

Pesticide Residues in Fresh and Dried Mushrooms on the German Market

Wieland, M, Hacker K, Bauer N, Schüle, E, Wauschkuhn C, Roux D, Scherbaum E, Anastassiades M
E-Mail: marc.wieland@cvuas.bwl.de

Chemisches und
Veterinäruntersuchungsamt
Stuttgart

INTRODUCTION

Findings of the insect repellent DEET (N,N-dimethyl-meta-toluamide) in chanterelles, nicotine in edible boletus and exceedances of maximum residue levels in cultivated mushrooms in recent years provoked an intensified surveillance of mushrooms in 2009 with regard to pesticide residues at the CVUA Stuttgart.

ANALYSIS

In 2009, CVUA Stuttgart analysed a total number of 55 samples of fresh and dried mushrooms for residues of more than 550 different pesticides and metabolites using the QuEChERS method [1]. A modified QuEChERS method (pH-value of 10-11, deuterated standard nicotine-D3)[2] was used to analyse the samples for residues of the active substance nicotine.

Since MRLs are only set for the fresh fungi, a processing factor of 9 was used for "legal judgement" of the residue values in dried fungi, taking into account the effect of drying on the residue concentration.

RESULTS

Of 55 samples analysed in 2009, 19 were cultivated mushrooms, 14 were chanterelles (one of them dried), 18 were edible boletus (16 of them dried), three were black fungus and one dried sample was of an unknown fungus species.

In 46 (84%) of the samples, pesticide residues were detectable, with 25 samples (45%) containing more than one residue. In 23 (42%) of the samples the residues of various pesticides exceeded the legal MRLs. In total, 30 different pesticides were found in the samples with an average of 2.3 pesticides per sample. Only one of the 19 champignon mushroom samples had residues above the legal MRL (for diazinon; see Table 1), the dried mushrooms showed an MRL-violation rate of 86%.

this substance above the default MRL of 0.01 mg/kg. The highest detected residue was 0.11 mg/kg (see Table 1).

The results for the dried edible boletus surveyed in 2009 were as follows (see Table 2 and Figure 1):

All of the analysed samples contained nicotine above the default MRL of 0.01 mg/kg. Five of the dried boletus samples exceeded the tolerable maximum value of 2.3 mg/kg for nicotine proposed by the COM, based on the risk assessment of EFSA. The high residues of nicotine were detected in dried edible boletus from China or from "Unknown" origin, whereas samples from Serbia or Italy contained notably smaller amounts. The acute reference dose was not exceeded by any of the samples; thus, none of those was considered dangerous to human health. In addition to the exceedances of nicotine, legal MRLs were also exceeded for cypermethrin, permethrin, propoxur, clomazone and fomesafen as well as the default MRL of 0.01 mg/kg for tetramethrin, all in samples of Chinese or "Unknown" origin.

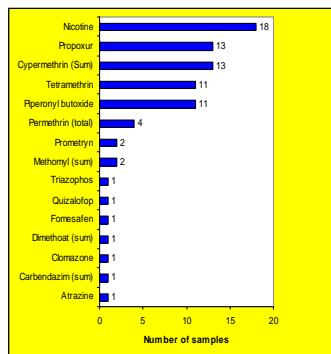


Figure 1 Detection frequency of pesticides in fresh/dried boletus

Country of Origin	Number of samples	Samples with residues	samples with multiple residues	Samples with MRL-violations	Pesticides exceeding the MRLs
China	7	7	7	7	clomazone (1x) cypemethrin* (1x) fomesafen (1x) nicotine (7x) permethrin* (1x) propoxur (2x) tetramethrin (5x)
Italy	1	1	-	1	nicotine (1x)
Serbia	2	2	-	2	nicotine (2x)
Unknown	6	6	6	6	nicotine (6x) permethrin* (2x) tetramethrin (6x) propoxur (4x)
Sum	16	16 (100 %)	13 (81 %)	16 (100 %)	

Table 2 Pesticide residue findings in dried edible boletus in 2009 (*sum)

Table 1 Pesticide residue findings in fresh chanterelles in 2009 (*dried chanterelles)

Country of Origin	Number of samples	Samples with residues	Samples with MRL-violations	Detected pesticides	Minimum and maximum contents [mg/kg]
Bulgaria	1	-	-	-	-
Lithuania	2	2	1	DEET (2x)	0,005-0,11
Poland	1	1	0	dieldrin (1x)	0,004
Russia	9	8	3	DEET (7x) dieldrin (1x) metolachlor (3x)	0,001-0,092 0,002 0,002-0,004
Serbia	1 *)	1	-	chlorpyrifos (1x) diazinon (1x)	0,008 0,008
Sum	14	12 (86 %)	4 (29 %)		

With regard to fresh chanterelles 11 of the 13 samples contained pesticide residues. Two samples (with origins in Bulgaria und Russia) had no detectable residues. Nine samples contained residues of the insect repellent DEET and four of these samples (three from Russia and one from Lithuania) had residues of

SUMMARY

Nearly all of the analysed samples of fresh chanterelles and all of the analysed samples of dried edible boletus contained pesticide residues (especially DEET, nicotine and pyrethroids). These findings are unexpected due to the fact that these mushrooms grow wild (cultivation is not possible). All 16 samples of dried boletus and four samples of fresh chanterelles contained residues above the legal MRLs. In contrast, cultivated mushrooms showed only one MRL-violation.

Note: New MRLs for nicotine have been adopted by SCoFAH in March 2010, but they are not yet published in the Official Journal of the European Union. The investigations will continue in the 2010 season.

LITERATURE

[1] CEN/TC 275 prEN 15662:2008; Foods of plant origin - Determination of pesticide residues using GC-MS and/or LC-MS/MS following acetonitrile extraction/partitioning and cleanup by dispersive SPE
[2] <http://www.crl-pesticides.eu>

PM 036

EPRW 2010



Baden-Württemberg