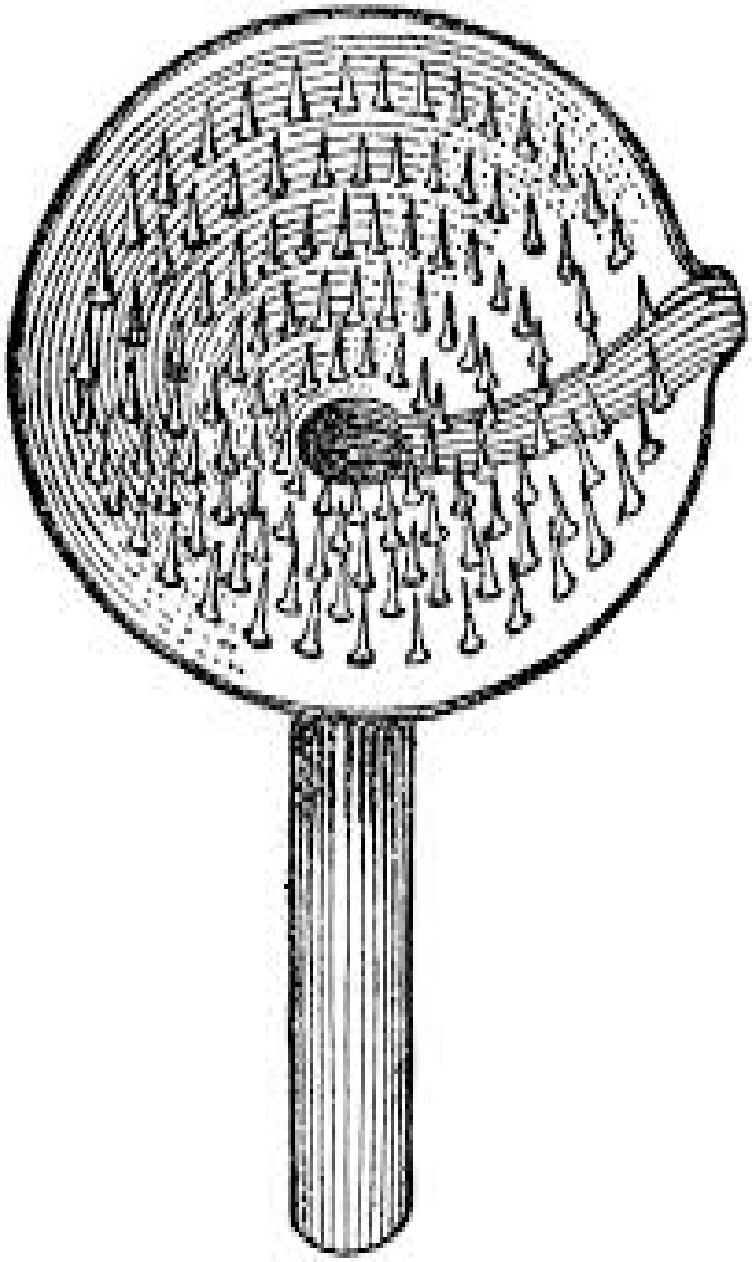
(Semi-solid, alcohol-free product)

↓ Dilution with $H_2O + NaCl$

4) Volatile oil

ii. Ecuelle Method

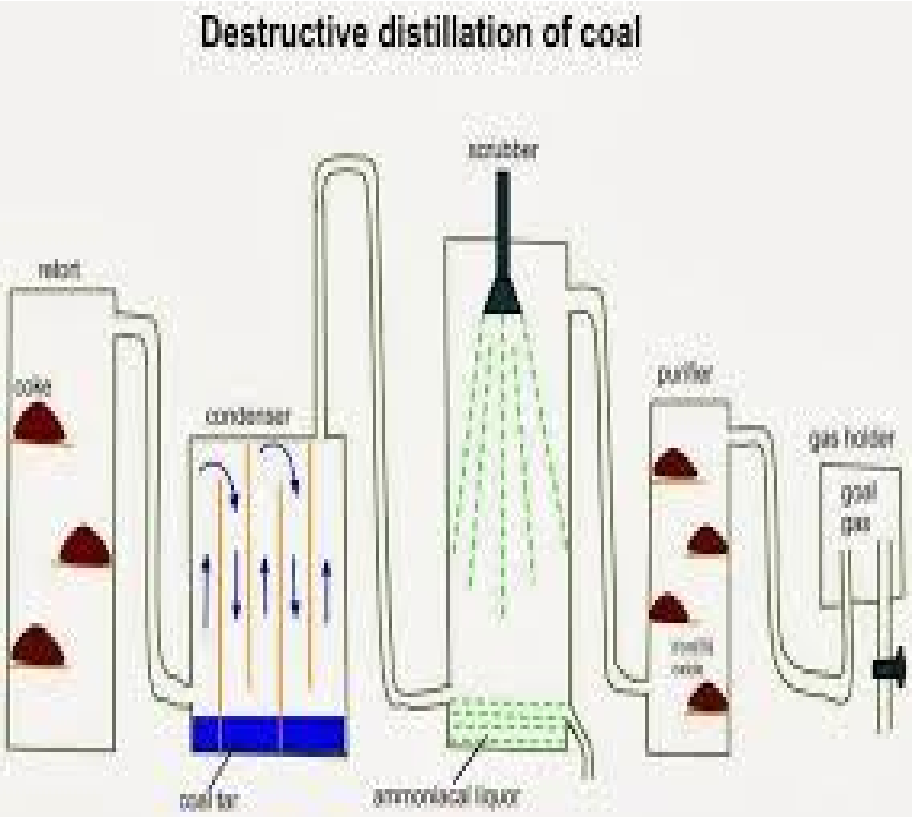
- It is used to obtain citrus oils.
- In this method, the fruit is rolled over the trough lined with sharp projections.
- These projections penetrate the epidermis and puncture the oil glands located in the outer portion of the peel.
- The fruit is then pressed to remove oil from glands.
- It is then sprayed with water that washes the oil from the mashed peel.
- The resulting oil water emulsion is separated by centrifugation.



