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Review Article

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Review on *Cuminum Cyminum* –Nature's Magical Seeds

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ABSTRACT

Cumin (Cuminum cyminum) is an annual herbaceous flowering plant belonging to family Apiaceae, also known as the Umbelliferae family. Cumin is native from the East Mediterranean to South Asia and today, grown all over the world for its pleasantly aromatic seeds. Cumin has been found to possess various pharmacological activities such as immunomodulator, anti-diabetic, anti-microbial, anti-fungal, analgesic, hepatoprotective, anti-osteoporotic, anti-oxidant, anti-inflammatory, anti-asthamatic, anti-stress, anti-infertility, dietary fibre, anti-cancer, blood platelet aggregation, anti-tussive activities and also has ophthalmic effects due to the presence of various chemical constituents. It contains 2.5 to 4.5% volatile oil, 10% fixed oil and proteins. Volatile oil mainly consists of 30 to 50% cuminaldehyde, small quantities of α-pinene, β-pinene, phellandrene, cuminic alcohol, hydrated cuminaldehyde and hydro cuminine which make it suitable for medicinal purpose.

Keywords: *Cuminum cyminum*; Flavouring agent; Phytoconstituents; Medicinal properties

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INTRODUCTION

Cumin (*Cuminum cyminum*) is an annual herbaceous flowering plant belonging to family Apiaceae, also known as the Umbelliferae family. Cumin is native from the East Mediterranean to South Asia and today, grown all over the world for its pleasantly aromatic seeds. The only species in its genus, cumin depend on the seed source. Its seeds are used in the cuisines of many different cultures. The aromatic substances present in these herbs have attracted the enormous attention of researchers worldwide to experimentally validate the therapeutic uses of cumin seeds, which are documented in several indigenous healing systems [1-3] (Figure 1). More description of its physical and chemical is listed in Tables 1-6. Chemical structures of its constituents and pharmacological properties are listed in Tables 7 and 8 respectively. Contraindications and nutritional values of it are listed in Tables 9 and 10.

Plant

Flower

***Cuminum cyminum* seed**

Figure 1: Phenotype descriptors

Geographical Distribution
World scenario: *Cuminum cyminum* is an yearly plant. The estimated world production is around 300,000 tons. Today cumin production is mainly concentrated in Central and South Asia. Nowadays, India is the largest producer (70% of world production), exporter and consumer of cumin seed in the world. India scenario: India holds a major position in the world production of Cumin. Rajasthan produces 56% while as production from Gujarat accounts for 44% [3].

CULTIVATION AND COLLECTION

Climate
Cumin needs dry and cool climate for its growth, with a temperature ranging between 25 to 30°C.

Soil
Cumin grows excellent on sandy loam to loamy soil with a pH 6.8-8.3 range.

Sowing
The seeds are sown in spring at the time April-May and sowing is performed between middle November and in December, they are transplanted.

Irrigation
Depending upon the climatic conditions and soil irrigation is done. Generally, irrigation is not required for the crop grown in black cotton soils, but for light soils, 3-4 irrigations are given; first irrigation is carry out at 2-leaves stage (20-30 days after sowing); the second has to carry out at branching or flowering stage (60-70 days) and the third is performed at seed-filling stage (80-110 days). At the time of flowering beginning, sufficient moisture should be present in the soil.

Intercultural
For a good crop, weeding and digging are significant. Generally, two hoeing are enough for a ordinary crop. First, one performed when the plants grow well above the ground and the second is perform before rows closed up, but if there is an early rain at the time standing crop, additional hoeing and weeding are carry out to remove weeds and to provide better soil aeration to the crop.

Diseases and Pest Control
Cultivation of cumin is mainly troubled by three diseases wilt, blight and powdery mildew which are passed by *Fusarium oxysporum*, *Alternaria burnsii* and *Erysiphe betae* respectively.

Storage and Viability
The seeds can be reserved in cool, dry, dark place and in airtight containers. Avoid exposure to extreme heat.

Cumin Breeding
Cumin is a cross-pollinator means the breeds are hybrids. Thus procedures used for breeding are *in-vitro* regenerations, DNA technologies, and gene transfer. The *in-vitro* cultivation of cumin allows the generation of genetically exact plants. One goal of cumin breeding is improved resistance to biotic (fungal diseases) and abiotic stresses [4].

