ACCUMULATION OF TOXICOLOGICAL IMPORTANT COMPONENTS IN MUSHROOMS FROM MACEDONIA

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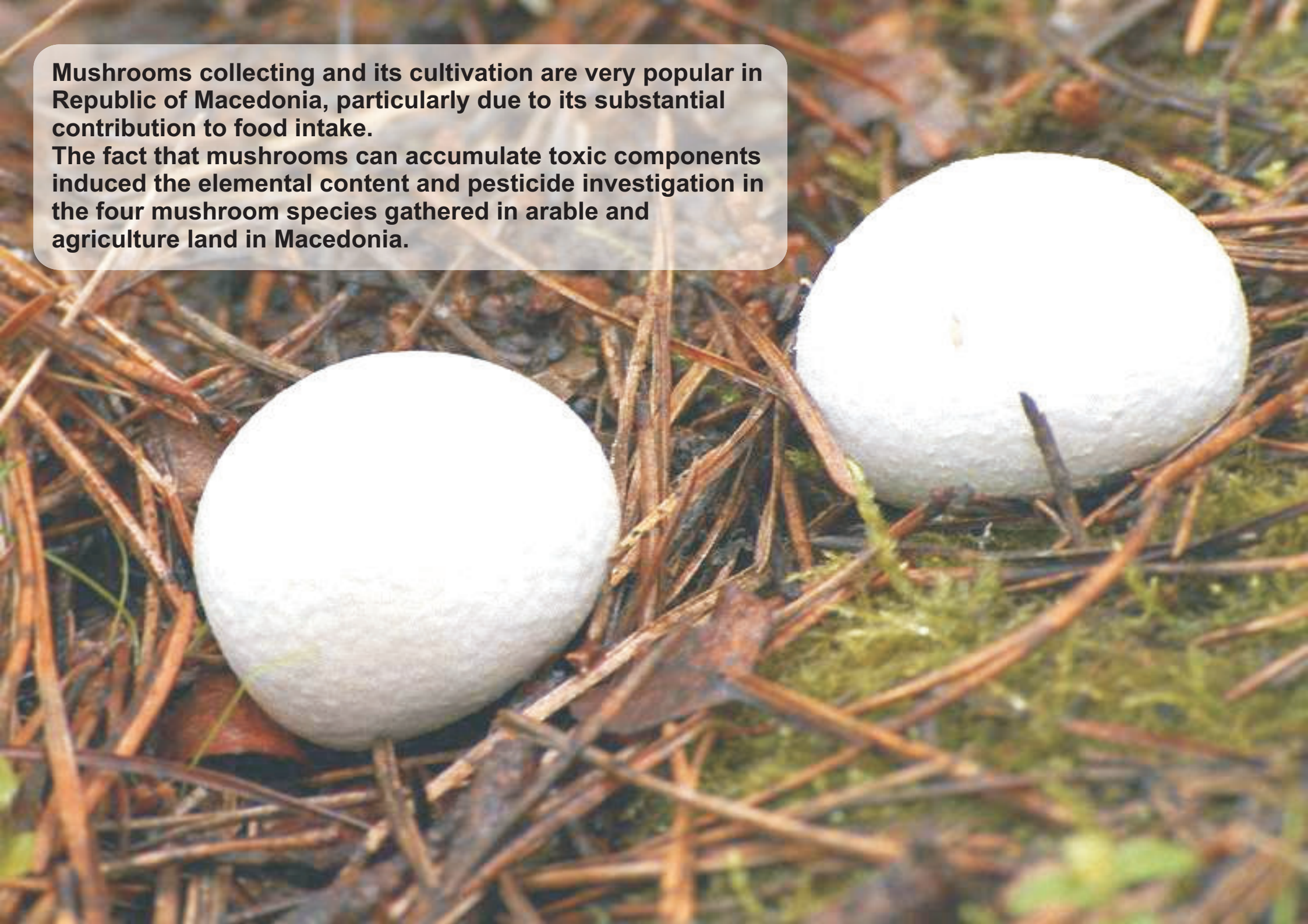


Mushrooms collecting and its cultivation are very popular in Republic of Macedonia, particularly due to its substantial contribution to food intake.
The fact that mushrooms can accumulate toxic components induced the elemental content and pesticide investigation in the four mushroom species gathered in arable and agriculture land in Macedonia.

