137Cs and 40K radioactivity of wild edible mushrooms from Podlaskie Voivodeship, Poland

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INTRODUCTION AND PURPOSE

Wild culinary fungi can be a source of secondary exposure to radioisotopes. Natural radiation from the Earth's crust is the largest source of 40K isotope. 137Cs radiation mainly results from nuclear weapons testing and accidents at nuclear power plants (e.g. Chernobyl near the eastern border of Poland in 1986 or Fukushima in Japan in 2011). Both isotopes tend to accumulate in food.
The study aimed to determine the radionuclides 137Cs and 40K in fruiting bodies of wild edible mushrooms to check whether they are safe in terms of radiation exposure.

MATERIAL AND METHODS

The material for the study consisted of nineteen species of wild edible mushrooms (*Armillaria sp., B. edulis, C. cibarius, C. caperatus, H. repandum, I. badia, L. deliciosus, L. aurantiacum, M. procera, R. aeruginea, S. imbricatus, S. bovinus, S. grevillei, S. luteus, S. variegatus, T. equestre, T. portentosum, X. chrysenteron, X. subtomentosus)* from six communes located in the southeastern and northeastern parts of Podlaskie voivodeship (figure 1). Acquisition of particular mushroom species from particular locations depended on their availability. Mushrooms were collected between 2017 and 2021 in the number of 1 to 9 samples of each species. The samples consisted of edible parts of fruiting bodies (mostly stems and caps), which were then cleaned, freeze-dried and crushed. Radioactivity was measured by gamma spectrometry using a germanium semiconductor detector (30% efficiency, model GX3020) and a computer system for collecting and analyzing spectra, Genie-2000 (Canberra).

RESULTS

The range of 137Cs activity concentration was from 1.80±0.82 Bq/kg fresh weight in *Macrolepiota procera* to 178.30±74.13 Bq/kg fw in *Sarcodon imbricatus* (figure 2). The range of mean 40K activity concentration was from 64.85±18.96 Bq/kg fw in *Suillus bovinus* to 150.673±43.86 Bq/kg fw in *Tricholoma equestre* (figure 3). On a fresh weight basis, the results showed that none of the mushrooms from the study area exceeded the 137Cs activity limit (1250 Bq/kg) for mushrooms intended for human consumption.

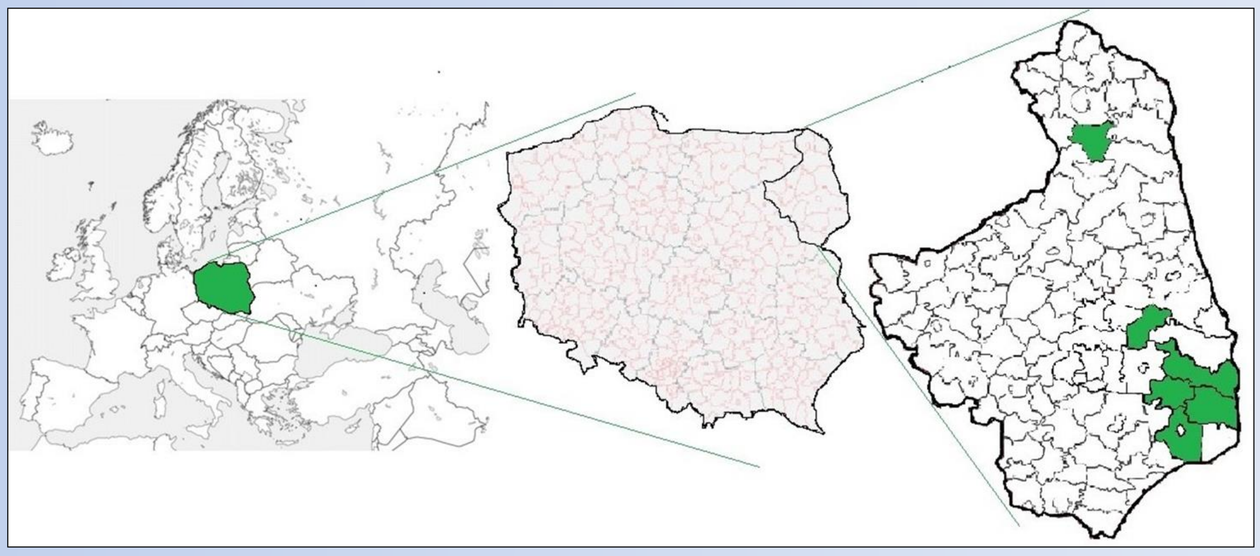

Figure 1. Mushroom collection area.

