Uranium (^{234}U, ^{235}U, ^{238}U) content in fruit bodies of bolete mushroom *Boletus bainiugan* from Yunnan province (China)

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Introduction

Mushrooms typically grow in forests and fields, but almost all ecosystems will favor their growth in the correct substrate medium. They are considered as organisms that well bio-concentrate in fruitbodies certain mineral constituents absorbed by mycelium e.g. heavy metals or radiocaesium. Hence, to some degree mushrooms can be useful as indicators aiming to evaluate degree of soil pollution, while fruitbodies of edible species when loaded with heavy metals may pose a risk for consumer. This study aimed to assess potential radiotoxicity to human consumers from uranium (^{234}U, ^{235}U, ^{238}U) accumulated in mushroom (*Boletus bainiugan*) collected in Yunnan Province (southern China).

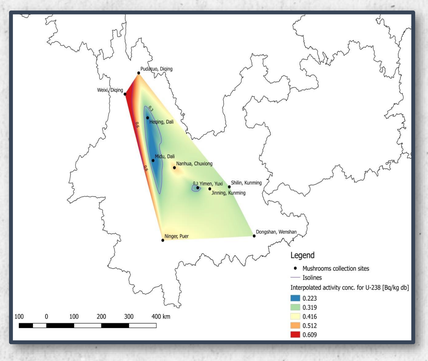

Fig. 1. ^{238}U concentrations in analyzed mushrooms

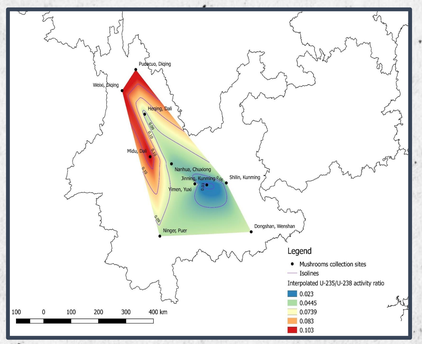

Fig. 2. ^{235}U concentrations in analyzed mushrooms

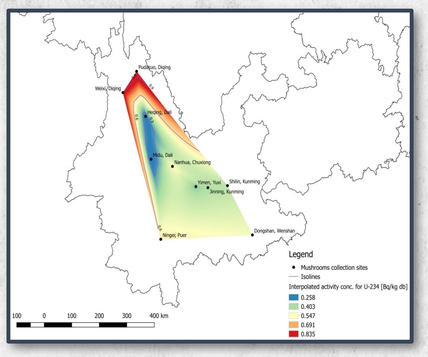

Fig. 3. ^{234}U concentrations in analyzed mushrooms

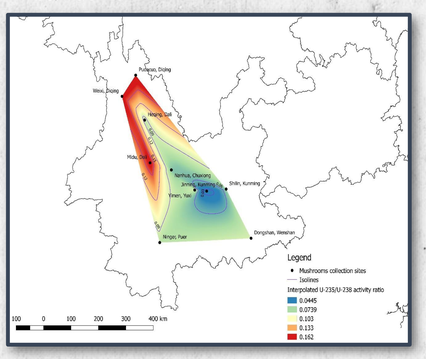

Fig. 4. The activity ratios of $^{235}U/^{238}U$ in analyzed mushrooms

Tab. 1. The assessed average values of the effective radiation dose for adult members of the public from ^{234}U, ^{235}U and ^{238}U decay while ingested with *Boletus bainiugan*

Sampling site	Effective dose		
	^{234}U	^{235}U	^{238}U
	[nanoSv/kg dm]		
Jinning, Kunming	20.4±1.6	0.12±0.12	12.6±1.2
Yimen, Yuxi	22.8±2.2	0.63±0.37	13.9±1.6
Pudacuo, Diqing	48.0±10.2	2.10±2.10	22.0±6.6
Midu, Dali	9.2±0.9	0.68±0.24	6.7±0.7
Weixi, Diqing	43.6±16.4	2.99±2.99	34.3±14.0
Heqing, Dali	10.8±1.0	0.73±0.28	9.2±0.9
Dongshan, Wenshan	26.1±2.3	1.56±0.55	16.0±1.7
Shilin, Kunming	21.2±2.1	1.05±0.47	14.7±1.7
Nanhua, Chuxiong	24.7±2.3	1.51±0.57	21.9±2.1
Ninger, Puer	28.4±2.3	1.69±0.56	20.1±1.9

Results

The results of uranium measurement in analyzed mushrooms indicated the highest ^{234}U activity was determined in samples from Pudacuo, Diqing (0.98 Bq/kg dry biomass), while the highest ^{238}U activity was measured in samples from Weixi, Diqing (0.76 Bq/kg dry biomass). Moreover, the analysis of the values of $^{235}U/^{238}U$ activity ratio showed increased amount of ^{235}U in northern Yunnan (Fig. 4.). On the basis of determined activities of analyzed radionuclides, the effective radiation doses from dried mushrooms consumption were calculated. The effective radiation doses for the human consumers were estimated would give from 9.2 to 43.6 nSv of ^{234}U, from 0.12 to 2.99 nSv of ^{235}U and from 6.7 to 34.3 nSv of ^{238}U (Table 1). However, the results mean if consumers would eat the analyzed mushrooms, they should not increase significantly the total effective radiation dose from analyzed radionuclides when compared to their other sources from typical diet.