



PHYTOCHEMICAL SCREENING OF *CORIANDER SATIVUM* LINN

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ABSTRACT

Coriander sativum is an important Ayurvedic drug. Phytochemical investigation of fresh, powdered and anatomical sections of fruit of *Coriander Sativum* were carried out to determine its micro morphological and physical evaluation profiles. Various extract of *Coriander Sativum* were subjected to various Qualitative chemical examination & carried out Preparative thin layer chromatography study on its basis GCMS of Methanolic extract was performed and active constituents like linalool, linalyl acetate, cymene, triterpene were identified. These findings will be useful in the identification of the plant and the drug but also contribute towards establishing pharmacopoeial standards towards.

Keywords: *Coriander Sativum*, Thin layer chromatography, Phytochemical, GCMS.

INTRODUCTION

Coriander (*Coriandrum sativum* L.) fruit Apiaceae (Umbeliferae) is an annual herb originating from the Mediterranean countries, and is nowadays mostly grown in Italy, India, Morocco, and Eastern Europe, Latin America Africa and Southeast Asian cuisine. Coriander, also known as cilantro, cilantrillo, Arab parsley, Chinese parsley, Mexican parsley, Dhanya and Yuen sai^{1,2}. Its use is recommended in urethritis, cystitis, urinary tract infection, urticaria, rash, burns, sore throat, vomiting, indigestion, nosebleed, cough, allergies, hay fever, dizziness and amoebic dysentery. All parts of the plant are edible, but the fresh leaves and the dried seeds are the most common parts used in cooking. In the Indian traditional medicine, coriander is used in the disorders of digestive, respiratory and urinary systems, as it has diaphoretic, diuretic, carminative and stimulant activity^{3,4,5}. In Iranian traditional medicine, Coriander has been indicated for a number of medical problems such as dyspeptic complaints, loss of appetite, convulsion, insomnia and anxiety^{4,7}. Pharmacological studies have demonstrated the Hypoglycemic⁸, Hypolipidemic^{9, 10}, Antimutagenic¹¹, Antihypertensive¹², Antioxidant¹³, Antimicrobial¹⁴ and postcoital antifertility¹⁵ activity of *Coriander sativum*. It has also been used in heavy metal detoxification¹⁶. Pharmacognostical investigation with microscopic analysis and macerate details besides GCMS studies on the fruits of *C. Sativum* which help in the identification of crude drug.

MATERIALS AND METHODS

Samples of coriander sativum were collected from C. U. SHAH College Of Pharmacy And Research and authenticated by Botanical Scientist of Dr. Hitesh A. Solanki Dept. of Botany Gujarat University, of India.

1. Evaluation of Microscopical characters

Pharmacognostic evaluation including Anatomical sections and powder studies were carried out. The vernacular names are provided Photomicrographs were obtained by observing free hand sections of drug under compound binocular microscope with built in analogue and computer images were captured. Measurements of cells and tissues were carried out using Micro Image Lite Image Analysis Software¹⁷⁻¹⁹.

2. Qualitative investigation (Evaluation of standard parameter):

Qualitative Investigation of *coriander sativum* like moisture content, ash value and extractive values of the powdered fruits samples carried out as describe below procedure.²⁰⁻²⁴.

2.1 Determination of Moisture content²⁰⁻²⁴.

Weight about 1.5 gm of the powder drug in to a weighted flat and thin porcelain dish. Dry in the oven 100°C. Cool in a desiccator and watch. The loss in weight is usually recorded as moisture.

2.2 Determination of Ash values

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 colour), cool and weigh. Calculate the percentage of ash with reference to air-dried drug²⁰⁻²⁴.

Determination of Acid Insoluble ash: Boil the ash with 25ml of 2M HCl for 5 minutes, collect the insoluble matter in a Gooch crucible or on an ash less filter paper, wash with hot water, ignite, cool in a desiccator and weigh. Calculate the percentage of acid-insoluble ash with reference to the air dried drug²⁰⁻²⁴.



Determination of water soluble ash: To the crucible containing the total ash, add 25ml of water and boil for 5 minutes. Collect the insoluble matter in a sintered glass crucible or on an ash less filter paper. Wash with hot water and ignite in a crucible for 5 min. at a temperature not exceeding 450°C. Weigh the residue in mg. Calculate the content of water soluble as in mg/g of the air-dried material²⁰⁻²⁴.