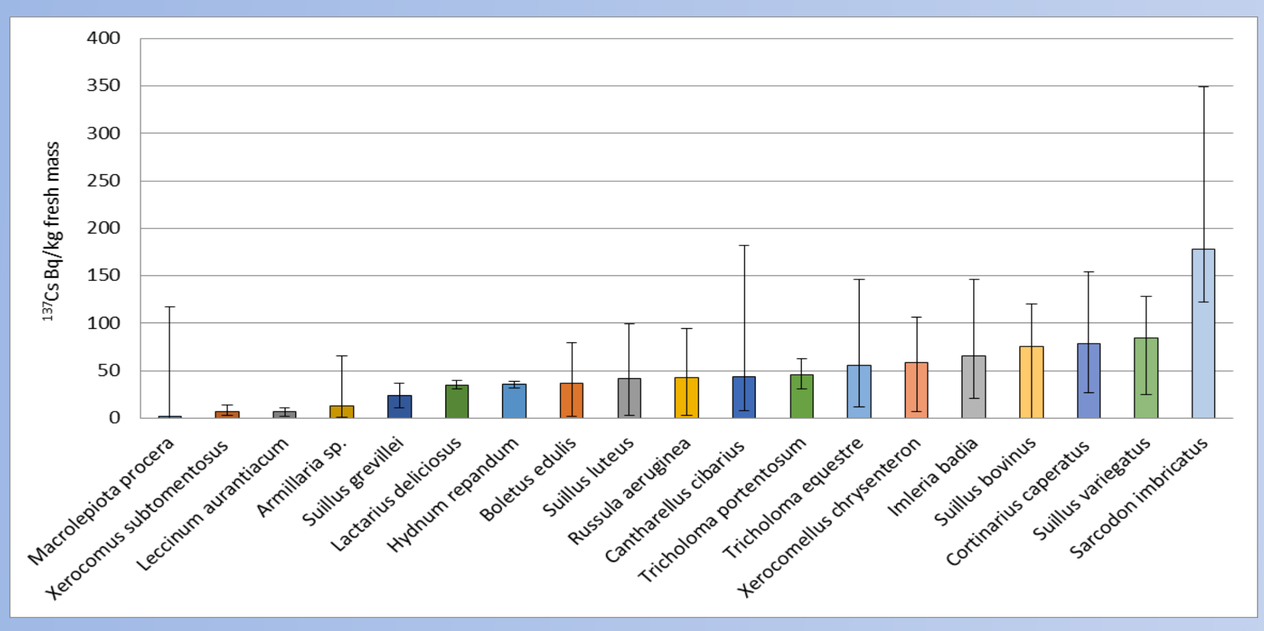

Figure 2. Average concentration of 137Cs (Bq kg-1) in various species of mushrooms collected in north-eastern Poland..

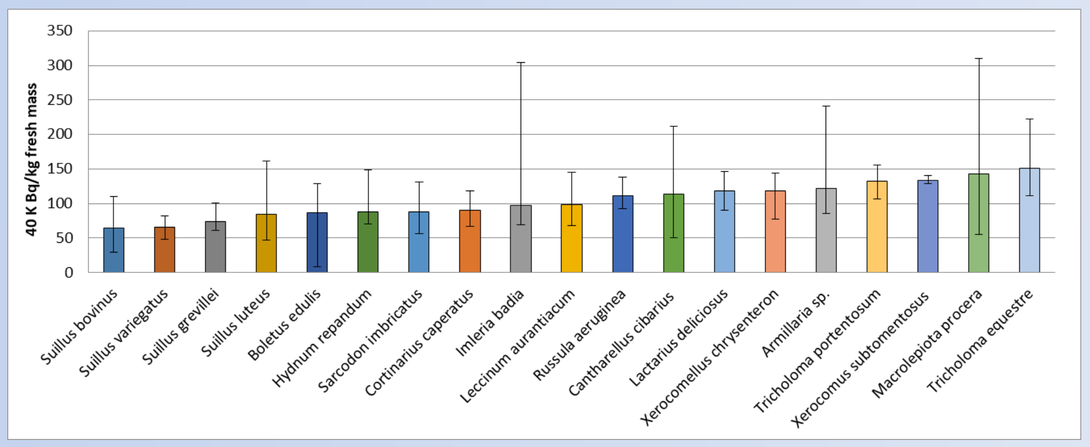

Figure 3. Average concentration of 40K (Bq kg-1) in various species of mushrooms collected in north-eastern Poland.

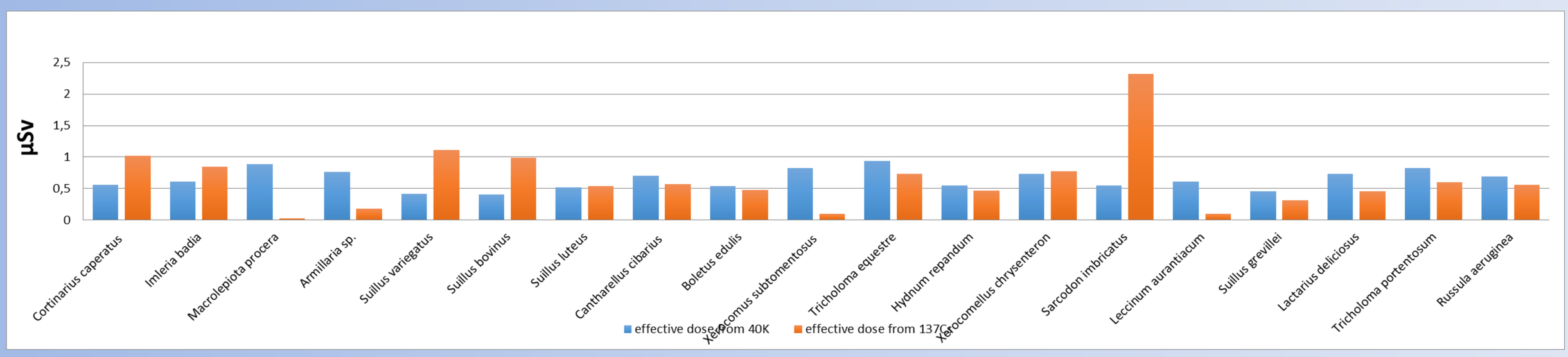

Figure 4. Effective dose, from 40K and 137Cs contained in a kilogram of fresh mushrooms, estimated for an adult.

Conclusions

1. On a fresh weight basis, the results showed that none of the mushrooms from the study area exceeded the 137Cs activity limit (1250 Bq/kg)* for mushrooms intended for human consumption. Although there are no corresponding limits for 40K, it is necessary to estimate the effective radiation dose to humans.