ECUELLE METHOD

iii. Destructive distillation(vaccum)

- Organic substances such as wood or resin are decomposed by heat in the absence of air and distilled to produce useful products such as coke, charcoal etc.
- It is called destructive because the chemical composition of the end product is different from that of the introduced material.
- The principle products are CO, H, H_2S, NH_3, oils etc.


Destructive distillation of coal
scrubber
retort
coke
condenser
purifier
gas holder
coal tar
ammoniacal liquor

MENTHA
(Mint, Peppermint, Mentha piperita Linn.)

- **Family:**

  Labiatae
- Botanical origin:

  Mentha pipertia L
- English Name:

  Peppermint
- Urdu Name:

  Podina
- **Parts used:**

  Leaves & Whole Plant

MENTHA

- **Synonyms :** Colpermin, Mentha Oil
- **Biological Source :** The oil is obtained by steam distillation of the fresh flowering tops of the plants known as *Mentha piperita* Linn, belonging to family **Labiatae.**
- **Geographical Source :** It is cultivated in various parts of the world. It grows wild in Europe, while it is cultivated in Japan, England. In India, it is cultivated near Jammu and in Tarai region of Uttar Pradesh.

INTRODUCTION

- **Peppermint** (*Mentha* × *piperita)*, also known as *M. balsamea* Wild.) is a hybrid mint, a cross between watermint and spearmint. Peppermint was first described in 1753 by Carolus Linnaeus from specimens that had been collected in England; he treated it as a species, but it is now universally agreed to be a hybrid. The plant, indigenous to Europe, is now widespread in cultivation throughout all regions of the world. It is a herbaceous rhizomatous perennial plant growing to 30–90 cm (12–35 in) tall, with smooth stems, square in cross section. The rhizomes are wide-spreading, fleshy, and bare fibrous roots.

- **Macroscopic Characters**

❖ **Colour** : Colourless to Yellow.

❖ **Odour** : Characteristic and pleasant.

❖ **Taste** : Pungent followed by cooling sensation.

❖ **Solubility**: It is soluble in 70% alcohol, ether and chloroform and insoluble in water.

The four most commonly cultivated species are

- Japanese Mint/Menthol Mint (*M.arvensis*)
- Peppermint (*M.piperita*)
- Spearmint (*M. spicata*)
- Bergamot mint (*M. citrata*)

varieties

Japanese

Bergamot

Mint

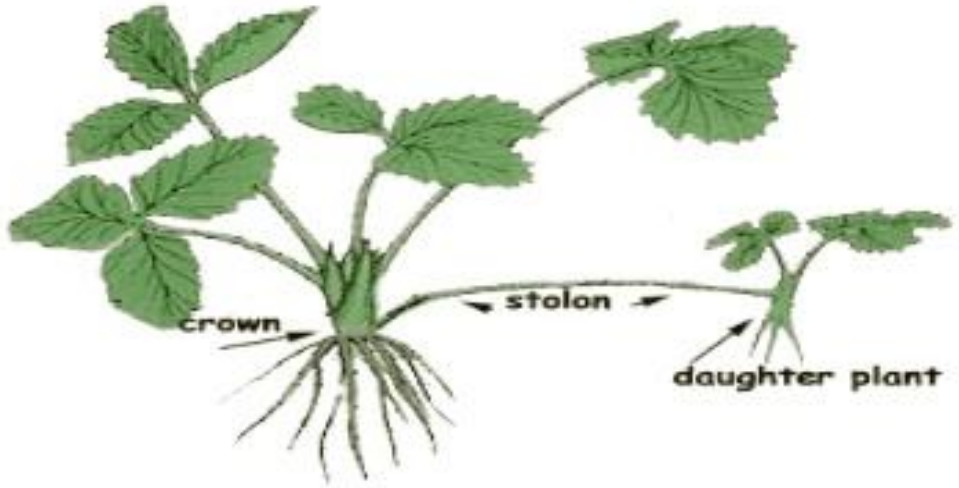
Pepper

Spear

P. V. NAIK

Silent feature of mint crop

- All species are herbaceous plants, readily sending out runners (rainy season) and Stolons (winter), which develop new roots and shoots at the nodes and form plants.



- Peppermint plants grow to about 2 - 3 feet tall. They bloom from July through August, sprouting tiny purple flowers in whorls and terminal spikes.
- Dark green, fragrant leaves grow opposite white flowers. Peppermint is native to Europe and Asia, is naturalized to North America, and grows wild in moist, temperate areas. Some varieties are indigenous to South Africa, South America, and Australia.

Cultivated mint species and their main constituents

Common name	Botanical name	Main constituents of mentha oil
Japanese mint	*Mentha arvensis*	Menthol (70-80 %)
Pepper mint	*M. Piperita*	Menthol (35-50 %)
Bergamot mint	*M.citrata*	Linalool and linalyl acetate (45 %)
Spear mint	*M. Spicata*	Carvone (60-95%)
Scotch spear mint	*M. cardiaca*	Carvone (53-68 %)
Garden mint	*M. viridis*	Carvone (very less)

Chemical Constituents

- Volatile Oils
- Menthol
- Menthone
- Methyl acetate
- Cineole
- Limonene
- Flavonoids
- Tannins
- Resins
- Azulene
- Limonene

USES

- Reduces spasm and pain caused by endoscopy.
- In migraine headache.
- To treat nausea.
- To treat bad breath and reduce dental plaque.
- Azulene reduces inflammation and help to heal ulcer.
- It relaxes muscles of GIT and relieve colon spasm.
- Menthol kill bacteria and parasites.

Mechanism of Action

- Menthol act as calcium channel blocker.
- It affect the smooth muscles of vessels GIT or neuron cells and heart.
- It blocks the Calcium channels and prevent the influx of calcium channel and leads to the relaxation of smooth muscles.

Side Effects

- Heart Burn.
- Increase Uterine contraction and causes abortion.
- Allergic reactions including mouth sores.
- Gastritis.
- Mouth Ulcers.

