



## ANISEED FRUIT - *ANISI FRUCTUS*

**Aniseed** – *Pimpinella anisum* L., Fam. Apiaceae.

Synonym(s): *Anisum vulgare* Gaertn., sweet cumin.

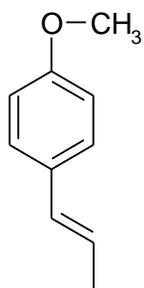
**Plant.** An annual herb with an erect, cylindrical, smooth stem arising to the height of about 1 m. Leaves are alternate below, opposite above, the lower long-petioled, ovate to orbicular, dentate, the upper with short dilated petioles, pinnatifid or ternately pinnate with long, entire or cut, segments. The inflorescences are compound umbels. The flowers are

small, white in color, each on a long hairy pedicel. The fruit is a mouse-shaped cremocarp.

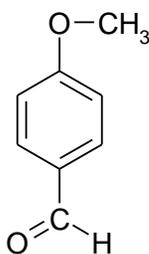
**Area of distribution.** Anise has been cultivated in Egypt, Asia Minor and southern Europe for many centuries. It has also been cultivated in many sections of this country, in India, Mexico and South America. The drug should be collected as soon as the summits of the fruits assume a grayish-green color. In harvesting, the plants are pulled up by hand or moved down and stacked in tall heaps for about 4 or 5 days until the fruits have ripened. The fruits are then separated by thrashing and carefully cleaned.

**Description.** The cremocarp is ovoid or pyriform and slightly compressed laterally, yellowish-green or greenish-grey, 3 mm to 5 mm long and up to 3 mm wide. The mericarps are covered with short, warty trichomes visible using a lens; the fruit shows five primary ridges, running longitudinally, comprising three dorsal ridges and two lateral ridges, non-prominent, and lighter in colour, odor is characteristically aromatic, and taste – sweet.

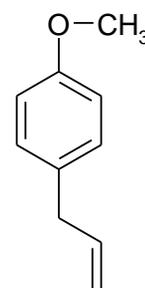
**Constituents.** Volatile oils 2–6%. Major components are *trans*-anethole (80–95%), with smaller amounts of estragole (methyl chavicol), anise ketone (*p*-methoxyphenylacetone) and  $\beta$ -caryophyllene. Minor components include anisaldehyde and anisic acid, linalool, limonene,  $\alpha$ -pinene, pseudoisoeugenol-2-methyl butyrate. Other constituents: Carbohydrate (50%), lipids 16%,  $\beta$ -amyryn (triterpene), stigmasterol coumarins, flavonol and flavone glycosides, e.g. quercetin-3-glucuronide, rutin, luteolin-7-glucoside, apigenin-7-glucoside; isoorientin and isovitexin (C-glucosides).



*trans*-Anethole



Anisaldehyde



Methyl chavicol  
(estragole)

**Uses.** Aniseed is stated to possess expectorant, antispasmodic, carminative and parasiticide properties. Traditionally, it has been used for bronchial catarrh, pertussis, spasmodic cough, flatulent colic. Aniseed has been used as an oestrogenic agent. It has been reputed to increase milk secretion, promote menstruation, facilitate birth. Drug: Spirit of anise, Distilled anise water, Pectoral Elixir.

**Contraindications:** Aniseed may cause an allergic reaction.

**Side Effects:** Contact dermatitis reactions to aniseed and aniseed oil have been attributed to anethole. Reactions have been reported with products, such as creams and toothpastes, flavoured with aniseed oil.

**Pharmacopoeial and Other Monographs:** BHP 1996, BP 2009, Complete German Commission E, ESCOP 1997, Martindale 35th edition, Ph Eur 6.4.



### **STAR ANISE FRUIT - *ANISI STELLATI FRUCTUS***

**Star anise** - *Illicium verum* Hook., Fam. Illicaceae.

**Plant.** A small evergreen tree with oblong, acuminate, entire leaves and spherical flowers comprising strongly curved reddish perianth parts. 10 stamens, and generally 8 carpels forming when ripe a star-shaped syncarp with each follicle containing one seed.

