

Studies on Nutritional and Medicinal Values of *Perilla frutescens* (L.)

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Abstract

Perilla frutescens (L.) Britton, is an annual medicinal, aromatic, herbal and functional food plant. Perilla origin traces back to East Asian countries including India, China, Japan and other countries, where it has been used as an important source of nutritional and traditional medicinal plant. The leaves, seeds, and stems of Perilla are used for various medicinal applications. In this review it has aims to present an overview pertaining to the nutritional and medicinal values of Perilla. It has conventionally been used to treat various ailments like anxiety, indigestion, analgesic, asthma, chest stuffiness, vomiting, coughs, colds, flu, phlegm, tumors, allergies, depression-related disease, intoxication, fever, headache, stuffy nose, constipation, abdominal pain and a sedative. The various main uses of perilla will be described in this review.

Keywords: *Perilla frutescens*, Nutritional values, Medicinal Importance, Seed oil.

Introduction:

Perilla, *Perilla frutescens* (L.) Britton], is an annual herbal medicinal, aromatic and edible plant that belongs to the mint family, Lamiaceae, which grows mainly in Asia and is native to the mountainous areas of China and India¹.



Fig: 1 *Perilla frutescens* plant

Recently, Perilla is an important plant gaining attention due to its medicinal values and beneficial phytochemical constituents. The main phytochemical constituents reported in this species are phenolic compounds (caffeic acid, ferulic acid, rosmarinic acid), flavonoids (luteolin, apigenin), Phytosterols, Tocopherols, Policosanols and Fatty acid. Perilla seed oil is also a rich source of essential fatty acid such as α -linolenic acid and linoleic acid. Perilla seeds and its oils have been widely used in medicinal formulations and traditional nutritional. Analysis of Perilla seeds has showed anticancer, anti-diabetic, antiasthma, antimicrobial, anti-inflammatory, antioxidant and cardio-protective effect. The aim of this review article is to provide an update on the nutritional composition, phytochemical properties and pharmacological evaluation of Perilla seed².

In India Perilla commonly known as Bhanjira and it is distributed in the tropical and temperate Himalayas from Kashmir to Bhutan³. *P. frutescens* leaves are widely used for flavoring, food, medicine and oil in China, Korea and Japan^{4,5} and also as one of the most popular garnishes and food colorants⁶. The leaves as well as the seeds are part of popular and traditional Chinese herbal medicines, which are prescribed for colds and coughs and to promote digestion⁷. Perilla plant is important due to its nutritional value, containing vitamins and minerals, terpenoids, phenolics, flavonoids and anthocyanins^{8,9}. Perilla has shown antioxidant, antispasmodic, expectorant, anti-inflammatory, and antimicrobial properties^{10,11,12}. A study has been conducted on anti-allergic effect of *Perilla frutescens* and its active constituents. It was reported that 271 natural molecules have been identified in

perilla which includes phenolic acids, phytosterols, fatty acids, tocopherols, flavonoids, essential oils, triterpenes, carotenoids and policosanols. Some of the compounds are solvent extractable, these individual compounds (rosmarinic acid, perillaldehyde, luteolin, apigenin, tormentic acid, and isoegomaketone) have attracted researchers' interest for its pharmacological properties¹³. Perilla have various natural activities such as antioxidant, antimicrobial, anti-allergic, antidepressant, anti-inflammatory, anticancer, and neuro-protection effects. The preclinical studies (in vitro and in vivo), clinical studies are insufficient; but are promising it is therefore, further research needs to be conducted for validation of its therapeutic effects and to ensure its efficacy and safe use¹⁴.

The essential oil of the plant has a characteristic odor because of the variety of essential oil components that affects their nutritional and medicinal properties and toxicity. The oil has been the subject of limited investigation in India, which is reported as a rich source of rosefuran, a compound of interest in flavoring and perfumery¹⁵. The oil obtained from perilla is known for its high inconsistency and many chemotypes have studied earlier from different region of the World, these compounds are perillaldehyde, perillaketone, isoegomaketone, elsholtziaketone, citral, perillene, phenylpropanoid, piperitenone, limonene, piperitone, myristicin, apiole and elemicin type^{16,17}.

