

^{137}Cs and ^{40}K concentration to soil-transfer to plant impact to food chain in Greece and Croatia

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Abstract

The isotopes ^{137}Cs and ^{40}K to the plants are the radionuclides investigated for deposition in soil and transfer to the plants in relation to the impact of the "climatic change" in the Balkan region. Grass, cereals and sugar-beet are selected for this survey as they accomplish the main nutrition species for animals in Greece. Activity concentrations of soil and dry plants are measured in Bq/Kg using a direct gamma counting method. Certain physical properties of the Greek soil that may influence the transfer deposition are taken into account for elaborate result. Soil to plant transfer of various radionuclides is known to be affected by soil properties, plant species and variety, climatic condition and cultural practices. From the soil properties texture, pH, exchangeable potassium and calcium, kind and amount of clays and organic matter content are amongst the most important. Variation of the concentration of radionuclides on the soil surface depends mainly on its mineralogical composition; its chemical and physical properties, meteorological conditions and the possible transfer of material to deeper soil layers. The mechanism of fixation depends strongly on the mineral composition of the soil. In the real agroclimatic conditions of Western Pannonian (Croatia) agricultural subregion, on the edge of the Nature Park Lonjsko polje, 1996 field experiment was conducted. The research was extended to the monitoring of mineral fertilization impact on the surface soil (0-30 cm) and plant (grain) radioactive (^{40}K and ^{137}Cs) properties during maize (*Zea Mays* L.) vegetation. Activity concentrations of ^{40}K and ^{137}Cs in samples of soil and corn were measured using the high-resolution gamma ray spectrometry, and it was carried out at Institute for Medical Research and Occupational Health, Radiation Protection Unit. In both type of samples, significant activities of ^{40}K and relatively low activities of ^{137}Cs were measured. In samples of corn from treatments 2 and 7, ^{137}Cs was not observed. Transfer factors from soil to corn were calculated on the basis of the measured activities of ^{40}K and ^{137}Cs . The transfer factors of ^{40}K in Croatia were approximately ten times higher than the transfer factors of ^{137}Cs . With respect of the soil treatments, there were not observed significant differences in the activities and in the transfer factors.

Key words: radionuclides, soil, plants, corn, food chain

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