

Short Communication

NATURAL RADIOACTIVITY OF SOME MEDICINAL PLANTS

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Natural radioactivity of two medicinal plants was determined. It is found that the radioactivity level of ^{238}U , ^{232}Th and also ^{40}K in investigated plants was $0.6 \cdot 10^{-12}$ - $3.2 \cdot 10^{-9}$ Ci/kg. The balance of radioactivity between close daughter and mother isotopes is kept, whereas that between distant mother and daughter nuclides is broken.

Keywords: *Natural Radioactivity, Medicinal Plants*

INTRODUCTION

The study of the radioactivity level in different objects of environmental ambiances is interesting with many standpoints, for example, from the ecological point of view [1]. The evolution of plants under certain conditions of geo-chemical environment and their adaptation are the important factor [2]. The Zarafshan valley of Uzbekistan is unique in a diversity of vegetation, since there is a lot of species of medical plants. On the other hand, there is located uranium deposit in region. Therefore, it was of interest to estimate the radioactivity level of some medicinal plants subjected to harmful impacts of the radioactivity of the uranium and products of its decay in the growing process. We have investigated the radioactivity of a large number of plants collected in the Zaravshan valley [4]. Here, we will add some new data and discuss the results obtained for two medicinal plants.

EXPERIMENTAL PROCEDURE

The detailed description of experimental procedure was presented in [4]. Therefore, here we have discussed briefly the obtained results. As we did in [4], the investigated material was collected during six months (May-October).

The best time for plant gathering is August and September. The plants were dried in a ventilated room (the air-dried plants) then were cut into pieces 3-5 mm in size. The air-dried plants were heated in a porcelain cup placed in the heating furnace at 250 °C until the total charring is reached. Next, the furnace was closed and the temperature rises slowly as high as 400-450 °C (the ash was stirred from time to time). The heating lasts until the ash becomes light gray. Both the air-dried material and the ash were analyzed. The yield of ashes was found as $Y_a = [m_a/m_p] 100\%$ (where, m_a -the ash mass, m_p -the mass of air-dried plant). Table 1. shows names of investigated plants and yields of the ashes.

Table 1. The list of investigated plants and yields of the plants ashes (in %)

Name of a plant	Leaves	Stalks	$Y_{Av.}$
1. Origanum Tuthantum Gontsch	11±3	12±3	12±3
2. Inula Helenium L.	16±3	10±2	13±3

The activity was counted with the calibrated high-resolution γ -ray spectrometer with 80 cm³ Ge(Li) detector placed in the 15 cm thick lead shield, covered with a plastic cup which served as the holder for a powder sample. Estimated materials were put into it. The efficiency of the detector was determined by using the standard sources. The detector was connected to a multi-channel analyzer.

The ²²³Th, ²²⁵Th, ²²⁸Ac, ²¹²Pb, ²⁰⁸Tl, ²¹²Bi radionuclides of the ²³²Th family, ²³¹Th, ²³⁴Th, ²³⁴Pa, ²³⁴Bi of ²³⁵Th family were detected. The content of the radioactive elements were obtained by the comparison technique using the values of the radioactivity of the samples and the standard.

RESULTS AND DISCUSSION

Table 2. gives the average activity and the content of U, Ra, ⁴⁰K for the examined plants. We determined uranium and thorium concentration in plants with the use of the radioactivity of their daughter products.

Our new data have confirmed with data presented in former work [5], since once again we have found that there is a balance between close daughter and mother

isotopes, for instance, between ^{214}Pb and ^{214}Bi , whereas the balance between distant mother and daughter nuclides is broken.

Table 2. Radioactivity (A: 10^{-12} Ci/kg damp mass) and the content (% wt.) of Th, U, Ra, K in the ashes of investigated plants

Plant name	U		Ra		K		Th
	A	C: 10^{-4}	A	C: 10^{-12}	A (^{40}K)	C	C: 10^{-3}
Origanum Tuthantum Gontsch	0.7 ± 0.2	3.5 ± 0.7	0.6 ± 0.1	8.2 ± 1.2	3200 ± 600	5.6 ± 1.1	0.6 ± 0.1
Inula Helenium L.	1.0 ± 0.2	2.8 ± 0.6	1.3 ± 0.2	9.8 ± 1.7	1500 ± 400	5.6 ± 0.7	0.6 ± 0.1

CONCLUSIONS

1. The radioactivity level of ^{238}U , ^{232}Th and also ^{40}K in two medicinal plants was $0.6 \cdot 10^{-12}$ - $3.2 \cdot 10^{-9}$ Ci/kg.
2. In investigated plants the balance of radioactivity between close daughter and mother isotopes is kept, whereas that between distant mother and daughter nuclides is broken.

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النشاط الإشعاعي الطبيعي لبعض النباتات الطبية

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تم في هذا البحث تقدير النشاط الإشعاعي لنوعين من النباتات الطبية. وقد وجد أن مستوى النشاط الإشعاعي لليورانيوم-٢٣٨ والثوريوم-٢٣٢ وكذا البوتاسيوم-٤٠ في النباتات قيد الدراسة يتراوح بين $0,6 \times 10^{-12}$ إلي $3,2 \times 10^{-10}$ كوري لكل كيلوجرام. كما لوحظ حفظ الأتزان الإشعاعي بين كل من نظائر الأم والابنة الدانية، بينما لوحظ إنكسار التوازن بين النويدات الأبنة والأم البعيدة.