

PAPERS IN ENGLISH

BIOLOGICAL SCIENCES

GENERAL BIOLOGY

BIOGEOCHEMISTRY

DOI - 10.32743/UniChem.2024.116.2.16647

**BIOGEOCHEMISTRY OF ONION (*Allium Cera L.*) AND MEDICINAL SCENT
(*Anethum Graveolens L.*) PLANTS****Zokirjon Isomiddinov**PhD,
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E-mail: 0901zokir@gmail.com**БИОГЕОХИМИЯ ЛУКА (*Allium Cera L.*) И ЛЕКАРСТВЕННЫХ
АРОМАТНЫХ (*Anethum Graveolens L.*) РАСТЕНИЙ****Исомиддинов Зокирджон Джалолдинович**PhD,
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Республика Узбекистан, г. Коканд**ABSTRACT**

The article analyzes the biogeochemical properties of the amount of chemical elements found in the organs of the common onion (*Allium Cera L.*) and the medicinal aromatic shivit (*Anethum graveolens L.*) in the irrigated gray-brown soils of the desert region. The order of reduction of the amount of chemical elements in the cross-section of gray-brown soils with a brown color is as follows: $\text{Ca} > \text{K} > \text{Na} > \text{Cr} > \text{Sc} > \text{Co} > \text{Cs}$. In the body of the onion plant, the change in the amount of chemical elements differs from that in the soil: $\text{K} > \text{Na} > \text{Ca} > \text{Cr} > \text{Co} > \text{Cs} > \text{Sc}$. In the case of *Anethum graveolens L.*, the change of the amount of chemical elements in the underground and upper parts is also different from that in the soil: $\text{K} > \text{Na} > \text{Cr} > \text{Ca} > \text{Co} > \text{Sc} > \text{Cs}$.

This, of course, is by the rule of selective absorption of plants. It is based on the fact that the chemical composition of the organs of onions and sweet plants is related to the amount of chemical elements in the soil. Biological absorption coefficients were calculated.

АННОТАЦИЯ

В статье проанализированы биогеохимические свойства суммы химических элементов, обнаруженных в органах лука репчатого (*Allium Cera L.*) и шивита лекарственного ароматного (*Anethum Graveolens L.*) на орошаемых серо-бурых почвах пустынного региона. Порядок уменьшения количества химических элементов в разрезе серо-бурых почв бурого цвета следующий: $\text{Ca} > \text{K} > \text{Na} > \text{Cr} > \text{Sc} > \text{Co} > \text{Cs}$. В организме лукового растения изменение количества химических элементов отличается от такового в почве: $\text{K} > \text{Na} > \text{Ca} > \text{Cr} > \text{Co} > \text{Cs} > \text{Sc}$. У *Anethum Graeolens L.* изменение количества химических элементов в подземной и верхней частях также отличается от такового в почве: $\text{K} > \text{Na} > \text{Cr} > \text{Ca} > \text{Co} > \text{Sc} > \text{Cs}$.

Это, конечно, по правилу избирательного поглощения растений. Он основан на том, что химический состав органов лука и сладковатых растений связан с количеством химических элементов в почве. Рассчитаны коэффициенты биологического поглощения.

Keywords: gray-brown soils, common onion (*Allium cepa* L.), chivet (*Anethum graveolens* L.) macro- and micronutrients, biological absorption coefficient.

Ключевые слова: серо-бурые почвы, лук репчатый (*Allium cepa* L.), лук репчатый (*Anethum Graveolens* L.), макро- и микроэлементы, коэффициент биологического поглощения.

Introduction. The main source of agricultural production in our republic is the irrigated soils, which have undergone erosion and salinization under the influence of various processes, particularly natural and anthropogenic factors. Soils need to be protected from such negative processes, and increasing their productivity, preservation, and cultivation of ecologically clean quality vegetable products requires effective and careful use of scientifically based agrotechnologies.

The area of brown soils formed in different regions of our country is 24.3% of the total land area of the republic. Most of the areas where onions and other vegetable crops are grown belong to these soils. However, the chemical properties of gray-brown soils, geochemical communication, migration, and changes in the soil-plant system are very little studied. Accordingly, it is important to study the geochemical condition of gray-brown soils, to carry out scientific research on effective use taking into account the processes of geochemical migration and accumulation under the influence of the human factor [2, 9, 12, 13].