Contraindication

- It is not used during pregnancy and lactation.
- Not used during intestinal diseases.
- Contraindicated in people with digestive ulcer.
- Not recommended in Parkinson's disease.
- Not recommended for children as menthol cause chocking sensation.

Drug Interaction

1. Peppermint delayed the absorption of caffeine.

2. It may influence metabolism of certain drugs such as falodipine and simvastatin.

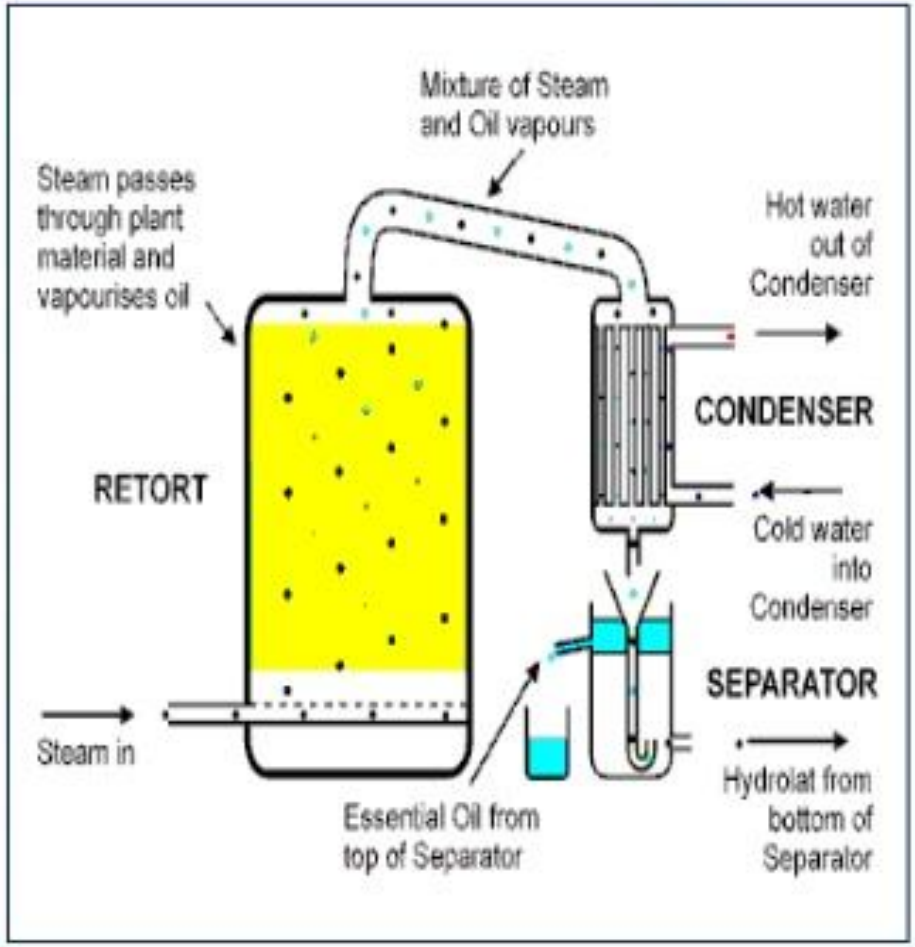
3. When taken with antacids such as omeprazole, they dissolve too quickly and causes heart burn and nausea.

Extraction of Peppermint oil

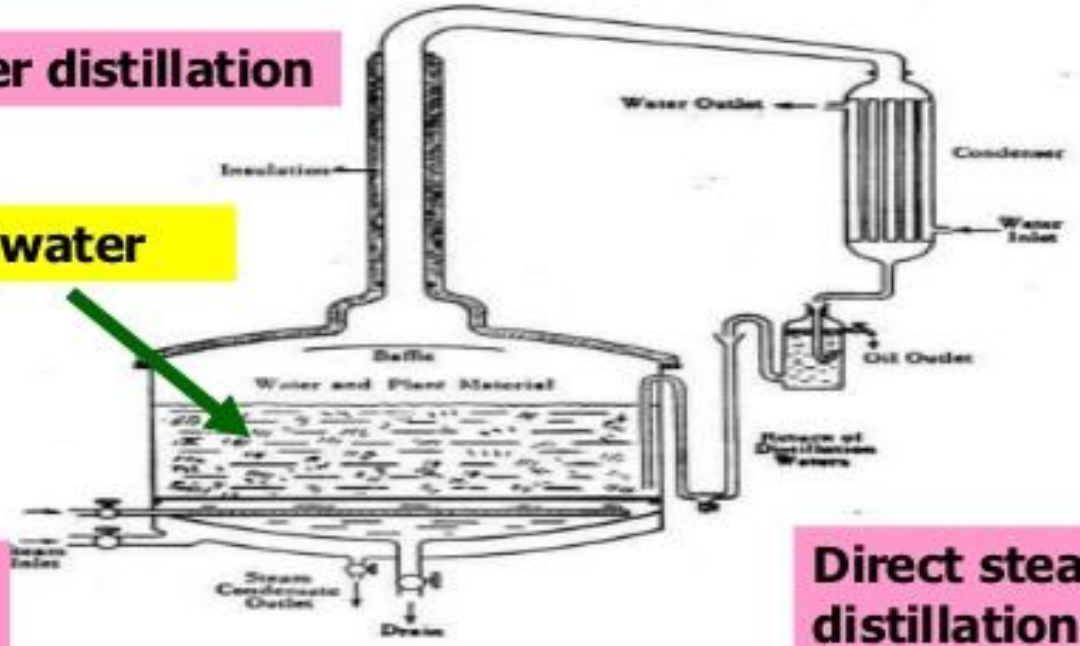
Peppermint oil is extracted from the whole plant above ground just before flowering.

The oil is extracted commercially by **steam distillation**

- Fresh or partly dried plant herb
- Yield is 0.1 - 1.0 %.



