



STUDY OF MINERAL ANALYSIS OF DRY EXTRACT OBTAINED FROM LOCALLY GROWN *CALENDULA OFFICINALIS L.* AND *SILYBUM MARIANUM (L.) GAERTN* PLANTS

G.G.Qayumova
Z.U.Mamatkulov

Tashkent Pharmaceutical Institute, Uzbekistan, Tashkent

*e-mail: feralinaf_g@mail.ru

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ABSTRACT

*Based on the reforms carried out in the pharmaceutical industry, special attention is paid to natural medicines obtained from plant raw materials. This article presents the results of the determination of macro- and microelements in the dry extract obtained from the raw materials of *Calendula officinalis L.* and *Silybum marianum (L.) Gaertn.**

Plants have been used as medicines for centuries to treat various diseases. The importance of plant-based compounds has increased significantly in recent years, not only in our country, but also around the world.

More than 7,000 medicinal plants have been scientifically proven to be useful in treating various diseases in humans and animals. The revival of interest in plants is largely a result of the negative effects that other sectors have on humanity. Therefore, efforts are being made to study and document ethnopharmacological data and scientific research on medicinal plants in order to create safe and effective plant species worldwide[1].

As is known, the research conducted initially studies the analysis of macro- and microelements in the plant, along with the main bioactive substances in it. Chemical elements measured in grams in the human body, elements that are present in very small concentrations, are called microelements. Mineral elements in body tissues change significantly with age. During the period of rapid growth and development of the human body, the amount of microelements also increases at the age of 17-20 and slows down or stops [2]. These elements, although present in small amounts in tissues, have high biological activity, and each has its own place in the physiology of a living organism.

Microelements constitute a diverse group of elements with different properties from a physiological point of view. In recent years, it has been found that microelements are as necessary for medicinal plants as macroelements, and that these two groups differ from each other only in quantity [4].

The purpose of the study: to study the analysis of macro- and microelements in the dry extract obtained from the raw materials of *Calendula officinalis L.* and *Silybum marianum (L.) Gaertn.*



Experimental part: Minerals in the dry extract obtained from the raw materials of *Calendula officinalis* L. and *Silybum marianum* (L.) Gaertn. were determined using the Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method. The reagents used in the experiment: multi-element standard No. 3 (29 elements for MS), standard for Hg (mercury), nitric acid, hydrogen peroxide, double-distilled water, argon (gas purity 99.995%).

According to it, 0.0500-0.500 g of the extract under investigation was weighed on an analytical balance and poured into a Teflon container of an autoclave, then the required amount of concentrated mineral acids (nitric acid and hydrogen peroxide) was poured over it. The autoclave was closed and placed in a Berghof programmed (MWS-3+) microwave disintegrator. In this case, the appropriate program was set depending on the type of substance under investigation. After the substances placed in the autoclave were disintegrated, they were placed in 100 ml volumetric flasks and brought to the required mark with 0.5% nitric acid. The determination of the sample under investigation was carried out using an ISPMS device. The optimal wavelength of the micro or macroelements being determined is indicated in the detection method, at which they have maximum emission. The sequence of tests is indicated in mg and the degree of its dilution in ml. After receiving the data, the actual amount of the substance in the test sample is automatically calculated by the device and entered in mg / kg or $\mu\text{g} / \text{g}$ with error limits – RSD in %. The analysis results are presented in Table 1.

Table 1.

Analysis of macro- and microelements in the obtained dry extract

Name of macro- and microelements	Amount, mg/kg	Name of macro- and microelements	Amount, mg/kg
Li	6.8	As	1.08
B	1197	Se	<0.50
Na	3059	Y	<0.10
Mg	1680	Sr	7.18
P	5010	Zr	0.255
K	12040	Nb	0.039
Ca	2053	Mo	1.76
Sc	0.197	Ag	0.511
Ti	16.0	Cd	0.057
V	0.309	In	<0.005
Cr	9.89	Sn	<0.010
Mn	9.40	Cs	0.023
Fe	25.8	Ba	3.18
Co	0.306	La	<0.50
Ni	6.72	Ce	0.134
Cu	15.6	Nd	0.043
Zn	15.5	Rb	4.74

The results of the analysis showed that the dry extract obtained from the raw materials of *Calendula officinalis* L. and *Silybum marianum* (L.) Gaertn contains calcium - 2053 mg/kg, phosphorus - 5010 mg/kg, potassium - 12040 mg/kg, sodium - 3059 mg/kg, boron - 1197



mg/kg, sulfur - 15.5 mg/kg, iron - 25.8 mg/kg, magnesium - 1680 mg/kg and a number of other microelements in various mg/kg quantities, which are important for human life. The higher their content in the dry extract, the greater its pharmacological effectiveness. It is known that plants selectively absorb the macro- and microelements necessary for them during their life cycle, depending on genetic factors. According to the results of the conducted studies, it was proven that the obtained dry extract has a composition that has a positive effect on the health of the human body, and in addition to biologically active substances, it contains minerals that stimulate its effect - macro- and microelements, including several elements such as zinc, magnesium, iron, boron, phosphorus, potassium, sodium, and calcium [3].

Conclusion: Inductively coupled plasma mass spectrometry (ICP-MS) was used to determine macro- and microelements in the dry extract obtained from the raw materials of *Calendula officinalis* L. and *Silybum marianum* (L.) Gaertn. The high content of important macro- and microelements such as Zn, Mg, Fe, B, P, K, Na, Ca in the dry extract increases its positive effect on the body and helps to improve biochemical processes.

Also, the combination of the above elements with biologically active substances in the extract makes the pharmacological effect of the dry extract somewhat more effective.

References:

1. Ganie SA, Yadav SS. *Holoptelea integrifolia* (Roxb.) Planch: a review of its ethnobotany, pharmacology, and phytochemistry. *Biomed Res Int* 2014;2014:401213
2. F.S.Qayumov, F.H.Tuxtayev Mineral analysis of dry extracts from the seeds of the plant *Silybum marianum* (L.Gaertner) introduced in Uzbekistan // *International Journal on integrated education.* – 2020. Volume 3, Issue VIII, p. 235-237
3. Z.U.Mamatqulov, Sh.F.Iskandarova, M.Fatxullayeva Technology of extracting extracts from the leaves and flowers of the plant *Silybum spinosa* (Capparis spinosa L.) and studying its elemental composition // *Journal of Pharmacy.* – 2018. -№1. – pp. 68-73.
4. Sh.F. Iskandarova, A.N. Yunuskhodjaev Mineral analysis of Jerusalem artichoke root extract and various *rhodiola* root extracts // *Journal of Pharmacy.* – 2015. -№2. – 41-43 p.