Experimental
Toxic heavy metals (Cd, Pb) were analyzed by ETAAS, and other elements were analyzed by FIMS (Hg) and FIAS (As) methods, respectively.
Pesticides were analyzed by GC-RCD (organochlorine) or GC-NPD (organophosporus) methods.

The investigated species were as follows:

Sample	Location
Agaricus urinascens (Jul. Schäff.&F.H.Moller) Singer	arable land Ohrid-Struga road
Tricholoma acerbum (Bull.: Fr.) Quél.	arable land Bistra Mountain, Sretkovo village
Volvariella gloiocephala (DC.: Fr.) Boekh. & Enderle	in agriculture land, Negotino-Molotenov Lak by river Vardar
Bovista plumbea Pers.	at roadsides, near arable land Prespa Pretor, 850 m

The samples were collected from different habitats of the Republic of Macedonia in 2006-2010 year

Results

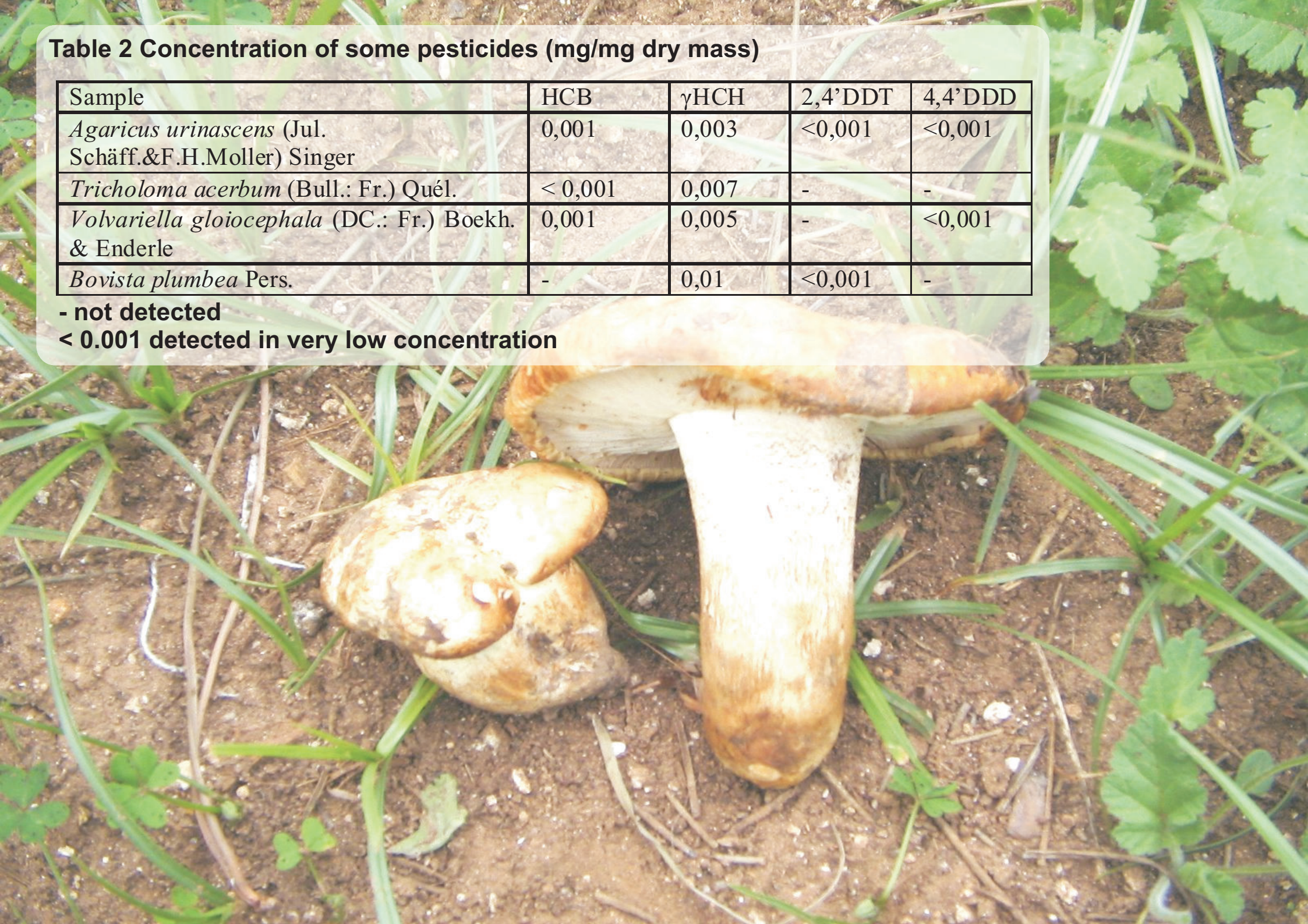
Table 1 Concentration of some trace elements (mg/mg dry mass)

