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Research Article

Mushrooms as Food Supplements: Mg, K, Se-Zn/P in Dried Mushrooms

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Abstract

Modern nutritionists often prescribe and recommend various nutritional supplements to their patients, taking into account their specific needs. Five essential minerals for the human body are magnesium, potassium, zinc (metals), and phosphorus and selenium (non-metals). Walking through our cities, we see many pharmacies, drug stores, and herbalist's shops displaying colorful signs with the words "MgKS"—dietary supplement—in their windows. These supplements are often expensive, but poor mountain populations have access to mushrooms directly from the pristine wilderness, free of charge. We, who have been analyzing fresh, pickled, frozen, dried, and freeze-dried mushrooms since 1980, have found that these elements (Mg, K, P, Se, Zn), essential for the human body, are present in good concentrations in wild edible mushrooms found locally. To this end, we analyzed the "edible" mushrooms listed in Annexes 1 and 2 of Presidential Decree 376/1995 of the Italian Republic, obtaining significant information. Some of these mushrooms are coveted by mushroom hunters for their deliciousness and high price, and therefore these products quickly fly onto the market; other edible mushrooms, sometimes valuable, are neglected and often left to rot in the woods: we are referring to Leccinum and Suillus, various Lactarius and Ruusula, many Agaricus, Tricholoma, and Macrolepiota, as well as the numerous less valuable Boletaceae (Butyriboletus, for example). By exploiting this food (and economic) resource with a healthy walk in the woods, you can therefore obtain excellent supplements, and therefore we are convinced that these data have scientific value as well as a health and social purpose.

Keywords

Mushrooms, Food Supplements, Nutritional Metals

1. Introduction

Mushrooms: A Source of Many Nutrients
Professor Antonio Brusca, the distinguished head of Medical Cardiology at Le Molinette Hospital in Turin, Sicilian by birth and a resident of Borgotaro, wrote in 1981: "Mushrooms are a useful and recommended food for diabetics and heart patients." Over the years, nutritional analyses of mushrooms have been expanded and refined, and today we have reliable nutritional tables from scientists around the world examining wild and cultivated mushrooms. Many results have been obtained by rediscovering the archives of old PMP and local health authorities, as well as private laboratories that have followed this nutritional trend over the years. The FAO has also identified mushrooms as a potential nutritional support for the world's poorest populations. The work of Prof. Eric

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Boa of Aberdeen, Scotland, commissioned by the FAO, remains perhaps - to date - the most important effort to promote the study and consumption of edible mushrooms worldwide, of which at least 200 have certified and proven medicinal properties. Mushrooms, especially in Southern Europe, have remained a staple food but also a significant economic boost for rural mountain populations. In this work, we have attempted to summarize a vast topic by presenting not only the best-known edible mushrooms available on the national market but also the Asian ones that have now invaded the European "preserved" market. We'll then examine the parameters that contribute to classifying mushrooms as nutritional supplements for children, adults, and the elderly. We'll also briefly review their Energy Value (pursuant to EC Regulation No. 1169/2011) and why these low-calorie food products (on average, less than 25-35 calories per 100 grams) can actually supplement the diet with vitamins and minerals at practically negligible prices compared to the various MKS or ACES available in the pharmaceutical and parapharmaceutical sector First of all, it's important to know that they contain little sugar and fat (0.2-0.4 g on average per 100 g), are cholesterol-free, and contain minerals that are highly valued today (for example, Se).

Moreover, various mushrooms (*Agaricus* in particular) are richer than various vegetables in water-soluble vitamins, contain little salt, and have a dietary fiber content of approximately 1-3 g per 100 g. In the various tables, we'll see, in addition to the nutritional values required by EC Regulation, the average vitamin content per 100 g for various edible mushrooms, and the mineral content. One thing to keep in mind (and little known) is that many of the properties listed reside in the spores and therefore in the hymenial part; if the mushroom is young, the cell wall is thin and therefore easily broken down by gastric juices, while in mature mushrooms, the spores have thick walls and therefore risk acting like insoluble fiber. In the tables below, you will see clear differences in the various parameters due to the different degrees of ripeness of the fruit bodies, their water content, and often also their place of origin.

For each external data point, we have listed the publications and authors (whom we publicly thank).

Each of these data points is followed by a number that refers to the publication mentioned in the last pages.

Regarding external data, we have used only those from universities or laboratories accredited to ISO 17025 for the specific analysis and for the specific matrix.

The samples highlighted in blue are dried in the sun or with hot air at 50-60 ℃.