2.3 Determination of solvent extractive values: 5 gm of the air dried drug, coarsely powdered have to be macerated with 100ml of water closed flask for 24hr, shaking frequently during the first 6 hr. and allowing standing for 18 hr. There after filter rapidly, and evaporate the whole content in a previously tarred porcelain dish. After evaporation of all the solvent, again weight the content and calculate the percentage of water-soluble extractive with reference to the air-dried drug have to be calculated. As such, perform the alcohol soluble extractive and also petroleum ether extractive values²⁰⁻²⁴.

3. Preliminary phytochemical investigation

The fruits of *Coriander Sativum* were dried under shade and powdered with a mechanical grinder. Dried material was Successively extracted with Petroleum ether, Methanol (90% v/v), Ethyl acetate and Water in Soxhlet apparatus and after complete extraction (50 hr), the solvent was removed by distillation under reduced pressure and resulting semisolid mass was vacuum dried. Extracts of *Coriander Sativum* were subjected to preliminary phytochemical screening for the detection of various plants constituent. The preliminary phytochemical investigations were done by the standard chemical tests²⁰⁻²³.

Test for alkaloids

The small portion extracts were stored separately with a few drops of dilute hydrochloric acid and filtered. The filtrate was tested with various alkaloidal agents, such as Mayer's reagent (cream precipitate) and Dragendorff's reagent (orange brown precipitate).

Test for carbohydrates and glycosides

Small quantity of extracts were dissolved separately in 5 mL of distilled water and filtered. The filtrate was subjected to Molisch's test to detect the carbohydrates. Another small portion of extract was hydrolyzed with dilute hydrochloric acid for few hours in a water bath and was subjected to Liebermann-Burchard's, legal and Borntrager's test to detect different glycosides. (Pink to red color indicates presence of glycosides).

Test for flavonoids

5 mL of dilute ammonia solution were added to a portion of aqueous filtrate of plant extract followed by addition of concentrated H₂SO₄. A yellow coloration observed in extract indicated presence of flavonoids. Test for steroids 2 mL acetic anhydride was added to 0.5 g extracts with 2

mL H₂SO₄. The color changed from violet to blue or green in samples indicated presence of steroid.

Test for terpenoids (Salkowski test)

Five mL of extracts were mixed in 2 mL of chloroform, and then concentrated H₂SO₄ (3 mL), was carefully added to form a layer. A reddish brown coloration formed at the interface indicated presence of terpenoids.

Test for saponin

About 1 mL of extract were diluted with distilled water to 20 mL and shaken in graduated cylinder for 15 minutes. One cm layer of foam indicated presence of saponin.

Test for tannin

When extract were treated with vanillin-hydrochloric acid reagent, pink or red color was formed due to formation of phloroglucinol.

Test for protein

Mellon's reaction: Million's reagent (mercuric nitrate in nitric acid containing a trace of nitrous acid) usually yields a white precipitate on addition to a protein solution, which turns red on heating.

Test for volatile oil or essential oil

A thick section of extract was placed on a glass slide. A drop of Sudan red reagent was added and after two minutes, it was washed with 50% alcohol mount in glycerin.

4. Preparative thin layer chromatography of Methanolic extract of *coriander Sativum*

Ordinarily, microgram quantities of mixture of organic compounds are separated by analytical TLC. It is possible to scale up the quantities to milligram amount (10-50 mg) by using thicker layer (0.5-2.0 mm thickness) of the support material and by the use of larger plates (20 x 20 cm or 20 x 40 cm). Multiple developments also bring about better resolution. Preparative TLC for the isolation of marker compound from the Methanolic extract of *Coriander Sativum* fruits was performed by using solvent system toluene: ethyl acetate (93: 7).

Detection

Detection of active constituent by spraying of Vanillin-sulphuric acid reagent. It is composition of solution 1 (1% Ethanolic vanillin), and solution 2 (10% Ethanolic sulphuric acid).

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 visual light^{24,25}.