**Area of distribution.** Believed originally to have been native in Southern China and Northern Vietnam; not now known in the wild; cultivated in the tropics, including China, Japan, Philippines.

**Description.** The dried reddish brown composite fruits are corky and woody, dehiscent syncarp composed of 6-11 (mostly 8) unevenly developed 12-20 mm long mericarps (follicles), arranged stellately around a central, 6 mm wide columella. The drug may also contain separated follicles and seeds. When ripe, they spring open along the suture, exposing shiny chestnut-brown coloured, ovoid, compressed seeds, up to 8 mm long. Odour: anise like. Taste: Pungent and spicy.

**Constituents.** 5 -9%, essential oil localized mainly in the pericarp: it comprises up to 80-90% anethole and 6% methylchavicol and 5% monoterpenoid, including limonene and linalool. The drug also contains fixed oil (especially in the seed) and tannins.

**Uses.** Star anise is used principally as an aromatic and spice, and less often like anise as a stomachic and expectorant

**Pharmacopoeial and Other Monographs:** Ph. Eur. 6.4, BP 2009.



### **FENNEL FRUIT - *FRUCTUS FOENICULI***

**Fennel** - *Foeniculum vulgare* Miller., Fam. Apiaceae.

**Plant.** Perennial aromatic herbs attaining a height of about 1 m. with green, glaucous, furrowed, branched stems bearing alternate, twice pinnate leaves with narrow pinnules, small yellow flowers in compound umbels and oblong cremocarps.

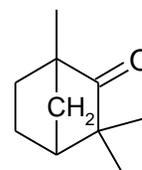
**Area of distribution.** Fennel is cultivated in India, Argentina, Germany, Spain, Italy, Russia, France, Romania.

**Description.** The fruit of bitter fennel is a cremocarp, of almost cylindrical shape with a rounded base and a narrower summit crowned with a large stylopod. It is generally 3 mm to 12 mm long and 3 mm to 4 mm wide. The mericarps, usually free, are glabrous. Each bears five prominent slightly crenated ridges. When cut transversely, four vittae on the dorsal surface and two on the commissural surface may be seen with a lens, odour and taste characteristically aromatic.

**Constituents.** Up to 6.5 % of volatile oil (*Oleum Foeniculi* U.S.P.) containing anethole and fenchone, fixed oil, calcium oxalate, etc.

**Uses.** Stimulant, spasmolytic, carminative, in mild digestive disorders; galactagogue and condiment; secretolytic, antiseptic and expectorant. Drug: Fennel Water, Glycyrrhiza Syrup, Carminative Mixture, Compound Senna Powder

**Pharmacopoeial and Other Monographs:** Ph. Eur., WHO monographs on medicinal plants commonly used in the Newly Independent States (2010).



**Fenchone**



### **THYME HERB - *THYMI HERBA***

**Thyme** - *Thymus vulgaris* L., Fam. Lamiaceae.

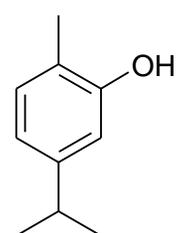
Synonym(s): Common thyme, garden thyme, mother of thyme.

**Plant.** An aromatic perennial sub-shrub, 20–30 cm in height, with ascending, quadrangular, greyish brown to purplish brown lignified and twisted stems bearing oblong-lanceolate to ovate-lanceolate greyish green leaves that are pubescent on the lower surface. The flowers have a pubescent calyx and a bilobate, pinkish or whitish, corolla and are borne in verticillasters. The fruit consists of 4 brown ovoid nutlets.

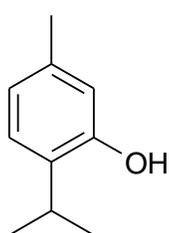
**Area of distribution.** Indigenous to southern Europe. It is a pan-European species that is cultivated in Europe, the United States of America and other parts of the world.

