

ANISEED

Pimpinella anisum L.

Family

Apiaceae (or Umbelliferae) known as the celery, carrot or parsley family. Not to be confused with star anise *Illicium verum*.

Parts Used

Fruit

Description

Aniseed is a herbaceous annual topped with umbrella shaped clusters of dainty white flowers which turn into seed like fruits. It reaches an average height of 30 to 50 centimetres. The leaves at the base of the plant are simple while leaves higher on the stems are secondary feather-like leaflets of bright green, hence its name (of mediæval origin), Pimpinella, from dipinella, or twice-pinnate, in reference to the form of the leaves.¹

Traditional Use

One of the oldest medicinal plants, aniseed is a warming digestive tonic that has traditionally been used in many cultures for both medicinal and culinary purposes. This aromatic herb has a delicious sweet liquorice-like flavour and is a commonly used, and very safe, herbal remedy that is well suited for all age groups from children to the elderly. Its seeds and essential oil are widely used in the food industry as a flavouring, antioxidant, antispoilage agent and preservative in many products such as candies, sweets such as black jelly beans, toffees and beverages²

In traditional medicine aniseed is used as an analgesic in migraine and also as a carminative, aromatic, disinfectant and diuretic. In some traditional texts it is mentioned for melancholy, nightmare and also in the treatment of epilepsy and seizures.³



Aniseed was cultivated by the ancient Egyptians and later in Greece, Rome and the Middle East. In the Middle Ages its cultivation spread to Central Europe. It was mentioned by Dioscorides and Pliny. Mustacae, a Roman spiced cake containing aniseed, cumin and other aromatics, was introduced at the end of a rich meal to prevent indigestion. This cake was sometimes brought in at the end of a marriage feast and is, perhaps, the origin of the spiced wedding cake. Many cakes, especially in Germany, still have aniseed flavouring.⁴

Although widely grown commercially aniseed's cultivation has declined in recent years through competition with cheaper anise flavourings such as *Illicium verum* and synthetic anethole.⁵

Constituents

Volatile oils including anethole; coumarins including bergapten, umbelliprenine and umbelliferone; flavonoids including rutin; lipids including fatty acids, oleic acid and linoleic acid; carbohydrates; protein. Many countries around the Mediterranean region, such as Turkey, Greece, Italy, Spain and France, have traditional alcoholic beverages produced with aniseed such as arak, pastis, absinthe, ouzo, sambuca and raki. The common special feature of all these beverages is their unique behaviour during dilution with water. Adding water causes the clear liquor to turn instantly into an opaque, translucent milky-white colour. This phenomenon is known as the ouzo effect (also louche or spontaneous emulsification) caused by the volatile oils which give a milky appearance when mixed with water. This is due to the instantaneous formation of a number of small drops which powerfully scatter visible light. This occurs when a strongly hydrophobic volatile oil, such as trans-anethole, is dissolved in a water miscible solvent, such as ethanol, and the concentration of ethanol is lowered by addition of small amounts of water. This observation illustrates the important role ethanol serves to help pull out the full spectrum of constituents in herbal material.^{6,7}

Actions

Expectorant, bronchodilator, immunomodulator, carminative, galactagogue, diuretic, hypoglycaemic, hypolipidaemic, anti-inflammatory, antimicrobial, antioxidant, antispasmodic, parasiticide, oestrogenic agent.

Pharmacological Activity

There is lack of controlled human clinical research assessing the effects of aniseed. Preclinical studies performed on aniseed, and its different constituents particularly the essential oil, have discovered various actions such as antimicrobial, antifungal, antiviral, antioxidant, muscle relaxant, analgesic (including for migraines) and anticonvulsant (traditionally it is used for epilepsy and seizures) as well as different actions on the gastrointestinal system such as antiulcer and laxative properties however there is a lack of studies on whole plant aniseed.⁸

Constituent studies will not be included in this monograph unless included with a whole plant study. Caution must be taken in extrapolating individual constituent results to human use due to many factors acting upon these processes and this information is regarded as only of tentative relevance to a clinical situation. Simultaneously there is accumulating data that suggests that the synergistic effects of the constituent phytochemicals in plants are accountable for their actions.⁹

Bronchodilator and Antispasmodic Activities

In many countries aniseed is recommended for the treatment of the respiratory tract. Experiments have shown the bronchodilatory and antispasmodic effect thus alluding to its effectiveness in the treatment of bronchial asthma.¹⁰

