# SAMARKAND IMMORTELLE: PHYTOCHEMICAL COMPOSITION AND PHARMACEUTICAL SIGNIFICANCE

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**Abstract**:This article investigates the phytochemical composition and biologically active compounds of *Helichrysum maracandicum* (Samarkand immortelle). During the study, samples of the leaves, stems, and inflorescences of the plant were analyzed using the High-Performance Liquid Chromatography (HPLC) method. The results revealed the presence of flavonoids, micro- and macroelements, amino acids, and vitamins (B1, B2, B6, B9, and C). In addition, both qualitative and quantitative differences in the content of these compounds were observed among different plant organs.

The obtained results indicate that *Helichrysum maracandicum* is an important medicinal raw material for the pharmaceutical and medical fields. The study also substantiates the potential for cultivating this species under plantation conditions and preserving its natural resources in order to provide a high-quality raw material base for the pharmaceutical industry.

**Keywords:** *Helichrysum maracandicum*, Samarkand immortelle, medicinal plants, phytochemical analysis, High-Performance Liquid Chromatography (HPLC), flavonoids, vitamins, micro- and macroelements, amino acids, pharmaceutical raw materials, Uzbekistan flora.

**Introduction.** Medicinal plants have been used by humanity since ancient times to treat and prevent various diseases. They contain biologically active compounds such as alkaloids, glycosides, flavonoids, essential oils, vitamins, and minerals, and it is these substances that give them their healing properties. Medicinal

plants occupy an important place in both traditional medicine and modern healthcare.

Today, more than 20,000 plant species worldwide are considered to possess medicinal properties. The territory of Uzbekistan is also exceptionally rich in medicinal plants, where many healing species such as mint, licorice, wormwood, plantain, chamomile, Syrian rue, immortelle, butterfly bush, and aloe grow naturally. These plants are widely used as raw materials in the pharmaceutical industry for the production of medicines.

The main advantage of medicinal plants is that they are natural and generally have a positive effect on the human body, often causing fewer side effects than many synthetic drugs. However, using them in incorrect amounts or without professional advice may lead to adverse consequences. Therefore, caution is essential when using medicinal plants.

The medicinal properties of plants are directly related to the biologically active compounds present in their composition.

Using phytochemical methods, various biologically active substances found in plants, such as alkaloids, flavonoids, glycosides, saponins, tannins, essential oils, steroids, vitamins, and many other active compounds, can be identified. Each group of substances exerts different pharmacological effects on the human body. Therefore, phytochemical analysis plays an important role in the comprehensive study of the therapeutic potential of medicinal plants.

In addition, phytochemical analysis is essential for preserving the biological activity of medicinal plants and for developing appropriate processing technologies. Scientifically based methods are applied during the collection and drying of plants to prevent a reduction in the concentration of active compounds. This contributes to improving the quality of medicinal products. The Samarkand immortelle (*Helichrysum maracandicum* Popov ex Kirp.) is a perennial herb with numerous branched stems, reaching a height of 35–70 sm. Its leaves, stems, and branches are

covered with fine white hairs, while the basal leaves are elongated, obovate in shape, and gradually narrow into a petiole [D. Ulashov et al., 2024: 178].

