

THE DEPENDENCE OF ^{137}Cs CONCENTRATION IN VACCINIUM MYRTILLUS L ON THE MAIN RADIOMETRIC PARAMETERS

The accident at the Chernobyl nuclear power plant resulted in the radioactive contamination of large forest areas in different natural zones of Ukraine. Location of nuclear power station and weather conditions at the moment of the accident caused the greatest intensity and large-scale spatial distribution of releases in Polissia, which is one of the biggest forest regions. Polissia forests performed their protective function and were severely contaminated. Thus, 63,9 hectares of Ukrainian forest areas has been still forbidden for any economic activity. The forest area of 1141,6 hectares was imposed either a ban or a regulation for the use of non-timber forest products. The part of the forests has become a source of the permanent and significant radionuclides penetration into a human body through trophic chain.

After the Chernobyl accident, researchers have paid a considerable attention to the study of the intensity of the radioactive contamination of non-timber forest products. It is explained by the interest of the local population of Ukrainian Polissia to the consumption of wild berries, medicinal plants and mushrooms.

The largest areas of berry fields are located exactly in the northern Ukraine. But the density levels of radioactive contamination here is the maximum. Therefore, these areas were forbidden to pick berries. The permissible level of ^{137}Cs soil contamination density for harvesting berries was set to be not higher than 5 Ki/km^2 .

The study of ^{137}Cs accumulation in *Vaccinium myrtillus* L was conducted in humid pine forests. Each of the berry sample areas contained 6 record plots which were randomly chosen by the grid of L.G. Ramensky. Each separate plot had an area of 1m^2 . Berries of *Vaccinium myrtillus* L were harvested at each of the record plots. The above-ground phytomass was cut. The technique of "envelope" was used to take soil samples. The soil samples were selected in 5 points by a cylindrical drill with the diameter of 5 cm and the depth of 20 cm, (the volume of soil sample was approximately equal to 1000cm^3).

The density of radioactive contamination in soil plots had a wide range of values – from 31 to 267 kBq/m^2 . The plots with the minimum and the maximum density of radioactive soil contamination contained the lowest and the highest ^{137}Cs concentration in shoots of *Vaccinium myrtillus* L: $1306 \pm 128\text{ Bq}/\text{kg}$ and $9749 \pm 1023\text{ Bq}/\text{kg}$, respectively. The difference between the minimum and the maximum values of the radioactive contamination in fresh berries and aboveground phytomass of *Vaccinium myrtillus* L within all sample plots was 13,9 and 14,5 times, respectively.

The examination of all sample plots showed that the specific activity in shoots and in *Vaccinium myrtillus* L berries increases with the increase of the soil radioactive contamination. This dependence is confirmed by the results of the regression analysis; it is approximated by the linear equation: $y = a + bx$, and the values of correlation coefficients are close: 0,87–0,91 (Fig. 1). The confidence level did not exceed 0.00004, indicating a high reliability of connections.

Thus, mentioned above calculations can be used in practice. Based on the coefficients obtained from equations, we calculated the maximum permissible value of ^{137}Cs soil contamination density at which harvesting of economically valuable parts of *Vaccinium myrtillus* L is possible. Calculations showed that harvesting of fresh berries is available at the density of soil radiation contamination of $63\text{ kBq}/\text{m}^2$ ($1,7\text{ Ci}/\text{km}^2$) and at the density of dry fruit radiation contamination of $57\text{ kBq}/\text{m}^2$ ($1,5\text{ Ci}/\text{km}^2$)

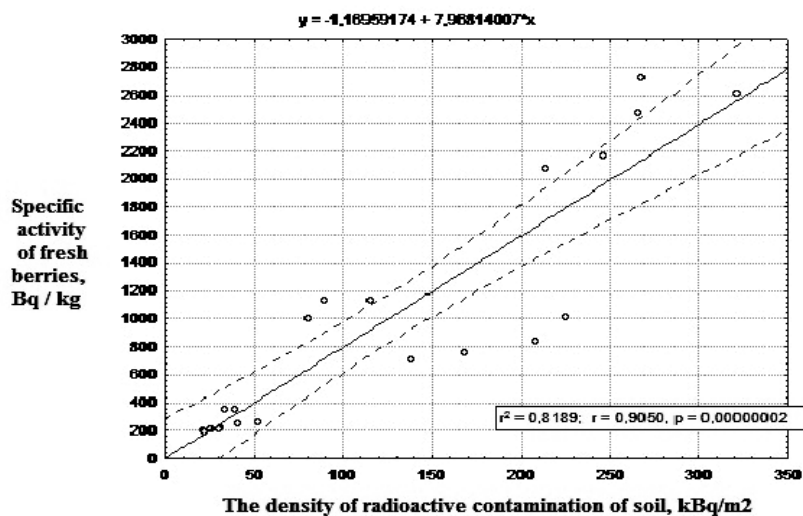


Figure 1. The dependence of ^{137}Cs concentration in fresh berries of *Vaccinium myrtillus* L on the density of soil radiation contamination

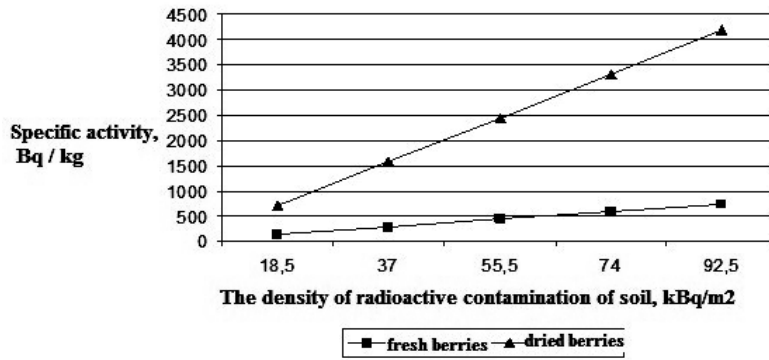


Figure 2. ¹³⁷Cs concentration values in fresh and dry berries of *Vaccinium myrtillus* L with definite densities of soil radiation contamination

The obtained data show that the further examination of the basic radionuclides migration in forest ecosystems and of the radiation contamination intensity in forest products is required.