



**Clove bud**

GALGOTIAS  
UNIVERSITY

The logo of Galgotias University is a circular emblem with a stylized 'G' in the center. The 'G' is composed of three curved segments in shades of yellow, blue, and red. The background of the emblem is a gradient of light blue and white.

**DISCLAIMER**

**ALL THE CONTENT MATERIAL PROVIDED HERE IS ONLY FOR TEACHING PURPOSE.**

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Synonyms: Caryophyllum, clove flower, clove buds, Lavang

Biological Source: Dried flower buds of *Eugenia caryophyllus*

Family: *Myrtaceae*

Should Contain **LT15% v/w of clove oil**

## Geographical source:

- Indigenous to Amboyna & molucca islands
- Cultivation: Zanzibar, pemba, penang, Madagascar, caribbean 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 grows well in the areas receiving an **annual rainfall of 150 300 mm**
- and it can be grown at an **altitude of 1500m** above the sealevel.





# Macroscopy

Colour: **Crimson to dark brown**

- Odor: **slightly aromatic**
- Taste : **pungent & aromatic** followed by numbness

Shape: **Hypanthium** is surmounted with 4 thick acute divergent surrounded by **dome shaped corolla**. The corolla consists of unexpanded membranous petals with prominent style several stamens and single stiff

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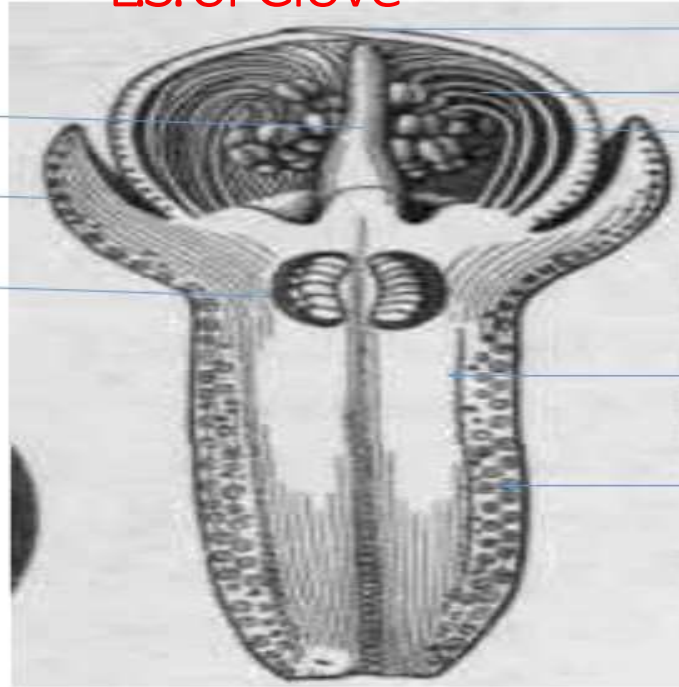
4mm width