GC-MS Study Methanolic extract of *coriander Sativum*

The GCMS analysis was performed in Agilent 6890 series equipped with MSD 19091S-433 system. It is known that there is a selective loss of low boiling terpenoids by conventional hydro-distillation technique. Head space-gc



is therefore more suitable for quantification of highly volatile compounds than conventional hydro distillation technique. For the Dynamic Headspace, 1.0 gm of sample was taken in 20 ml headspace vial. Headspace is created and these vapours are injected in GC equipped with MSD. Headspace components were identified by matching their mass spectra with those in NIST 05 MS library search and by comparing with literature reports and GC retention indices (RI)²⁶.

RESULTS AND DISCUSSION

As shown in fig 1(a) & fig 1(b) Transverse section of fruit shows pericarp with outer epidermis (Epicarps), middle layer of sclerenchymatous cell and inner layer of endosperm and endocarp. Epicarps which present with slightly thickened anticlinal wall it is single layer, thickened, polygonal tabular cells. Few cells contain calcium oxalate crystals; covered by smooth cuticles. Mesocarp is dividing into three layers (fig 1C) first Outer layer which is poorly arranged tangentially elongated non-lignified parenchyma. Second layer which is Fusiform, lignified. Third Inner layer which contain large, irregular, hexagonal, lignified parenchyma which is divided in to endocarp and endosperm Endocarp is inner pericarp shows typical parquetry arrangement of the cells. Endosperm is Thick walled, polygonal cellulosic parenchyma containing fixed oil aleurone grains and micro rosette of calcium oxalate.

As shown in figure 2 powder characteristic of *coriander sativum* shows Epicarps Endocarp, Endosperm, Vittae and Sclerenchymatous cell. Endocarp [Fig 2 (a)] is parquetry arrangement of thin walled lignified cells with polygonal cells of mesocarp. Endosperm [Fig 2 (b)] is polygonal

parenchyma with aleurone grain and oil globules. Microrosette crystals of calcium oxalate in the cells. Vittae [Fig 2(c)] are few yellowish brown fragments. Sclerenchymatous layer [Fig 2 (d)] is groups of fusiform fibers running wavy: crossing each other, lignified. Fragment of Epicarps [Fig 2 (e)] is in surface view with stomata and small prismatic crystals of calcium oxalate. While Fig 2 (f) describes Endo sperm cells with microsette crystals of calcium oxalate.

Qualitative analysis like Moisture content, Total ash value, Water soluble ash, Acid soluble ash, Water soluble extractive value and Alcohol soluble extractive value, Volatile oil content are describe in Table 1.

Table 1: describe evaluation of pharmacognostic standards of the powdered fruits of *Coriander sativum*

| Evaluation parameter | Value (%w/w) |
|----------------------------------|--------------|
| Moisture content | 8.9 ± 0.2 |
| Total ash value | 2.0± 0.9 |
| Water soluble Ash value | 1.0± 0.5 |
| Acid-insoluble ash value | 0.2 ±0.1 |
| Water soluble extractive value | 18±0.8 |
| Alcohol soluble extractive value | 16 ±0.6 |
| Volatile oil | 3.0± 0.3 |

Preliminary phytochemical investigation (table 2) indicate presence of carbohydrate reducing sugar, triterpenoids, protein and volatile oil are present in *coriander sativum*. Preparative thin layer chromatography (fig 3) of Methanolic extract indicate presence of linalool which further helps for performing GC-MS Study (fig 4) which indicate presence of cymene, terpinone, linalool like terpenoids.

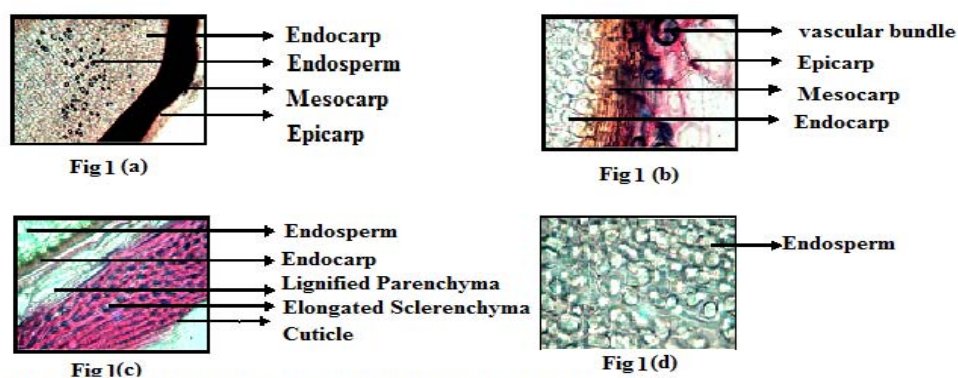


Fig 1: Describe Microscopic Characteristic of *Coriander Sativum*:

