



Coriandrum sativum: A biological description and its uses in the treatment of various diseases

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Abstract

Coriandrum sativum is an important source of chemicals of α -pinene, γ -terpinene, limonene and p-cymene together with various nonlinalool alcohols and esters. Linalool and geraniol as internal standards. Other constituents isolated from the fruits include flavonoids, coumarines, isocoumarines, phthalides and phenolic acids. The high content of fats (16-28) % and protein (11-17) % in the fruits make distillation residues suitable for animal feed. The fruits yield 5-7% of ash. 13% resin, astringent principle, malic acid and alkaloids, coriander oil contains coriandrol, jireniol and vebriniol. Hence in view of immense medicinal importance of the plant this review is therefore an effort to compile all the information reported on its phytochemical and pharmacological activities this information will be helpful to create interest towards the plant and may be useful in developing new formulations, which are more effective and have more therapeutic value.

Keywords: *Coriandrum sativum*, α -pinene, γ -terpinene, limonene, coumarines, isocoumarines, phthalides

Introduction

Dhanyaka consist of dried ripe fruits of *Coriandrum sativum* Linn. (Fam. *Umbelliferae*); a slender, glabrous, branched, annual herb, cultivated all over India, giving characteristic aroma when rubbed; crop matures in 2-3 months after sowing; herb is pulled out with roots, after drying, fruits threshed out and dried in sun, winnowed, and stored in bags. The whole plant and especially the unripe fruit, is characterized by a strong disagreeable odour, whence the name coriander (from the greek *K'opis*, a bug)¹.

Coriander is indigenously distributed in Italy, but is widely cultivated in The Netherlands, Central and Eastern Europe, the Mediterranean (Morocco, Malta, and Egypt), China, India and Bangladesh. Coriander is mentioned in the papyrus of Ebers and in the writings of Cato and Pliny. It was well known in England before the Norman Conquest. Ukraine is the major producer of oil and controls the world price on a supply and demand basis; in one large factory continuous distillation has replaced the batch process. In India it is chiefly found in Madhya Pradesh, Maharashtra, Rajasthan, Andhra Pradesh, Tamil Nadu, Karnataka and Bihar.

Botanical description^{2,3}:

Leaves: A small herb having many branches and sub-branches. New leaves are oval but aerial leaves are elongated.

Flowers: white, having slightly brinjal like shades.

Fruit: round, divided into 2 parts.

Seed: The herb bears flowers and seeds at the end of winter

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(a) **Macroscopic Characteristic**- Fruit globular, mericarps usually united by their margins forming a cremocarp about 2-4 mm in diameter, uniformly brownish-yellow or brown, glabrous, sometimes crowned by the remains of sepals and styles, primary ridges 10, wavy and slightly inconspicuous secondary ridges 8, straight, and more prominent: endosperm coelospemous : odour, aromatic; taste, spicy and characteristic.

Powder study of coriander sativum:

Description:

Fig 1: Endocarp: parquetry arrangement of **thin** walled lignified cells with **polygonal** cells of mesocarp.

Fig 2: Endosperm: polygonal parenchyma with aleurone grain and oil globules. Micro rosette crystals of calcium oxalate in the cells.

Fig 3: Vittae: few yellowish brown fragments of vittae, thin walled, small parenchymatous cell in group.

Fig 4: Sclerenchymatous layer: groups of fusiform fibers running wavy: crossing each other, lignified.

Fig 5: Fragment of epicarp in surface view with stomata and small prismatic crystals of calcium oxalate.

Fig 6: Endosperm cells with microsette crystals of calcium oxalate.

Solubility of coriander in 70% per cent alcohol:

One volume dissolves in 3 volumes of 70% alcohol.