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L.S. of Clove

Style  
Calyx  
Bilocular ovary



Corolla  
Anther  
Stamen

Hypanthium  
Oil glands

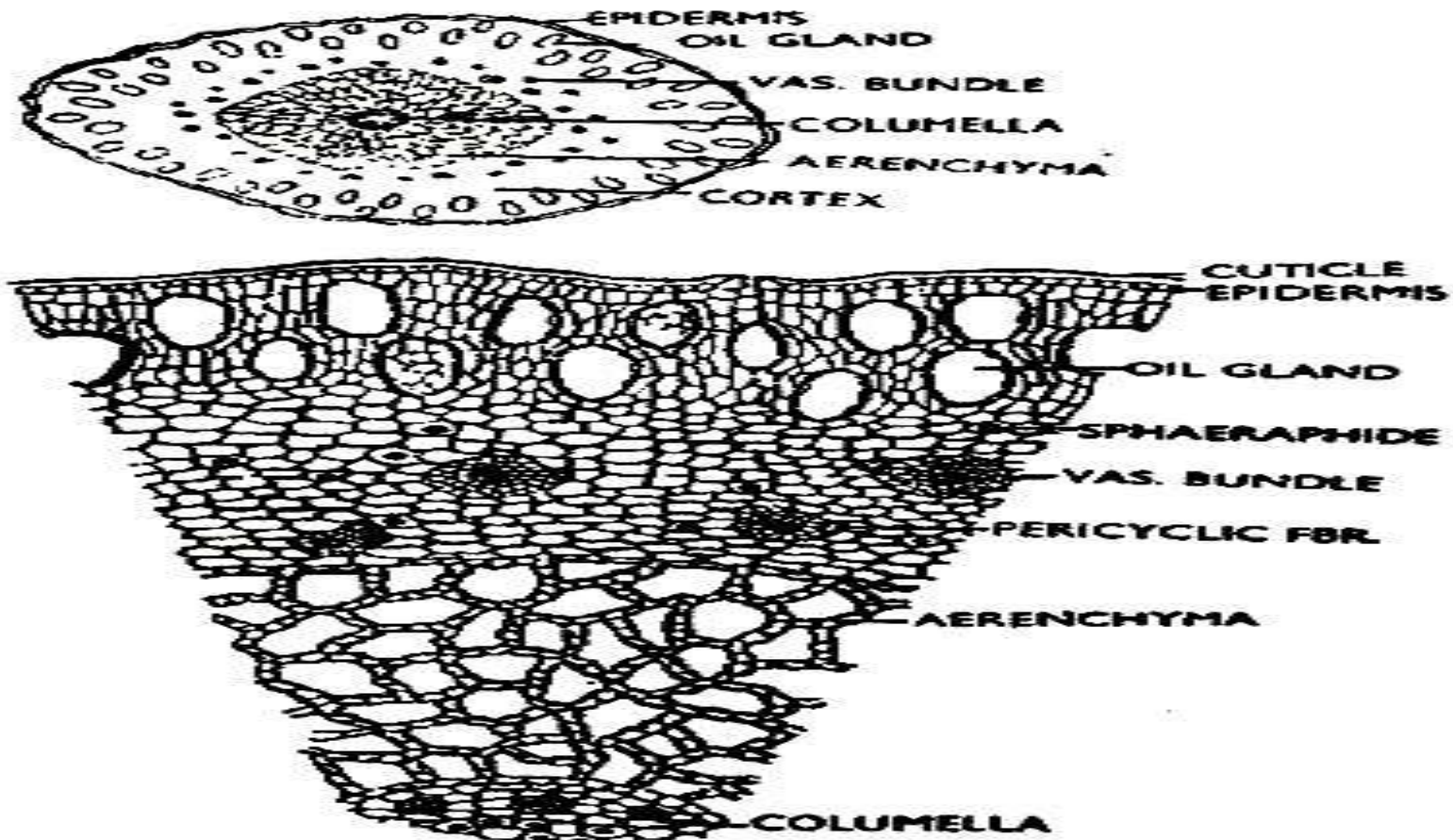




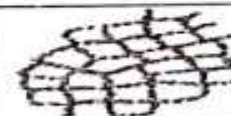



Fig. 13: T. S. of Clove

**STAINING / DIAGNOSIS / MICRO-CHEMICAL TESTS :**

Sr. No.	Reagents	Observations	Characteristics
(1)	Phloroglucinol + conc. HCl (1:1)	Pink	Vascular bundles and fibre.
(2)	Sudan Red III	Red	Cuticle, oil glands.
(3)	Strong KOH solution	Needle shaped pot. eugenate crystals	Eugenol of vol. oil.
(4)	Dil. hydrochloric acid	Soluble	Calcium oxalate crystals
(5)	Sulphuric acid (60% w/w)	Soluble, needles of calcium sulphate on standing.	Calcium oxalate crystals

**MICROSCOPICAL CHARACTERISTICS OF POWDERED DRUG :**

Oil glands	Aerenchyma	Pollen grains	Fibres	Anther	Calcium oxalate crystals	
						
Fragments of aerenchyma showing long oval schizolysigenous oil glands.	Portion of loose parenchyma with air spaces.	Diameter : 15 to 20 $\mu$ Small, bioconvex, rounded or triangular in shape.	Sclerenchymatous fibres with parenchymatous cells	Fibrous layer of anther with reticulated cells	Sphaerophides	No starch grains

**CHEMICAL TESTS :**

Sr. No.	Tests	Observation	Inference
(1)	Aq. extract + Lead acetate solution.	White Ppt.	Tannins
(2)	Clove oil + alcohol + ferric chloride 5% solution	Blue coloration	Eugenol
(3)	Aq. extract + Ferric chloride solution (5%)	Dark color	Tannins

**CHEMICAL CONSTITUENTS :** Volatile oil : Eugenol, isoeugenol, methyl and dimethyl furfural,  $\alpha$  and  $\beta$  caryophylline.