The *in vivo* relaxant effect of aniseed and its possible mechanisms were studied. Aqueous and ethanol extracts, essential oil and theophylline showed significant relaxant effects compared to those of controls indicating their bronchodilatory effects. The results also showed that the relaxant effect of this plant is possibly due to inhibitory effects on muscarinic receptors.¹¹

The relaxant action displayed by aniseed in a recent study justifies its use in traditional medicine as an antispasmodic agent. Three hydroalcoholic extracts were tested for activity in rats' smooth muscle. Studying the possible mechanisms underlying the relaxant effect showed that this effect is mainly dependent on the activation of the nitric oxide-cyclic guanosine monophosphate (NO-cGMP) pathway.¹²

Gastrointestinal Activities

A 2014 double-blind, randomised clinical trial demonstrated beneficial effects of aniseed in the treatment of dyspepsia. It decreased gastrointestinal complications and improved quality of life in patients with functional dyspepsia. The aniseed group involved 47 patients who received 3g of aniseed powder after each meal (three times a day) for four weeks.¹³

An *in vivo* study provided substantial evidence for anti-ulcer and anti-secretory effects of an aqueous suspension of aniseed. Aniseed suspension significantly inhibited ulcerative lesions in animals with induced gastric ulcers. The antiulcer effect was further confirmed when the tissues were studied. The researchers said the chemical constituents of aniseed responsible for its anti-ulcer activity are not known however aniseed and its compounds have been identified as free radicals or active oxygen scavengers. They also said the ability of aniseed to protect the gastric mucosa against lesions induced by chemical irritants is likely to be by maintaining the structural integrity of the gastric epithelium and balance of aggressive factors and inherent protective mechanisms. They concluded by saying aniseed exhibits an anti-ulcer potential activity through at least one or more possible mechanisms including inhibition of basal gastric secretion, stimulation of mucus secretion, endogenous gastric mucosal prostaglandin synthesis and possible antioxidant activity.¹⁴

Antioxidant Activities

Aniseed showed antidiabetic and lipid-lowering activity in a clinical trial in type 2 diabetic patients which was, at least in part, explained by its antioxidant activity. The antidiabetic, hypolipidemic and antioxidant activities of aniseeds were assessed *in vivo* by the administration of aniseed powder (5g per day) to type 2 diabetes patients for 60 days. Hyperglycaemia, hyperlipidaemia and oxidative stress, as shown by increased lipid peroxidation, protein oxidation and increased activity of catalase in erythrocytes, decreased serum beta carotene, vitamin A, E and C observed in diabetics were countered by aniseed. The researchers also concluded that the antidiabetic, hypolipidaemic and antioxidant activities exhibited by aniseed are a result of the synergistic action of the bioactive compounds present in the seeds.¹⁵

Aniseed may have beneficial effects in the treatment of nonalcoholic fatty liver disease. In an *in vivo* study on 60 rats with induced liver damage aniseed significantly reversed an increase in the plasma levels of total cholesterol, low density lipoprotein, and triacylglycerol and decrease in high density lipoprotein level in a dose dependent manner. Serum levels of liver damage markers were also significantly modified by treatment with aniseed and biomarkers of oxidative stress were modulated. The antioxidant and protective effects of aniseed were demonstrated in an *in vivo* study investigating aniseed's alleviating effect on gentamicin (an antibiotic) induced damage, one of the most common causes of drug induced nephrotoxicity. The researchers recommended the simultaneous use of an ethanolic extract of aniseed during gentamicin administration to reduce its nephrotoxic effects.¹⁶

The antioxidant properties of water and ethanolic extracts of aniseed were evaluated using different antioxidant tests compared with synthetic antioxidants. Both extracts of aniseed showed strong antioxidant activity, reducing free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging and metal chelating activities.¹⁷

Oestrogenic Activities

Aniseed was deemed effective in reducing the frequency and severity of hot flashes in postmenopausal women, and showed rapid effects, following a 2012 double blind clinical trial. Seventy-two women with hot flashes were randomly selected and divided into two experimental and control groups. Each woman in the experimental group took a capsule containing 330mg of aniseed three times a day while in the control group women took three capsules, each containing 330mg potato starch, over four weeks and after that, they were followed up for four weeks. In the experimental group there was a significant reduction in hot flash frequency and intensity. No change was found in the frequency and severity of hot flashes in the control group. The results showed that aniseed can control the symptoms long after the consumption. The frequency and severity of hot flashes was decreased during four weeks of follow up period. The researchers also recommended that using herbal or chemical drugs for relieving the postmenopausal problems of women should

be accompanied with instructions regarding managing stress, changing lifestyle and having foods with phytoestrogens.¹⁸

