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Review Article

A Review on *Trachyspermum ammi* (Ajwain)

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A B S T R A C T

Trachyspermum ammi (L), commonly known as "*Ajwain*", is a herbal origin drug used in Unani system of medicine for centuries in various ailments. It is a herbaceous annual plant that belongs to Family Apiaceae. It is native to Egypt and is cultivated in India, Pakistan, Iran, Afghanistan, and Egypt. In India, it is mostly cultivated in Gujarat and Rajasthan. The plant is about 90 cm tall. Its fruit is used as a spice all over the world. Morphological features of the fruit are consisting of two mericarps with bifid stylopod and have five light-coloured ridges. It is ovoid in shape and has pungent taste, aromatic odour and is greyish brown in colour. It is 2 m long and 1 mm wide in size. The temperament of the fruit according to the Unani literature is hot and dry 3^0. Fruit yielded about 5% essential oil, which is brownish in which thymol is the principal constituent (35-60%). The other phyto-constituents which are present in it are carbohydrates, glycosides, saponins, phenol compound, volatile oil (thymol,γ-terpinene, para-cymene and α and β-pinene), protein, fat, fibre and mineral matter containing calcium, phosphorus, iron and nicotinic acid. Various pharmacological and studies have been done on its phytoconstituents. Some are antifungal, antioxidant, antimicrobial, antinociceptive, cytotoxic activity, hypolipidaemic, antihypertensive, antispasmodic, broncho-dilating actions, anti-lithiasis, abortifacient, antitussive and anthelmintic. Its fruit is used in Unani medicine as an appetiser, antidiarrhoeal, carminative, antiseptic, and anthelmintic. The purpose of doing this study is to give a comprehensive review of *Trachyspermum ammi*, a Unani drug along with its zoonotic perspective.

Keywords: *Tachyspermum ammi*, Apiaceae, *Ajwain*, Unani, Thymol, Zoonotic

Introduction

Trachyspermum ammi Linn. (*ajwain*) is an erect, aromatic annual herbaceous plant belonging to the Apiaceae family, which is used worldwide as a spice and has medicinal properties, therefore it is being used since centuries as a traditional system of medicine. It is native to Egypt and grows widely in the Mediterranean Sea and southwest Asia. It grows throughout the world such as in Iraq, Iran, Pakistan, Afghanistan, and India.[1] In India, mostly cultivated in Gujarat, Rajasthan, Maharashtra, Bihar, Madhya Pradesh and West Bengal.[2] *T. ammi* is also known by various vernacular names *Ajwain*, Ajowain[3], ajowan caraway, bishop's weed.[4] It is a 60-90 cm tall plant. Its fruit is an oval seed-like fruit brown in colour, having a resemblance with the seeds of other plants in the Apiaceae family such as cumin, caraway, and fennel. Its taste is pungent and bitter and it has a flavour similar

to oregano and anise. It has thyme like odour because its main constituent is thymol, therefore it can dominate the smell of the dish even on use of small quantity.[5] Ajwain seeds contain 2-5% brown colour essential oil. The fruit has a potential medicinal value and is used in various ailments such as diarrhoea, flatulence, and atonic dyspepsia.[6] It also acts as a carminative, antihelmintic, laxative, and stomachic, and is also used in piles, abdominal pains, and abdominal tumours.[7] Its major component, thymol, is used in perfumes and toothpaste.[8]

Table 1.Classification of *Trachyspermum ammi*

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Order	Apiales
Family	Apiaceae
Genus	Trachyspermum
Species	T. ammi

Figure 1.Flowers of *Trachyspermum ammi*

Classification[9]

Vernacular Names[2]

- **Sanskrit:** Yamini, Yaminiki, Yaviniki
- **Assamese:** Jain
- **Bengali:** Yamani, Yauvan, Yavan, Javan, Yavani, Yoyana
- **English:** Bishop's weed
- **Gujrati:** Ajma, Ajmo, Yavan, Javain
- **Hindi:** Ajwain, Jevain
- **Kannada:** Oma, Yom, Omu
- **Malayalam:** Oman, Ayanodakan
- **Marathi:** Onva
- **Oriya:** Juani
- **Tamil:** Omam
- **Telugu:** Vamu

Synonyms[10,11]

- Ammi copticum L.
- Carum copticum L.
- Trachyspermumcopticum L.
- Sisonammi L.

Botanical Description

Trachspermumammi is mostly cultivated in arid and semi-arid regions[12] due to high salt levels in the soil.[13,14] It is a 60-90 cm tall and branched annual herb. Its stem is striated with16 umbellets, each containing up to 16 flowers; flowers actinomorphic and white in colour, corolla 5 and petals bilobed; stamens 5; ovary inferior; stigma knob-like; leaves pinnate, with a terminal, 7 pairs of lateral leaflets. Its fruit is aromatic, greyish brown, compressed, ovoid, and consisting of two mericarps. Its size is about 2 mm long and 1.7 mm wide. It has 5 ridges and 6 vittae in each mericarp, typically separate, and 5 primary ridges.[15]