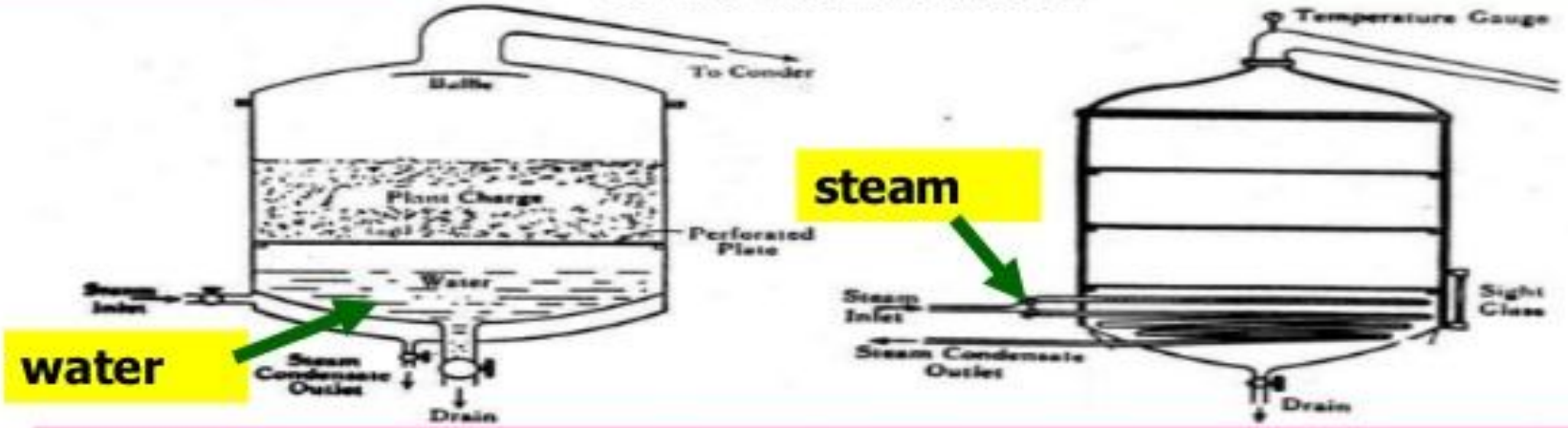
Water distillation



Water & steam distillation

Direct steam distillation

Still for water distillation



Different types of distillation apparatus

CHEMICAL TEST

- Few drops of peppermint oil are mixed with 5ml of nitric acid solution(prepared by adding 1ml of nitric acid to 300ml of glacial acetic acid).
- Heat on water bath and within five minutes liquid develops – blue color, which on further heating deepens and show cooper color fluorescence after some time it becomes golden yellow.
- It is clear and transparent liquid.

CLOVE
(Caryophyllum)

Synonyms: Caryophyllum, clove flower, clove buds, Lavang

Biological Source: Dried flower buds of **Eugenia caryophyllus**

Family: **Myrtaceae**

Should Contain NLT 15% v/w of clove oil

Geographical source:

- Indigenous to Amboyna & molucca islands
- Cultivated Zanzibar, pemba, penang, Madagascar, caribean islands, srilanka, india.
- In India, hilly areas of Tamil Nadu, Kerala and Karnataka.

Cultivation & collection:

Climate and Soil:

•Grows well in rich loamy soils of the humid tropics and can be grown successfully in the red soils of Kerala, Tamil Nadu and Karnataka.

• A cooler climate with well distributed rainfall is ideal for flowering

•The site selected for its cultivation needs Good drainage since the crop cannot withstand water logged conditions.

•It grow well in the areas receiving an annual rainfall of 150-300 mm

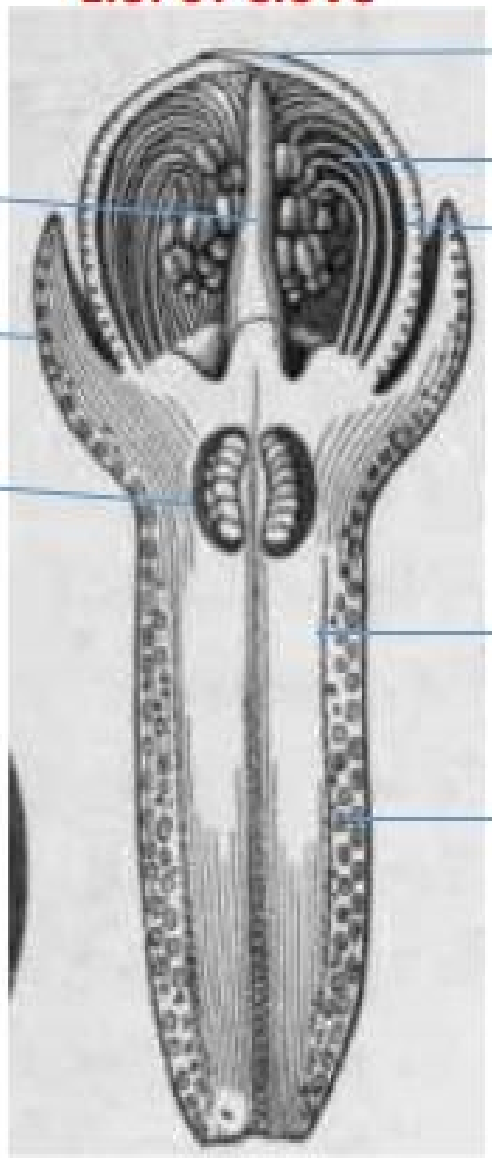
•and it can be grown at an altitude of 1500m above the sea level.

CHEMICAL CONSTITUENTS

Clove consist of about:

- Volatile oil (15-20%)
- Eugenol (70-90%)
- Acetyl Eugenol
- α,β- Caryopyllene
- Tannins
- Other substances mainly methyl furfural and dimethyl furfural.

