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DISTRIBUTION OF SPECIFIC ACTIVITY OF CESIUM-137 IN THE COMPONENTS OF MOSS-LICHEN COVER

As a result of the Chernobyl accident about 3.5 million hectares of forests suffered from radioactive contamination. Polissia forests were the most affected. Pollution in Zhytomyr region reached to 60%. Even 30 years after disaster the components of forest phytocenosis contain a significant amount of radionuclides.

Mosses and lichens in comparison with other representatives of forest biota are characterized by high cumulative ability. Along with mushrooms, they have the highest specific activity, followed by herbaceous plants, shrubs, bushes and undergrowth. Due to the highly developed surface, moss cover has a significant sorption capacity which in combination with low metabolism leads to a strong fixation of highly dispersed radioactive particles. Lichens have ten times greater sorption surface per unit of weight than vascular plants. They produce specific lichen acids which can contribute to the accumulation of radionuclides. Most researchers believe that the main way of radionuclides transfer into mosses and lichens is by air; but some believe that there is that radionuclides can transit from soil with water-soluble forms by rising soil moisture through capillaries.

Moss species *Dicranum polysetum* and lichen *Cladonia rangiferina* that are wide spread in Ukrainian Polissia forests, were the objects of our study. Sampling was carried out by the routing method on the territory of Borutyno forestry. The density of soil radioactive contamination by ^{137}Cs was about130 kBq/m^2.

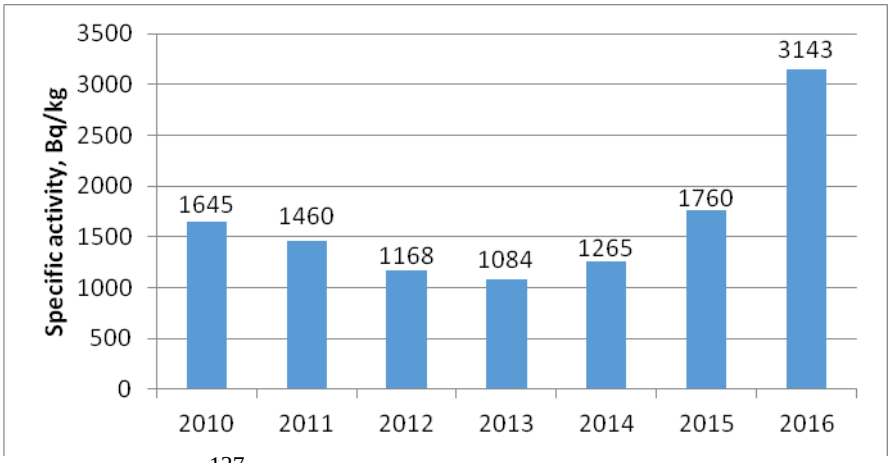

Fig.1. The dynamics of ^{137}Cs specific activity in the annual growth of *Cladonia rangiferina*

The dynamics of ^{137}Cs specific activity in seven-year old lichen thalli was analyzed. The highest value of specific activity was detected in the growth of the current year - 3143 Bq/kg. Since 2010, there was a decrease in activity from 1645 to 1084 Bq/kg. The minimum was reached in 2013, which roughly equals to the average value in thalli. Since 2014, the activity starts to increase from the value of 1265 Bq/kg

and reaches its peak in 2016 in the top of lichen. High values of specific activity in the top of lichen was repeatedly noted by researchers both in the period of atmospheric precipitations and when soil was the main source of radionuclide intake. This regularity is determined by the biological properties of lichens.

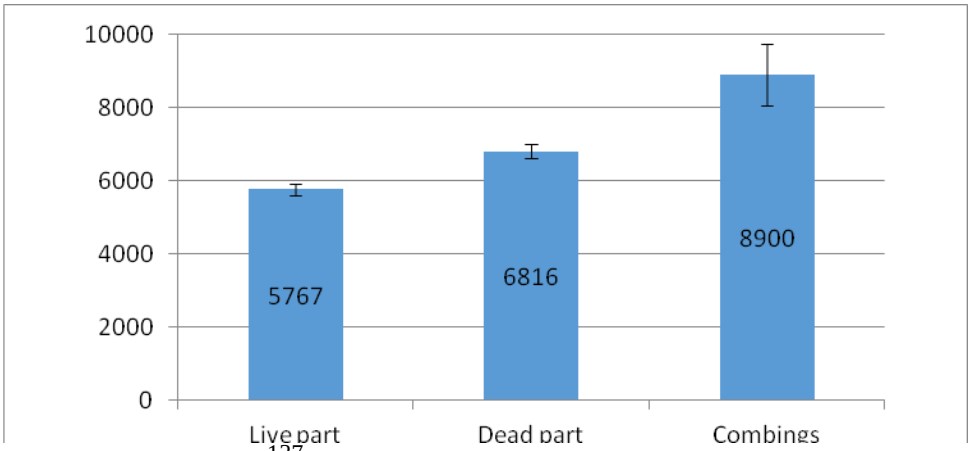

Fig.2. Distribution of ^{137}Cs specific activity in different parts of the moss

Moss samples were divided into apical (live), middle (dead) and lower (flocks) parts. According to the values of average specific activity, the lowest concentration of ^{137}Cs was detected in the apical part (5767±151,4 Bq/kg). The value of ^{137}Cs specific activity in the middle part of moss was 6816±202,4 Bq/kg. The lower part (flocks) was the most radioactive part– 8900±846,3 Bq/kg.

Comparing the values of ^{137}Cs specific activity a significant heterogeneity of radionuclide distribution in lichen and mosses can be observed. *Dicranum polysetum* (7161 Bq/kg) demonstrated high ability to accumulate ^{137}Cs compared to *Cladonia rangiferina* (1646 Bq/kg). The values of transfer factor (TF) in these species are 55,08 of 12.66, respectively. In general, ^{137}Cs specific activity in moss cover exceeded the same index in soil by 3 times (2261 Bq/kg). Thus, moss-lichen cover is a significant fraction of the total radioactivity in forest phytocenoses.

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