Antimicrobial Activities

The *in vitro* antibacterial activities of the aqueous, 50 per cent methanol, acetone and petroleum ether extracts of aniseed were tested against four pathogenic bacteria (*Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* and *Klebsiella pneumoniae*). The results showed that only aqueous and methanol extracts exhibited fair antibacterial activity against all of the test bacteria and the aqueous extract was found to be more effective than methanolic extract, whereas acetone and petroleum ether extracts did not inhibit the growth of the pathogenic test bacteria.¹⁹

Antimicrobial *in vitro* effects of water and ethanolic extracts of aniseed were studied against 10 bacterial species, including *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus mirabilis*, *Citrobacter koseri*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Enterobacter aerogenes*, *Micrococcus luteus*, *Staphylococcus epidermidis* and *Candida albicans*. Ethanolic extract showed significant inhibitory activity against all tested bacteria apart from *Candida albicans*. The antimicrobial effect of the water extract was not detected against Gram-negative bacteria, *Pseudomonas aeruginosa* and *Escherichia coli*, but it was effective against *Candida albicans*.²⁰

The alcoholic extracts of aniseed showed *in vitro* antibacterial activity against *Micrococcus luteus* and *Mycobacterium smegmatis*.²¹

Cardiovascular Activities

The cardiovascular actions of aniseed were validated in a 2019 preclinical study which characterised its hypotensive effects related to the blockade of calcium channels. The study investigated the effects of aniseed on arterial blood pressure and its pharmacological mechanism of action. The data revealed that the aniseed aqueous extract reduced blood pressure in all rat groups evaluated. In the depolarised portal vein the aniseed aqueous extract inhibited calcium influx which indicated that it acts as a calcium channel blocker.²²

Indications

- Symptomatic treatment of mild, spasmodic gastrointestinal complaints including bloating, flatulence, colic, nausea and indigestion
- Bronchial catarrh, bronchitis, spasmodic coughs, colds, whooping cough and asthma
- To increase milk supply in lactating women and give relief to their infants from gastrointestinal problems
- Dysmenorrhoea, to promote menstruation, menopausal hot flashes and to facilitate birth
- To increase urine flow
- Appetite stimulant
- Increase libido
- Diabetes
- Topically for head lice and scabies

Energetics

Warm and dry.

Use in Pregnancy

The safety of aniseed taken during pregnancy and lactation has not been established. There are no known problems provided that doses taken do not greatly exceed the amounts used in foods. It has been proposed that aniseed preparations used at recommended dosages may be used during pregnancy and lactation.²³

Contraindications

None known.

Drug Interactions

None known.