**Description.** The lamina is tough, entire, lanceolate to ovate, covered on both surfaces by a grey to greenish grey indumentum; the edges are markedly rolled up towards the abaxial surface. The midrib is depressed on the adaxial surface and is very prominent on the abaxial surface. The calyx is green, often with violet spots, and is tubular; at the end are 2 lips of which the upper is bent back and has 3 lobes on its end; the lower is longer and has 2 hairy teeth. After flowering, the calyx tube is closed by a crown of long, stiff hairs. The corolla, about twice as long as the calyx, is usually brownish in the dry state and is slightly bilabiate. Odour and taste aromatic.

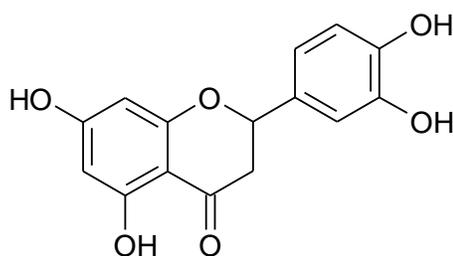
**Constituents.** *Herba Thymi* contains about 2.5% but not less than 1.0% of volatile oil. The composition of the volatile oil fluctuates depending on the chemotype under consideration. The principal components of *Herba Thymi* are thymol and carvacrol (up to 64% of oil), along with linalool, *p*-cymol, cymene, thymene,  $\alpha$ -pinene; flavonoids: apigenin, luteolin, and 6-hydroxyluteolin glycosides, as well as di-, tri- and tetramethoxylated flavones. Other constituents include Caffeic acid, oleanolic acid, ursolic acid, rosmarinic acid, resins, saponins and tannins.



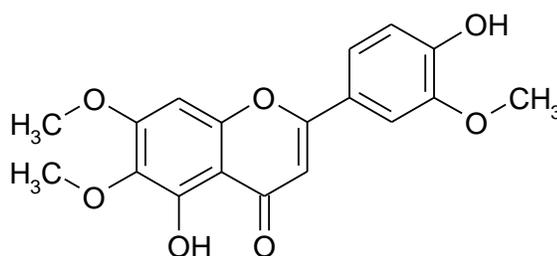
**Carvacrol**



**Thymol**



**Eriodictyol**



**Cirsileneol**

**Uses.** Thyme is stated to possess antitussive, expectorant, secretomotor, bactericidal, anthelmintic and carminative, antispasmodic properties. Thyme extract has been used orally to treat coughs due to colds, bronchitis and pertussis; and laryngitis and tonsillitis (as a gargle); dyspepsia and other gastrointestinal disturbances. Topical applications of thyme extract have been used in the treatment of minor wounds, the disorders of the oral cavity, and as an

antibacterial agent in oral hygiene. Both the essential oil and thymol are ingredients of a number of proprietary drugs including antiseptic and healing ointments, syrups for the treatment of respiratory disorders, and preparations for inhalation. Another species in the genus, *T. serpyllum* L., is used for the same indications. In folk medicine they are used as emmenagogue, sedative, antiseptic, antipyretic, to control menstruation and cramps. Drug: Pertussin, Bronchicum, Bronchicum Husten; Maraslavin; Stoptussin-Fito.

**Contraindications:** Thyme oil is toxic and should be used with considerable caution. It should not be taken internally and only applied externally if diluted in a suitable carrier oil.

**Side Effects:** Contact dermatitis has been reported. Patients sensitive to birch pollen or celery may have a cross-sensitivity to thyme.

**Pharmacopoeial and Other Monographs:** BHP 1996, BP 2009, Complete German Commission E, ESCOP 2003, Martindale 35th edition, Ph Eur 6.4, WHO volume 1 1999, SPU.



### **WILD THYME HERB - *SERPYLLI HERBA***

**Wild Thyme** - *Thymus serpyllum* L., Fam. Lamiaceae.

Synonym(s): Mother of thyme.

**Plant.** This perennial shrub is 5 to 30 cm high, has ligneous and ramous roots. Its ramous stems are greyish; lying at the base, they then become erect and bear entire leaves, linear to elliptic, with hardly no petiole. It bears pinkish, white or crimson flowers in terminal glomerules inflorescence. This aromatic plant gives off a pleasant smell.