**Uses :** Carminative, aromatic, stimulant, antiseptic, flavouring agent, dental analgesic oil, in microscopic work, for isolation of eugenol.

**ADULTERANTS :**

(i) Exhausted cloves :

- i) Darker in colour
- ii) Do not yield oil when pressed with a finger nail.
- iii) Float when placed in freshly boiled and cooled water.

(ii) Blown cloves : Expanded flower without corolla.

(iii) Mother cloves : (Anthophylli)

- i) Ovoid brown berries
- ii) Presence of starch grains.

(iv) Clove stalks :

- i) Thick-walled, pitted stone cells (upto 140 microns in diameter)
- ii) Calcium oxalate prisms are present.
- iii) Occasional small starch grains and reticulate vessels.



Blown clove



Clove stalk

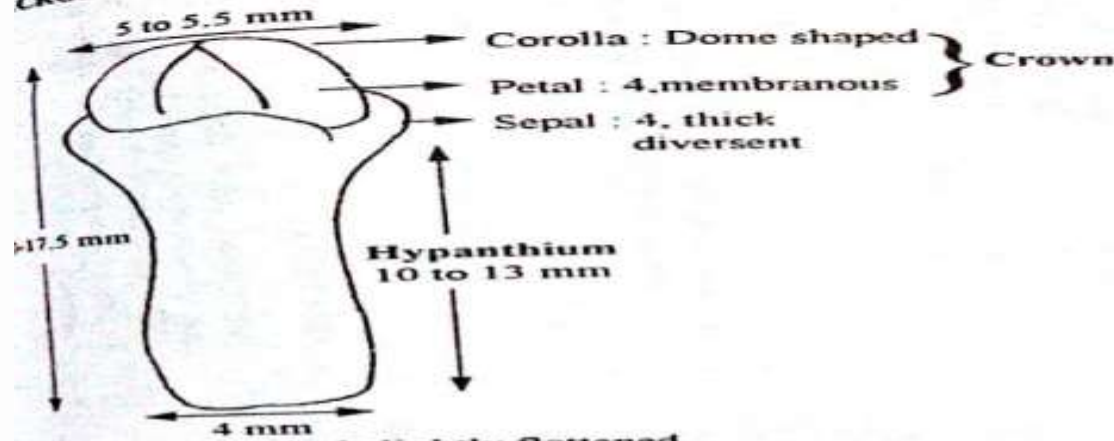


# CLOVE

**SYNONYMS**  
**LOGICAL SOURCE**

: Lavang (Hindi)  
: It consists of dried flower buds of *Eugenia caryophyllus* Sprange Fam. Myrtaceae.  
The clove contains not less than 15 percent v/w of clove oil.

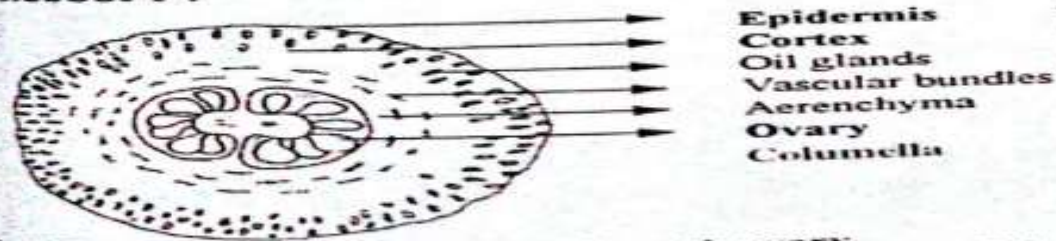
**MICROSCOPY**



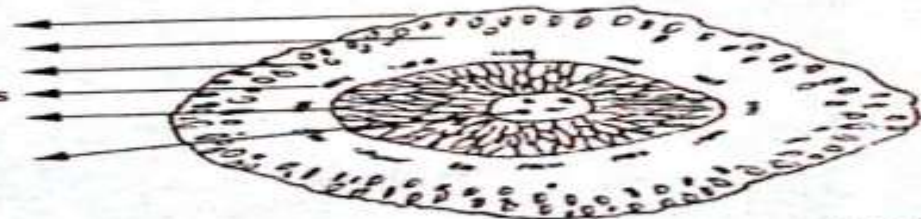
Shape : Sub-cylindrical slightly flattened.  
Entire clove bud

**ORGANOLEPTIC CHARACTERS** : Colour : Dark brown or crimson red. Odour : Aromatic. Taste : Spicy pungent followed by numbness.