Uses
Culinary uses**:** Seeds of cumin are generally added to dishes to bring out the perfect flavour of the seeds, they are usually toasted in a dry frying pan or with a little butter before adding [5]. Below are the uses and how to use cumin:

- Cumin is used in barbeque sauces and marinades.
- Sprinkle ground cumin inside a cheese omelette mixture.
- Fry along onions and use to flavour lentils.
- Blend with olive oil and pour over stir-fried vegetables.
- Used in hot and spicy soups or sauces.
- Added in curries and chillies.
- Cumin is mixed in pickles and chutneys.

Traditional uses [6,7]:

- Drug is used in abortive and emmenagogue.
- In Indonesia, it used in cases of bloody diarrhoea and headache (paste is applied to the forehead).
- Cumin is used for kidney and bladder stones, chronic diarrhoea, leprosy and eye disease.
- In Unani system of medicine, the fruits of *Cuminum cyminum* used for the treatment of corneal opacities, ulcers, boils, styles and to diminish cough and inflammation.

Dose

Daily dosage: The average single dose is 300 to 600 mg of drug. However, cumin can be used both internally and externally.

Table 1: Botanical description of cumin [3,8]

Organoleptic characteristics	
Color	Leaves- yellowish green
	Flower- White or Pink
	Seed- Yellowish-brown
	Stem- Inner core White and Outer core Grey or dark
Odor	Peculiar, Strong and Heavy aromatic
Taste	Warm, bitter, aromatic and disagreeable
Macroscopic characteristics	
Stem	It has an erect stem, with little slender branched, not very tall, from 20 to 50 cm.
Leaves	The leaves are 5 to 10 cm long, pinnate or bipinnate, with thread-like leaflets.
Flower	The small flowers are radially symmetrical with 5-small sepals, 5-petals, and 5-stamens.
Fruit	The cumin fruits (seeds) are elliptical, flat on one side, convex, furrowed, and rough on the other, from 5 to 6 mm. in length and about 1.5 mm. in thickness, and of a light brown color. Each has seven longitudinal ridges.
Microscopic characteristics	
Epicarp	Single layer, colorless cell, having stomata
Vittae	Yellowish brown consisting of small, thin-walled, polygonal, tubular, cutinized cells.
Mesocarp	One type sclereids are single layer longitudinally cells with moderately thickened walls and other type sclereids are small groups and are composed of considerably elongated cells.
Endosperm	Polygonal cells and containing microspheroidal crystals of calcium oxalate
Endosperm	Large, thin walled, elongated cell.
Fibro vascular tissue	Present
Testa	Present

Table 2: Taxonomical classification of cumin [9]

Kingdom	**Plantae**
Subkingdom	*Tracheobionta*
Superdivision	*Spermatophyta*
Division	*Magnoliophyta*
Class	*Magnolipsida*
Subclass	*Rosidae*
Order	*Apiales*
Family	*Apiaceae*
Genus	*Cuminum L.*
Species	*Cuminum Cyminum L.*

Table 3: Physicochemical characteristics [8]

Physicochemical properties	**Value**
Moisture content	8%
pH	7.3
Total ash	7.5
Property of the Essential oil of Cumin Seed	
Refractive index (20°C)	1.47-1.50
Density	0.90-0.94
Carbonyl index	9.32
Steric index	19.24

Table 4: International names of cumin

Names	Language	Country/Region
Comino, Comin hortense	Spanish	Spain
Cumin, Cumin blanc	French	France
Romischer Kummel	German	Germany
Spiskummin	Swedish	Sweden
Kamoun, Kamun	Arabic	Northwestern Arabia
Komijn, Djinten	Dutch	West Germanic
Comino	Italian	Italy
Cominho	Portuguese	Portugal
Jira	Nepali	Nepal
Kumin, Umazeri	Japanese	Japan
Zi ran	Chinese	China
Zirch, Zirch Sabz	Farsi	Western Iranian
Kmin, Kumin	Russian	Russia
Jira, Safaid Jeera, Zeera	Hindi	India
Green cumin, White cumin	English	England, USA, New Zealand

Table 5: Indian names of cumin

Names	Language	State/Region
Jira, Safaid Jeera, Zeera	Hindi	North India
Jira, Safaid Jeera	Punjabi	Punjab
Jeere (জিরা)	Bengali	West Bengal
Jeeru	Gujrati	Gujrat
Jeerige (ಜೀರಿಗೆ)	Kannada	Karnataka
Jira (زیرہ)	Urdu	Jammu and Kashmir
Jeerakam	Malayalam	Kerla
Jeregire	Marathi	Maharashtra
Jeera	Odia	Odisha
Ziragum (சீரகம்)	Tamil	Tamil Nadu
Jidakara, Jikaka (జీలకర్ర)	Telugu	Telangana
Jir	Maithili	North-Eastern Bihar
Jira	Manipuri	Manipur
Jira	Assamese	Assam

