

## PHYTOCHEMISTRY AND REMEDIAL PROPERTIES OF *CARUM CARVI* SEEDS

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### ABSTRACT

*Carum carvi* is a biennial plant, belonging to family *Apiaceae*. It is a native to Europe and at present grown in several parts of the world. This plant is a source of caraway seeds. This plant and its products are of great medicinal value. Some of the important components from this plant include carvacrol, p-cymene, linalool, etc. These compounds are used in variety of consumer products as play vital role in cure of diseases such as gastrointestinal problems, eye problems, lack of appetite, etc.

**KEYWORDS:** *Carum carvi*, *Apiaceae*, caraway seeds, medicinal, gastrointestinal problems.

### INTRODUCTION

The genus *Carum* belongs to the family *Apiaceae* or *Umbelifereae* and includes about twenty five species, *Carum carvi* (Caraway) among these is of great economical importance. *Carum carvi* is a native to Europe, Western Asia and North Africa, but presently, is cultivated in several parts of the world mainly including Northern Europe to the Mediterranean regions, Russia, Iran, India, Indonesia, North America, Siberia, Egypt, Australia, China and Turkey. *Carum carvi* plant is a source of caraway seeds which have been used for the treatment of various diseases throughout the globe. *Carum carvi* seeds contain numerous essential oils of medicinal value and thus extensively researched for their chemical structure, composition and bio-functions. Present work is therefore aimed to analyze the general aspects and essential components of caraway seeds.

#### Taxonomic hierarchy

**Kingdom:** Plantae

**Division:** Magnoliophyta

**Class:** Magnoliopsida

**Order:** Apiales

**Family:** Umbelliferae

**Genus:** *Carum*

**Species:** *carvi*

#### Morphology of the plant

*Carum carvi*, commonly known as Kala jira, Caraway, Meridian fennel or Persian cumin, is usually a biennial, 30-100cm high plant with a fleshy, fusiform tap root. The stem is erect, angular, grooved, filled with latex, glabrous and branched from the ground up. The rosette

leaves and the cauline leaves are glabrous and in part tri-pinnate. The lower pinna are typically crossed. The main trunk and the side branches each terminate in a compound flowering umbel of 8-16 umbel rays. The epicalyx and calyx are almost non-existent. The florets are white or reddish and very small. The fruit is a schizocarp that is glabrous, oblong and elliptoid. It consists of two mericarps that are 3-6 mm long, sickle-shaped, brownish with 5 lighter angular main ribs [Fig. 1-4](Meshkatsadat *et al.*, 2012; Abou El-Soud *et al.*, 2014; Al-Snafi, 2015).

#### Cultivation of the plant

This plant prefers warm, sunny locations and well-drained soil rich in organic matter. In India, it grows in the temperate regions of the western Himalayas, Jammu and Kashmir and in Chakrata hills of Uttar Pradesh. It has been cultivated in the hills as summer crop and in the plains of North India as an annual winter crop. The fragrance of the seed oil in the spring season depends upon the intensity of sun light at any particular location. It is tolerant to cold conditions up to Zone 3. In warmer regions it is planted in the winter months as an annual. In temperate climates it is planted as a summer annual or biennial. Caraway does best when the seeds are sown in the autumn, as soon as ripe, though they may be sown in March. From an autumn-sown crop, seeds will be produced in the following summer, ripening about August. The plant is cut and the caraway seeds are separated by threshing as the fruit ripens (Johri, 2011; Gwari *et al.*, 2012; Meshkatsadat *et al.*, 2012; Agrahari and Singh, 2014; Khan *et al.*, 2016).

Fig. 1: whole plant parts of *Carum carvi*Fig. 2: Inflorescence of *Carum carvi*Fig. 3: Developing *Carum carvi* seedsFig. 4: Fully developed seeds of *Carum carvi*

#### Phytochemical analysis of *Carum carvi*

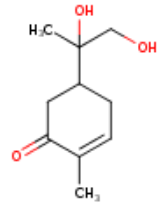
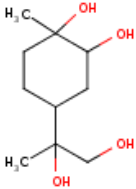
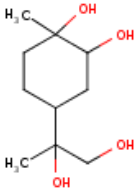
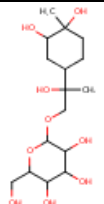
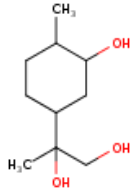
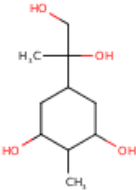
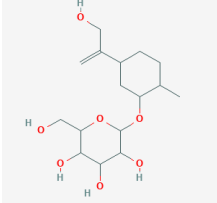
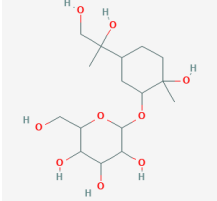
Seeds of *Carum carvi* contain essential oils, which mainly are rich in monoterpene hydrocarbons, oxygenated monoterpenes, oxygenated sesquiterpenes, saturated and unsaturated fatty acids, aldehydes, ketones and esters. Other components include fatty acids, triacylglycerol, polysaccharides and lignins. Major

