

### 5.3.8. Black Pepper

Black pepper is the fruit of black pepper plant (figure 5.13) belonging to Piperaceae family. It is used as a spice as well as a medicine. Its major chemical constituent, piperine, is responsible for its spiciness.

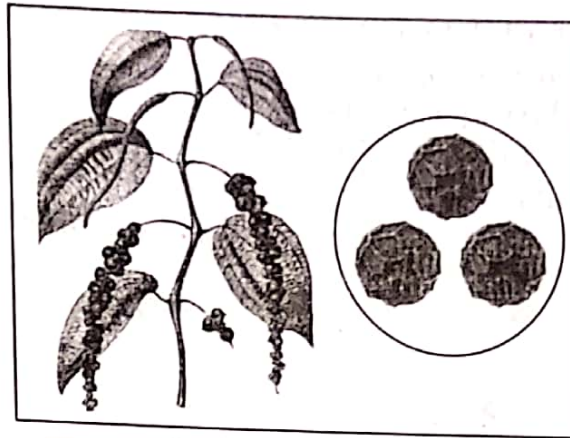


Figure 5.13: *Piper Nigrum L* Vine Fruiting

#### Synonyms

Pepper, *Piper nigrum*, and Maricha.

#### Biological Source

Black pepper is the dried unripe fruit of perennial climbing vine, *Piper nigrum* Linn. It contains not less than 2.5% of dried piperine.

#### Family

Piperaceae

#### 5.3.8.1. Occurrence and Distribution

Black pepper is native to and is also cultivated in South India. It is also grown in Indonesia, Brazil, Malaysia, and Sri Lanka. In India (the highest grower of black pepper), large scale cultivation is done in sub-mountainous tracks of Western Ghats, i.e., Kerala, Karnataka, and parts of Maharashtra.

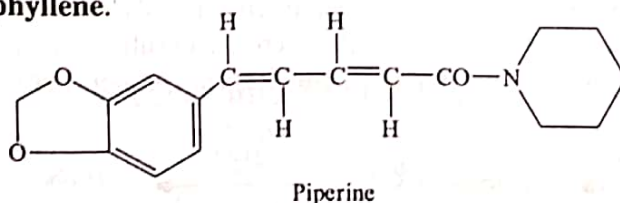
#### 5.3.8.2. Organoleptic Evaluation

Black pepper has the following organoleptic characteristics (figure 5.13):

- 1) **Colour:** Blackish-brown or greyish-black.
- 2) **Odour:** Aromatic and pungent.
- 3) **Fruits:** 3.5-6mm in diameter; globular, coarsely reticulately wrinkled; the apex has remains of stigma; pericarp is thin and has a single white kernel, which is hollow at the centre, and rest consists of perisperm, a small endosperm, and an embryo.

#### 5.3.8.3. Chemical Constituents

Black pepper contains **piperine** (5-9%), **volatile oil** (1-2.5%), a pungent resin (6.0%), **piperidine**, and starch (30%). The yellow coloured volatile oil contains **phellandrene** and **caryophyllene**.



### 5.3.8.4. Therapeutic Efficacy

Black pepper has the following therapeutic properties:

- 1) Its fruits are aromatic, stimulant, stomachic, and carminative.
- 2) It exerts a feeling of warmth and is used as a condiment.
- 3) It also stimulates the taste buds, thus increases the production of gastric juice.
- 4) Its pungent tasting oil is used as a spice.
- 5) It also enhances the bioavailability of some drugs.

### 5.3.9. Asafoetida

The name Asafoetida has been derived from the Latin word *foetid* which means **smelly**. Asafoetida is a genus of perennial herbs. It has a very distinct, pungent odour. It is a spice used as a digestive aid, in food as a condiment, and making pickles.

#### Synonyms

Gum Asafoetida and Devil's dung.

#### Biological Source

Asafoetida is the oleo-gum resin obtained by incision from the rhizomes and roots of *Ferula foetida*.

#### Family

Umbelliferae

#### 5.3.9.1. Occurrence and Distribution

Asafoetida is found to be distributed from Mediterranean region to Central Asia, especially in Iran and Afghanistan. Three species of *Ferula* are found in India. *Ferula narthex* occurs in Kashmir.