Sample	Pb	Cd	As	Hg
Agaricus urinascens (Jul. Schäff.&F.H.Moller) Singer	0.59	0.365	1.964	0.083
Tricholoma acerbum (Bull.: Fr.) Quél.	2.372	0.588	1.97	0.335
Volvariella gloiocephala (DC.: Fr.) Boekh. & Enderle	13.34	0.224	4.94	0.175
Bovista plumbea Pers.	0.685	0.303	0.152	0.604

Table 2 Concentration of some pesticides (mg/mg dry mass)

Sample	HCB	γHCH	2,4'DDT	4,4'DDD
Agaricus urinascens (Jul. Schäff.&F.H.Moller) Singer	0,001	0,003	<0,001	<0,001
Tricholoma acerbum (Bull.: Fr.) Quél.	< 0,001	0,007	-	-
Volvariella gloiocephala (DC.: Fr.) Boekh. & Enderle	0,001	0,005	-	<0,001
Bovista plumbea Pers.	-	0,01	<0,001	-

- not detected
< 0.001 detected in very low concentration



Discussion

Results expressed on dry mass basis indicated on the presence of toxicological important components. The average values for heavy metals were higher than the maximum concentrations imposed by Macedonian regulation[1] in 25 % for Cd and 50 % for Pb of the investigated samples, but below the European Union tolerance limit value.

Hg concentration ranged from 0.083 to 0.604 µg/g dry mass is far below the provisionally tolerable weekly intake (0.004 mg/kg body weight), reevaluated recently by WHO.

***Volvariella gloiocephala* has the highest arsenic level of 4.94 µg/g while the other species' concentrations fell within the range of 0.152 to 1.97 µg/g dry mass.**

Organophosporus pesticides were not detected and not all tested organochlorine pesticides were present. Where organochlorine pesticides were found quantities were less than 0.001 µ/g dry mass. Higher concentrations were estimated for γHCH but lower than our permission.

Conclusion

Elemental analyses from a point of toxicological importance showed that the mineral composition of four species of Macedonian mushrooms varied greatly by the speces and place of growing.
Obtained average values of Pb, Cd, As and Cu were lower than the maximum concentration imposed by European Union and WHO.
In most of the pesticides were not detected; where were detected the average values were lower than the maximum concentration imposed by our food regulation.

References

[1]Pravilnik za opshti baranja za bezbednost na hrana, Sl. Vesnik RM 118/05.