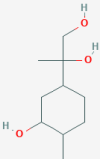
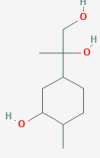
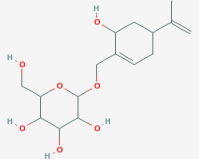
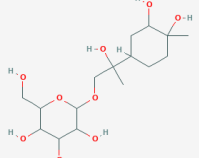
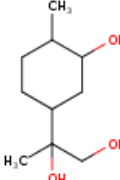
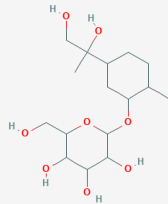
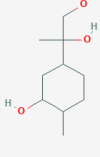
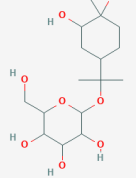
compounds present in the seed oil of *Carum carvi* are Cavacaryl, Carvenone, Carvone,  $\alpha$ -pinene,  $\beta$ -cymene,  $\gamma$ -terpinene, limalool *etc* (Table1-2). Some of the important chemicals have been taken here (Meshkatalsadat *et al.*, 2012; Agrahari and Singh, 2014, Dr. Duke's Phytochemical and Ethnobotanical Databases - USDA).

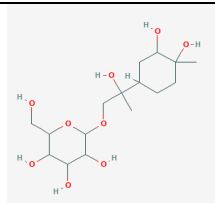
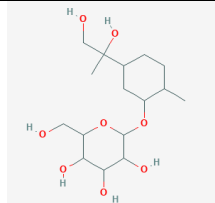
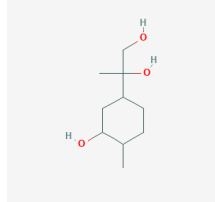
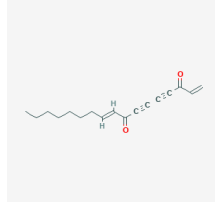
Table 1: Plant parts and chemical contents of *Carum carvi*.

Sr No.	Plant part	Number of chemicals present
1.	Essential oil	08
2.	Flower	02
3.	Flower essential oil	01
4.	Fruit	25
5.	Leaves	02
6.	Plant	24
7.	Root	03
8.	Seed	67
9.	Seed essential oil	06
10.	Shoot	01
11.	Seed	--
<b>Total</b>		<b>129</b>

Table 2: Major chemical components and structures present in the seeds and root of *Carum carvi*.

Plant Part	Chemical present	Structure
Seed	(4S,8S)-8,9-Dihydroxy-p-menth-1(6)-en-2-one	
Seed	(1S,2S,4R,8R)-p-Menthane-1,2,8,9-tetrol	
Seed	(1S,2S,4R,8S)-p-Menthane-1,2,8,9-tetrol	
Seed	(1S*,2R*,4R*,8S*)-p-Menthane-1,2,8,9-tetrol	
Seed	(1R*,2S*,4R*,8R*)-p-Menthane-2,8,9-triol	
Seed	(1alpha,2alpha,4betaH,6alpha,8R)-p-Menthane-2,6,8,9-tetrol	
Seed	(1S,2R,4R)-p-Menth-8-ene-2,10-diol 2-glucoside	
Seed	(1S,2S,4R,8S)-p-Menthane-1,2,8,9-tetrol 2-glucoside	

Seed	(1S,2R,4R,8R)-p-Menthane-2,8,9-triol	
Seed	(1R*,2S*,4R*,8S*)-p-Menthane-2,8,9-triol	
Seed	(4S,6R)-p-Mentha-1,8-diene-6,7-diol 7-glucoside	
Seed	(1R*,2R*,4R*,8S*)-p-Menthane-1,2,8,9-tetrol	
Seed	(1S,2R,4R,8S)-p-Menthane-2,8,9-triol	
Seed	(1S,2R,4R,8S)-p-Menthane-2,8,9-triol 9-glucoside	
Seed	(1S*,2S*,4R*,8R*)-p-Menthane-2,8,9-triol	
Seed	(1R,2R,4S)-p-Menthane-1,2,8-triol	

Seed	(1R*,2R*,4R*,8S*)-p-Menthane-1,2,8,9-tetrol-9-glucoside	
Seed	(1S,2R,4R,8S)-p-Menthane-2,8,9-triol 2-glucoside	
Seed	(1S,2S,4S,8R)-p-Menthane-2,8,9-triol	
Root	Falcarindione	

### Medicinal properties

*Carum carvi* is used in traditional Chinese medicine and other folk medicines as a carminative. Dried seeds of *Carum carvi* are used in treatment of spasmodic gastrointestinal problem, indigestion, lack of appetite, and dyspepsia in adults and infants. It has enormous potential to acts as antimicrobial, antifungal, antibacterial, antihyperglycemic, antihyperlipidaemic, antiulcerogenic, antiproliferative, antidyspeptic, antitumor, molluscidal, insecticidal, nematocidal, antioxidant, antiaflatoxigenic activities and anti cancer agent (Sadiq *et al.*, 2010; Deepak, 2013; Thippeswamy and Achur, 2014; Kopalli and Koppula, 2015).