Table 6: Essential oil composition of cumin seeds [10-16]

Components	Percentage %
α-Pinene	0.63
Camphene	0.01
β-Pinene	10.22
Sabinene	0.58
Δ3-Carene	0.03
Myrcene	0.83
α-Phellandrene	1.6
α-Terpinene	0.11
Limonene	0.39
β-Phellandrene+1.8-cineole	0.49
ϒ-Terpinene	0.11
p-Cymene	5.51
Terpinene	17.25
Trans-Sabinenehydrate	0.09
Cis-Sabinenehydrate	0.19
Linalool	0.04
p-Mentha-3-en-7-al	2.91
β-Caryophllene	0.45
Terpinen-4-ol	0.13
(Z)-β-Farnesene	0.6
α-Terpineol	0.05
Cumin aldehyde	27.6
p-Mentha-1,3-diene-7-al	15.18
p-Mentha-1,4-diene-7-al	9.48
p-Mentha-1,3-diene-7-ol	0.31
Cumin alcohol	0.36
Total	95.1

Table 7: Chemical structures

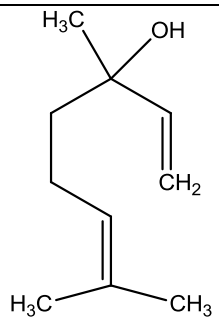
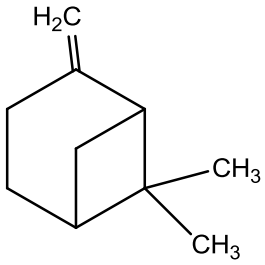
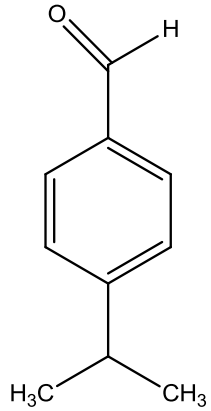
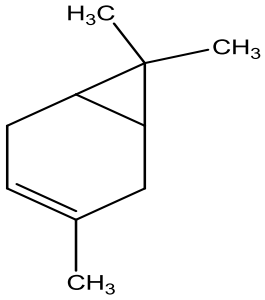
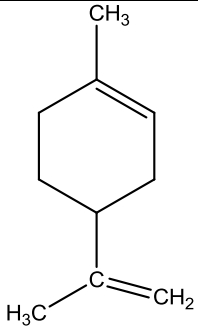
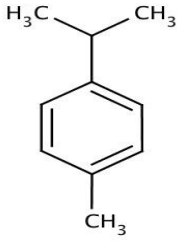
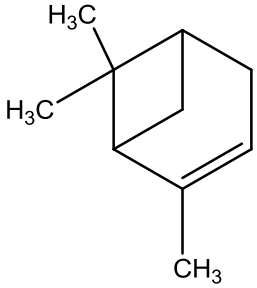
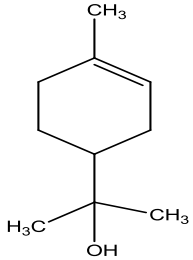
Structure	Name	Formula	Structure	Name	Formula
	Linalool	$C_{10}H_{18}O$		β-Pinene	$C_{10}H_{16}$
	Cuminaldehyde	$C_{10}H_{12}O$		Δ_3-Carene	$C_{10}H_{16}$
	Limonene	$C_{10}H_{16}$		*p*-Cymene	$C_{10}H_{14}$
	α-Pinene	$C_{10}H_{16}$		α-Terpineol	$C_{10}H_{18}O$

