American Journal of Applied Science and Technology

VOLUME Vol.05 Issue 09 2025
PAGE NO. 59-62
DOI 10.37547/ajast/Volume05Issue09-13

Technology For Extracting Essential Oils From The Leaves Of The Marmarak Plant (Folia Salviae)

Nurutdinova Feruza Muidinovna
Bukhara State Medical Institute, Samarkand State Medical University, Uzbekistan

Bazarova Nigina Sobirjanovna
Bukhara State Medical Institute, Samarkand State Medical University, Uzbekistan

Received: 31 July 2025; **Accepted:** 28 August 2025; **Published:** 30 September 2025

Abstract: This article discusses the technology of extracting essential oils from the leaves of the salvia plant (Folia Salviae). The study examines the stages of raw material preparation, the main methods of obtaining essential oils - steam distillation, extraction and supercritical CO_2 technology. Information is provided on the chemical composition of the obtained essential oils, in particular thujone, cineole, borneol and other biologically active components. The practical significance of essential oils obtained from salvia leaves in the pharmaceutical, cosmetology and food industries is also analyzed. The results of this study play an important role in the rational use of medicinal plants and the production of high-quality phytopreparations.

Keywords: Thickener, chitosan, cotton-silk properties, coloristic and printing-technical properties.

INTRODUCTION:

It is known that many fragrant plants contain essential oils. One of such plants is the sage (folia sflvife) plant.

Salvia (salvia) leaf – Folia Salviae. The name of the plant. Medicinal sage (salvia) – Salvia officinalis., belongs to the family of mint – Lamiaceae (Labiatae).

A perennial, semi-shrub reaching a height of 20–50 cm. The stem is numerous, branched, leafy, four-edged, the lower part is slightly woody. The leaves are simple, long-stalked, the upper part of the stem is unstalked, and are arranged oppositely on the stem. The flowers are short-stalked, forming a spike-like, circular false inflorescence at the top of the stem and branches. The flower is crooked, the calyx is two-lipped, the corolla is two-lipped, blue-violet in color, the male node is two, the female node is four-lobed, located at the top. The fruit consists of 4 nuts [1-4].

Blooms in June - July.

Geographical distribution. Homeland is the Mediterranean countries. It is grown in Moldova, Ukraine, Krasnodar Territory and Crimea.

Product preparation. Marmarak leaves are picked by hand three times a year (from flowering). In the first and second picking, only the leaves in the lower part of the stem are collected. In the third picking (in September), all the leaves on the stem and the tip of the upper part of the stem (up to 10% is allowed) are collected and dried in attics or air dryers.

Product appearance. The finished product consists of a long-striped (2 cm), oblong or broadly lanceolate (sometimes with one or two small segments at the base of the leaf blade). The tip of the leaf blade is blunt, and the edge is bluntly serrated. The length of large leaves is 6–10 cm, width 2–2.5 cm, and the length of small leaves is 2 cm, width 0.8 cm. Young leaves are covered with a large number of small hairs (especially on the underside), which gives them a silvery color. Older leaves have fewer hairs, and the upper side of the blade is gray-green, and the lower side is gray. Since the veins of the 3rd and 4th order located on the leaf blade are sunken in from the upper side of the leaf blade and protrude from the lower side, the lower side of the blade looks like a uniform small cell. The product has a very fragrant aroma and a pleasant, slightly bitter, astringent taste. According to the state pharmacopoeia, the product should have a moisture content of 14%, total ash of 12%, blackened and brown leaves of 5%, admixtures of stems and inflorescences of 13%, a crushed part passing through a sieve with a hole diameter of 3 mm of 3% (for the whole product), organic impurities of 3% and mineral impurities of no more than 0.5%. For the cut product, particles larger than 10 mm should not exceed 5%, and small parts passing through a sieve with a hole diameter of 0.5 mm should not exceed 10%.

Microscopic structure of the product. The appearance of the leaf, boiled in an alkaline solution, is observed under a microscope.

The upper epidermis of the leaf is composed of polygonal or rounded, slightly curved-walled cells, while the lower epidermis is composed of cells with generally curved-walled cells. Oysters are mainly located in the lower epidermis, equipped with 2 epidermal cells (typical of the labiate family). The hairs on the leaf are of two types: simple (3–4 small and one long curved-walled) and ciliated hairs. The ciliated hairs are small, consisting of 1–3 short stalks with small cells and a round one-celled cilia. The ciliated hairs are mainly located along the leaf veins. Essential oil glands are almost invisible under the hairs. These glands are round in shape, consisting of 8 cells located radially (similar to those of a gypsy moth) that produce essential oil.

Chemical composition. All parts of the plant contain essential oil. The leaves contain 0.5–2.5% essential oil, alkaloids, tannins, flavonoids, ursolic and oleanolic acids and other compounds.