L.S. of Clove



Corolla

Anther

Stamen

Style

Calyx

Bilocular ovary

Hypanthium

Oil glands

ADULTERANT

- **Exhausted clove**: Volatile oil is partly or completely removed.as a result buds appear darker in color, shrunken in form and yields no oil.
- **Mother cloves** (anthophylli) are the ripe fruits of cloves that are ovoid, brown berries, unilocular and one-seeded. This can be detected by the presence of much starch in the seeds. They also contain volatile oil but only about 3-5%.
- **Brown cloves** are expanded flowers from which both corolla and stamens have been detached.
- **Clove stalks** are slender stems of the inflorescence axis that show opposite decussate branching. Externally, they are brownish, rough, and irregularly wrinkled longitudinally with short fracture and dry, woody texture.

CHEMICAL TEST

- dissolve a drop of clove oil in 5ml of alcohol and add a drop of ferric chloride solution. blue colour is seen because of phenolic OH group of Eugenol
- Take a powder of clove and add it sudan(iii), Red colour ppt is formed.
- Treat a thick section of hypanthium's clove with 50% potassium hydroxide solution. Needle shape crystals of potassium Eugenate are seen.
- prepare a decoction of clove and add it ferric chloride solution. Blue-black colour is formed because of the tannin.

USES

- Antiseptic
- Carminative
- Flavoring agent
- Stimulant
- Local anesthetic (Eugenol)
- Spice
- Oil in perfumery
- Uses in toothache, dental preparations and mouth washes
- Clove oil and zinc oxide are used in temporary filling of dental cavities.

Uses

- Clove oil is used in traditional medicine including oral health.
- Cloves are known for their strong taste and smell and can be used in cooking.
- Some perfumes use cloves for the aroma and clove oil is sold for use as an essential oil.
- Cloves are commonly used in Ayurveda, which is traditional Indian medicine.

CINNAMON
(Dalchini, *Cinnamomum zeylanicum* Nees.)

Cinnamon

- Synonyms
  - Cinnamon bark
  - Kalmi-Dalchini
  - Ceylon cinnamon
- Biological Source:
  - Dried inner bark of the shoots of trees of *Cinnamomum zeylanicum* belonging to the family Lauraceae
  - Must contain less than 1.0% of volatile oil.
  - Found in Sri Lanka and Malabar coast of India.

CINNAMON POWDER

Cinnamon is best known spice for its culinary and medicinal properties. It is widely used in distinct industries due to its aroma flavor. Cinnamon is native to Srilanka and India and is found in tropical regions of the world. Srilanka and India are one of the major producers and exporters of whole and powdered form of cinnamon..

Substitute and Adulterants

- Jungle Cinnamon: dark in colour, less aromatic, bitter
- Cinnamon Chips: from untrimmed bark.
- Saigon Cinnamon: bark of Cinnamomum loureirri.
  - Exported from port of Saigon.
  - Grayish brown, sweet taste,
  - Quills are: 30×4×0.7 cm.
- Java Cinnamon: from Cinnamomum bermanii.
  - Less aromatic
  - Contains tubular crystals of calcium oxalate
  - Contains about 75% of cinnamaldehyde in the oil.

So Where Does Cinnamon Come From?!

- Cinnamon is native to Sri Lanka
- Dates back in Chinese writing to 2800 B.C.
- Arabic term ***amomon***, meaning fragrant spice plant.
- ***Cinnamomum verum*** is the plant that cinnamon derives from. This is commonly known as the "cinnamon tree".

Cultivation

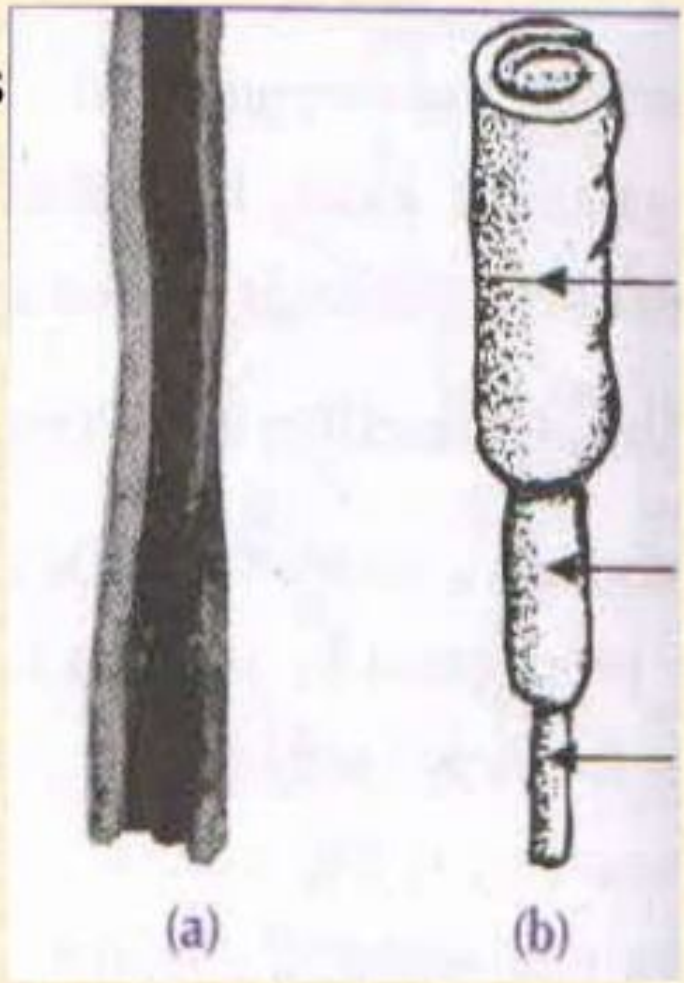
- Can be propagated through vegetative propagation and seed growing.
- Needs siliconous soils with an admixture of humus.
- Altitude: 800- 1000 meters.
- Rainfall: 200-250cm.
- Seeds sown at a distance of 10cm.--- Germinated within 20 days---grown for 10-12months--- transplantation is done keeping at least 2mtr in between.
- Manure: 100gm ammonium sulphate and super phosphate.

Collection

- Harvested in rainy season--- bark can be peel off easily from shoots.
- Round bark strips are collected--- made into bundles---wrapped in coir matting--- fermented for 24 hours.
- Cork and cortex are dried and converted to quills.--- quills are arranged end to end--- with a length of 90cm.
- Quills are collected, packed into bundles of different size and sold.