**Area of distribution.** It grows spontaneously in dry and sunny places in Ukraine.

**Description.** Stems quadrangular, about 1 mm. in diameter, dusky red-purple, brown to dusky greenish yellow in colour, pubescent, nodes up to 35 mm. apart, occasionally with opposite leaves attached. Leaves obovate, elliptical or ovate, up to 15 mm. in length and from 2 to 5 mm in width; summit obtuse; base attenuate, tapering into a short petiole; margin revolute, ciliate, upper surface weak olive green, pellucid-punctate, lower surface light green, pellucid-punctate, with few non-glandular and glandular hairs. Inflorescence in 12-flowered short, terminal spikes; flowers polygamous; calyx tubular-bilabiate, glandular hairy with a tuft of white hairs in the throat, upper lip 3-lobed. Lower lip of 2 slender attenuate lobes bearing bristly

marginal hairs; corolla tubular, bilabiate, purple, or pink, red or white in varieties, as long or longer than the calyx; stamens slightly didynamous and exserted; stigma bifid; nutlets ovoid or oblong, smooth; odor and taste characteristically aromatic.

**Constituents.** It contain: - 0.1 to 0.6 % essential oil composed of phenolic compounds: thymol, monoterpenes (carvacrol, cineole, linalool,  $\alpha$ -pinene and p-cymol) an important quantity of flavonoids deriving from various aglycones including flavones: apigenin, diosmetin, luteolin and scutellarin, up to 7 % tannins.

**Uses.** It is used for the same indications as *Thymus vulgaris* L.

**Pharmacopoeial and Other Monographs:** Ph. Eur. 6.4, BP 2009, SPU.



### **POT MAJORAM HERB - *ORIGANI HERBA***

**Pot majoram** - - *Origanum vulgare* L., Fam. Lamiaceae.

Synonym(s): wild majoram, Oregano.

**Plant.** Pot majoram is generally considered as a perennial herb, with creeping roots, branched woody stems and opposite, petiolate and hairy leaves. The flowers are in corymbs with reddish bracts, a two-lipped pale purple corolla and a five-toothed calyx. In moderate climates, the flowering period extends from late June to August. Each flower produces, when mature, four small seed-like structures. The foliage is

dotted with small glands containing the volatile oil that gives the plant its aroma and flavor.

**Area of distribution.** It is indigenous to Europe and Asia.

**Description.** The raw material consists of the upper parts of stems up to 20 cm with leaves and inflorescences; partly crumbled. Stems are green or purple, roughly hairy. Leaves are oblong-ovate in shape, short-petiolate, acuminate at the apex, opposite and have entire or denticulate margin. Flowers are small, pink-purple or white bilabiate. The corolla is brownish-purple or brownish-pink in colour. The odour is aromatic: the taste is bitterish, spicy, and slightly astringent.

**Constituents.** Volatile oil containing carvacrol, thymol, free alcohol and ester. Although abundant chemical compounds have been isolated from oregano, the most important group, from application point of view, refers to its volatile oils. However, composition may vary significantly among different genotypes. *Origanum* species are rich in phenolic compounds such as carvacrol

and thymol. Other chemical groups that are commonly detected in *Origanum* species are acyclic monoterpenoids such as geraniol, geranyl acetate, linalool.

**Uses.** There are various reports on the traditional medicinal uses European oregano has as a carminative, diaphoretic, expectorant, emmenagogue, stimulant, stomachic and tonic. In addition, it has been used as a folk remedy against colic, coughs, headaches, nervousness, toothaches and irregular menstrual cycles. “Urolesan” is diuretic, holagogue, spasmolytic phyto remedy.

**Contraindications:** *Origanum* may cause abortion during pregnancy.

**Pharmacopoeial and Other Monographs:** BP 2009, SPU.



### **GINGER RHIZOME - ZINGIBERIS RHIZOMA**

**Ginger** - *Zingiber officinale* Roscoe., Fam. Zingiberaceae.

Synonym(s): *Amomum zingiber* L., common ginger, Gan Jiang, Zingiber.

