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Channels of Cs-137 and K transfer from soil to plant under natural conditions in the 10-km Exclusion Zone of the Chornobyl nuclear power plant

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The mechanisms of potassium (K) and cesium (Cs-137) uptake by plants were studied using radish as an example. The investigations were performed at four experimental field sites within the 10 km Zone of the Chornobyl Nuclear Power Plant in 2012 and 2013:
Radish seeds were sown, and plants and their corresponding soil solutions were sampled, several times during each growing season. The concentration of Cs-137 in the samples was determined by a gamma-spectrometer with the semiconduc-tor detector HPGe ORTEC GMX40P4-83-RB POPTOP sn.48-TN22465A. Potas-sium concentrations at the samples of soil solutions and dissolved plants were measured by an optical method by atomic-absorbing spectrometer
C-115-M1.
It was observed that potassium and cesium entered plant roots, as a rule, through a complement of transporters with low selectivity when the concentration of dis-solved potassium (CK) in the soil solution was greater than 2 to 4 mkg/cm3. In this case the value of r was near 1. However, when CK was between 0.5 and 2 to 4 mkg/cm3, potassium also appeared to enter plant roots through highly-selective potassium transporters, whilst cesium entered roots only through the transporters with low selectivity. In this case the value of r was much less than 1. When *CK* was less than 0.5 mkg/cm3, cesium appeared to enter roots through a comple-ment of transporters with greater selectivity for cesium than potassium. The value of *r* in this case could exceed 1.

Topics

Session D. Biomedical optics and sensors technology

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