According to the state pharmacopoeia, the content of essential oil in the product should not be less than 1% in the whole product, and 0.8% in the cut product.

The essential oil contains up to 15% cineole, thujone, pinene, borneol, camphor, cedrene and other compounds.

Use. Medicinal marjoram leaf preparations are used as an astringent, disinfectant and anti-inflammatory drug for inflammation of the upper respiratory tract, as a gargle (stomatitis and gingivitis).

Medicinal preparations. Tincture. Marmarak leaf is part of teas used against inflammation of the throat, chest, upper respiratory tract, stomach diseases and diarrhea.

The medicinal preparation "Salvin" is obtained from the leaves of the marjoram. Its 0.1 and 0.25% solutions in water or isotonic sodium chloride solution are used to treat chronic inflammatory diseases of the oral cavity (gingivitis, stomatitis, periodontitis), purulent, tropical and festering wounds of the bones [5-7].

Experimental part

For the experiment, the marmara plant, collected in 2024 from the Bukhara region and dried in the shade, was used. The hydrodistillation process was carried out with the participation of water. 25 g of crushed plant organ was placed in a 1000 ml round-bottomed flask, 300-350 ml of water was poured on top, and a ball-shaped condenser was installed vertically on top of the flask. A Ginzberg apparatus was hung on the lower end of the condenser and the flask was heated. After the liquid in the flask boiled, the water vapor rose with the essential oil vapor to the condenser, where it turned into a liquid and fell back to the Ginzberg apparatus.

Since the essential oil is lighter than water, it collects on top of the liquid. If the amount of essential oil in the flask did not change (did not increase) within 15-20 minutes, the heating of the flask was stopped. After the flask cooled, the flask was removed and the amount of essential oil (ml) was determined. When 25 g of dried plant raw material was extracted with distilled water, 0.1 ml of essential oil was isolated. The extraction process lasted 1.5 hours. The percentage of essential oil was determined according to the following formula:

$$X = \frac{V \times 100 \times 100}{m\,(100 - a)}$$

So, the percentage of essential oil in 25 g of dried marmarak plant is 0.4%.

RESULTS

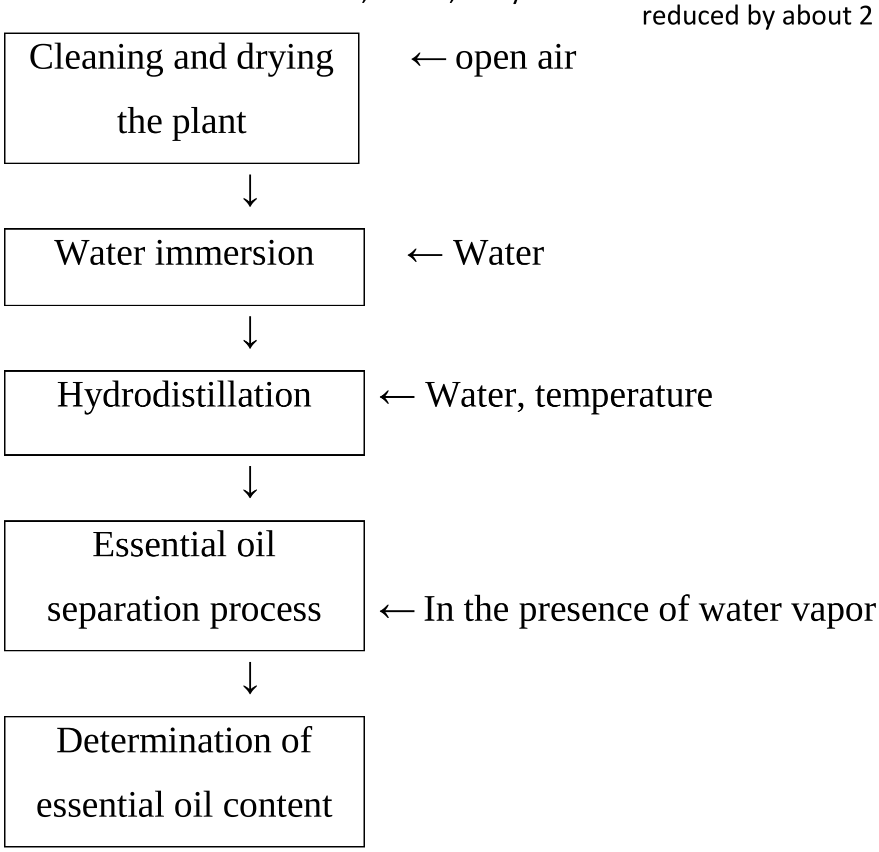
Hydrodistillation was carried out with the participation of surfactant solutions (SFM). That is, the extraction process was carried out by soaking dried plant leaves in solutions of surfactants of various concentrations. Chitin was used as a surfactant. When 25 g of dried plant raw material was extracted with distilled water, 0.1 ml of essential oil was isolated. The extraction process lasted 1.5 hours. In a 0.15% solution of surfactant, 0.13 ml of essential oil was isolated from the plant itself in the semolina, and in a 0.2% solution, 0.18 ml of essential oil was isolated. The extraction process lasted 1.4 hours in a 0.15% solution, and 1 hour in a 0.2% solution. The percentage of essential oil in the plant composition changed with the concentration of surfactant as follows: in a 0.15% solution, it was 0.52%, and in a 0.2% solution, it was 0.72%.

