Journal of Research in Science and Engineering (JRSE)
ISSN: 1656-1996 Volume-6, Issue-8, August 2024
DOI: 10.53469/jrse.2024.06(08).07

Analysis and Study of Coriandrum Sativum Linn as a Promising Component

Gowtham Mulpuri

St Soldier institute of Pharmacy Jalandhar
mulpuri814626610@gmail.com

Abstract: ***Coriander (Coriandrum sativum L.), is a versatile plant associated with the Apiaceae family. It is known as spice which is very popular in India and also used in culinary (leaves called cilantro) like salads, salsas, garnishes, etc. The whole coriander herb, with its abundance of Phytochemical, has a variety of pharmacological qualities that extend beyond its use in cooking. Significant attention has been paid to the potential benefits of coriander essential oil and linalool, two particular chemicals that have been discovered to be effective in treating ulcers and colitis. This review provides an overview of coriander's chemical constituents, cultivation, traditional uses, and potential side effects. The entire coriander herb is employed in treating illnesses by managing biomarkers such as myeloperoxidase (MPO), stool consistency, ulcer severity, and similar indicators. Together with India, Morocco, Romania, France, Spain, Italy, the Netherlands, Myanmar, Pakistan, Turkey, Mexico, Argentina, South and Western Australia and to a lesser extent the UK and USA are among the countries where coriander is commercially grown. Additionally well - known for their therapeutic qualities. Coriander is therefore frequently used as a component in the making of Ayurvedic medications.***

Keywords: Coriander (Coriandrum sativum L.), Apiaceae, culinary, linalool, myeloperoxidase (MPO)

1. Introduction

The coriander (Coriandrum sativum L., Apiaceae) is an annual herbaceous plant that originates in North Africa, Central Europe, and Asia for culinary and medicinal purposes. It's also well known for traditional remedies because people are quite comfortable with using it as a spice and for medicinal purposes like treating digestive problems, joint pain, and other inflammatory diseases[1]. Whole coriander is used for pharmacological actions; for example, the seeds are used to treat infections, rheumatism, stomach problems, and joint discomfort; the roots, stems, leaves, and fruits are known for their pleasant aroma[2]. The whole plant is used in sauces and chutneys, fruits (Seed and bark) are used for essential oil (importantly linalool), while the leaves are used to flavor soups and curries, globally. It is also often used to make bread, cakes, pastries, cookies, sausages, and spices [2]. The main ingredient found in the oil is linalol, which has an essential oil content of about 1%. It makes about 30–80% of the overall amount of seed oil. Coriander includes flavonoids, phenols, reducing sugars, tannins, fatty acids, sterols, and glycosides, as determined by phytochemical study. Minerals and vitamins are abundant, as are proteins, fats, carbs, fibres, and many other nutrients [3, 4]. Coriander seed oil's greater phospholipid saponification rate is primarily responsible for its capacity to scavenge free radicals. The application of coriander seed polyphenol fraction efficiently shielded human lymphocytes from H2O2 - induced oxidative stress, and it also restored their oxidative processes to normal cells [5]. The traditional Maharasnadhi Quaather (MRQ) recipe's major ingredient, coriander seeds, suggests that coriander is used as an anti - inflammatory. In both animal models and human subjects, MRQ has demonstrated anti - inflammatory qualities. When MRQ was given to rats, the paw edoema caused by carrageenan was lessened. By the time the hot plate test was completed, this formula had raised the rats' pain threshold by 57%. Coriander has antioxidant properties that may help in delay or prevent poisoning[6]. Both the leaves and seeds have been shown to contain antioxidants[7]. In early studies, rats fed a high fat diet were given coriander seeds which reduced peroxide, unsaturated fatty acids and glutathione and increased antioxidant enzyme activity. Both the aqueous and etheric properties of coriander extract have the effect of preventing lipid peroxidation in the body and can treat changes in aging. The effectiveness of extract increases when used over time. However, ether extracts were more successful in reducing oxidation [8].

1.1 Functional quality and medicinal value:

One of the rare and delectable herbs with Ayurvedic provenance is coriander; it works wonderfully and has no side effects. Traditional medicine uses a variety of plant parts, such as its fresh leaves, flowers, and fruits to cure a wide range of illnesses. It has a long history of healing in addition to its nutritional value. Herbal remedies have been used for many years by Ayurveda to treat a wide range of conditions, including diabetes, gas, indigestion, sleeplessness, renal disease, and appetite loss. It is therefore frequently regarded as a storehouse of biologically active substances[9].

