MACRO- AND MICROELEMENTS IN THE AERIAL PARTS OF *ATRAPHAXIS PYRIFOLIA*

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In our research, the main objective was defined as the study of the chemical components of *Atraphaxis pyrifolia*, a plant belonging to the Polygonaceae family.

In June 2025, we initiated the qualitative and quantitative analysis of macro- and microelements in the aerial parts of *Atraphaxis pyrifolia*, collected in the mountainous areas of Parkent District, Tashkent Region, as part of the study of its chemical components.

The analysis of the chemical composition of the studied plant provides an opportunity to draw more precise conclusions about this species.

An accurately weighed sample of 0.1000 g was quantitatively transferred into Teflon autoclaves. Subsequently, 3 mL of purified concentrated nitric acid (HNO_3) and 2 mL of purified hydrogen peroxide (H_2O_2) were added. The autoclaves were sealed and placed into a microwave digestion system Berghof (SpeedWave Xpert or a similar microwave oven). The digestion process was carried out according to a specific program set via the instrument interface. The number of autoclaves, as well as the temperature and pressure inside them, were automatically controlled and monitored by the system. Process parameters were displayed on a liquid-crystal display. The digestion was conducted under conditions of moist decomposition, with a minimum temperature of T = 50 °C and a maximum temperature of T = 230 °C, at a maximum pressure of P = 40 bar, for a duration of 35–45 minutes. After digestion, the autoclaves were cooled to room temperature, and the liquid mixture was quantitatively transferred to a volumetric flask of 50 or 100 mL capacity. Each autoclave was rinsed 2–3 times, and the rinsings were combined, after which the flask was filled to the calibration mark with distilled water.

The solution was thoroughly mixed, transferred into an autosampler vial, and placed in the designated position of the autosampler. In the program, the position of each vial, the weighed mass, and the dilution factor were entered.

The mineralized solution was analyzed using an Avio-200 ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometer, PerkinElmer) to quantitatively determine the macro- and microelements, heavy metal salts, and rare metals relative to the corresponding standard samples. At the end of the process, the instrument automatically recalculated the results based on the sample mass and dilution factors, providing the degree of accuracy and the relative standard deviation (RSD) values.

Table 1 presents the chemical elemental composition of the aerial parts of *Atraphaxis pyrifolia*.

Table 1

Determination of Macro- and Microelement Contents in the Samples by the Avio 200 (ICP-OES) Optical Emission Spectrometric Method

Elements	Stem	Flower	Leaf

1	2	3	4
Al	1,125	1.265	2.437
Ba	0.750	1.248	2.647
B	0.086	0.101	0.102
V	0.064	0.045	0.035
Bi	0	0	0
Fe	1.288	3.744	1.878
Cd	0.033	0.022	0.024
Sr	0.212	0.273	0.608
K*	45.063	126.408	102.265
Ca*	80.440	144.507	536.259
Co	0.033	0.032	0.033
Si	0.434	1.572	0.732
Li	0.067	0.089	0.732
Mg*	3.313	7.582	15.068
Mn	0.182	0.525	2.344
Cu	0.318	0.210	0.140
As	0	0.007	0
Na*	2.388	17.608	4.659
Ni	0.094	0.172	0.132
Pb	0.019	0.001	0
Se	0.216	0.186	0.201
Ag	0	0	0
Sn	0	0	0
Ti	0.083	0.046	0.066
Cr	0.052	0.054	0.052
Zn	0.332	0.424	0.316
P*	4.637	15.152	12.251
Mo	0.014	0.023	0.013
Hg	0	0	0
S	2.384	2.466	2.899

The analysis of the macro- and microelements in the aerial parts of *Atraphaxis pyrifolia* revealed that elements such as potassium (K), calcium (Ca), and magnesium (Mg) were present in higher amounts in the flowers, stems, and leaves of the plant. In addition, aluminum (Al), iron (Fe), sulfur (S), phosphorus (P), and sodium (Na) were also detected in comparatively higher amounts than other elements, although at lower concentrations overall. Importantly, toxic elements such as Pb, Cd, As, and Hg were not detected in the composition of *Atraphaxis pyrifolia*, and the levels of other heavy metals did not exceed permissible limits. On the contrary, the relatively high content of magnesium, potassium, and calcium in different plant organs highlights the significance of the studied plant as a subject of research.