Macroscopic characters

- Colour – Outer surface is dull yellowish brown, inner surface is dark yellowish-brown.
- Odour – Fragrant
- Shape – compound quills
- Size – 1m in length and 1 cm in diameter
- Taste – Aromatic and sweet followed by warm sensation
- Fracture - splintery



Microscopic characters

- Cork and primary cortex – absent
- Prominent sclerenchymatous pericycle
- Stelar part – phloem, phloem fibres, biseriate medullary rays and secretory cavities containing volatile oil
- Cortical parenchyma – starch grains
- Medullary rays, calcium oxalate crystals and parenchymatous cells

Chemical Constituents:

- Contains :-
  - 0.5-1.0% of volatile oil (active constituent, light yellow in fresh--- changes to red on storage.)
  - 1.2% of tannins,
  - mucilage,
  - calcium oxalate,
  - starch and
  - mannitol (a sweet substance).
- Cinnamon oil contains60-70% of cinnamaldehyde, 5-10% eugenol, benzaldehyde, cuminaldehyde and other terpenes like pinene, cymene, caryophyllene.

Uses:

- Bark is used as-
  - Carminative
  - Stomachic
  - Mild Astringent.
  - Flavouring Agent
  - Stimulant
  - Antiseptic
  - Losses Weight
- Commercially used as :
  - Spice and Condiment
  - In preparation of candy, dentrifices and perfumes.

Medicinal Uses Of Cinnamon:

- Anti-Oxidant
- Anti-Clotting
- Dentistry
- Respiratory Problems
- Healing
- Arthrits Relief
- Anti –Inflammatory
- Anti- Diabetic

Side Effects

- Skin Irritation
- Coumarin →Liver Disease
- When taken in large amounts, Long term

Interactions

- Hepatotoxic Drugs
- Diabetes Medication

Precautions and Warnings

- Pregnancy And breast feeding
- Diabetes
- Surgery
- Liver Disease

Marketed preparations of Ceylon cinnamon

- It is used to flavour cookies, cakes stewed fruits, puddings and bread – as well as curries, sauces and vegetable dishes.

- Cinnamon capsules – promote sugar metabolism, heart and circulatory health,

Fennel

Introduction

- **Botanical name**: *Foeniculum vulgare*
- **Family**: umbelliferae
- **English Name:** Fennel, sweet fennel, bitter fennel
- **Urdu Name :** saunf
- **Part Used:** dried ripe fruit
- **Chemical class:** volatile oils

ORIGIN AND DISTRIBUTION

- It is indigenous to the shores of the Mediterranean but has become widely naturalized in many parts of the world, especially on dry soils near the sea-coast and on riverbanks
- **India is top producer of fennel seeds in the world**
- Fennel is known in various names in different parts of the country. In Hindi, fennel is known as 'saunf'
- Major production centers of fennel in India are Rajasthan, Andhra Pradesh, Punjab, Madhya Pradesh, Uttar Pradesh, Gujarat, Karnataka, and Haryana

Chemical constituents:

Major constituents:

anethole

Other constituents:

fenchone

limonene

Estragol

Volatile oils

Anisic acid

Anisic aldehyde

Salts Na,K,P

Coumarin

vitamins A&C

CHEMICAL CONSTITUENTS

The major constituent of fennel oil is **anethole** (80%)

It contains not more than 10% estragole and not more than 7.5% fenchone

Other constituents include alpha pinene, beta myrcene, beta pinene, bitter fenchone, camphene, estragole (methyl-chavicol), fenchone, limonene, p-cymen, and safrole.

Furthermore, sweet fennel contains other nonvolatile constituents such as flavonoids and coumarins