**MICROSCOPY** :

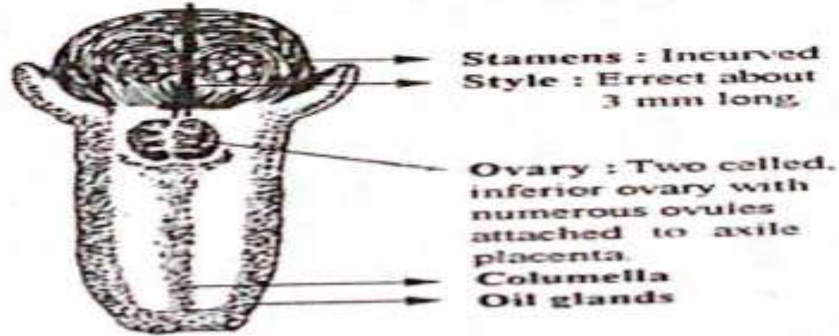


T.S. of Clove (hypanthium) passing through ovary



T.S. of Clove (hypanthium) passing through columella

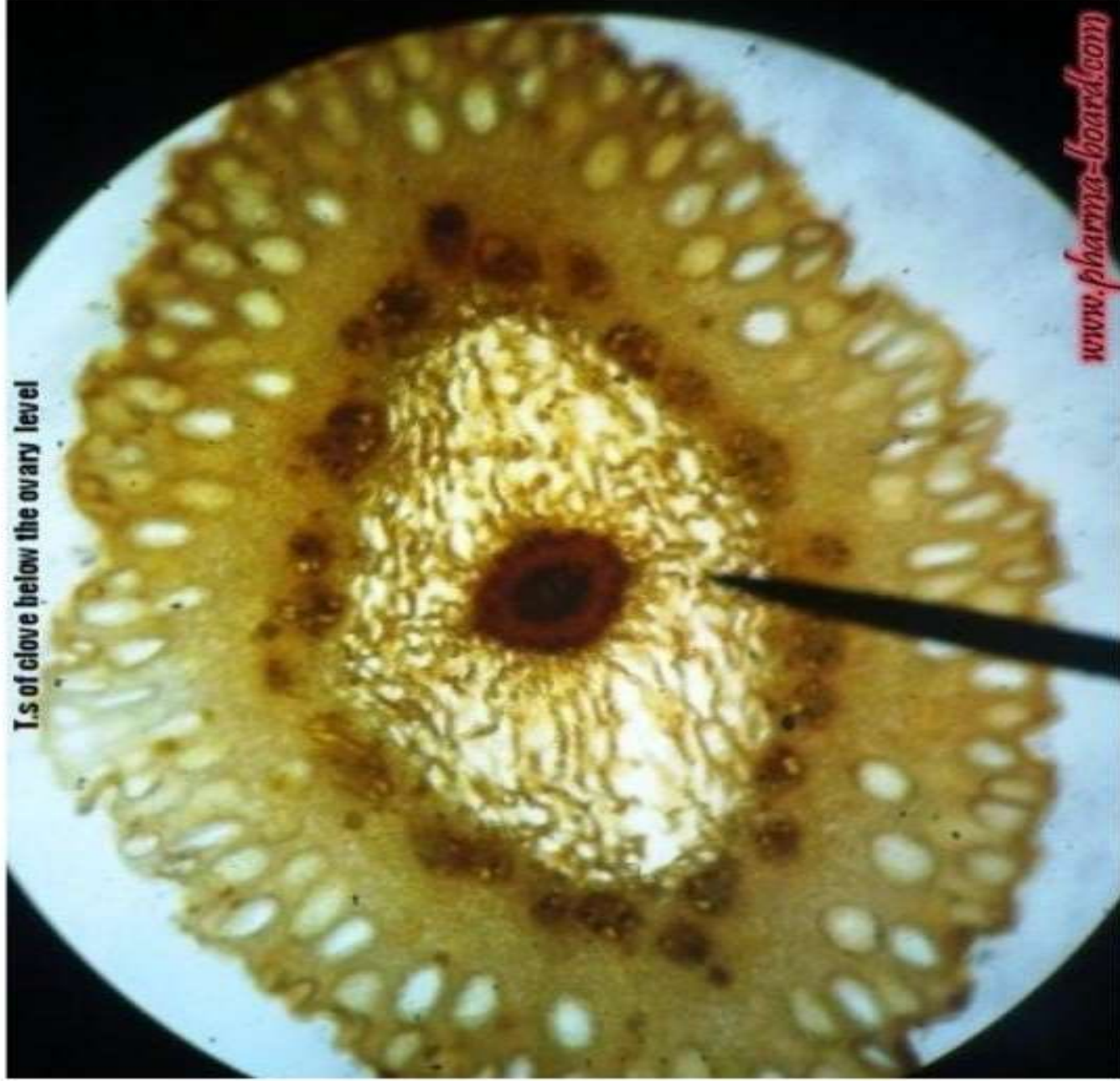
Schematic diagrams (T.S.)