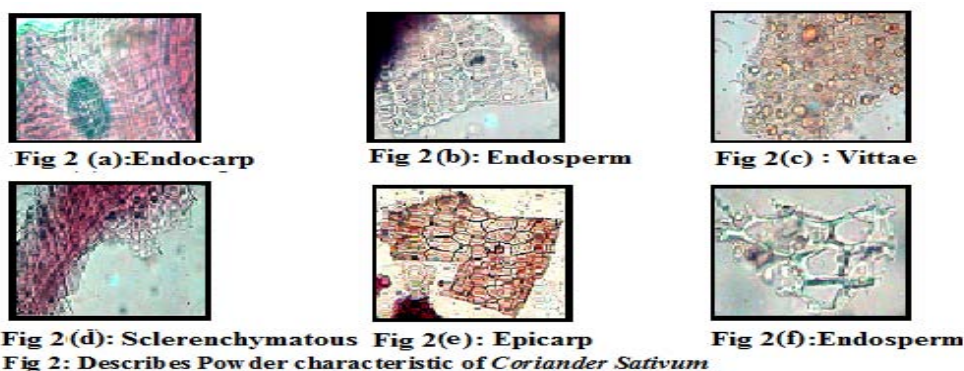
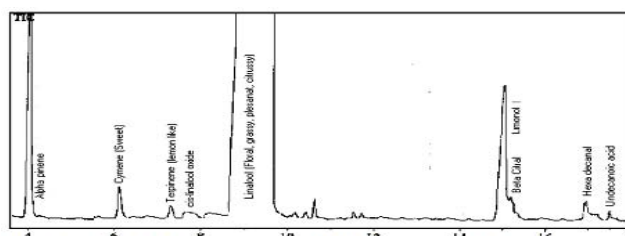


Fig 2: Describes Powder characteristic of *Coriander Sativum*

Table 2: Describes preliminary phytochemical investigation of various extracts of fruits of *Coriander sativum*

| Test for active constituents | Petroleum extracts | Chloroform extracts | Ethylacetate extracts | Methanol extracts | Aqueous extracts |
|-------------------------------|--------------------|---------------------|-----------------------|-------------------|------------------|
| Alkaloids | -ve | -ve | -ve | -ve | -ve |
| Carbohydrates | +ve | +ve | +ve | +ve | +ve |
| Reducing sugars | +ve | +ve | +ve | +ve | +ve |
| Steroids | -ve | -ve | -ve | -ve | -ve |
| Glycosides | -ve | -ve | -ve | +ve | -ve |
| Flavonoids | -ve | -ve | -ve | -ve | -ve |
| Triterpenes | +ve | +ve | +ve | +ve | +ve |
| Saponin | -ve | -ve | -ve | -ve | -ve |
| Proteins | -ve | -ve | -ve | +ve | +ve |
| Tannins | -ve | -ve | -ve | -ve | -ve |
| Amino acids | -ve | -ve | -ve | -ve | -ve |
| Volatile oil or Essential oil | -ve | +ve | +ve | +ve | +ve |

Methanolic Std
Extract Linalool**Fig 3 :** Describes TLC Profile of *Coriander Sataivum***Fig 4:** Describes GC-MS Characterization of Methanolic extract of *Coriander Sativum*.

CONCLUSION

The Pharmacognostic and phytochemical studies of fruits of *coriander sativum* were carried out. Pharmacognostic studies are help full for identification of herbal drugs. While preliminary phytochemical analysis revealed presence of carbohydrates, glycoside, protein amino acid terpenoids were present. Methanolic extracts of *coriander sativum* shows presence of linalool, a-pinenen, cymene, tepene etc compounds.

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