



Use of Quantity Indicators for Forecasting of Biogeochemical Behavior Sr-90 and Cs-137 in the Conditions of the Combined Pollution of Soils

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From huge number of the radionuclides generated by anthropogenous activity the major value the group of biologically active radionuclides has. First of all, it Sr-90 and Cs-137 which play an important role in various radiological situations. In researches on studying of laws of behavior in environment Sr -90 and Cs-137 the basic attention was given to studying of influence of their chemical analogs Ca and K, instead of stable isotopes Sr and Cs. However, even low concentration of stable isotopes Sr and Cs in soil can influence on biogeochemical behavior of radionuclides.

Objects of research: dernovo-podsolic soil, summer barley of grade, stable and radioactive isotopes Sr, Cs. Schemes of experiments provided entering of 8 doses stable Cs and Sr in the range from 0 to 500-750 mg/kg of air-dry weight of soil and 50 kBq of radionuclides on each frequency.

Absorption of radionuclides by plants will be defined by two parametres of transport. The first - factor of transition (TF), which characterises level of regulation of process of carrying over of a radionuclide from soil in plants and depends on distribution of an element between the firm and liquid phase, distribution defined in the factor (Kd). The second parametre – factor of concentrating (CF) which characterises biological level of regulation of this process.

The increase in quantity of stable Sr in soil leads to an active desorption Sr-90 in a soil solution on all frequency. Kd of Cs-137 on the general background of which decrease in values some increase in factor in the range of 120–225 mg of Cs/kg of soil is observed. Received Kd of radionuclides will well be co-ordinated with the revealed functional dependences between concentration Cs and Sr in soil and specific activity Cs-137 and Sr-90 in a soil solution.

Comparison CF of two radionuclides shows that plants absorb Sr-90 from a soil solution actively, than Cs-137. Thus values CF of Sr-90 in the investigated interval of concentration of a stable isotope are in inverse relationship from the element maintenance in a soil solution in all investigated interval of the maintenance of the isotope carrier whereas change similar the indicator for Cs-137 has more difficult dependence. The revealed laws of change of CF studied radionuclides prove to be true the received dependences of accumulation Sr-90 and Cs-137 in barley from specific activity of radionuclides in a soil solution.

Values of TF of Sr-90 are in direct dependence on level of the maintenance stable Sr, below similar indicators for Cs-137 in all interval of change of concentration of stable isotopes. It finds reflection in the analysis of functional dependences between concentration of radionuclides in plants and soil.

The received values of studied factors completely reflect change of specific activity of radionuclides in a soil solution and their biological availability depending on concentration of their stable isotopes that confirms use possibility in the prognostic purposes of these indicators.