Table 8: Pharmacological activities of cumin seeds

S.NO	Activity	Phyto-component and Extract	Action
1	Skin Disorders and boils [17]	vitamin-E	Vitamin-E is good for skin and keeps the skin young and gleaming
2	Anti-microbial [18]	Cuminaldehyde, carvone, linalool	It inhibits mycelium growth and toxin production
3	Anti-diabetic [19-22]	Cuminaldehyde	Reduces the blood glucose and inhibits glycosylated haemoglobin, creatinine, blood urea nitrogen and improved serum insulin and glycogen.
4	Anti-cancer [23,24]	Eugenol, limonene	By make change to carcinogen metabolism via carcinogen /xenobiotic metabolizing phase I and phase II enzymes
5	Anti-oxidant [25]	Eugenol, limonene	Extract show the less amount of cumin was needed for scavenging the superoxide radicals
6	Anti-osteoporotic [26]	Phytoestrogens	By reduction in urinary calcium excretion and augmentation of calcium content.
7	Immuno-Modulator [27]	Iron, essential oils, vitamin-C, vitamin-A	Large quantity of iron, a presence of essential oils and vitamin-C & vitamin-A in cumin boosts up our immune system.
8	Ophthalmic effects [28]	Cumin aqueous extract	By delayed progression and maturation of streptozotocin-induced cataracts
9	Anti-asthmatics [28,29]	Caffeine, aromatic essential oils	Act as a decongestant
10	Antiepileptic [30]	Cumin essential oil	Shows the activity against epilepsy induced by pentylenetetrazole(PTZ)
11	Gastrointestinal Disorders [31,32]	Cuminaldehyde and flavonoids	By activates, our salivary glands in our mouth (the mouth-watering flavor), facilitating the primary digestion of the food Antiulcer by enhancing gastric mucin protection and regeneration. Provide protection against hepatotoxicity.
12	Analgesic [33]	Cumin alcoholic extract	Shows the analgesic activity individually or in combination with *Coriandrum sativum* seed methanolic extract.
13	Astringent [34]	Cumin ether extract	By inhibiting arachidonate induced platelet aggregation
14	Antitussive [35]	Caffeine, aromatic essential oils	Showed significant reduction of cough number.
15	Anti-fertility [36,37]	Phytoestrogens	By anti-implantation effects
16	Anti-hypertensive [38]	Cumin aqueous extract	Improve plasma nitric oxide and decreased the systolic blood pressure.
17	Anti-inflammatory [39]	Cumin essential oil	By significantly inhibit the mRNA expressions of inducible nitric oxide synthase (iNOS), cyclooxygenase (COX-2), interleukin- (IL-) 1, and IL-6.
18	Insecticidal effects [40]	Cuminaldehyde	Shows toxicity against *Anopheles gambiae* strain

Table 9: Contraindications of cumin seeds

S.NO.	Contraindications
1.	Avoid to **Allergic people** with the plant of Umbelliferacea family.
2.	Avoid to women with **Heavy Menstrual Cycles**.
3.	Avoid to patients with **Diabetes Mellitus**
4.	Avoid to patients during **Sun Exposure** treatment.
5.	Avoid to **Pregnant and Lactating Women.**

Table 10: Nutritional factors cumin seeds [17]

Principle	Nutrient Value	% of RDA
ENERGY	375 Kcal	19%
Carbohydrates	44.24 g	34%
PROTEIN	17.8 g	32%
Total Fat	22.27g	74%
Cholesterol	0 mg	0%
Dietary Fiber	10.5 g	26%
VITAMINS		
Folates	10 µg	2.5%
Niacin	4.58 mg	28.5%
Pyridoxine	0.435 mg	33%
Riboflavin	0.32 mg	24.5%
Thiamin	0.628 mg	52%
Vitamin A	1270 mg	42%
Vitamin C	7.7 mg	13%
Vitamin E	3.3 mg	22%
Vitamin K	5.4 µg	4.5%
ELECTROLYTE		
Sodium	1788 mg	38%
Potassium	68 mg	11%
MINERALS		
Calcium	931 mg	93%
Copper	0.867 mg	96%
Iron	66.36 mg	829%
Magnesium	366 mg	91%
Manganese	3.3 mg	145%
Phosphorus	499 mg	71%
Zinc	4.8 mg	43.5%
PHYTO-NUTRIENTS		
Carotene-ß	762 µg	--
Crypto-xanthin-ß	0 µg	--
Lutein-zeaxanthin	448 µg	--

CONCLUSION

From the above mentioned literature we concluded that cumin, not only has an important place in spices but it also has many pharmacological activities which are of diverse importance. It is used not only for its taste but also as a preventive measure for various ailments. It is quite safe to use as no side effects have been reported so far but it should not be taken during pregnancy or breast feeding and as it reduces the blood sugar level it should not be combined with anti-diabetics to prevent hypoglycemia. It has been used in traditions for various affects but still it is a drug of concern for the researchers as many of its activities are still hidden.

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