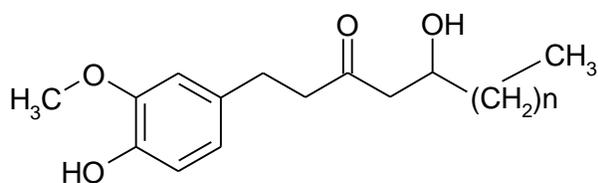
**Plant.** A perennial herb with a subterranean, digitately branched rhizome producing stems up to 1.50 m in height with linear lanceolate sheathing leaves (5-30 cm long and 8-20 mm wide) that are alternate, smooth and pale green. Flower stems shorter than leaf stems and bearing a few flowers, each surrounded by a thin bract and situated in axils of large, greenish yellow obtuse bracts, which are closely arranged at end of flower stem forming collectively an ovate-oblong spike. Each flower shows a superior tubular calyx, split part way down one side; an orange yellow corolla composed of a tube divided above into 3 linearoblong, blunt lobes; 6 staminodes in 2 rows, the outer row of 3 inserted at mouth of corolla, the posterior 2, small, horn-like, the anterior petaloid, purple and spotted and divided into 3 rounded lobes; an inferior, 3-celled ovary with tufted stigma. Fruit a capsule with small arillate seeds

**Area of distribution.** The plant is probably native to south-east Asia and is cultivated in the tropical regions in both the eastern and western hemispheres. It is commercially grown in Africa, China, India, and Jamaica; India is the world's largest producer

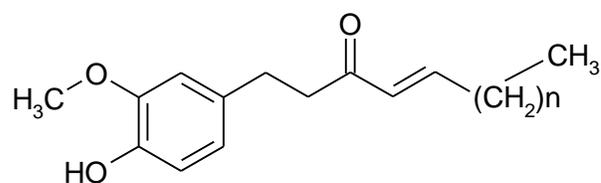
**Description.** Ginger occurs in horizontal, laterally flattened, irregularly branching pieces; 3 -16 cm long, 3-4 cm wide, up to 2 cm thick; sometimes split longitudinally; pale yellowish buff or

light brown externally, longitudinally striated, somewhat fibrous; branches known as "fingers" arise obliquely from the rhizomes, are flatfish, obovate, short, about 1-3 cm long; fracture, short and starchy with projecting fibres. Internally, yellowish brown, showing a yellow endodermis separating the narrow cortex from the wide stele, and numerous scattered fibrovascular bundles, abundant scattered oleoresin cells with yellow contents and numerous larger greyish points, vascular bundles, scattered on the whole surface Odour, characteristic aromatic; taste, pungent and aromatic; colour, internally pale yellow to brown

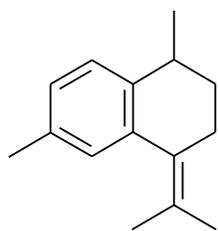
**Constituents.** The rhizome contains 1-4% essential oil and an oleoresin. The composition of the essential oil varies as a function of geographical origin, but the chief constituent sesquiterpene hydrocarbons (responsible for the aroma) seem to remain constant. These compounds include zingiberene, curcumene, psesquiphellandrene, and bisabolene. Monoterpene aldehydes and alcohols are also present. The constituents responsible for the pungent taste of the drug and possibly part of its anti-emetic properties have been identified as 1-(3'-methoxy-4'-hydroxyphenyl)-5-hydroxyalkan-3-ones, known as gingerols (having a side-chain with 7-10, 12, 14, or 16 carbon atoms, respectively) and their corresponding dehydration products, which are known as shogaols.