In Unani system of medicine, fruit of *Carum carvi* is major component of an Unani formulation “Safoof-e-Mohazzil” used for reducing weight. *Carum carvi* is also used in eye ailments, genitourinary diseases like metritis, orchitis, dysurea etc. The vapours of *C. carvi* seeds have been reported to be effective in relieving pain and inflammation in patients suffering from lumbar pains and rheumatism. Antispasmodic, emmenagogue, expectorant, galactagogue, stimulant, stomachic and tonic properties have also been reported. An aqueous extract of caraway is used as an emenagogue, diuretic, aperitif, tranquilizer, spasmolytic, carminative, galactagogue and as an aphrodisiac in Moroccan traditional medicine (Deepak, 2013; Agrahari and Singh, 2014.)

*Carum carvi* seeds are thus rich sources of essential oils which contain many phytochemicals with great medicinal importance. Further, it requires more research

to be conducted on the chemicals present in the caraway seed so as to utilize these chemicals for betterment of the mankind, as some of these chemicals play vital role in vital cellular functions such as Cell signalling, fuel and energy storage, Membrane integrity/stability.

### REFERENCES

1. Abou El-Soud, N.H., El-Lithy, N.A., Wahby, M.S., Khalil, M.Y. Morsy, F., Shaffie, N. 2014. Renoprotective effects of Caraway (*Carum carvi L.*) essential oil in streptozotocin induced diabetic rats. *J.Appl. Paharm. Sci*, 4(02): 027-033.
2. Agrahari., P., Singh D.K. 2014. A review of the pharmacological aspects of *Carum carvi*. *J Biol. Earth Sci*, 4(1): M1-M13.
3. Al-Snafi, A.E. 2015. The chemical constituents and pharmacological effects of *Carum carvi*: A review. *Ind. J. Pharm. Sci. Res*, 5(2): 72-82.
4. Boska, R., Vagnerova, L., Pluhackova, H., Sofrova, J., Smirous, P. 2016. The variability of Caraway (*Carum carvi L.*) essential oils. *Mendel Net*, 30-34.
5. Deepak. 2013. Importance of *Cuminum cyminum* and *Crum carvi L.* in traditional medicaments-A review. *Ind. J. Trad. Know*, 12(2): 300-307.
6. Degtyarenko K., de Matos P., Ennis M., Hastings J., Zbinden M., McNaught A., Alcántara R., Darsow M., Guedj M., Ashburner M. 2008. ChEBI: a database and ontology for chemical entities of biological interest. *Nucleic Acids Res*. 36(Database issue), D344–D350.

7. Gwari G., Bhandhari, U., Amdola., H.C., Lohani, H., Chauhan, N. 2012. Aroma profile of seeds of *Carum carvi* Linn. cultivated in higher hills of Uttarakhand Himalaya. Ind. J. Nat. Prod. Resou, 3(3): 411-413.
8. Jha D.K., Panda, L., Rana, S. Samantarrai, D and Anbarasu, A. 2011. Molecular docking approach to locate the potent anti-leishmanial agent. J. Pharamacy Res, 4(7): 2003-2006.
9. Johri, R.K. 2011. *Cuminum cymium* and *Carum carvi*: An update. Pharmacogen Rev, 5(9): 63-72.
10. Khan, R.M., Ahmad, W., Ahmad, M., Hasan, A. 2016. Phytochemical and pharmacological properties of *Carum carvi*. Eur. J. Pharm. Med. Res, 3(6): 231-236.
11. Kopalli, S.R., Koppula, S. 2015. *Carum carvi* Linn(Umbelliferae) attenuates lipopolysaccharide induced neuroinflammatory responses via regulation of NF-kB signalling in BV-2 microglia. Tropical J Pharam. Res, 14(6): 1041-47.
12. Mshkatalasadi, M.H., Salahvarzi, S., Aminiradpoor, R., Abdollahi, A. 2012. Identification of essential oil constituents of Caraway (*Carum carvi*) using ultrasonic assist with headspace solid phase microextraction (UA-HS-SPME). Digest Journal of Nanomaterials and Biostructures, 7(2): 637-40.
13. Najda, A., Dyduch J., Brzozowski N. 2008. Flavonoid content and antioxidant activity of Caraway roots (*Carum carvi* L.). Veg. Crops Res. Bull, 68: 127-133.
14. Sadiq, S., Nagi, A.H., Shahzad, M., Zia, A. 2010. The reno-protective effects of aqueous extract of *Carum carvi* (Black zeera) seeds in Streptozotocin induced diabetic nephropathy in rodents. Saudi J. Kidney Dis. Transplant. 21(6): 1058-1065.
15. Thippeswamy, N.B., Achur, R.N. 2014. Inhibitory effect of phenolic extract of *Carum carvi* on inflammatory enzymes hylauronidase and trypsin. World J. Pharm. Sci, 2(4); 350-356.
16. Wang, Y., Xiao, J., Suzek, T.O., Zhang, J., Wang J., Bryant, S.H. 2009. Pubchem: a public information system for analyzing bioactivities of small molecules. Nucleic Acid Res, 37: W 623-33.