Phytochemicals of coriander^{3,4}:

Green coriander contains 84% water. Seeds contain up to 1.8% volatile oil according to origin (BP standard not less than 0.3%). The distilled oil (coriander oil BP) contains 65-70% of (+)-linalool (coriandrol), depending on the source, and smaller amounts of α -pinene, γ -terpinene, limonene and p -cymene together with various nonlinalool alcohols and esters. Some 40 constituents have been identified. The BP uses GC for evaluation of the oil with linalool and geraniol as internal standards. Other constituents isolated from the fruits include flavonoids, coumarines, isocoumarines, phthalides and phenolic acids. The high content of fats (16-28) % and protein (11-17) % in the fruits make distillation residues suitable for animal feed. The fruits yield 5-7% of ash. 13% resin, astringent principle, malic acid and alkaloids, coriander oil contains coriandrol, jireniol and vebrin iol.

Physical constants:

Ash value: Not more than 6 per cent

Determination of total ash: Weight accurately 3 gm of the air dried crude drug in the tared crucible and incinerate at a temperature about 500-600°C until free from carbon (Become whitish grey in color), cool and weigh. Calculate the percentage of ash with reference to air-dried drug^{5,6}.

Acid insoluble ash: Not more than 1.5 per cent

Determination of Acid Insoluble ash: Boiled the ash with 25ml of 2M HCl for 5 minutes, collected the insoluble matter in a Gooch crucible or on an ashless filter paper, washed with hot water, ignite, cool in a dessicator and weighed. Calculated the percentage of acid-insoluble ash with reference to the air dried drug.

Water-soluble extractive: Not more than 19 per cent

Determination of water soluble ash: To the crucible containing the total ash, added 25ml of water and boiled for 5 minutes. Collected the insoluble matter in a sintered glass crucible or on an ash less filter paper. Washed with hot water and ignite in a crucible for 5 min. at a temperature not exceeding 450°C. The weight of this residue in mg from the weight of total ash. Calculated the content of water soluble as in mg/g of the air-dried material.

Alcohol soluble extractive: Not more than 10 per cent

Determination of Alcohol soluble extractive: As per the above procedure using alcohol as a solvent, performed the alcohol soluble extractive values.

Thin layer chromatography of coriander:

Coriandri sativum fruits^{7,8}: Essential oils with terpenes

Drug sample (Essential oil): Coriandri fructus aeth and coriandri semen aeth.

Solvent system: Toluene-ethyl acetate (93:7)

Detection: Vanillin-sulphuric acid reagent. 1% ethanolic vanillin (solution 1), 10% ethanolic sulphuric acid (solution 2). The plate is sprayed with 10 ml (solution 1), followed immediately by (solution 2). After heating at 110°C for 5-10 min under observation, the plate is evaluated in vis.

Reference compound: Linalool

The rape utic uses:

Seeds:

Local application of coriander seeds alleviates swelling and pains. Paste of green coriander has very good action on headache caused by pitta. Externally, powdered green coriander alleviates burning sensation and pain in diseases like inflammation caused by pitta, erysipelas and lymphadenopathy. Decoction of green coriander is useful in stomatitis. In epistaxis, nasal drops of green coriander act as a haemostat and thus stop bleeding. In conjunctivitis, either juice or decoction of green coriander is put in eyes. The paste of dry coriander is used in headache. The seeds were included in a host of prescriptions for fever, diarrhoea, vomiting, indigestion as in stomach and carminative^{9,10,11}.

Leaves:

Green leaf is used as a refrigerant. Fresh juice of leaves is used as a gargle in sore throat and stomatitis. Paste is applied over swellings and boils; also over cervical adenitis. The paste is prepared by pounding green leaves with barley flour. The paste of dry fruits is applied over forehead and temples during headache. For cooling effect on the mind and for including sleep, fresh juice of the leaves, mixed with sugar, is given. It is also given in biliousness, intestinal irritations, heartburn, thirst and nausea^{12,13,14}.

Internal uses:

Coriander used internally as tonics for majjadhatu. It cures vertigo, syncope and memory loss.