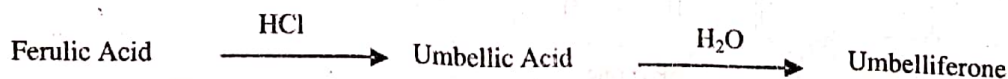
#### 5.3.9.2. Organoleptic Evaluation

Asafoetida has the following organoleptic characteristics

- 1) **Colour:** Yellowish-white changing to reddish-brown.
- 2) **Odour:** Intense, persistent, penetrating, and alliaceous.
- 3) **Taste:** Bitter, alliaceous, and acidic.
- 4) **Size:** Tears are 0.5-3cm in diameter.
- 5) **Shape:** Occurs in 2 different forms, i.e., **tears** and **masses**. Tears are rounded or flattened.
- 6) **Extra Features:** Fresh tears are tough, which on drying becomes hard and brittle. The inner surface of tears is milky whitish-yellow, translucent, or opaque. Mass of asafoetida is agglutinated and mixed with root fragments, foreign materials, and other impurities.

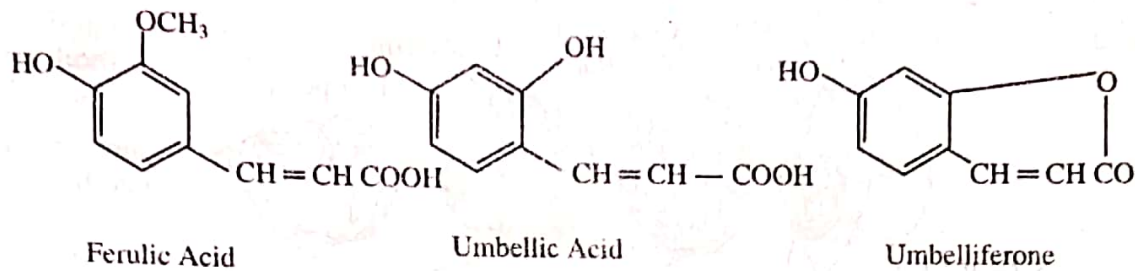
#### 5.3.9.3. Chemical Constituents

Asafoetida contains **resin** (40-65%), **gum** (20-25%), and **volatile oil** (4-20%). The chief resin of asafoetida is **asaresinotannol** present either in free form or is combined with **ferulic acid**. Asafoetida does not contain free umbelliferone. Ferulic acid when treated with hydrochloric acid, converts into umbellic acid, which forms umbelliferone by losing water.





Asafoetida oil is obtained by steam distillation of the oleo-gum resin. The oil contains **secondary butyl propanyl disulphide** as its chief constituent. However, di- and tri-sulphides, pinene, and other terpenes are also present in the oil. The sulphur compounds of the formulae  $C_7H_{14}S_2$ ,  $C_{16}H_{20}S_2$ , and  $C_{10}H_{18}S_2$  imparts odour to asafoetida.



#### 5.3.9.4. Chemical Tests

Asafoetida gives the following chemical tests:

- 1) On treating its fractured surface with sulphuric acid, a red or reddish-brown colour appears.
- 2) On treating with 50% nitric acid, it yields a green colour.
- 3) On triturating with water, it forms a yellowish-orange emulsion.
- 4) Around 0.5gm of asafoetida is triturated with sand and 5ml of hydrochloric acid. To the resultant mixture, a small amount of water is added, followed by filtration. On adding an equal volume of ammonia to the obtained filtrate, a blue fluorescence appears indicating the presence of umbelliferone.

#### 5.3.9.5. Therapeutic Efficacy

Asafoetida has the following therapeutic properties:

- 1) Its 2% (w/v) suspension is used as a repellent against dogs, cats, deer, rabbits, etc.
- 2) It is used in veterinary to apply over the bandages of dogs so they do not chew them.
- 3) Sometimes it is used as an antispasmodic, carminative, expectorant, and laxative.
- 4) It is also a powerful nerving stimulant, used in nervous disorders related to hysteria.
- 5) It is also used as intestinal flatulence.

#### 5.3.10. Nutmeg

Nutmeg is a spice with several health benefits. It relieves pain, soothes indigestion, strengthens cognitive function, detoxifies the body, boosts skin health, alleviates oral conditions, reduces insomnia, increases immune system function, prevents leukaemia, and improves blood circulation.

##### Synonyms

Semen myristicae, Myristica, and Jayfal.

##### Biological Source

Nutmeg is the kernel of the dried ripe seeds of *Myristica fragrans* Houtten, deprived of its arillus and seed coat and with or without a thin coating of lime.

##### Family

Myristicaceae

##### 5.3.10.1. Occurrence and Distribution

Nutmeg has its origin in Molucca Islands of Indonesia. It is being cultivated in India, Ceylon, Malaysia, and Grenada (West Indies). Indonesia holds the major share market for production and export of nutmeg.

### 5.3.10.2. Organoleptic Evaluation

The organoleptic features of nutmeg are (figure 5.14):

- 1) **General Appearance:** Kernels consists of outer and inner perisperm, endosperm, and embryo.