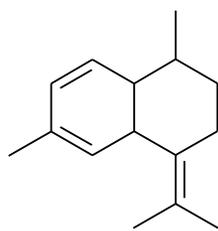
**Gingerols:**  
**n=4, [6]-gingerol**  
**n=6, [8]-gingerol**  
**n=8, [10]-gingerol**



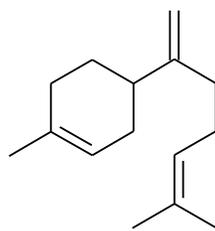
**Shogaols:**  
**n=4, [6]-shogaol**  
**n=6, [8]-shogaol**  
**n=8, [10]-shogaol**



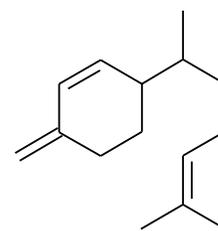
**ar-Curcumene**



**(-)-zingiberene**



**beta-Bisabolene**



**beta-Sesquiphellandrene**

**Uses.** The prophylaxis of nausea and vomiting associated with motion sickness, postoperative nausea, pernicious vomiting in pregnancy, and seasickness. It is used to treat dyspepsia,

flatulence, colic, vomiting, diarrhoea, spasms, and other stomach complaints. Powdered ginger is further employed in the treatment of colds and flu, to stimulate the appetite, as a narcotic antagonist, and as an anti-inflammatory agent in the treatment of migraine headache and rheumatic and muscular disorders. To treat cataracts, toothache, insomnia, baldness, and haemorrhoids, and to increase longevity

**Drug interactions.** In view of the documented pharmacological actions of ginger, the potential for preparations of ginger to interfere with other medicines administered concurrently, particularly those with similar or opposing effects, should be considered. Ginger has been reported to possess both cardiogenic and antiplatelet activity in vitro and hypoglycaemic activity in in vivo studies. An oleo-resin component, 6-shogaol has been reported to affect blood pressure (initially decrease then increase) in vivo. The clinical significance of these findings, if any, is unclear.

**Side Effects:** Contact dermatitis of the finger tips has been reported in sensitive patients

**Pharmacopoeial and Other Monographs:** BHC 1992, BHP 1996, BP 2009, BPC 1973, ESCOP 2003, Martindale 35th edition, Ph. Eur. 6.4, USP29/NF24, WHO 1999 volume 1.



### **CINNAMON BARK - CINNAMOMI CORTEX**

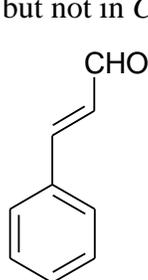
**Cinnamon** - *Cinnamomum verum* J.S. Presl. or of *Cinnamomum cassia* Blume., Fam. Lauraceae.

**Plant.** A moderate-sized evergreen trees with dense foliage; the bark is harvested from 2-3cm thick branches of about 6 year old trees. Leaves opposite or subopposite (rarely alternate), hard and coriaceous, by 3.8-7.5 cm, ovate or lanceolate, subacute or shortly acuminate, glabrous and shining above. Flowers numerous, in lax panicles usually longer than the leaves. Fruit dry or slightly fleshy, dark purple, surrounded by the enlarged campanulate perianth.

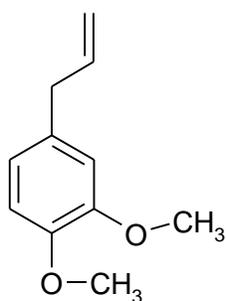
**Area of distribution.** *Cinnamomum verum* is native to India and Sri Lanka; cultivated in parts of Africa, southeastern India, Indonesia, the Seychelles, South America, Sri Lanka, and the West Indies. *Cinnamomum cassia* found in China, Indonesia, the Lao People's Democratic Republic, and Vietnam; mostly cultivated.

**Description.** The drug is channelled or quilted, 30-40 cm long, 3-10 cm in diameter, 2-8 mm thick. Outer surface is greyish brown, slightly rough, with irregular fine wrinkles and transverse raised lenticels; inner surface reddish brown, with fine longitudinal striations and exhibiting oily trace on scratching. Texture is hard and fragile, easily broken, fracture uneven. Odour is characteristic and aromatic; taste - characteristic, slightly sweet and fragrant.