One of the main factors in increasing vegetable crop yield and improving quality is the timely supply of nutrients. At the same time, it is necessary to comprehensively study the physiological and biogeochemical changes occurring in the onion plant to be of high yield and quality.

Research object and methods. Newly irrigated gray-brown soils formed on pluvial alluvial rocks of the Fergana region and onion (*Allium cepa* L.) research object, processes such as migration and accumulation of geochemical elements in the soil-onion system are the subject of our research. Also, the medicinal aromatic plant (*Anethum graveolens* L.) is an object of research.

The chemical element composition of soil and plants was studied by the neutron-activation method in the activation analysis laboratory of the Institute of Nuclear Physics of the Republic of Uzbekistan. In this case, the samples were irradiated with a neutron flux of $5 \cdot 10^{13}$ neutrons/cm² sec in an atomic reactor, and their amounts were determined based on the half-life periods of chemical elements.

Research results. The morphological cross-section of irrigated brown soils has a characteristic two-layer structure. Light brown (gray) color, light and medium sand mechanical composition upper layer consists of loose arable and sub-aerial layers. Its thickness is 15-30 cm, depending on the length of the irrigation period. The lower second layer has a yellowish-brown color and dense, medium, and heavy mechanical content. White pores, carbonate spots, gypsum grains, and iron compounds are visible in it [5, 6, 7].

The gray-brown soils are more developed on the ancient surfaces formed in the Neogene and Lower Quaternary periods, and its layers are the product of two periods. Brown or brownish-colored conglomerates with heavy mechanical composition, well-defined substructure, and gypsum layers below them are the product of distant past processes. The brown upper layer is the result of modern processes [9].

There is a relative increase in the distribution of macro- and microelements across the soil section. It is characterized by a decrease in the amount of macro- and micronutrients in the arable layer of brown soils with a brown color compared to the lower layers (Table 1).

Table 1.

Changes in the amount of chemical elements in brown soil with a brown color, $\mu\text{g/g}$ ($n=6$)

Section number	Depth, sm	Macroelements			Microelements			
		Na	K	Ca	Cr	Sc	Co	Cs
1/bag	0-25	11600	23000	39900	41	6,7	6,6	4,2
	25-45	11600	24900	54500	54	11	9,6	6,8
	45-55	13000	23600	27700	51	9,9	10	7,9
	Average	12067	23833	40700	48,6	9,2	8,73	6,3

Among the macronutrients, calcium is the dominant element in the soil cross-section. The amount of calcium varies between 27700 $\mu\text{g/g}$ and 54500 $\mu\text{g/g}$. The maximum value corresponds to the brown layer. A relatively high amount of potassium is accumulated in the brown layer. Sodium content increases from 11,600 $\mu\text{g/g}$ to 13,000 $\mu\text{g/g}$ across the soil cross-section.

The average amount of trace elements cesium (Cs) in the soil section is 6.3 $\mu\text{g/g}$, which is higher than the

lithospheric clark. The amount of cesium (Cs) being higher than the amount of Clark indicates that it is being accumulated in the layers of irrigated brownish-brown soils formed in trans-alluvial-accumulative landscapes of various degrees of cultivation. On the contrary, the amounts of scandium (Sc), chromium (Cr), and cobalt (Co) microelements are low compared to lithospheric clay. Their amounts vary between 4.2-57.0 $\mu\text{g/g}$.

The element composition of the vegetative organs of the onion plant changes depending on the amount of chemical elements in the soil. The coefficient of biological absorption characterizes biogenic migration processes. Biogenic migration takes part in the absorption of mobile

elements, and a small biological substance turnover process is observed [4, 8]. The plant absorbs chemical elements from the soil in different ways in its different phases and organs. (Table 2).

Table 2.