Administration and Dosage

Liquid Extract:	1:1
Alcohol:	60%
Weekly Dosage: ²⁴	10 to 20mL

References

- Grieve, M. A Modern Herbal. Penguin, London 1980.
- Rocha I, Fernandes CP. Chapter 22 - Aniseed (*Pimpinella anisum*, Apiaceae) Oils. Editor(s): Preedy VR. Essential Oils in Food Preservation, Flavor and Safety, Academic Press, 2016, Pages 209-213, ISBN 9780124166417, <https://doi.org/10.1016/B978-0-12-416641-7.00022-5>. (<http://www.sciencedirect.com/science/article/pii/B9780124166417000225>)
- Shojaii A, Abdollahi Fard M. Review of Pharmacological Properties and Chemical Constituents of *Pimpinella anisum*. ISRN Pharm. 2012;2012:510795.
- Grieve, M. A Modern Herbal. Penguin, London 1980.
- Ates DA, Erdogruul ÖT. Antimicrobial activities of various medicinal and commercial plant extracts. Turkish Journal of Biology. 2003;27:157-162.
- Botet R. The "ouzo effect", recent developments and application to therapeutic drug carrying. Journal of Physics: Conference Series. 2012;352. 10.1088/1742-6596/352/1/012047.
- Özgülven M. Handbook of Herbs and Spices (Second Edition), Volume 2, 2012.
- The pharmacological activity you can put this: Shojaii A, Abdollahi Fard M. Review of Pharmacological Properties and Chemical Constituents of *Pimpinella anisum*. ISRN Pharm. 2012;2012:510795. doi:10.5402/2012/510795
- Yang C, Gundala SR, Mukkavilli R, Vangala S, Reid MD, Aneja R. Synergistic interactions among flavonoids and acetogenins in *Graviola* (*Annona muricata*) leaves confer protection against prostate cancer. Carcinogenesis. 2015 Jun;36(6):656-65. doi: 10.1093/carcin/bgv046. Epub 2015 Apr 11.
- Tirapelli CR, de Andrade CR, Cassano AO, De Souza FA, Ambrosio SR, da Costa FB, et al. Antispasmodic and relaxant effects of the hidroalcoholic extract of *Pimpinella anisum* (Apiaceae) on rat anococcygeus smooth muscle. J Ethnopharmacol. 2007 Mar 1;110(1):23-9. Epub 2006 Sep 6.
- Boskabady MH, Ramazani-Assari M. Relaxant effect of *Pimpinella anisum* on isolated guinea pig tracheal chains and its possible mechanism(s) Journal of Ethnopharmacology. 2001;74(1):83-88.
- Tirapelli CR, de Andrade CR, Cassano AO, De Souza FA, Ambrosio SR, da Costa FB, et al. Antispasmodic and relaxant effects of the hidroalcoholic extract of *Pimpinella anisum* (Apiaceae) on rat anococcygeus smooth muscle. J Ethnopharmacol. 2007 Mar 1;110(1):23-9. Epub 2006 Sep 6.
- Ghoshegir SA, Mazaheri M, Ghannadi A, Feizi A, Babaeian M, Tanhaee M, et al. *Pimpinella anisum* in modifying the quality of life in patients with functional dyspepsia: A double-blind randomized clinical trial. J Res Med Sci. 2014 Dec;19(12):1118-23.
- Al Mofleh IA, Alhalder AA, Mossa JS, Al-Soohalbani MO, Rafatullah S. Aqueous suspension of anise "*Pimpinella anisum*" protects rats against chemically induced gastric ulcers. World Journal of Gastroenterology. 2007;13(7):1112-1118.
- Rajeshwari CU, Shobha R, Andallu B. Comparison of aniseeds and coriander seeds for antidiabetic, hypolipidemic and antioxidant activities. Spatula. 2011;1(1):9 -16 .
- Changizi-Ashtiyani S, Seddigh A, Najafi H, Hossaini N, Avan A, Akbary A. *Pimpinella anisum* L. ethanolic extract ameliorates the gentamicin- induced nephrotoxicity in rats. Nephrology (Carlton). 2017 Feb;22(2):133-138. doi: 10.1111/nep.12953.
- Gulcin I, Oktay M, Kirecci E, Kufrevioglu OI. Screening of antioxidant and antimicrobial activities of anise (*Pimpinella anisum* L.) seed extracts. Food Chemistry. 2003;83(3):371-382.
- Nahidi F, Kariman N, Simbar M, Mojab F. The Study on the Effects of *Pimpinella anisum* on Relief and Recurrence of Menopausal Hot Flashes. Iran J Pharm Res. 2012;11(4):1079-1085.
- Akhtar A, Deshmukh AA, Bhonsle AV, Kshirsagar PM, Kolekar MA. *In vitro* Antibacterial activity of *Pimpinella anisum* fruit extracts against some pathogenic bacteria. Veterinary World. 2008;1(9):272-274.
- Gulcin I, Oktay M, Kirecci E, Kufrevioglu OI. Screening of antioxidant and antimicrobial activities of anise (*Pimpinella anisum* L.) seed extracts. Food Chemistry. 2003;83(3):371-382.
- Ates DA, Erdogruul ÖT. Antimicrobial activities of various medicinal and commercial plant extracts. Turkish Journal of Biology. 2003;27:157-162.
- Pontes VCB, Rodrigues DP, Caetano A, Gamberini MT. Preclinical investigation of the cardiovascular actions induced by aqueous extract of *Pimpinella anisum* L. seeds in rats. J Ethnopharmacol. 2019 Mar 21;237:74-80. doi: 10.1016/j.jep.2019.03.050. [Epub ahead of print]
- Aniseed. Pharmaceutical Press Editorial. Herbal Medicines. 4th ed. London:Royal Pharmaceutical Society; 2015.
- British Herbal Medicine Association Scientific Committee. British Herbal Pharmacopoeia. Cowling:BHMA; 1983.