



Radioactive contamination of the soils of Georgia

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ABSTRACT

After 29–30 years from Chernobyl atomic plant accident the main soil types of Georgia have been examined on contamination presence of ^{137}Cs and ^{90}Sr .

Level of radioactive contamination of soils (^{137}Cs deposition) we can separate three levels: I – 0–10 kgq/m^2 – Black, Cinnamonic, Raw carbonate, Mountain meadow, Chernozems, Black forest brown, Primitive and Yellow soils; II – 10–37 kgq/m^2 – Red, Bog and Yellow forest brown soils; III – > 37 kgq/m^2 – Yellow podzolic soils.

In a big majority of soils ^{137}Cs deposition of layer 0–20 cm does not exceed 37 kgq/m^2 (1 Ci/km^2), that allows us to attribute this examined sample points to non-contaminated territories.

In five points of sampling with maximum ^{137}Cs deposition in a layer of 0–20 cm have been measured specific activities of ^{137}Cs in a layer of 20–40 cm and have been evaluated ^{137}Cs deposition in a layer of 0–40 cm. Results for most of the soils also does not exceed 37 kgq/m^2 (1 Ci/km^2).

Exclusion in Yellow podzolic soil near to v.Jvari (West Georgia), where ^{137}Cs deposition was 38.0 and 70.4 kgq/m^2 accordingly in layers of 0–20 cm and 0–40 cm. We can attribute this zone to radiological contamination, particularly to living zone of privileged socio-economic status. In Yellow podzolic soils we can observe high mobility of ^{137}Cs primary in kaolinite composition of clay fraction and in connection to this lowering of intensity of non-exchangeable absorption by soil of this radionuclide.

In all soils ^{90}Sr deposition in a layer of 0–20 cm does not exceed 11.1 kgq/m^2 (0.3 Ci/km^2) that allows us to attribute examined territories to “relatively satisfying situation”.

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Introduction

From the main types of radioactivity of soils the biggest treat comes from artificial radioactivity. Sources of radioactive contamination of soils are different. This includes global deposition of radionuclides resulting from testing of nuclear weapon, radiation breakdowns/accidents and “peace” nuclear explosions. Radioactive elements are easily accumulating in agricultural products. Radioactive contamination of soils is an independent type of contamination, lowering quality of agricultural production [1].

Exceptionally dangerous in biological relations are anthropogenic radionuclides and in first place ^{90}Sr ($T_{1/2} = 28.79$ years) and ^{137}Cs ($T_{1/2} = 30.17$ years) [2]. Both radionuclides are actively involved in biological circuit of substances as Cs is a chemical analogy of K and Sr of Ca. We must mention that direct proportional

dependency between their content in soil and in plants that grow on it is observed often.

In Georgia after examination of contamination of plants by global deposition of strontium-90 scientist found out, that maximum level of contamination by this radionuclide is in western part of country, on the Black Sea coastal area. In high mountain regions contamination level was not so high.

Like Georgia, also Austria was contaminated after Chernobyl accident [3]. Whereby radionuclides showed very small speed of migration in a few millimetres per year and accumulate in upper parts of soils, transforming them into important source of radioactive elements for plants.

It is also interesting to use ^{137}Cs for evaluation of modern agrogenic transformation of soil layers in Chernobyl contamination region [4]. In addition to the above, ability of using spatial distribution stocks of radioactive isotope ^{137}Cs for assessment of agrogenic transformation of soil layer on territories with high level of Chernobyl contamination. The main basic requirements for the methodology have been examined for particular region. The best

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