^{226}Ra, ^{232}Th AND ^{40}K RADIONUCLIDE MEASUREMENTS IN SOIL SAMPLES OF HUNGARY

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Radionuclides of ^{226}Ra, ^{232}Th and ^{40}K are found in all soils and rocks. Their distribution is more frequent in the upper continental crust than in the other spheres of the Earth because of their highly incompatible property. The worldwide average radionuclide concentrations in soils for ^{226}Ra, ^{232}Th and ^{40}K are 32 Bq/kg, 45 Bq/kg and 412 Bq/kg, respectively. These radionuclides and their daughter isotopes have direct effect on the human through their radiation in the nature environment. We collected soil samples from the upper 0-30 cm layer of the soils to define the ^{226}Ra, ^{232}Th and ^{40}K radionuclide concentrations. In Pest County 34 samples from 34 localities (16 on loess and 18 on sand), in Zsámbék basin (Pest and Komárom-Esztergom counties) 10 samples from 10 localities (all on loess), at Kvágószls (SW-Hungary) 4 samples from 3 localities (on red sandstone) and in Pál-völgyi Cave (Budapest) 5 samples (4 on limestone and 1 on marl) have been collected and then studied their activity concentrations for ^{226}Ra, ^{232}Th and ^{40}K by use of HPGe gamma-spectroscopy technique. The main aim of our study is to relate the measured activity concentrations to the soil type and their source rock type from which the soils developed. The average ^{226}Ra, ^{232}Th and ^{40}K activity concentrations were 32±3 Bq/kg, 20±2 Bq/kg and 256±26 Bq/kg in the soil samples of Pest County where the loess has greater values (^{226}Ra: 43±4 Bq/kg; ^{232}Th: 26±3 Bq/kg; ^{40}K: 220±23 Bq/kg) than sand (^{226}Ra: 25±3 Bq/kg; ^{232}Th: 16±2 Bq/kg; ^{40}K: 310±28 Bq/kg). In Zsámbék basin the average values for loess are: ^{226}Ra: 31±4 Bq/kg; ^{232}Th: 22±4 Bq/kg; ^{40}K: 280±56 Bq/kg. The average ^{226}Ra activity concentration is 80±37 Bq/kg in the sandstone of Kvágószls where a former uranium mine operated. In Pál-völgyi Cave the average activity concentrations are ^{226}Ra: 31±6 Bq/kg, ^{232}Th: 26±5 Bq/kg, ^{40}K: 291±65 Bq/kg for limestone and ^{226}Ra: 32±4 Bq/kg, ^{232}Th: 26±1 Bq/kg, ^{40}K: 315±9 Bq/kg for marl. In concluding, the average ^{226}Ra, ^{232}Th and ^{40}K activity concentrations in the studied soil and rock samples are within the average worldwide range, however soils developed on loess show higher values than those on sand.

Keywords: radionuclides, soils, Hungary