Table 1

Amount of essential oil extracted from the leaves of Marmarak (folia sflvife) in the presence of water and surfactant (ml)

Plant raw material mass (g)	Essential oil extracted in the presence of water	Surfactant solutions	
		0,15 %	0,2 %
25	0,1 (0,4%)	0,13 (0, 52%)	0,18 (0,72 %)

It can be seen from the table that with increasing concentration of surfactant in the solution, the extraction of essential oils increases, that is, the yield increases. It should be emphasized that in the presence of surfactant solutions, not only the yield of essential oils increases, but also the extraction time is reduced by about 2 times.



Scheme 1. Extraction of essential oil from raw materials using hydrodistillation method

Scheme 1 shows the sequence of extraction of essential oils from medicinal plant raw materials by hydrodistillation. The same process can be carried out in the presence of a surfactant, only the percentage concentration of the surfactant in water is increased.

CONCLUSION

The mechanism of extraction of essential oils with the participation of surfactants can be explained as follows:

1. The dependence of the physical properties of the extractant on the amount of essential oil during the extraction process.

One of the physical properties of the extractant that significantly affects the speed of the extraction process is its viscosity and surface tension. Viscosity is a component of Einstein's diffusion coefficient equation. With its decrease, the diffusion coefficient increases proportionally.

Since surfactant solutions have low viscosity, they have a significant effect on the diffusion rate. As a result, the ability of the solvent to penetrate and dissolve plant pores increases. According to available data, a decrease in surface tension has a positive effect on the extraction rate. Surfactants concentrate at the phase boundary and reduce surface tension. The surface of plant raw materials is polarized under the action of ionogenic surfactants and the surface tension decreases.

During wetting, surfactant molecules participate in adsorption and diffusion processes below and above the critical concentration of micelles. This process is relatively fast.

2. Effect of adsorption of surfactants during mass transfer.

Adsorption of surfactants to the solution boundary of plant raw materials is one of the important conditions of the extraction process. The amount of adsorption of surfactants from aqueous solutions of marmarak plant powder was studied. Positive adsorption was observed in all cases. The extent of adsorption is calculated by measuring the concentration of surfactant solutions before and after adsorption.

REFERENCES

1. Asghari G., va boshqalar. GC-MS analysis of essential oils from Salvia officinalis L.: comparison of extraction methods of the volatile components. Jundishapur Journal of Natural Pharmaceutical Products, 2014.
2. Đurović S., va boshqalar. The effect of various extraction techniques on the quality of sage (Salvia officinalis L.) essential oil, expressed by chemical composition, thermal properties and biological activity. 2022.
3. Aleksovski S.A., Sovová H., va boshqalar. Supercritical CO_2 extraction of Salvia officinalis L. Journal of Supercritical Fluids, 2007.
4. Djermane M., Abdenabi A., Imed C., Toubal A., Noureddine G. Eco-Extraction of Essential Oil of the Species Salvia officinalis L. Systematic Characterization and Parametric Modeling. Environmental Journals.
5. Ciko L., va boshqalar. Extraction of Essential Oil from Albanian Salvia officinalis L. and its Characterization by FTIR Spectroscopy. Asian Journal of Chemistry, 2016.
6. Mamatkulova I.E., Akromova S. Marmarak oʻsimligi dorivor xususiyatlari. Scientific Impulse, 2023.
7. F. Nurutdinova, D. Tilloyeva, S. Ortiqov. STUDIES OF PHYSICO-CHEMICAL PROPERTIES CHITOS AN APIS MELLIFERA /International Journal of Early Childhood Special Education (INT-JECSE) 2022-14 (2), 5770-5772. WOS:000826204400019.
8. Ф.М. Нурутдинова. Выделение хитина-хитозана из подмора пчел Apis Mellifera и изучение их свойства. Монография. 2021/3/3, 14.
9. Feruza Nurutdinova, Zebiniso Tuksanova, Yulduz Rasulova. Study of physico-chemical properties of biopolymers chitin-chitosan synthesized from poddle bees Apis Mellifera/ E3S Web Conf. 474 01002 (2024). DOI: 10.1051/e3sconf/202447401002.