To better interpret the analytical data in Data Table 1, we specify that:

a- the values reported [in blue], which come from the Analytical Laboratory and CSPLFM archives, refer to analyses on whole mushrooms and, where present (?), the values are extrapolated from fresh samples using the ratio: fresh weight/dry weight = 10:1.

b- [/n.x] X after the slash indicates the number of samples analyzed from the same area and for which we have reported only the minimum and maximum values to simplify the large Data Table no. 1.

c) The data in green come from the Archives of Dr. Luigi Cocchi and Dr. Luciano Vescovi (RE-Italy).

Figure 1. *Boletus aereus.*

2. Materials and Methods

2.1. Procedure

The first step for a correct analysis is the confirmation of the fungal species to be examined by a public or private mycologist, registered in the National Mycologists Registry.

The collected mushrooms were cleaned on site with a plastic brush and then wrapped in foil for transport to the laboratory (for longer storage in a portable refrigerator for cars at T °<10 ℃).

In the laboratory the stems were quickly washed with cold water to remove residues of soil and humus.

The stems were now dried with disposable paper and then with a cold air dryer.

At this point, the first weighing of the sample to be examined is performed and so the mushrooms were sliced and dried at 50-60 ℃ for 8-10 hours in a rising current of hot air.

The slices were then shredded and then dried in a stove at 105 ℃ and stored in a silica gel dryer.

Old procedure: 1 gram (dw) of this crushed material was then treated in a microwave mineralizer with 5 ml of concentrated HNO_3 using the various potencies available for the timescale.

The mineralized product was then brought to 25 ml in a calibrated flask and then analyzed.

The archive surveyed reported that before 2001 the analysis was carried out with GFA AS (Graphe and HGA 400 Perkin Elmer) of PMP, public laboratory in Parma (dr. Sara Reverberi and dr. Gianmarco Curti, †), after 2001 with ICP/Thermo Scientific of Analytical Snc in Borgotaro, with the DigiPREP procedure for plant products (dr. Eugenio Borghi).

2.2. Mg, Magnesium

Magnesium is a divalent metallic element, which is very commonly found in the earth's crust. It does not occur as a pure metal in nature but is found in many common minerals.

The adequate consumption according to the EFSA is shown on page 16 but certainly among the populations of the North and the South these numbers can fluctuate.

The Nordic RDA for Mg is 280 mg/day for females and 350 mg/day for males whereas the average daily intake in Finland is 309 mg and 405 mg, respectively.

High amounts (100-500 mg kg^{-1}) of magnesium are found in green leafy vegetables, legumes and wholegrain cereals while meat and dairy products contain lower levels of Mg (100-300 mg kg^{-1}).

Cereal products provide 33%, potatoes and vegetables 20%, milk products 15% and meat and fi sh 10% of the total Mg intake.

Mg is an essential mineral element required as a cofactor in many enzyme systems.

Magnesium has a multifunctional role in cell metabolism, cell division and in the synthesis of RNA and DNA.

Mg is considered essential for the normal functioning of the parathyroid gland and for vitamin D metabolism.

Magnesium depletion markedly disturbs calcium homeostasis whereas hypocalcemia is a common manifestation of a moderate to severe Mg deficiency.

Figure 2. Four Mushrooms rich in Magnesium.

Figure 3. Four other Mushrooms rich in Magnesium.

The net absorption of Mg from diet is approximately 50%. High levels of dietary protein as well as dietary fiber from fruit, vegetables and cereals decrease the absorption of Mg.

About 5% of magnesium is excreted in urine.

There are no adverse effects from the ingestion of magnesium from food.

The average daily intake of Mg from food is 280 mg.

The Nordic RDA for men and women is 400 mg/day and 310 mg/day, respectively.

It is estimated that supplemental doses of 400 mg/day do not result in adverse health effects. Excessive dosage of magnesium salts may result in osmotic diarrhea. [69]

With this work we propose the mushrooms, from the data in our archives, as a good source of Magnesium.

2.3. K, Kalium (Potassium)

Potassium intake and health consequences: the level of potassium intake has been reported to be associated with several health outcomes.

Most studies focused on its relation with cardiovascular endpoints and, in particular, blood pressure and stroke. Several other outcomes, such as bone health and kidney stones and metabolic disease, have also been investigated.

A large number of observational and intervention studies have addressed the relationship between the dietary intake of potassium and risk of cardiovascular disease in adults, focusing on blood pressure and hypertension, as well as the risk of stroke, ischemic heart disease and arrhythmia.

This section summarizes evidence primarily from meta-analyses of randomized controlled trials (RCTs) and prospective observational studies on the relationship between potassium intake and cardiovascular disease - related outcomes, particularly blood pressure, stroke and coronary heart disease.

Where studies measured 24 - h urinary potassium excretion as a marker of potassium intake, the Panel applied a factor of 1.3 to estimate the corresponding daily potassium intake.

