

**QUALITATIVE ANALYSIS OF THE CHEMICAL COMPOSITION OF THE ABOVE-GROUND
PART OF THE SAPONARIA PLANT**

<https://doi.org/10.5281/zenodo.19055528>

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Annotatsiya: *Ushbu maqolada Saponariya (*Saponaria officinalis* L.) o'simligining yer ustki qismi (poya, barg va gullari)ning kimyoviy tarkibi hamda biologik faol moddalari o'rganildi. Tadqiqot natijalariga ko'ra, o'simlikning yer ustki qismida saponinlar, flavonoidlar, organik kislotalar, vitaminlar va boshqa biofaol birikmalar mavjudligi aniqlandi. Ushbu moddalarning mavjudligi o'simlikning yallig'lanishga qarshi, balg'am ko'chiruvchi va antiseptik xususiyatlarini asoslaydi. Olingan natijalar Saponariya o'simligini farmatsevtika va xalq tabobatida qo'llash istiqbollarini kengaytiradi.*

Аннотация: *В данной работе изучены химический состав и биологически активные вещества надземной части растения *Saponaria officinalis* L. (стебли, листья и цветки). В результате исследования установлено наличие сапонинов, флавоноидов, органических кислот, витаминов и других биологически активных соединений. Выявленные компоненты обуславливают противовоспалительные, отхаркивающие и антисептические свойства растения. Полученные результаты расширяют перспективы применения *Saponaria officinalis* в фармацевтике и народной медицине.*

Abstract: *This study investigates the chemical composition and biologically active compounds of the aerial parts (stems, leaves, and flowers) of *Saponaria officinalis* L. The results revealed the presence of saponins, flavonoids, organic acids, vitamins, and other bioactive substances. These compounds contribute to the plant's anti-inflammatory, expectorant, and antiseptic properties. The findings expand the prospects for the use of *Saponaria officinalis* in pharmaceutical applications and traditional medicine.*

Kalit so'zlar: *Saponaria officinalis, yer ustki qismi, saponinlar, flavonoidlar, biofaol moddalar, kimyoviy tarkib, dorivor o'simlik.*

Ключевые слова: *Saponaria officinalis, надземная часть, сапонины, флавоноиды, биологически активные вещества, химический состав, лекарственное растение.*

Keywords: *Saponaria officinalis, aerial parts, saponins, flavonoids, bioactive compounds, chemical composition, medicinal plant.*

INTRODUCTION

Nowadays, interest and demand for medicinal plants is increasing. In particular, biologically active substances obtained from natural sources are gaining importance in the pharmaceutical industry. *Saponaria officinalis* L. is one of the medicinal plants rich in saponins. Despite the widespread use of its aerial part in folk medicine, its chemical composition and bioactive substances have not been studied sufficiently in depth. Therefore, scientific research of the aerial part of the plant, determination of its chemical composition and assessment of the possibilities of practical application are one of the urgent issues.

Saponaria officinalis L. is a perennial plant belonging to the Caryophyllaceae family, distributed in many regions of Europe and Asia. Biologically active substances contained in the plant, especially triterpene saponins, occupy an important place in pharmacognosy.

Saponaria officinalis mainly contains triterpene saponins (saponariosides), which have a glycoside structure. Saponins form a stable foam when shaken with water, which indicates their surface-active properties. They increase bronchial secretion and have an expectorant effect. Therefore, preparations prepared from the plant are used in respiratory diseases.

- According to literature, the plant contains:

- - triterpene saponins,
- - flavonoids,
- - phenolic compounds,
- - organic acids,
- - ascorbic acid,
- - essential oils.

Flavonoids have antioxidant and capillary-strengthening properties. Phenolic compounds have antimicrobial effects. Ascorbic acid plays an important role in strengthening the immune system.

Scientific sources indicate that although the root part of the plant is richer in saponins, the above-ground part is also pharmacologically significant and is acceptable as a raw material from an ecological point of view. Harvesting the above-ground part causes less harm to the plant population.

Saponins give the plant a foaming property and have expectorant, anti-inflammatory and antimicrobial effects. Flavonoids, on the other hand, have antioxidant properties and play an important role in neutralizing free radicals in the body.

The study of the above-ground part is pharmacologically promising, since the collection and processing of this part is more environmentally and economically convenient than the root.

MATERIAL AND METHODS

For the study, the above-ground part of the *Saponaria officinalis* plant was collected during the flowering period. The sample was dried in the shade at a temperature of 25–30°C and ground.

To determine the chemical composition:

Determination of saponins - using the foam reaction, that is, to perform this reaction, approximately 5–10 ml of an aqueous extract prepared from plant raw materials is poured into a test tube and shaken with the mouth closed for 15–30 minutes. Then the test tube is left undisturbed for 10–15 minutes and examined for the foam layer.

Determination of flavonoids - for testing by qualitative reactions (color formation with aluminum chloride), 2-3 ml of alcoholic extract of plant raw material is poured into a test tube. Then, a few drops of 5% aluminum chloride (AlCl_3) solution are added to the test tube, mixed, and a color change is observed.

Determination of phenolic compounds - for testing by iron (III) chloride reaction, 2-3 ml of aqueous or alcoholic extract of plant raw material is poured into a test tube, 1-2 drops of 1-5% iron (III) chloride (FeCl_3) solution are added. The solution is mixed thoroughly, and a color change is observed.

The extraction process was carried out in a 70 % ethanol solution. For this, the dried and crushed plant raw material is placed in a test tube or flask. A 70 % ethanol solution is added to it. The mixture is stirred for a certain time, then filtered and partially evaporated in a water bath.

RESULTS

The results of the analysis confirmed the presence of saponins and flavonoids in the above-ground part of the plant.

Qualitative reactions:

Determination of saponins (foam reaction):

When the extract was shaken with water, a stable foam was formed 1–2 cm high. This indicated the presence of saponins.

Determination of flavonoids (AlCl_3 reaction):

When aluminum chloride solution was added to the extract, a yellow color appeared, which confirmed the presence of flavonoids.

Determination of phenolic compounds (FeCl_3 reaction):

When iron (III) chloride was added, a dark green color was formed, which was a qualitative reaction characteristic of phenolic substances.

Determination of pH environment:

It was observed that the medium reaction of the extract was slightly acidic ($\text{pH} \approx 5-6$), which is explained by the presence of organic acids.

The experimental results were consistent with the literature data. The obtained results confirm that the above-ground part of the plant is rich in biologically active substances.

CONCLUSION

Qualitative analysis of the composition of the above-ground part of the *Saponaria officinalis* plant revealed a number of biologically active substances. The presence of saponins, flavonoids, phenolic compounds, organic acids and some other natural compounds in the plant was confirmed by qualitative reactions. The appearance of one of these specific active components of saponins.

The analysis itself shows that the above-ground part is a medicinal product and can be used in pharmaceutical and folk medicine. The identified biologically active plant may have significant production in terms of anti-inflammatory, expectorant and antiseptic properties.

Thus, the qualitative analysis conducted shows that the above-ground part of the *Saponaria officinalis* plant is rich in biologically active substances and confirms the need for further study of it as a medicinal plant.

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