In India, perilla is called *silam*. A savoury dish or chutney has been prepared by roasting Perilla seed mixed ground with chillies, tomatoes and salt. In the region Kumaon belong to Uttrakhand, India, the seeds of Bhangira (cultivated Perilla) are eaten as raw. Perilla oil is used for cooking and preparation of various dishes and the oil cake is fed to cattle. After roasting and grinding of perilla seeds are used to prepare aspicy chutney. The seeds and leaves of Perilla are also used for flavoring curries. In the Manipur region a famous salad cuisine called 'singju' is prepared by using the roasted and ground seed of perilla.



Fig: 2 Silam Chutney/ Perilla seeds chutney

It has been emphasized on cultivation of *Perilla frutescens*, one of the important oil yielding traditional crops with medicinal value is at the verge of extinction due to decreasing cultivation in central Himalaya, due to lack of promotion to marketing and awareness among the policy maker, there is an urgent need to endorse the cultivation and marketing of this indigenous and traditional crop for its conservation in the region¹⁸.



Fig: 3 Perilla seeds and oil

Nutritional Values of Perilla

The species Perilla has various uses in India and abroad in at least nine ways: seeds are sold as food for birds or human consumption; the seed oil is used as a fuel, a drying oil, or a cooking oil; the leaves are used as a potherb, for medicine, or for food coloring; and the foliage is distilled to produce an essential oil for flavoring. The seeds are eaten by people and used as bird seed.

The approximate composition and nutrient content present in the *Perilla frutescens* was detected also determined. The results are presented in table: 1. The protein and total ash content was comparable to the reported values²⁸. The fat content was found to be more when compared with the reported results. Compared to common oilseeds, the proximate composition of Perilla was similar to that of sunflower. The results showed a significant content of magnesium (261.7mg/100g) and iron (9.54mg/100g). Manganese (4.93mg/100g) was also found in more quantity as compared to other oilseed crops which can help to assist the body in metabolizing protein and carbohydrates. Magnesium (Mg) improves insulin sensitivity, protects against diabetes and its complications, reduces blood pressure, prevents heart rhythm abnormalities and is found in chlorophyll. The elements like copper and chromium were also found in low content as compared to other oilseeds crops (0.20 mg/100g and 17.6 μ g/100g, respectively). Copper (Cu) is an essential redox-active transition element that plays vital role in various metabolic processes. Being toxic, its quantity in plants should be very low. It is essential to the human body since it forms a component in many enzyme systems, such as cytochrome oxidase, lysyl oxidase and an iron-oxidizing enzyme in blood. Chromium (Cr) is known to regulate carbohydrate, nucleic acid and lipoprotein metabolism and also potentiates insulin action.

Table:1 Approximate composition and mineral content of *Perilla frutescens* oils compared to other seeds oil(per 100gm seeds).

Content	Perilla	Groundnut ^a	Linseed ^a	Mustard seed ^a	Sunflower ^a
Moisture (g)	6.8	5.5	6.5	8.5	5.5
Protein (g)	18.5	18.3	20.3	20.0	19.8
Fat (g)	52.0	43.3	37.1	39.7	52.1
Ash (g)	3.4	5.2	2.4	4.2	3.7
Carbohydrate (g)	22.8	25	28.9	23.8	17.9
Energy (Kcal)	630	563	530	541	620
Calcium (mg)	249.9	1450	170	490	280
Magnesium (mg)	261.7	-	-	-	-
Phosphorous (mg)	677.2	570	370	700	670
Iron(mg)	9.54	9.3	2.7	7.9	5.6
Manganese(mg)	4.93	1.32	-	2.56	-
Zinc (mg)	4.22	12.2	-	4.8	-
Copper (mg)	0.20	2.29	-	0.83	-
Chromium (μ g)	17.6	87	-	63	-

^aLongvah and Deosthale, 1991

Perila as flavouring agent

Perilla aldehyde is the volatile oil used as a desirable flavoring compound. One of the aldehyde isomers is about 2,000 times sweeter than sugar and four to eight times as sweeter than saccharin¹⁹. Rosefuran compound of *perilla* line from Bangladesh is a potential commercial source in flavoring and perfumery, in the Asian herbalists used to prescribe *perilla* for cough and lung afflictions, influenza prevention, restless fetus, seafood poisoning, incorrect energy balance, etc. In the United States and Europe *Perilla* alcohol prepared from perilla aldehyde, is used in fragrances and also has legal food status²⁰. Locally the plant is used for various purposes i.e. as a medicine, edible oil, garnish or flavouring agent, as vegetable and other traditional food items.