1.2 Taxonomic classifications


Kingdom: Plante**,** Family: Apiaceae**,** Subkingdom: Tracheobionta**,** Division: Magnoliophyta Superdivision: Spermatophyta, Class: Magnoliopsida, Subclass: Rosidae
Odor: Apiales**,** Genus: Coriandrm**,** Species: Coriandrum sativum Linn.

Figure 1: Seeds, leaves and stem of coriander

1.3 Chemical constituents of Coriander sativum

The different component of coriander is classified essential oils, flavonoids, fatty acids and sterols. The most common use of the coriander plant is its fruits (seeds and bark) which contain essential oils and fats. It is known that approximately 1% of the total seed oil contains essential oil and the linalool content varies between 30% and 80%[3]. Phytochemical analysis of coriander shows that it contains tannins, reducing sugars, alkaloids, phenols, flavonoids, fatty acids, sterols, glycosides and essential oils. It also contains many minerals, trace elements, vitamins, proteins, lipids, crab and fiber with important nutritional properties [2] (Table 1). Coriander green leaves include 87.9% moisture content, 3.3% protein, 0.6% fat, 6.5% carbs, and 1.7% mineral stuff. Ripe coriander seeds that have been dried have a moisture content of 6.3 - 5.0% and contain essential oil (0.3 - 2.06%), fatty oil (13 - 18%), and Crude fiber (28.4–29.1%), protein (11.5–21.3%), fat (17.8–19.15%), and ash (4.9–6.0%) [10].

Table 1: Chemical Constituents of Coriander sativum Linn.

Part of Coriander sativum	Chemical Constituents
Seed	Linalool, citral, Geranyl acetate (17.6%), Camphor, g - terpinene (14.4%), b - pinene (1.82%), Camphene, m - cymene (1.27%), citronellal (1.96%), citronellol (1.31%), citral (1.36%), Geraniol (1.87%), Citronellyl Acetate (1.36%), α - cedrene (3.87%), α - farnesence (1.22%), β - sesquiphell - andrene (1.56%), α - thujene, α –pinene (1.63%), anethole (1.15%), p - cymene (1.12%), sabinene, α - terpinene, cymene, γ - Terpinene 14.42, Camphene 0.14, E - Verbenol 0.27, Sabinene, Oxabicyclo (2.2.2), 0ctan - 6 - l, 1, 2, 3 - trimethyl 0.02, β - Myrcene 0.55, Cyclooctanol 0.02, α – Thujene 0.04.
Leaf and stem	Decanal (14.3 %) (F), Thionodecalactone, n - Cetyl alcohol, Dimethyleheptane, 2E - decen - 1 - ol (14.2 %) and n - decanol (13.6 %), 2 - decenoic acid (30.8%), E - 11 - tetradecenoic acid (13.4%), capric acid (12.7%), undecyl alcohol (6.4%), tridecanoic acid, undecanoic acid, alcohol, aldehyde, kaempherol, Quercetin, O - mesquercitin, acacetin, Vanillic acid, P - coumaric acid, cis - Ferulic acid and trans - Ferulic acid, β - ionone, eugenol, E - 2 - decenal, Undecanal, β - Cinene, Z - Nonene, Cyclododecane, Cyclooctanaol, Decanol, d - limonene, Eucalyptol, Nonanol, Capric acid, 2 - decenoic acid (30.82%), E - 11 - tetradecenoic acid (13.4%), capric acid (12.7)

1.4 Cultivation of coriander sativum: [2, 11]

1) Climate and soil

For coriander to yield strong crops and seeds, particularly during flowering and sowing, it needs a cool, dry, and frost - free climate. Coriander is an important crop. Frosts that occur after blossoming could affect production. Low yield and infertility during seed development and flowering are caused by high temperatures and strong winds. When it's overcast outside during blossoming, aphids and illnesses are more likely[2, 11].

2) Preparation of land:

It is grown as an irrigated crop on loamy to moderately heavy soils, and is produced as a rain - fed crop with conserved moisture content on heavy soils, such as black cotton[2, 12].

3) Sowing:

Sowing a hectare of land requires about 12–15 kilograms of

fruits. For seeding in one hectare the fruits are necessary. Before planting rubbing is done because it splits fruit. Fruits or seeds begin to grow a little earlier than intact fruits do. If the seeds are soaked in water for 12–14 hours and then dried in the shade for 12 hours, they will germinate more quickly Prior to seeding, the proper fungicides are applied to the seeds. Apply 2.5 g/kg of Thiram to seeds as a prophylactic against the stem - gall disease. The seeds are placed in rows with 25 cm between rows and 15 cm separating plants. Rakes are sometimes used to mix seeds that have been dispersed with the soil. Depending on the temperature, germination occurs in 10 to 15 days[13].