There is a direct relationship between blood pressure and risk of cardiovascular disease in the general population.

The Panel notes that blood pressure is a continuum and studies conducted in people classified as hypertensive may inform the relationship between potassium intake and blood pressure in the general population.

The Panel also notes that raised blood pressure affects a large proportion of the adult European population. According to WHO estimates, prevalence of raised blood pressure (defined as systolic and/or diastolic blood pressure equal to or above 140/90 mmHg) in adults aged ≥ 25 years is 44.5% in males and 37.1% in females in the European region (WHO, 2010).

The Panel examined the data relating potassium intake to blood pressure when expressed as a continuous variable from intervention studies conducted in normotensive and/or hypertensive people.

The Panel also reviewed the evidence, from observational studies, for an association between potassium intake and the risk of developing hypertension.

The Panel notes that different criteria may have been used for defining ‘hypertension’ across studies; the Panel uses the term as defined by the authors when describing the individual studies.

With this work we propose the mushrooms, from the data in our archives, as a good source of Potassium.

Figure 4. Four Mushrooms rich in Potassium.

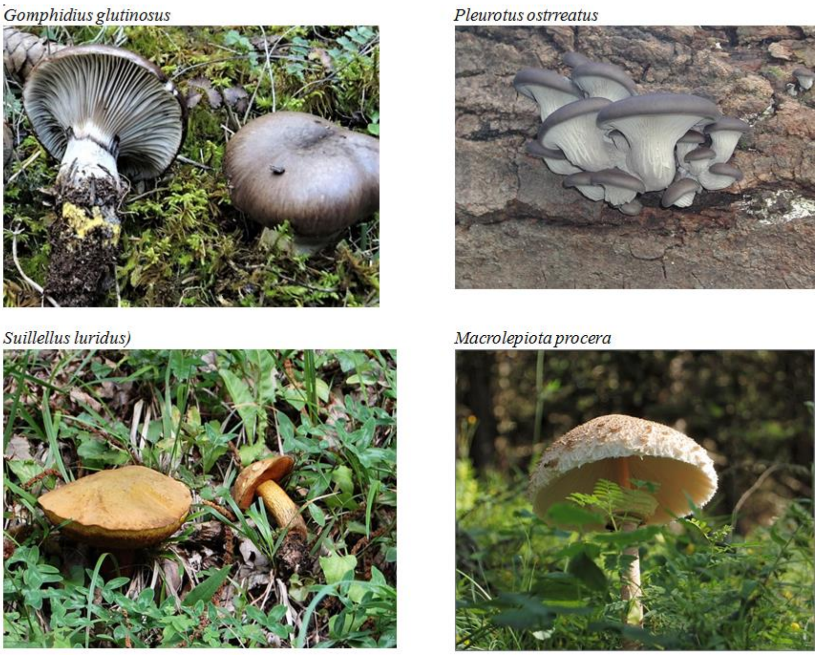

Figure 5. *Four other Mushrooms rich in Potassium.*

2.4. P, Phosphorus

Phosphorus is an essential nutrient and is involved in many physiological processes, such as in the cell's energy cycle, in regulation of the body's acid-base balance, as a component of the cell structure, in cell regulation and signaling, and in the mineralization of bones and teeth.

In 1993, the Scientific Committee for Food (SCF, 1993) adopted an opinion on nutrient and energy intakes for the European Community and derived for phosphorus a Lowest Threshold Intake, an Average Requirement (AR) and a Population Reference Intake (PRI) for adults. The SCF also set PRIs for infants from 6 months of age, for children and for pregnant and lactating women.

Figure 6. *Four Mushrooms rich in Phosphorus.*

Definition/category

In the human body, phosphorus is present in different forms. Serum contains mainly inorganic phosphates (dihydrogen and monohydrogen phosphate), bone contains phosphorus largely in the form of hydroxyapatite, while the soft tissues and extracellular fluids contain organic phosphates in complex with carbohydrates, lipids and proteins. In this Opinion, the term phosphorus is used for consistency and simplicity when referring to its presence in blood or bone.

Chemistry

Phosphorus is the 11th most abundant element in the earth's crust. It is a non-metal, solid chemical element and belongs to Group 15 (VA) of the periodic table of the elements. It has the atomic number 15 and an atomic mass of 30.97 Da.

Phosphorus has several oxidation states, the most important being +3 and +5.

Phosphorus does not occur in nature as a free element because of its high reactivity, but is found in the form of phosphate minerals.

The most abundant form is apatite (and related minerals), hydroxyapatite [$Ca_{10}(OH)_2(PO_4)_6$], chlorapatite [$Ca_{10}Cl_2(PO_4)_6$] and fluorapatite [$Ca_{10}F_2(PO_4)_6$].

