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THE STUDY OF THE ELEMENTAL COMPOSITION OF AGRIMONIAASIATICA

This article describes the elemental composition of *Agrimoniaasiatica* as determined by AAS. We found a high concentration of the macro element phosphorus (2506.75±501.35mg/kg), and the microelements aluminium (1654.25±595.53mg/kg), zinc (40.54±10.54mg/kg) and manganese (28.6±10.3mg/kg). Many other elements were found in lower concentrations (V, Cd, Pb, Sn, Be, Ni, Sr, Mo, Cr, Co, Cu, Fe).

Keywords: macro elements, micro elements, heavy metals, *Agrimoniaasiatica*, atomic absorption spectrometer (AAS)

Introduction. Data about the chemical composition of edible and medicinal plants is essential for the treatment of disorders related to nutrient deficiencies. More than 80 macro- and micro elements are found in plants. Medicinal plants have therapeutic properties and are nutritionally important because of their mineral content. Heavy metals can accumulate in the human body over a long period of time and may have adverse effects on human health. It is therefore important to conduct quality control on medicinal plants in order to protect consumers from contamination [1].

We aimed to study the elemental composition of *Agrimoniaasiatica* to assess its nutritional composition and potential benefits for human consumption.

Materials and methods. *Agrimoniaasiatica* was collected during its flowering period in the scrubs of Kaskasu. *A. asiatica* was dried, ground (to 2-3 mm) and sieved. We prepared samples using dry and wet mineralization [2]. The elemental composition of *Agrimoniaasiatica* was studied using an atomic absorption spectrometer MGA-1000.

The mass fraction of each sample was calculated by the following formula (1):

$$X = \frac{0.001 \cdot (C_{\text{measured}} - C_{\text{single}}) \cdot V \cdot Q}{m}$$

Here:

X - mass fraction of the element in the sample;

C_{measured} - mass concentration of element in sample mg/kg;

C_{single} - mass concentration of element in single sample, mg/kg;

V - volume of mineralized, ml;

Q - additional diluting of mineralized;

m - mass of sample;

0,01 - unit conversion factor of mass.

Measurement results in documentations are given by this formula (2):

$$\Delta_x = \frac{\delta_x \cdot X}{100}$$

$X \pm \Delta_x$, mg/kg, P=0.95

Here:

\bar{X} - individual results of measurements, mg/kg;

Δ_x - accuracy factor of methodology.

Results and discussions. Table 1 shows the macro- and micro element content of *A. asiatica*.

Table 1 - The macro- and micro element content of *A. asiatica*.

Chemical element	Mass of mineral elements, (mg/kg)	MAC* (mg/kg)
Macro elements		
Phosphorus	2506.75±501.35	-
Micro elements		
Aluminum	1654.25±595.53	-
Zinc	40.54±10.54	-
Manganese	28.6±10.3	-

Strontium	21.18±6.35	-
Iron	7.74±2.01	-
Stannum	2.24±1.12	-
Copper	2.05±0.41	-
Nickel	1.930.48±0.48	-
Lead	1.47±0.001	32.0
Chromium	1.03±0.26	-
Vanadium	0.8±0.2	-
Cadmium	0.37±0.09	1.0
Cobalt	0.1±0.02	-
Beryllium	0.00475±0.00123	-
Stibium	Absent	-
Selenium	Absent	-

MAC* - maximum allowable concentrations

The content of toxic elements in the extract from the aerial part of *A.Asomatica* does not exceed the maximum allowable concentrations.

Conclusion. Studies of the elemental composition of *Agrimonia asiatica* show that it is a promising source of macro and microelements. *A.Asomatica* herb accumulates significant amounts of trace elements, such as: aluminum, zinc and manganese. In the *A.Asomatica* there are large amounts of the macro element phosphorus. The concentration of the toxic element of lead does not exceed the norm with Kazakhstan State Pharmacopoeia requirements on plant raw materials.

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AGRIMONIA ASIATICA ЭЛЕМЕНТТІК ҚҰРАМЫН АНЫҚТАУ

Түйін: Бұл мақалада *Agrimonia asiatica* өсімдігінің атомды абсорбциялық спектрометр көмегімен анықталған элементтік құрамы жайында айтылады. Біз фосфор макроэлементінің және алюминий, цинк және марганец микро элементтерінің жоғары концентрациясын анықтадық. Басқа қалған элементтер аз мөлшерде кездеседі (V, Cd, Pb, Sn, Be, Ni, Sr, Mo, Cr, Co, Cu, Fe).

Түйінді сөздер: макро элементтер, микро элементтер, ауыр металдар, *Agrimonia asiatica*, атомды-абсорбциялық спектрометр (ААС).

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ИЗУЧЕНИЕ ЭЛЕМЕНТНОГО СОСТАВА AGRIMONIA ASIATICA

Резюме: В данной статье описывается элементный состав *Agrimonia Asiatica* определенной ААС. Нами были определены высокая концентрация макроэлемента фосфора и микроэлементов алюминия, цинка и марганца. Остальные другие элементы присутствуют в малых концентрациях (V, Cd, Pb, Sn, Be, Ni, Sr, Mo, Cr, Co, Cu, Fe).

Ключевые слова: макроэлементы, микроэлементы, тяжелые металлы, *Agrimonia asiatica*, атомно-абсорбционный спектрометр (ААС)