External uses:

Local application of coriander seeds alleviates swelling and pains. Paste of green coriander has very good action on headache caused by pitta¹⁵. Externally, powdered green coriander alleviates burning sensation and pain in diseases like inflammation caused by pitta, erysipelas and lymphadenopathy. Decoction of green coriander is useful in stomatitis. In epistaxis, nasal drops of green coriander act as a haemostat and thus stop bleeding. In conjunctivitis, either juice or decoction of green coriander is put in eyes. The paste of dry coriander is used in headache^{16,17,18}.

The plant is prescribed for Snake bite (Sushruta, Brihannighantaratakara) and scorpion- sting (Sushruta), but is an antidote to neither Snake-venom (Mhaskar and Caius) or Scorpion-Venom (Caius and Mhaskar)

Dose: 1-3 g of the drug in powder form.

Conclusion

Coriander is used as Digestive, Astringent, Liver stimulant, Anthelmintic, Diuretic, Dyspeptic, Anti pyretic, Antiinflammatory, Stomatitis, haemostat, Conjunctivitis, Headache, Tonic for majjadhatu, Appetizer. The fruit extract of Coriander inhibit mycelial growth of *Pythium aphanidermatum*. The essential oil of Coriander exhibit strong antifungal activity at very low concentration.

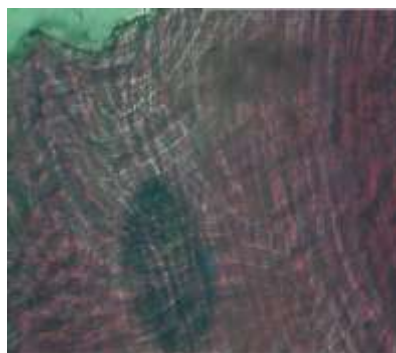


Fig 1: Endocarp

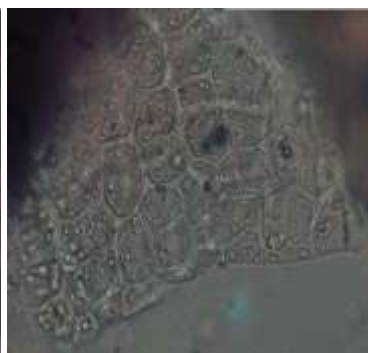


Fig 2: Endosperm

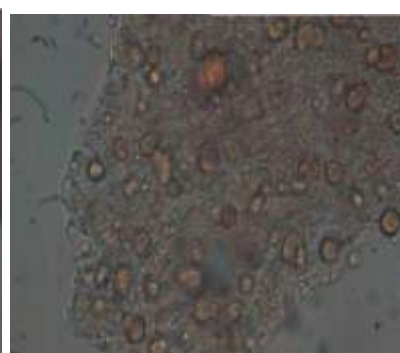


Fig 3: Vittae

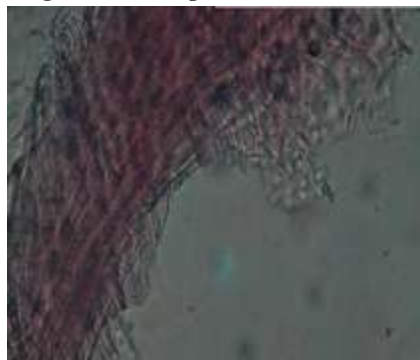


Fig4:Sclerenchymatous layer

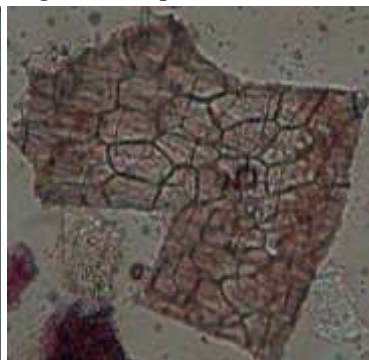


Fig5:Fragment of epicarp



Fig 6: Endosperm

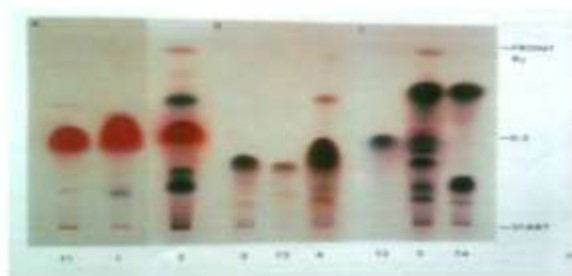


Fig 7: TLC of Coriander fructus (1) and Coriandri semen (2), Linalool (T) is the major compound in both essential oils. Commercial seed oil can have a higher amount of linalool and in addition geraniol (Rf 0.2) and geranyl acetate (Rf 0.7), detected as grey zones.

Table: 1 Different activities of the plant

Activity studied	Part(s) used
Digestive	Seeds and Whole part
Astringent	Seeds and Whole part
Liver stimulant	Seeds and Whole part
Anthelmintic	Seeds and Whole part
Diuretic	Seeds and Whole part
Dyspeptic	Seeds and Whole part
Anti pyretic	Seeds and Whole part
Stomat itis	Seeds and Whole part
Haemostat	Seeds and Whole part
Conjunctivitis	Seeds and Whole part