L.S. of Bud



T.S of clove below the ovary level



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Microscopy:

**Epidermis:** Straight walled cells and large anomocytic stomata, covered with thick cuticle

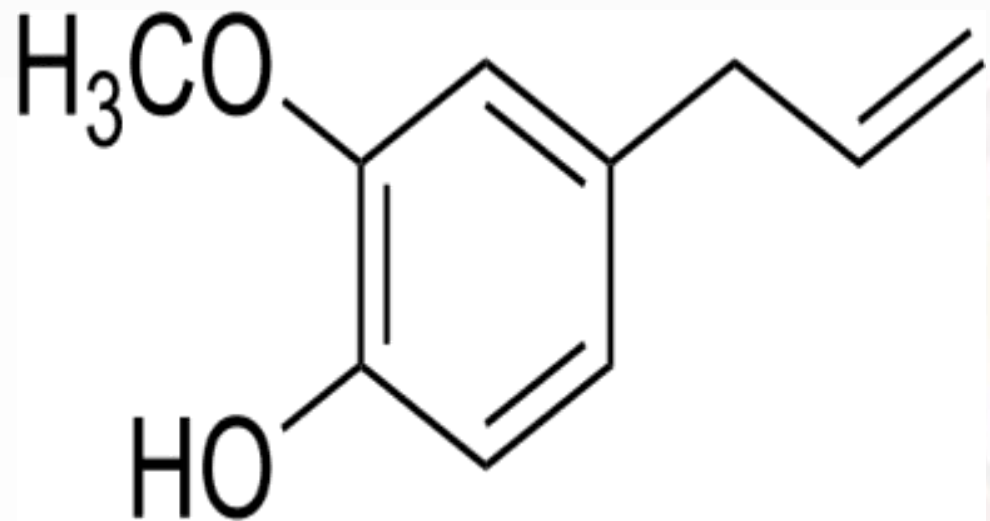
**Oil Glands:** ovoid and schizolysigenous **Cluster**

**crystals of calcium oxalate Starch was absent**

# Chemical constituents

1. Clove Oil: 15%-20%
  - a- Eugenol 70%-90%
  - b- Vanillin
  - c- Caryophyllene
  - d- Acetyl eugenol 4%
2. Tannin : 10-13% (Gallotannic acid)
3. Resin
4. Chromone
5. Eugenin
6. Small quantities of esters, ketones, alcohols





Eugenol

Clove oil:

Colourless to pale yellow

Sp.gr:1.038-1.06

R.I: **1.527-1.535**

Boiling point:250°C

## USES:

1. Condiment.
2. Carminative.
3. Clove oil which contain high percentage of eugenol used commercially to produce Vanillin .
4. Antiseptic.
5. Flavoring agent.
6. Dental uses : as filling material with ZnO
7. Local anesthetic (dental analgesic)

# Adulterants

## CLOVE STALK

- These do not often exceed 3-5 cm in length or 3 mm in thickness
- brownish, dry and woody
- In transverse section shows few oil-glands.
- when crushed, an aromatic odour and a pungent clove-like taste.
- They yield much less volatile oil than cloves (5 to 7%)
- used for adulterating powdered cloves, determined by microscopical examination (they contain iso-diametric sclerenchymatous cells one which do not occur in cloves) and by the amount of ash yielded by the drug, good cloves affording not more than 7 per cent.

- **Exhausted cloves:** i.e. cloves which have been deprived of their volatile oil by distillation, are darker, yield no oil when indented with the nail and float in water.
- **Blown cloves:** These are expended flowers of the clove tree. The stamens are detached. These are similar in colour to clove and contain less amount of volatile oil than clove

### Mother Clove:

- It is ripe fruit of clove containing a single seed, unilocular.
- **Dark** brown, ovate **ripened fruits** of clove tree.
- They are slightly aromatic and **contain** starch.
- Very inferior in volatile oil content



## References :

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