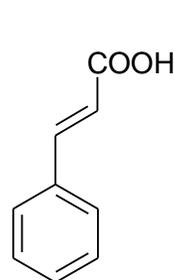
**Constituents.** The major constituent in both *C. verum* and *C. cassia* is cinnamaldehyde, at concentrations of 65-80% and 90% of the volatile oil, respectively. *Cinnamomum verum* also contains o-methoxycinnamaldehyde. *Cinnamomum verum* differs from *C. cassia* in its eugenol and coumarin content. *Cinnamomum verum* volatile oil contains 10% eugenol, whereas in *C. cassia*, only a trace quantity of this compound is found. Coumarin is present in *C. cassia* (0.45%), but not in *C. verum*



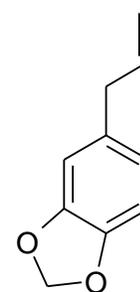
**Cinnamaldehyde**



**Methyleugenol**



**trans-Cinnamic acid**



**Safrole**

**Uses.** Cinnamon is stated to possess antispasmodic, carminative, orexigenic, antidiarrhoeal, antimicrobial, refrigerant and anthelmintic properties. It has been used for anorexia, intestinal colic, infantile diarrhoea, common cold, influenza, and specifically for flatulent colic, and dyspepsia with nausea. Cinnamon bark is also stated to be astringent, and cinnamon oil is reported to possess carminative and antiseptic properties. A few prepared medicines contain cinnamon bark, primarily, as an aromatic or flavor enhancer.

**Side Effects:** Contact with cinnamon bark or oil may cause an allergic reaction. Cinnamon oil is stated to be a dermal and mucous membrane irritant, and a dermal sensitiser.

**Pharmacopoeial and Other Monographs:** BHP 1996, BP 2007, Complete German Commission E, Martindale 35th edition, Ph Eur 2007, WHO volume 1 1999.



### **TURMERIC RHIZOME - CURCUMAE RHIZOME**

Turmeric - *Curcuma longa* L., Fam. – Zingiberaceae.

Synonym(s): *C. domestica* Valetton.

**Plant.** Turmeric is a perennial herbaceous plant about 0,5-1 m in height. Rhizome is horizontal, fleshy, yellow-orange, branchy, with adventitious roots. Leaves are radical, oblong or lanceolate in shape, pressed to one another, naked. Leaves have petiole, which in lower part is extended into the sheath. The inflorescence is a spike with wide green stipules. Flowers are yellow. They are

located in the axils of green stipules.

**Area of distribution.** The plant is native to India and cultivated in India, West-Pakistan, China, Malaya.

**Description.** The primary rhizomes are ovate or pear-shaped; secondary rhizomes are cylindrical. Lateral rhizomes are about 4-7 cm long and 1-1,5 cm thick. Their outer surface is yellowish-grey in colour, fracture is yellow. Turmeric has an aromatic odour and worm somewhat bitterish taste.

**Constituents.** The drug contains volatile oils (about 5%), consisting from sesquiterpenes: zingiberene (25%), and monoterpenes: cineole, phellandrene. It also contains about 5% of colouring materials, known as curcuminoids, the chief of which is curcumin. The rhizomes also contain arabinose, fructose, glucose, and starch. Curcumin (dicinnamoyl methane derivatives) related phenolics possess antioxidant, anti-inflammatory, gastroprotective and hepatoprotective activities. The volatile oil, also curcumin, exhibited anti-inflammatory activity in a variety of experimental models. Used orally, curcumin prevents the release of inflammatory mediators.

**Uses.** Turmeric is used as an aromatic, stomachic, diuretic, cholagogic agents. It possesses strong antihepatotoxic action and is used for the treatment of jaundice and hepatitis.

**Pharmacopoeial and Other Monographs:** German Commission E, ESCOP, WHO, DAC, JHMC, PPRC, Ph. Eur. 6.4, BP 2009, USP 32.



### **CLOVE - CARYOPHYLLI FLOS**

Clove - *Eugenia aromaticum* L., Fam. Myrtaceae.