Distribution of the amount of macro and micronutrients in onion (*Allium cepa* L.) plant organs, µg/g (n=6)

Element	Onion (<i>Allium cepa</i> L.) 1/bag				Coefficient of biological absorption			
	onion head	Leaf	root	average	onion head	Leaf	root	average
Na	1360	1430	15900	6230	0.117	0.123	0.223	0.487
K	10400	16700	21600	16233	0.452	0.671	0.915	0.679
Ca	5360	11000	14300	10220	0.134	0.202	0.516	0.284
Cr	0.47	1.20	1.90	1.19	0.011	0.022	0.037	0.023
Sc	0.017	0.079	0.230	0.109	0.002	0.007	0.023	0.010
Co	0.055	0.140	1.200	0.465	0.008	0.014	0.012	0.047
Cs	0.028	0.082	0.310	0.122	0.007	0.012	0.039	0.019

The onion (*Allium cepa* L.) plant absorbs macro and micronutrients found in brown soils well from the soil layer through its roots.

The geochemical spectra of cyclic elements for the variety Namangan-77 grown on gray-brown soils were found to be in the following position in the location scheme. That is: Ca>K>Na>Co decreases, the cotton plant takes most of the cyclic elements: Ca, K, Na, and the rest are observed to decrease sharply in the given case [11].

According to our research, the order of reduction of the amount of chemical elements in the cross-section of the brown soils is as follows: Ca>K>Na>Cr>Sc>Co>Cs.

In the body of the onion plant, the change in the amount of chemical elements differs from that in the soil: K>Na>Ca>Cr>Co>Cs>Sc. This is certainly by the law of selective absorption of plants. The absorption of calcium, which has the highest value in the soil, into the onion body is low compared to potassium and sodium. The onion body has the highest amount of potassium.

All the chemical elements contained in the soil are changed in the body of the onion plant. But there are certain laws in the accumulation of their amount in the vegetative organs of the plant. The root of the onion plant has the highest amount of all chemical elements. Plant leaves have an intermediate status. The minimum amount of all macro- and micronutrients characterizes the onion head.

Among the studied macroelements in terms of the amount and absorption of elements in onion organs, potassium averaged -0.679 µg/g, sodium averaged -0.487 µg/g, and calcium averaged -0.284 µg/g. Among microelements, the highest amount of chromium was observed - 0.023 µg/g, the second place was cobalt - 0.047 µg/g, and the lowest amount was scandium - 0.010 µg/g.

Onion (*Allium cepa* L.) contains all the elements in sufficient and moderate amounts, the plant grows

normally, and the chemical elements serve as the main source of nutrition for the onion. In cases where the amount of elements in the soil is insufficient, the elements are provided as nutrients by spraying the plant in solution through the leaf or by applying it to the soil.

In particular, in all regions of our republic, the aromatic plant, which is widely consumed as a medicinal plant, is grown as a green medicinal vegetable crop. However, as a result of the research on the biogeochemical properties of the aromatic plant (*Anethum graveolens* L.) and the practical work carried out on soils formed in the climatic conditions of Southern Fergana [10] this species has shown potential for cultivation on old irrigated brown soils.

Contemporary literature and foreign publications show that the medicinal plant *Anethum graveolens* L. is believed to be native to Southwest Asia or Southeast Europe [1]. Medicinal fennel (*Anethum graveolens* L.) is a plant rich in vitamins and is widely used in modern medicine.

In particular, products made from the green vegetable plant are widely used for various pains in the abdominal cavity, improving and normalizing the digestive system. In addition, it is widely used in the prevention of stomach ulcers, eye diseases, and pain in women's genital organs [3].

The composition of elements present in the above-ground and below-ground organs of the fragrant sedum (*Anethum graveolens* L.) plant changes depending on the amount of chemical elements found in the genetic layers of gray-brown soils.

The coefficient of biological absorption characterizes biogenic migration processes. Biogenic migration takes part in the absorption of mobile elements, and a phenomenon of small biological substance turnover is observed [4]. The plant *Anethum graveolens* (*Anethum graveolens* L.) absorbs chemical elements from the soil differently in its different phases and organs (Table 3).

Table 3.

