

The use of *Styrax officinalis* L. in folk medicine and chemical composition

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Abstract

Styrax officinalis L. species is a shrub-shaped plant belonging to the Styracaceae family, distributed in Central America, Southeast Europe, Southwest Asia and the Mediterranean region.

The Styracaceae family consists of small trees and shrubs mostly distributed in tropical and subtropical regions. The genus *Styrax* differs from other genera of this family in that it produces a resinous substance that is usually secreted when the bark and stems are damaged. The resin of the *Styrax officinalis* L. species, which was called “storax” in the past, is used in traditional medicine in the Mediterranean basin, especially for antiseptic purposes and against respiratory diseases. It is also used externally medicinally, to heal skin wounds and to treat scabies. In Latin America it is used as an antiseptic, expectorant and also for the treatment of heart diseases, stroke, leprosy, constipation and bronchitis.

The leaves, fruits, resin, fruit peels, flowers and seeds of *Styrax officinalis* have natural products rich in various biological properties. It has been determined that the herbal materials, crude extracts and isolated chemical components of the plant are used biologically and pharmacologically. As a result of this research; cardiovascular diseases, tuberculosis, edema, paralysis, leprosy, constipation, skin wounds, scabies, skin rash, diphtheria, intestinal ulcers, acute earache, toothache, eye inflammations, kidney and bladder pain, diphtheria, leukorrhoea have been revealed to be an important medicinal plant used in the treatment of malignant tumors, fever and respiratory diseases.

Keywords: *Styrax officinalis*; Styracaceae; Folk Medicine; Medicinal and Aromatic Plants; Essential oil

1. Introduction

Styrax is the largest genus of the Styracaceae family and has about 130 species. *Styrax officinalis* L. is distributed in Southern Europe, Eastern Mediterranean, Cyprus, Israel, Jordan and Turkey. This species, which is a drought-resistant plant, stands out as the only species of the genus *Styrax* native to the arid regions of the Mediterranean Basin and Barley Plateau [1-3]. In Lebanon, the fruits of this tree are traditionally used for fishing. The fruits are rich in saponins and when ripe, they are crushed and thrown into the water, which causes the fish to get scared and come to the surface [4].

Styrax officinalis L. grows as a shrub plant in the Southeast, Mediterranean, Aegean and Central Black Sea regions of Turkey. *Styrax officinalis* L. is an alternative oilseed plant in the form of a perennial shrub that can be grown widely between 0-1000 m altitudes. This plant is also suitable for cultivation in barren and unproductive soil conditions in non-agricultural areas, and its oil can be used industrially (biodiesel) due to its high oil (50%) content [5].

Styrax officinalis is a deciduous shrub-shaped plant that can grow to 2-5 m in height. The leaves are in thin elliptical form, 5-10 cm wide, 3.5-5.5 cm wide. The plant has 5-7 petals, the anthers are yellow, the calyx is 5-lobed. Inflorescence

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is short and few flowers. Flowering time is late spring-early summer (May-June) [6]. It prefers dry rocky slopes, woods and thickets at an elevation up to 1,500 metres (4,900 ft) above sea level [7].

The aim of this study is to compile all available information from the literature on the phytochemistry, traditional medicinal values, scientifically supported uses, morphology and habitat of the *Styrax officinalis* plant.

Traditional Uses: In recent years, the vast majority of natural medicines are derived from plants widely used in traditional medicine [8]. *Styrax officinalis*, one of the oldest and most famous traditional medicinal plants, is used in medicine as Storax. Storax has been used to make incense as well as as a therapeutic agent for diseases in ancient civilizations [9-10]. It has also been used to heal skin wounds and treat scabies. It is used in Latin America as an antiseptic, expectorant, and also for the treatment of heart diseases, stroke, leprosy, constipation and bronchitis [11]. In many Muslim countries, storax is used to make rosary and incense against the evil eye [12]. In Jordan and Palestine, the seeds of the plant are used in the treatment of skin rashes, leprosy and many other skin diseases [17-18].