Figure 2.Parts of *Trachyspermum ammi* Plants

Adulteration

Trachyspermumammi seeds are obtainable in whole as well as in ground form. It adulterates excess stems, chaff, and earth or dust by adding exhausted or spent seed (from which oil or oleoresin has been extracted). Also, the oil is adulterated by ajwain chaff oil. The range of essential oil is 2.5-5 per cent and it should contain 35 to 60 per cent thymol. If chaff oil is added, the content of thymol will decrease to below 35%. Adding synthetic saturated acid may adulterate the oleoresin. These adulterants can be detected by gas chromatography or by thin layer chromatography combined with high-performance liquid chromatography. Adulteration can be detected at any level by using the specifications for whole seed, powdered seed, volatile oil and oleoresin.[35]A ban *Ajwain* [*Seselidiffusum* (Roxb. ex. Sm.)] or *Randhuni* [*Apium graveolens* (Linn.) Sprague] sometimes adulterate the seeds. Thin layer chromatography may detect the adulteration using benzene:petrol (1:7).[36]

Phytochemistry

Analysis shows that Trachyspermumammi seed has 2.5%-5.0% essential oil in it, with thymol as a main constituent (35%-60%).[16]

It encompasses carbohydrate (38.6%), fat (18.1%), protein (15.4%), fibre (11.9%), moisture, tannin, glycosides (8.9%), flavones, saponins and mineral matter (7.1%) such as

calcium, iron, phosphorus, and nicotinic acid.[17]

The other non-thymol constituents are thymine which contains p-cymene (50%-55%), β-pinene (4%-5%), limonene with γ-pinenes and β-pinene (30%-35%).[18] The major constituents of T. ammi are carvone (48%), limonene (38%). And dillapiole (9%).[19] Its fruit also contains minerals like aluminium, cadmium, calcium, copper, iron, and lithium. Some other minerals are also found in its fruit such as carotene, cobalt, chromium, manganese, nicotinic acid, calcium, iodine, thymine, riboflavin, phosphorus, and zinc.[20]

Pharmacological Activities

T. ammi has been used since centuries in the Unani system of medicine due to its magical effects on numerous diseases. It is used as a spice world-widely. In asthma, it is used externally on the chest by making a paste of crushed *Ajwain*.[20,21] It is carminative, stomachic,[22] digestive,[23]

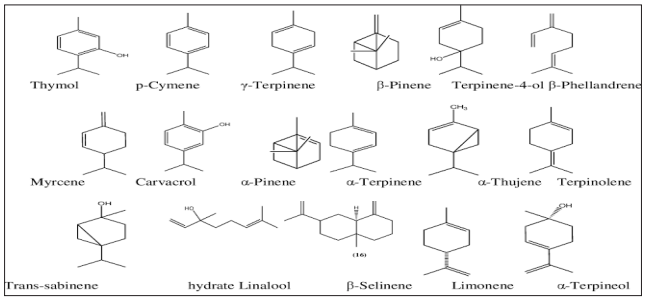

Figure 3.Phytoconstituent of *Trachyspermum ammi*

antimicrobial,[24] Antipyretic,[25] expectorant, antiseptic,[26] hepatoprotective, antispasmodic, broncho-dilating,[27] anti-inflammaory,[28] anti-lithiasis, diuretic,[29] antitussive,[30] antifilarial,[31] and ammenhorea.[32]

Anti-Microbiological Activities of *Trachyspermumammi*

According to several studies, it is pretty effective against many zoonotic diseases such as *Salmonellosis*, *Clostridial infection*, *Escherichia coli infection*, *Helicobacteriosis, Listeriosis* and many more. A study showed that acetone and aqueous extracts of *Trachyspermum ammi* were tested in order to test its antibacterial efficacy against *Escherichia coli, Klebsiella pneumonia, Enterococcus faecalis, Salmonella typhi, Salmonella typhimurium, Shigella flexneri, Pseudomonas aeruginosa, Staphylococcus aureus* using agar diffusion assay.[37] The study revealed that acetone extract shows more activity compared to the aqueous extract. In another research, ethanolic extract from *T. ammi* had antibacterial activity against eight strains of *Helicobacter pylori*.[38] Even methanolic extract of *T. Ammi* showed bactericidal activity at 2 mg/ well against 11 species using agar well-diffusion method.

It was measured by Diameter of Inhibition Zones (DIZ) DIZ was over 10-14 mm against *Pseudomonas aeruginosa* and *Bacillus pumilus*; 15 mm against *Staphylococcus aureus* and *Staphylococcus epidermidis*; 7-9 mm against *Escherichia coli, Klebsiella pneumonia* as well as *Bordetella bronchiseptica*. In contrast, no activity against *Pseudomonas fluorescens* and *Micrococcus luteus* was reported.[39] As *T.ammi* may contain large amounts of thymol or carvacrol in its total essential oil, the aforementioned phenolic compounds are reported to be either bactericidal or bacteriostatic agents depending on the concentration.[40] To assess T. ammi's antifungal activity, the total essential oil extracted from seeds was subjected to fungicidal effect and had a proper effect at 5000 ppm on Aspergillus niger and Curvularia ovoidea as minimum inhibitory concentration.[41]

Adverse Effect

Trachyspermum ammi is an abortifacient[33], therefore should not be used in pregnancy. In higher doses, it is toxic and may lead to fatal conditions.[34]

Conflict of Interest: None

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