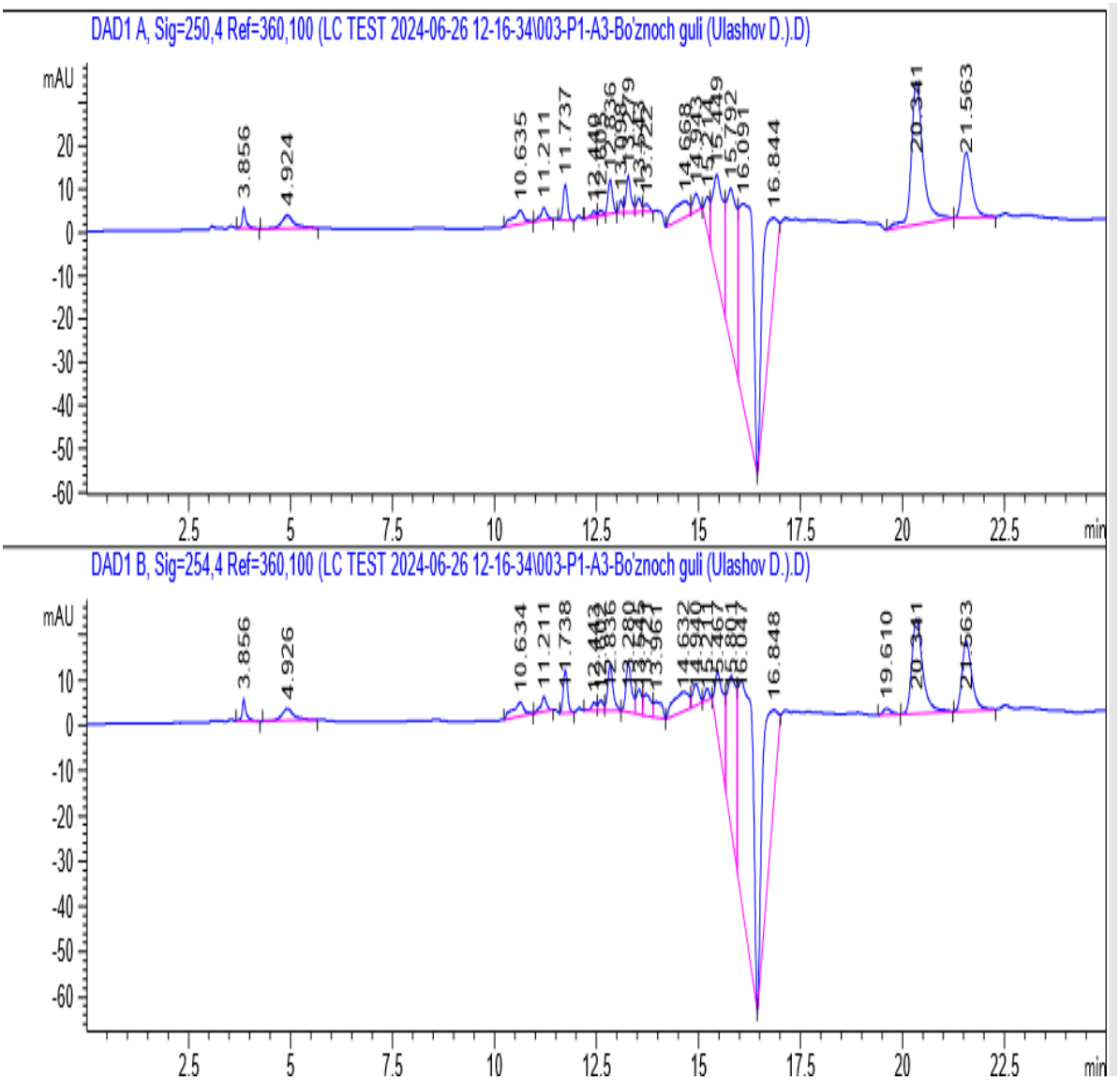
The biochemical composition of Samarkand immortelle growing in Uzbekistan has been extensively studied [A. Sarabekov et al., 2022: 929]. Research conducted by scientists in our republic revealed the presence of several important elements in its chemical composition. In particular, among the microelements essential for the human body, iron (Fe) was found in the highest concentration, along with manganese (Mn), zinc (Zn), copper (Cu), chromium (Cr), molybdenum (Mo), and selenium (Se) [A. Matchonov et al., 2020: 200].