4) Irrigation

Irrigation depends on the soil, weather and season. Crops made with black cotton usually do not need water, but light soils require 3 - 4 irrigations. The first occurs during the two - leaf period (20 - 30 days after planting) the second (after 6070 days) during the branching or flowering period and the third entire seed period after 80 - 110 days. At the beginning of flowering, the crop should be given sufficient moisture[2, 13].

5) Wedding and Hoeing:

Weeding and hoeing are essential for a successful harvest. For a typical crop, two hoeing is usually sufficient. If there is an early rain during the standing crop further hoeing and weeding are done to remove weeds and to improve soil aeration for the crop. The first one is done when the plants grow well above the ground and the second is given before rows close up. About 30 days after planting, the initial hoeing and weeding of irrigated crops is finished and depending on the weed development, one or two additional weddings may be required[13, 14].

6) Disease and pest control:

The wilt, powdery mildew, stem - rot, and stem - gall are significant diseases that harm the crop. Spraying Sulfate (0.25 %) or more than (0.15 %) or using wettable sulfur (0.25 %) as a spray during blooming and again at intervals of 15 to 25 days helps control powdery mildew. Wilt has no immediate controls that are available. However, choosing seeds free of disease, treating seeds with fungicides, and avoiding growing coriander repeatedly on the same piece of ground[15].

1.5 Traditional uses of Coriander sativum

Coriander was one of the world's oldest spice crops used in many conditions since about 1550 BC. It was utilized as a stimulant, aromatic, and carminative in medicine. The main therapeutic function of the powdered fruit, fluid extract, and oil is as a flavoring agent to mask the taste of potent purgatives and curb their chewing tendencies. The entire or ground seed (fruit) was used to flavor many commercial meals including certain soups, stews, many cakes, bread and other pastries, alcoholic beverages, frozen dairy desserts, sweets and puddings. It was also used as an ingredient in pickling spices. The fruit essential oil was frequently found in lotions, creams, detergents, emulsifiers, surfactants, and perfumes[10].

Coriander is one of the medicinal herbs used for the treatment of hyperglycemia. It is also utilized as an anti - diabetic medication in various nations including Saudi Arabia, Jordan, and Morocco. Regular consumption of a coriander seed decoction was said to effectively lower blood lipid levels in Ayurvedic literature. Moreover, the Moroccan and Palestinian pharmacopeia have both documented the use of coriander as a conventional diuretic or to treat urinary infections. The herb coriander has been used to treat inflammatory conditions and arthritis [16]. To reduce swelling and pain locally seeds were applied. Headaches were treated with green coriander paste. Green coriander powder was applied topically to treat disorders including lymphadenopathy and erysipelas inflammation that produce burning and agony. Green coriander decoction was utilized for stomatitis. Green coriander nasal sprays work as a hemostat to reduce bleeding in the epitasis. Green coriander juice or a decoction is used to treat conjunctivitis. The seeds are commonly used as a carminative and for the treatment of indigestion, vomiting, diarrhea and fever. For internal tonics coriander was employed. Memory loss and syncope were additional uses for it. Fresh leaf juice was gargled for stomatitis and sore throats. Locally leaf paste was utilized for headache and forehead [1].

1.6 Side effects of coriander

When the coriander aqueous extract was employed in high doses in both of the tested strains (Salmonella typhimurium TA97 and TA102) mutagenicity was found. Because some major unfavorable effects could be seen in vivo, coriander aqueous extract cannot be considered as safe. The highest concentrations of coriander extract caused the highest levels of apoptosis and necrosis which decreased the cell viability of human cell lines (WRL - 68 and 293Q cells). Additionally, the extract caused serious abnormalities to occur throughout fetal development. The Artemia salina lethality test was also used to assess the toxicity of coriander essential oil. As a result, the oil was determined to be bioactive and had a median lethal concentration (LC50) value of 23 g/mL. To be considered a safe and efficient antifungal drug, however, the acute toxicological effects and antifungal activity in vivo must be assessed. Coriander essential oil in particular its primary ingredient linalool is thought to be generally harmless due to its long history of use as a flavoring agent and traditional medicine with no known harmful consequences. A slight possibility of sensitization is the only adverse impact that has been observed[17]. In mice, 2.257 ml/kg of Coriandrum sativum essential oil was found to be the median fatal dose (LD50). The decoction and maceration extracts' maximal non - fatal doses were 0.5 g/kg and 5 g/kg respectively while their LD50 values were 0.78 g/kg and 8.11 g/kg respectively [12].

Disclosure Statement

There is no conflict of interest.