Uses of seed as Delicious sauce and Salad

The seeds are used as spice and also roasted to prepare a very delicious sauce (chutney), one of the famous traditional dishes of Uttarakhand. Traditionally the plant is useful in the treatment of colds, cough, chest stuffiness, vomiting, abdominal pain, and constipations. Seedlings cooked as vegetable and also added to salads for better taste.

Anti-asthmatic

In China Perilla is a major constituent in various folk medicines used for the treatment of Asthma, because of the flavone luteolin present in Perilla, which gives relaxant action to the smooth muscles of the trachea. Dietary treatment plays a key role in decreasing the Asthmatic allergies, serum OVA-specific immunoglobulin level and total immunoglobulin anantibodies, hence a diet with Perilla oil supplementation helps in treating Asthma²¹.

Anti-depressant

Perilla is an important constituent of anti-depression medicines. Some of the researchers have been reported that the bioactive constituent of *Perilla frutescens* such asrosmarinic acid and apigenin has an anti-depressionproperties²².

Antimicrobial

In a study it was found that the ethyl acetate extract of Perilla seeds and polyphenols isolated form ethyl acetate extract (luteolin) was effective against oral pathogenic bacteria (Oral Streptococci and strains of *Porphyromonas gingivalis*)²³.

Anti-oxidant

Perilla seeds have antioxidative properties, whereas leaf and stalk extract investigated by DPPH, superoxide radical scavenging activity, reducing power and metal chelating ability and reported that 50% of methanol leaf extract could be used as a new functional food²⁴.

Neuroprotective

Perilla seed shave active component of containing certain fatty acid like α -linolenic acid which showed anti-apoptosis and anti-inflammatory properties in the brain cells of mice during atherogenic diet, thus showed neuroprotective effect²⁵. Perilla seed oil rich source of α -linolenic acid, could offer a novel substitute to fish oil for neuroprotective and mitochondrial functions in the brain²⁶. Morerecently the safety and feasibility of Perilla seed oil as an antioxidative therapy has been proved in patients with mild to moderate dementia²⁷.

Other Pharmacological activity

Hepatoprotective activity of the majorphenolic components (rosmarinic acid andcaffeic acid) present in cold-pressed *Perilla frutescens* seed flour. *Perilla frutescens* increases cytokine LIF (leukemia inhibitory factor) which regulates endometrial receptivity. As reported in some literature that perilla can be beneficial for women suffering from faulty implantation and anti-tumor activities. The major phytochemical compounds reported in this species are phenols, flavonoids, phytosterols, tocopherols, Policosanols and fatty acid. Perilla seed oil is also a rich source of essential fatty acids. In spite of its abundant uses of this plant it is still unknown to the common population. There are very few toxicological researches on Perilla plant. Although, there are some studies that proved that its consumption is safe at a low dosage for a short period of time. It is required to establish the safe dosages of perilla and its different parts it can be used as an active constituent in the formulation of various functional foods. Hence, further researches are required to validate its use in product development by using seed and seed oil.

Conclusion

In this review paper it was emphasized on nutritional and medicinal values of perilla. This study reports extensive information about the traditional uses, nutritional, pharmacological properties of perilla seeds and its oil. It is found that leaves, seeds and its oil are used in various regions of the world like China, Japan, Korea and India in the preparations of spices,

condiments, sauces, tea, leafy vegetables and herbal medicines. Medicinal importance showed that the plant has potential antiasthmatic, antioxidant, antidepressants, antimicrobial, neuroprotective, hepatoprotective and other uses. Hence, further researches are required to validate its use in product development by using seed and seed oil.

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