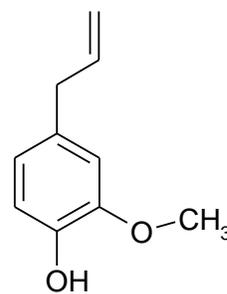
Synonym(s): *Caryophyllus aromaticus* L., *Eugenia aromatica* (L) Baill., *E. caryophylla* Thunb., *Jambosa caryophyllus* (Spreng.) Nied., *Myrtus caryophyllus* Spreng., *Syzygium aromaticum* (L.) Merrill et L.M.

**Plant.** Small evergreen trees, 10-20 m high. Leaves opposite, petiolate, lanceolate, pinkish to dark green, with translucent, aromatic glands, have a pungent odour when young. Inflorescence occurs as racemose panicles and bears buds that take on the form of nails before blossoming. Flowers red with 4 concave, overlapping petals that drop off as soon as the flower opens; stamens numerous; 4 calyx lobes. Fruit dark red, fleshy drupe. Buds readily exude oil when pressed or scratched with a fingernail

**Area of distribution.** Indigenous to the Moluccas and southern Philippines, but currently cultivated in many tropical areas including Africa (e.g. Madagascar and Tanzania), South America, Indonesia, Malaysia and Sri Lanka

**Description.** Flower bud 10-20 mm long, bright reddish-brown to dark brown; lower part (the hypanthium) solid, cylindrical, somewhat flattened, 4-sided, tapering towards the base and bearing at the apex 4 thick, triangular, divergent sepals, alternating with 4 rounded, fragile, unexpanded, membranous, imbricated petals forming a pale, nearly spherical head that encloses numerous stamens, curved inward and inserted on a small disc, and a stiff, slender, erect, single style arising from a depression in the centre. Externally wrinkled; internally, hypanthium contains in its upper portion a 2-celled inferior ovary with numerous ovules attached to the axile placenta; has very large outer zone with numerous shining, oval oil glands near the periphery, numerous vascular bundles in the centre and a dark, lacunose layer abutting on the central zone and columella. Odour: characteristic, strongly aromatic; taste: pungent, spicy, followed by slight numbness

**Constituents.** The major constituent (up to 20%) is an essential oil, which is characterized by the presence of eugenol (60-95%), eugenol acetate (2-27%), and caryophyllene (5-10%). Other constituents include campesterol, carbohydrates, kaempferol, lipids, oleanolic acid, rhamnetin, sitosterol, stigmasterol and vitamins.



**Eugenol**

**Uses.** The pharmacological properties documented for cloves are associated with the volatile oil, in particular with eugenol which has local anaesthetic action. External or local applications for the treatment of toothache, and minor infections of the mouth and skin.

Also used as an antiseptic for dressing of minor wounds, and, in the form of lozenges, for sore throats and coughs associated with the common cold. The essential oil (1-5%) is used in mouthwashes. Clove oil is stated to be a carminative, occasionally used in the treatment of flatulent colic.

Clove is listed by the Council of Europe as a natural source of food flavouring (category N2). This category indicates that clove can be added to foodstuffs in small quantities, with a possible limitation of an active principle (as yet unspecified) in the final product. Clove is commonly used in cooking, and as a flavouring agent in food products. In the USA, clove is listed as GRAS (Generally Recognised As Safe).

**Contraindications:** Flos Caryophylli is contraindicated in cases of known allergy to plants of the Myrtaceae family.

**Drug interactions.** None documented. Cloves should not be taken in doses greatly exceeding those used in foods and caution should be exerted in patients taking anticoagulant or anti platelet therapy. The potential for preparations of clove oil to interact with other medicines administered concurrently, particularly those with similar or opposing effects, should be considered. Eugenol, a major constituent of clove oil, inhibits prostaglandin synthesis, although the clinical relevance of this, if any, is unclear.

**Side Effects:** Allergic contact dermatitis has been reported in patients who were regularly exposed to Flos Caryophylli or who already had dermatitis of the fingertips. An LD<sub>50</sub> (rat, by mouth) value for clove oil is stated as 2,65g/kg body weight.

**Pharmacopoeial and Other Monographs:** BHP 1996, BP 2000, Complete German Commission E, Martindale 35th edition, Ph. Eur. 6.4, SPU.