Headache	Seeds and Whole part
Tonic for majjadhatu	Seeds and Whole part
Appetizer	Seeds and Whole part

Table: 2 Test for Methanolic Extract of Coriander :

Test	Observation	Conclusion
Test for saponin glycoside (Foam test): Shake the drug extract or dry powder vigorously with water.	Persistent foam	Saponin glycoside absent.
Hemolytic test; Drug extract to one drop of blood placed on glass slide	Hemolytic zone appear	Saponin glycoside present.

<p>Test for tannins: Methanolic extract + water, boil and filter, filtrate + $FeCl_3$</p>	<p>Dark coloration / precipitate</p>	<p>Drug contain tannin</p>
<p>Test for flavanoids: Methanolic extract + few drops conc. HCL and 0.5 g magnesium turning.</p>	<p>Pink color observed</p>	<p>Drug contain flavonoid</p>
<p>Methanolic extract +lead acetate solution</p>	<p>Yellow coloured precipitate</p>	<p>Drug contains flavonoid.</p>
<p>Methanolic extract+ sodium Hydroxide</p>	<p>Residue shows yellow coloration which discoloration after addition of acid.</p>	<p>Drug contains flavonoid.</p>
<p>Test for mucilage: Methanolic extract +1-2 droop of water on microscopic side</p>	<p>Mucilaginous mass/zone, swelling/ slippery feeling</p>	<p>Drug contains mucilage.</p>
<p>Test for mucilage: Methanolic extract + molisch's reagent, heat</p>	<p>Violet/blue coloration</p>	<p>Drug contains carbohydrate.</p>
<p>Test for steroid: Methanolic extract+ 2ml chloroform and 2ml conc H_2SO_4 shake well.</p>	<p>Chloroform layer appears red and acid layer shows greenish yellow fluorescence.</p>	<p>Drug contain steroid</p>

Liebermann- Buchard reaction: Methanolic extract +1-2 ml acetic anhydride and 2drops of conc. H ₂ SO ₄ . From the side of tube.	Green color appears.	Drug contain steroid
Liebermann reaction: Methanolic extract + 3ml acetic anhydride. Heat and cool. Add few drops conc. H ₂ SO ₄ .	Blue color appears.	Drug contain steroid
Test for alkaloid: Methanolic extract+ Wagner 's reagent	Reddish brown precipitate	Drug contain alkaloid
Methanolic extract + Mayer 's reagent	Creamy precipitate	Drug contain alkaloid
Methanolic extract + Hagner's reagent	Yellow precipitate	Drug contain alkaloid
Test for alkaloid: Methanolic extract+ drangandorff's reagent	Reddish brown precipitate	Drug contain alkaloid

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