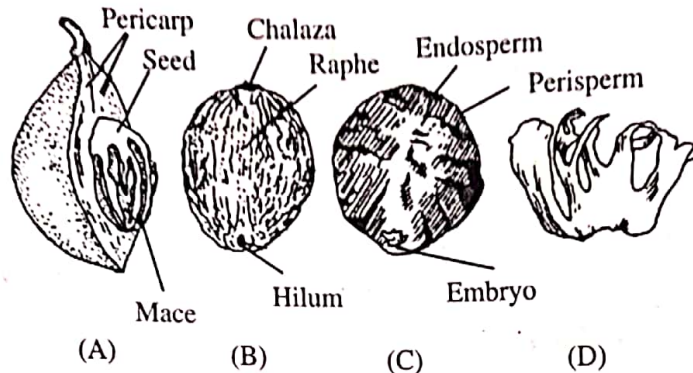
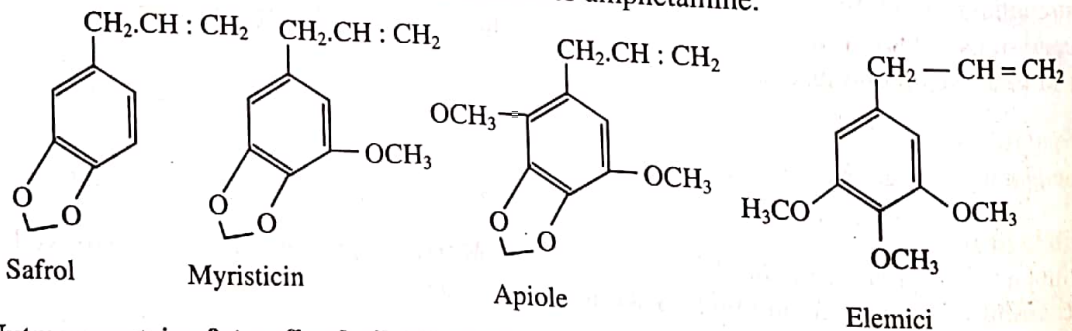


Figure 5.14: Myristica Seed, *Myristica fragrans* A) Seed in half of the pericarp; B) Seed; C) Longitudinal section of the Seed; D) Entire mace

- 2) **Size:** 2-3cm long, 1.5-2cm wide or in diameter.
- 3) **Shape:** Ovoid or broadly elongated.
- 4) **Outer Surface:** External perisperm is rough, dark-brown coloured, have reticulate furrows which are the vascular bundles. One end of the kernel has a small projection, in the centre of which micropyle is present and at the side of which hilum is positioned. The other end of kernel has the chalaza marked by a slight depression. A distinct furrow marking the position of raphe runs from chalaza to hilum.
- 5) A longitudinal preparation shows perisperm, whose inner part penetrates the endosperm having a small shrunken embryo at the micropylar end.

### 5.3.10.3. Chemical Constituents

Nutmeg contains **volatile oil** (5-15%) as its active constituent. The oil is secreted in large bubble-like cells in the inner perisperm. Volatile oil contains **myristicin** (4-8%), **elemicine**, **terpene alcohols** (borneol and geraniol), hydrocarbons pinene, camphene, and dipentene. **Safrol**, **eugenol**, and **isoeugenol** are other constituents of volatile oil. The activity of nutmeg is mainly achieved from myristicin and somewhat from safrol, eugenol, and iso-eugenol. Elemicine is related to amphetamine.



Nutmeg contains **fat or fixed oil** (25-30%) and is known as a **nutmeg butter**, which is an aromatic orange-coloured mass containing volatile oil. **Starch**, **amyloextrin**, and **saponin** are also found in nutmeg.

### 5.3.10.4. Chemical Test

On microsublimation of powdered nutmeg, a sublimate of colourless crystals of myristicin is obtained.



### 5.3.10.5. Therapeutic Efficacy

Nutmeg has the following therapeutic properties:

- 1) It is an aromatic, carminative, and flavouring agent.
- 2) It shows a narcotic and anaesthetic action on the central nervous system.
- 3) Peripherally it shows irritant action and irritates the intestine and uterus, thus is an abortifacient.
- 4) Recently it has been used to control diarrhoea related to certain carcinomas.
- 5) Its volatile oil is also used as an external counterirritant in inflammation, swelling, and rheumatism.
- 6) Sometimes its oil is added in hair-tonic preparations.
- 7) Its constituents, myristicin and elemicin have hallucinogenic property. ⑧