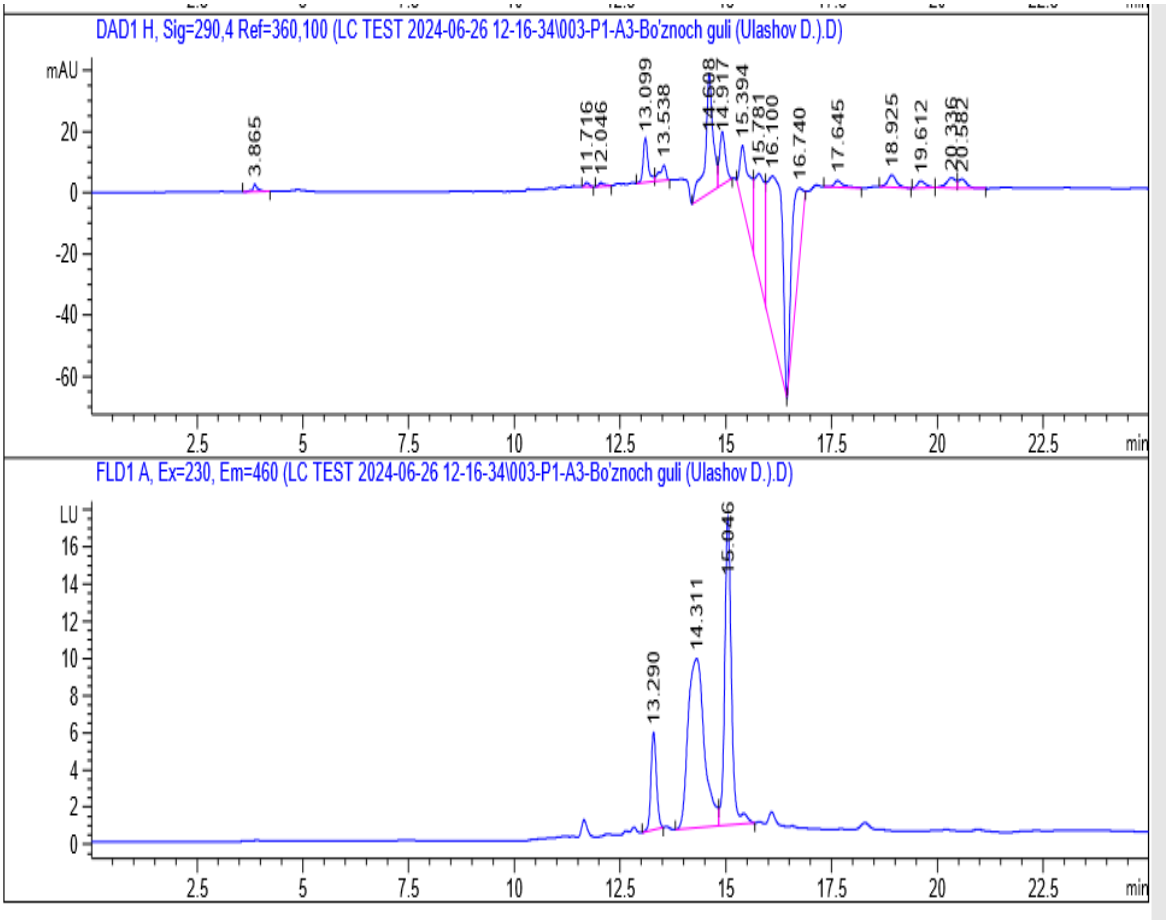
**Main Part.** The study area was located in the Chiroqchi District of the Kashkadarya Region. A 0.02-hectare plot of land was selected for the cultivation of Samarkand immortelle, and planting activities were carried out in 2023. Seedlings propagated under *in vitro* conditions were transplanted into the field. The dry biomass of the cultivated Samarkand immortelle was then prepared. During biomass preparation, mature leaves, stems, and inflorescences were dried at room temperature for 7–10 days in a location protected from direct sunlight.

For phytochemical analysis of its composition, the samples were analyzed using **High-Performance Liquid Chromatography (HPLC)**. The leaves, stems, and inflorescences of *Helichrysum maracandicum* were used for the analysis (Figure 1).

**the reproductive stage of the plant dry biomass of the inflorescences**

According to the analysis results, the composition of *Helichrysum maracandicum* was found to contain flavonoids, micro- and macroelements, amino acids, and vitamins. Quantitative and qualitative differences in these compounds were observed among the stems, leaves, and inflorescences of the plant. The chromatographic analysis of the vitamins is presented in the figure below (Figure 2).






The analysis revealed the presence of several vitamins, including vitamins B1, B2, B6, B9, and C, as well as other vitamins. These findings indicate that *Helichrysum maracandicum* is rich in biologically active compounds that contribute to its medicinal value.

In conclusion, *Helichrysum maracandicum* can be considered an important medicinal plant with significant practical value for the pharmaceutical and medical fields. Therefore, cultivating this species under plantation conditions may help restore its natural populations while also providing high-quality raw materials for the pharmaceutical industry.

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