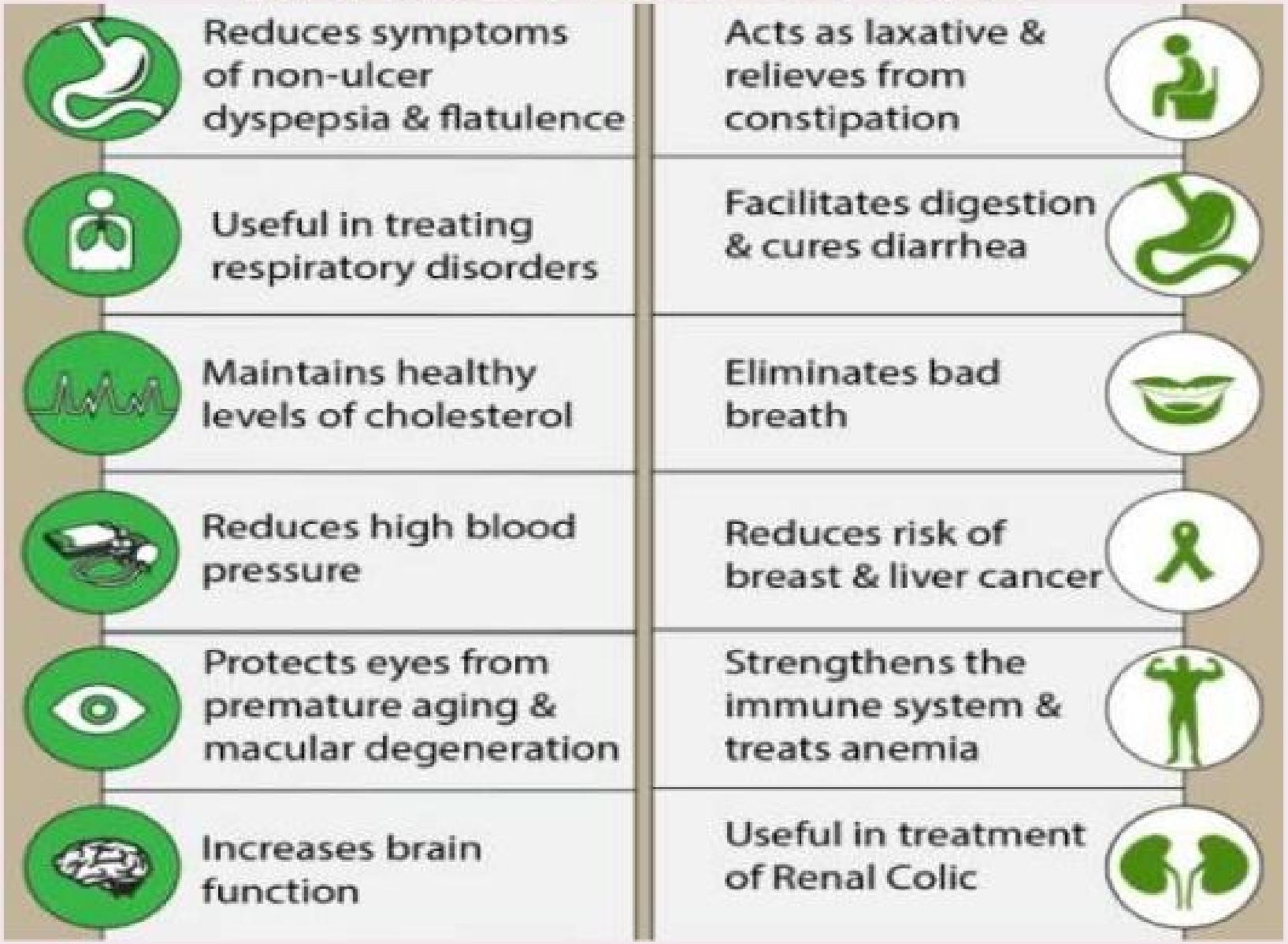
Soil and climate

- Fennel can be cultivated in all types of soils that are rich in organic matter.
- Best soils for fennel cultivation is loamy soil.
- Cool and dry climate .
- Dry and cool weather during the seed set increases seed yield as well as the quality of the produce.

Uses

- Anethole is used as anti-cancer and anti-inflammatory
- Fennel is used as carminatives
- Fennel contains Vitamin C which is used as anti-oxidant.
- Coumarin shows anti-coaggulant effect.
- Fennel has bronchodilatory effect.
- Anethole may influence milk secretions.
- Salts containing Phosphorous lowers the level of sodium which is essential for maintaining the blood pressure.

HEALTH BENEFITS OF FENNEL



Mechanism of action

- on account of its carminative properties fennel water ha similar properties with those of dill water mixed with sodium-bi-carbonate and syrup ,these water constitute the domestic “Gripe Water”used to correct flatulence of infants.
- Vitamin C is body’s primary water –soluble anti-oxidant,which is able to neutralize the free radicals in all aqueous environment of body.
- Fennel ha bronchodilatory effect due to potassium channel opening effect.

Cont...

- Anethole's effects may be mediated by modulation of tumor necrosis factor (TNF) - induced cellular responses, controls the expression of some genes involved in carcinogenesis and inflammation
- Coumarin competitively inhibit vitamin K and interfere with blood clotting.

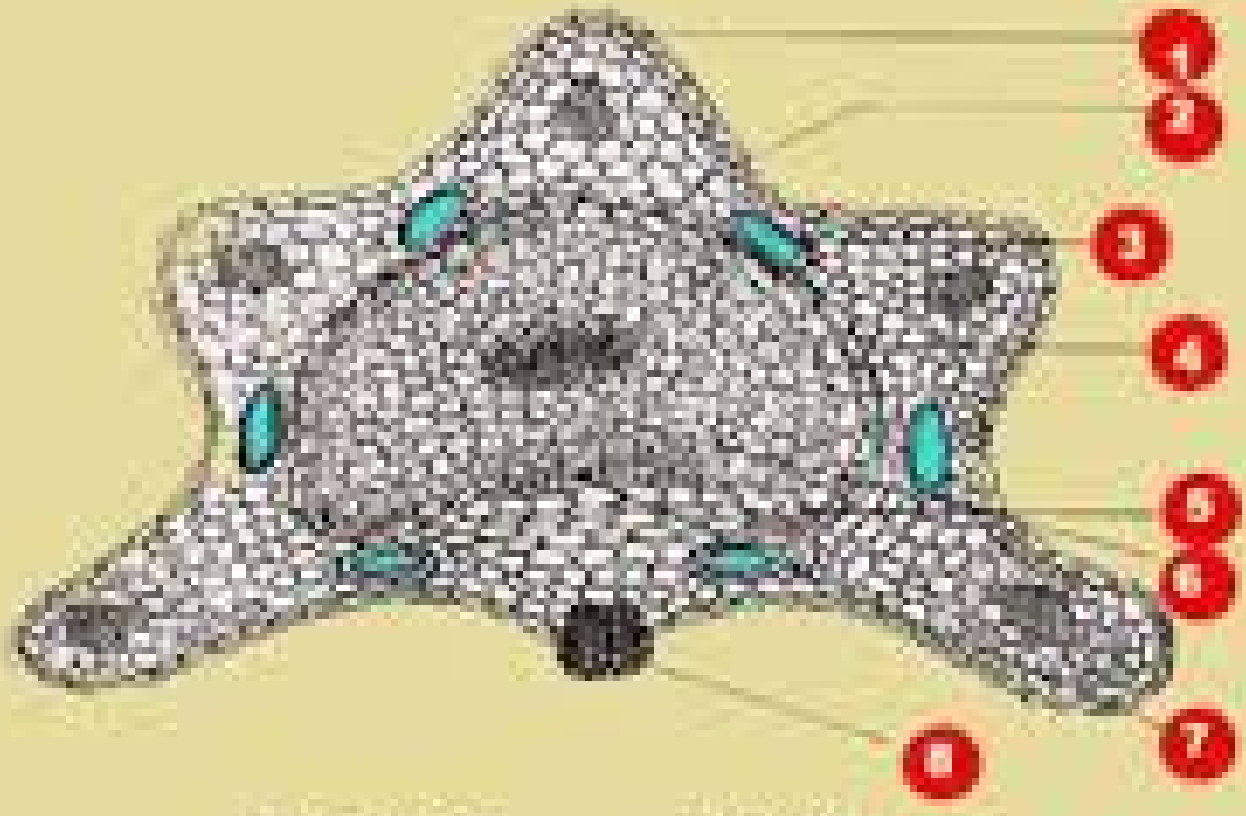
Drug interaction

- **Ciprofloxacin** interacts with fennel.

  ciprafloxacin is an anti-biotic.taking along with fennel decrease its effectiveness.so take fennel atleast after one hour of taking ciprofloxacin.
- **Estrogen** interacts with fennel. large amount of fennel might have same effect as of estrogen so taking fennel along with estrogen pills decreases the effect of estrogen pills.