It is used in infusions obtained from the leaves and flowers of the plant, against cough, in the treatment of diphtheria and leukorrhea [15-16]. The plant is also used in India for scabies, skin ulcers, antibacterial, antifungal and wound healing. The tincture obtained from the plant can be used as a mouthwash against asthma, as well as in cough, gonorrhoea, edema and tuberculosis [17-18].

In Iran, the oil obtained from the seeds of the plant has been used for constipation. In ancient Islamic medicine, the oil resin, fruits and leaves of the plant are used to treat malignant tumors, reduce fever in the body, intestinal ulcers, kidney and bladder pain, bronchitis, eye inflammation, redness, toothache, acute earache, and hemorrhoids [19]. Also in traditional Indian medicine; The fruits of the plant are crushed and boiled until dry, turned into a paste and mixed with powdered cow's milk and sugar. This mixture is traditionally used as a powerful male sterilizer [20].

Tincture of the plant is used in gargle form in Chinese medicine for asthma, cough, gonorrhoea, tuberculosis, and edema, as well as for antibacterial, antifungal, and wound healing [18]. Traditional uses of the *Styrax* herb include treating wounds, muscle ailments, neurological problems, anxiety, and arthritis. In addition to the parts of the plant used as extract, it also shows beneficial biological effects such as anticancer, hemolytic complement, leukemic, antifungal, antibacterial, antioxidant and tyrosinase inhibitory activity [21].

Chemical Compounds: As a result of the research, the essential oil ratio was determined as 0.013 % in the leaves, 0.007 % in the flowers and 0.004 % in the stem of the plant. 26 essential oil components were identified. Terpenoids were found to be 42.2 % in the leaves, 41.2 % in the stem and 48.7 % in the flowers of the plant. Among the terpenoids obtained, oxygenated monoterpenes are more concentrated in all organs of the plant. The major compounds in the leaf essential oils were (E)-2-hexenal (17.6 %), linalool (11.9 %) and geraniol (5.5 %). Linalool was the major compound (26.4 %) in the volatile flower oil, followed by tridecanal (9.8 %) and dodecane (9.6 %), while α -terpineol (17 %) and eugenol (9.9 %) were the main compounds in the stem essential oil [22].

Triterpenoids, tannins and saponins were found in the research conducted in *S. officinalis* species [13]. Essential oil ratios were determined as 0.01-0.02 %, lower than other studies. Among the components of the plant in three different development periods; essential oils (E)-2-hexenal, geraniol, octanol, nonanal, α -terpineol, tridecanal, trans-cubebol and geranyl acetone were detected [23]. In addition, various phenolic acids such as gallic, gentiic, caffeic, p-coumaric, vanillic, ferulic and p-hydroxybenzoic were detected in the leaves of the plant. In another study, the plant contains flavonoids such as quercetin, naringenin, (+)-catechin and (-)-epicatechin [24].

In the research conducted to determine the oil components of the seed, 6 fatty acids were determined. These components are methyl palmitate (11.62%), methyl palmito-oleate (0.64%), methyl stearate (1.54%), methyl oleate (51.54%), methyl linolenate (26.61%), and methyl gadoleate (7.11%) [9]. It has been determined that methanol obtained from the fruits of *S. officinalis* plant has antibacterial effect against *Staphylococcus aureus* and *Escherichia coli* strains. This effect was contrasted with potent broad-spectrum antibiotics such as ceftriaxone, amikacin, and cefepime [25].

2. Conclusion

As a result of this research, it has been seen that *Styrax officinalis* is used in the treatment and prevention of many diseases. It has been observed that it is used in the treatment of kidney pain, acute earaches, toothaches, hemorrhoids, edema, paralysis, leprosy, skin wounds, respiratory diseases, diphtheria, intestinal disorders in alternative medicine.

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