Amount of macro- and micronutrients in the organs of *Anethum graveolens* L. plant, µg/g (n=6)

Plant organs	Ca	K	Na	Cr	Sc	Co	Cs
Root	0,60	29900	2700	88,2	0,28	1,5	0,25
Stem	0,613	36600	2650	9,65	0,039	0,18	0,036
Flower	1,55	33400	365	3,03	0,032	0,12	0,020
Average	2,763	99900	5715	100,88	0,351	1,8	0,306

The sweet-smelling plant (*Anethum graveolens* L.) absorbs macro and micronutrients found in brown soils well through its roots from the soil and sub-soil layers.

According to research, the order of reduction of the amount of chemical elements in the cross-section of brown soils is as follows: Ca>K>Na>Cr>Sc>Co>Cs.

Changes in the amount of chemical elements in the above-ground and above-ground parts of *Anethum graveolens* (*Anethum graveolens* L.) differ from those in the soil: K>Na>Cr>Ca>Co>Sc>Cs. This, of course, corresponds to the law of selective absorption of plants (Table 4).

Table 4.

Bioabsorption coefficient of *Anethum graveolens* L. plant

Element	Root	Stem	Flower
Ca	<0,001	<0,001	<0,001
K	1,29	1,58	1,44
Na	0,30	0,23	0,03
Cr	2,15	0,24	0,07
Sc	0,43	<0,001	<0,001
Co	0,30	0,27	0,02
Cs	0,060	<0,001	<0,001

All the chemical elements contained in the brown soil with a brown color are quantitatively changed in the body of the aromatic plant. However, there are certain laws in the accumulation of their amount in the vegetative organs of the plant.

According to the data in the table, Ca-0.60-1.55 µg/g, average 2.763 µg/g, K-29900-36600 µg/g, average 99900 µg/g, Na-365-2700 µg/g, average 5715 µg/g, Cr-3.3-88.2 µg/g, average 100.88 µg/g, Sc-0.28-0.032 µg/g, average 0.351 µg/g, Co-1.5-0.12 µg/g, average 1.8 µg/g, Cs fluctuated in the range of 0.25-0.020 µg/g, with an average of 0.301 µg/g.

Absorption or assimilation of the chemical elements necessary for the plant of medicinal aromatic sedum (*Anethum graveolens* L.) is calculated and determined through the coefficient of biological absorption. It was determined based on the chemical elements in the irrigated brown soils.

Also, the intensity of biological absorption was estimated based on the data of the bioabsorption coefficient obtained from the aromatic plant (*Anethum graveolens* L.) plant, in which the elements were combined into the following series.

As can be seen from the table, Cr was included in the group of elements ($A_x > 1$) that accumulate biologically weakly in plant roots and stems, and only element K was included in the K flower. The remaining macro and microelements belong to the biologically retained ($A_x < 1$) group. That is, Na, Co, and Cr elements are average in all organs of the plant, and Cs elements are weak (0.01-0.1) only in the root. It was observed that

the remaining Ca, Cs, and Sc elements are in the group of very weak biological retention.

Conclusion

Thus, there is an organic relationship between the elemental composition of onions and the elemental composition of the soil. All macro- and micronutrients present in the soil are found in onions.

The moderate amount of macro and micronutrients in the soil has a direct impact on the high productivity and quality of the onion plant.

In small quantities, the fragrant sweet plant absorbs macro and micronutrients from old irrigated brown soils.

The order of reduction of the amount of chemical elements in the genetic layers of brown soils with a brown color is as follows: Ca>K>Na>Cr>Sc>Co>Cs.

In the underground and above-ground parts of *Anethum graveolens* (*Anethum graveolens* L.), the change in the amount of chemical elements differs from that in the soil: K>Na>Cr>Ca>Co>Sc>Cs. This, of course, corresponds to the law of selective absorption of plants. In particular, Cr was included in the group of elements that accumulate biologically weakly in plant roots and stems, and only the K element was included in the K flower. The remaining macro and microelements belong to the biologically retained group. That is, Na, Co, and Cr elements are average in all organs of the plant, and Cs elements are weakly (0.01-0.1) retained only in the root. It was observed that the remaining Ca, Cs, and Sc elements are in the group of very weak biological retention.

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