Acknowledgment

It's our privilege to express a profound sense of gratitude and cordial thanks to our respected chairman Mr. Anil Chopra, Vice Chairperson Ms. Sangeeta Chopra, St. Soldier Educational Society, Jalandhar for providing the necessary facilities to complete this review work.

References

[1] Al - Snafi AE. Medicinal plants Possessed anti - inflammatory antipyretic and analgesic activities (part 2) - Plant based review. *Sch Acad J Pharm*.2016; 5 (5): 142 - 158. www.saspublisher. com

[2] Sharma MM, Sharma RK, Keshwananda S, Agricultural R. Coriander. Published online 2012. doi: 10.1533/9780857095671.216

[3] Sahib NG, Anwar F, Gilani AH, Hamid AA, Saari N, Alkharfy KM. Coriander (coriandrum sativum L.): A potential source of high - value components for functional foods and nutraceuticals - a review. *Phyther Res*.2013; 27 (10): 1439 - 1456. doi: 10.1002/ptr.4897

[4] ElSayed S, Ahmed S. Effects of Coriander Seeds Powder (Coriandrum sativum) as Feed Supplements on Growth Performance Parameters and Immune Response in Albino Rats. *Int J Livest Res*.2017; (September): 1. doi: 10.5455/ijlr.20170215041849

[5] Hashim MS, Lincy S, Remya V, Teena M, Anila L. Effect of polyphenolic compounds from Coriandrum sativum on H 2O2 - induced oxidative stress in human lymphocytes. *Food Chem*.2005; 92 (4): 653 - 660. doi: 10.1016/j. foodchem.2004.08.027

[6] Shimba A, Ikuta K. Control of immunity by glucocorticoids in health and disease. *Semin Immunopathol*.2020; 42 (6): 669 - 680. doi: 10.1007/s00281 - 020 - 00827 - 8

[7] Chithra V, Leelamma S. Hypolipidemic effect of coriander seeds (Coriandrum sativum): Mechanism of action. *Plant Foods Hum Nutr*.1997; 51 (2): 167 - 172. doi: 10.1023/A: 1007975430328

[8] De Almeida Melo E, Mancini Filho J, Barbosa Guerra N. Characterization of antioxidant compounds in aqueous coriander extract (Coriandrum sativum L.). *LWT - Food Sci Technol*.2005; 38 (1): 15 - 19. doi: 10.1016/j. lwt.2004.03.011

[9] Nath P, Kale SJ. TARs.2015; (January 2016).

[10] Coşkuner Y, Karababa E. Physical properties of coriander seeds (Coriandrum sativum L.). *J Food Eng*.2007; 80 (2): 408 - 416. doi: 10.1016/j. jfoodeng.2006.02.042

[11] Patel RG, Pathak NL, Rathod JD, Patel LD, Bhatt NM. Phytopharmacological properties of Randia dumetorum as a potential medicinal tree: An overview. *J Appl Pharm Sci*.2011; 1 (10): 24 - 26.

[12] Hosseinzadeh H, Alaw Qotbi AA, Seidavi A, Norris D, Brown D. Effects of different levels of coriander (coriandrum sativum) seed powder and extract on serum biochemical parameters, microbiota, and immunity in broiler chicks. *Sci World J*.2014; 2014. doi: 10.1155/2014/628979

[13] Edrah SM. Screening for Phytochemical Constituents of Selected Medicinal Plants from Al - Khums Region, Libya. *J Clin Rev Case Reports Screen*.2017; 1 (3): 1 - 5.

[14] Silva MG, Soares TM, Gheyi HR, Oliveira MGB De, Santos CC. HYDROPONIC CULTIVATION OF CORIANDER USING FRESH AND BRACKISH WATERS WITH DIFFERENT TEMPERATURES OF THE NUTRIENT SOLUTION Coriandrum sativum shoot fresh matter, ABSTRACT A large number of studies on salinity in hydroponic systems have been carried out, b. *Eng Agrícola*.2020; 4430: 674 - 683.

[15] Ramadan MF. *Handbook of Coriander (Coriandrum Sativum)*.; 2022. doi: 10.1201/9781003204626

[16] Laribi B, Kouki K, M'Hamdi M, Bettaieb T. Coriander (Coriandrum sativum L.) and its bioactive constituents. *Fitoterapia*.2015; 103: 9 - 26. doi: 10.1016/j. fitote.2015.03.012

[17] Hassanen NHM, Eissa AMF, Hafez SAM. Original Research Article Antioxidant and antimicrobial activity of celery (Apium graveolens) and coriander (Coriandrum sativum) herb and seed essential oils. *Int J Curr Microbiol Appl Sci*.2015; 4 (3): 284 - 296.