Cont...

- **Tamoxafen** interacts with fennel. Some types of cancers are effected by hormones in body such as: estrogen-sensitive cancer that are effected by estrogen level in body.temoxifen is used to treat cancer.fennel seems to effect estrogen level in body. So taking temoxifen with fennel decrease the effectiveness of temoxifen.



T.S of Fennel Fruit

1. EPICARP
2. MESOCARP
3. VITTAE
4. ENDOCARP
5. TESTA
6. ENDOSPERM
7. RAPHE
8. CARPOPHORE

Fig 07.3

Contraindications

- During pregnancy and breast feeding it is best to avoid use . because infants experienced damage to their nervous system.
- Fennel cause allergic reaction in people who are skin sensitive so do not use fennel.
- Fennel might slow blood clotting so taking fennel might increase the risk of bleeding in people with bleeding disorders

CORIANDRUM SATIVUM L. (UMBILLIFEREAE)

Coriander

- Botanical origin: Coriandrum Sativum L.
- Family: Apiaceae / Umbillifereae
- Common name: Dhania, Cilantro
- English name: Coriander
- Part used: Fresh leaves and seeds

Chemical constituents

- Essential oils(1-2%)
- Linalool (major constituent)

The flowers are borne in small umbels, white or very pale pink, asymmetrical, with the petals pointing away from the center of the umbel longer than those pointing toward it .

The fruit is a globular, dry schizocarp 3–5 mm in diameter. The seeds are generally used as a spice or an added ingredient in other foods or recipes, although sometimes they are eaten alone.

All parts of the plant are edible, but the fresh leaves and the dried seeds are the parts most traditionally used in cooking. Coriander is common in South Asian, Southeast Asian, Indian,

Middle Eastern, Caucasian, Central Asian, Mediterranean, Tex-Mex, Latin American, Brazilian, Portuguese, Chinese, African, and Scandinavian cuisine.

Introduction

- Coriander is an annual herb native to the Mediterranean and Western Asia regions with commercial supplies now coming from Turkey, India, Bulgaria, Russia, and Morocco.
- The plant Coriander is named after koris, the Greek word for bug, as the unripe fruits have a smell that has been compared to that of bedbugs.
- The fruits and leaves of coriander possess very unique flavors and hence are used in different ways to flavor food.

CORIANDER

Chemical Constituents :

0.3 to 1%Volatile oils

13% fixed oils

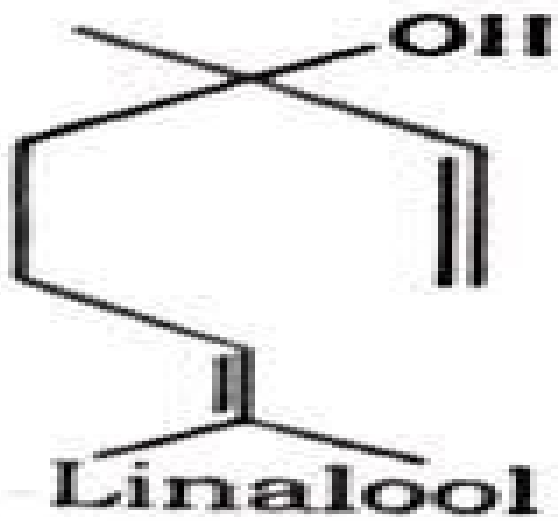
20% proteins

Important volatile constituents

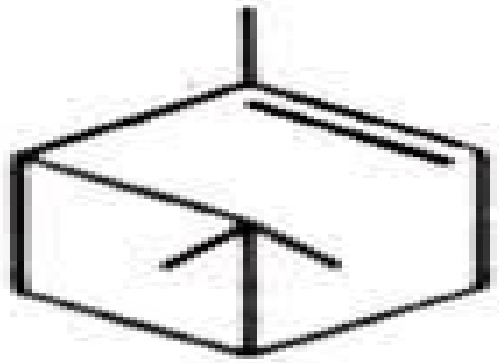
90% of D-linalool (Coriandrol)

L-Borneol Geraniol

Pinene leaves contains VIt.A



Linalool



Pinene

Miracle herb- Coriander

Anti-cancer
Liver protection
Anemia
Smallpox
Enhance libido
Menstrual disorders
Diabetes
Salmonella protection
Digestion
Eye care
Bone health
Alzheimer's disease
Anti-allergic
Controls anxiety
Heavy metal detoxification
Reduces blood pressure
Ulcer cure
skin problems
Prevent bad breathe
Diarrhea
lower cholesterol

myhealthonly.net

Side Effects

- Effect on liver functioning
  - Overdose may cause damage to liver by extra ordinary essential oil components & may emphasize excessive bile secretion.
- Skin sensitivity problem
  - Acids present in it cause irritation and itching of skin and make it sensitive to sunlight.
- Breathing problems and chest pain
  - Prolonged use cause tightness of throat and dry throat & also cause chest pain.
- Harmful in pregnancy and lactation
  - It may affect the gland secretion leading to abnormal activity of reproductive glands causing damage to mother or the developing fetus.

Contraindications

- The pure essential oil is irritating . Orally in doses higher than those specified may cause convulsion.
- It should not be used during pregnancy and lactation.
- It has a weak potential for sensitization , although its known cases of contact dermatitis.

Toxicity

- Linalool and umbelliferone may be toxic if taken in higher concentrations & may cause contact dermatitis.


THANK YOU