There is only one stable phosphorus isotope, that is 31P.

There are, however, several radioactive isotopes with highly variable, usually very short, half-lives ranging from a few nanoseconds to a few seconds.

Only two radioactive isotopes (P-32 and P-33) exist long enough to be measured: P-32 has a half-life of 14 days and has applications in medicine, industry and in tracer studies. P-33 has a half-life of 25 days and it also has tracer applications.
With this work we propose the mushrooms, from the data in our archives, as a good source of Phosphorus.

Figure 7. *Four other Mushrooms rich in Phosphorus.*

2.5. Se, Selenium

Selenium is a metalloid with similar chemical and physical properties to sulfur.

Selenium exists in 5 oxidation states, -2, 0, +2, +4 and +6. It is ubiquitous in nature but distributed in a highly uneven man ner with the highest concentrations found in arid areas with high soil pH.

Plants readily absorb Se, thus synthesizing organic selenium compounds.

High concentrations of selenium are also found in sedimentary rocks and sulfur minerals.

The Selenium concentration in both plant and animal food varies widely throughout the world.

Protein rich foods generally contain the highest level of Se in meat, fish, milk and cereals the range is 0.1-0.5 mg kg^{-1}.

Selenium is an essential trace element and its biologically active form amino acid selenocysteine.

Selenium is an integral part of selenoproteins such as glutathione peroxidase, iodothyronine deiodinase, thioredoxin reductase, and selenoprotein P.

The gastrointestinal absorption of Selenium from food is high and ranges between 40 and 90%.

Approximately half of ingested selenium is excreted via urine.

In Finland the mean intake of Se from diet is 0.07 to 0.09 mg/day.

About 75% of the intake is derived from meat, milk and cereals whereas vegetables only contribute to a small proportion of total intake.

A safe upper level for daily consumption is considered to be 0.45 mg/day.

Chronic Selenium toxicity, selenosis, results in pathological changes in nails and hair followed by adverse effects on the nervous system.

With this work we propose the mushrooms, from the data in our archives, as a good source of Selenium.

Figure 8. *Four Mushrooms rich in Selenium.*

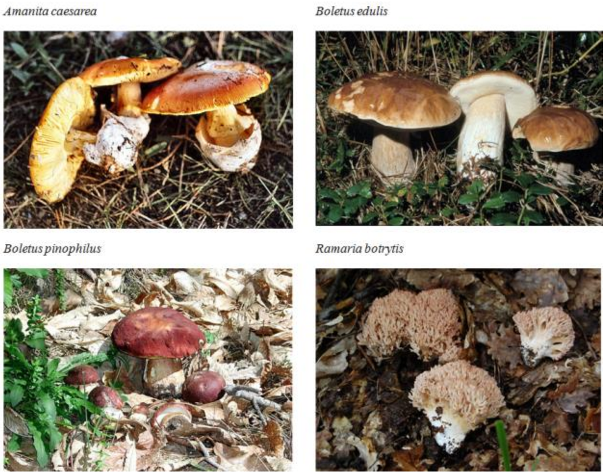

Figure 9. *Four other Mushrooms rich in Selenium.*

2.6. Zn, Zinc

Zinc is an abundant metallic element, which occurs in many minerals but not in a metallic form.

It forms compounds with the oxidation state +2.

Good dietary sources of zinc are meat and sea foods (10-50 mg kg^{-1}), milk (3 mg kg^{-1}) and wholegrain cereals (10-20 mg kg^{-1}).

Foods rich in fats and sugar have a low zinc content. Zinc is an essential trace element and necessary for the function of several hundred metalloenzymes.

It plays a key role in the synthesis and stabilization of genetic material and is necessary for cell division.

Signs of zinc deficiency include poor prenatal development, growth retardation, mental retardation, reproductive failure, dermatitis and loss of appetite.Zinc and copper are mutually antagonistic, each competing with the gastrointestinal uptake of the other. Also zinc and iron compete for absorption.

Absorption of dietary zinc from food is approximately 20-40%.

The absorption is higher from meat and fsh and lower from cereals.

Very little zinc is excreted via the urine.

The mean dietary intake of zinc is 12 mg/day.

Supplemental zinc at doses of approximately 50 mg/day may affect copper and iron uptake. The estimated safe upper level for daily supplementation with zinc is 25 mg.

Early signs of a zinc overdose include gastrointestinal discomfort, cramping and nausea [68].

With this work we propose the mushrooms, from the data in our archives, as a good source of Zinc.

Figure 10. *Four Mushrooms rich in Zinc.*

Figure 11. *Four other Mushrooms rich in Zinc.*

Table 1. *(Analytical results) Mg-K-Se-Zn/P in wild Mushrooms Unity (mg/kg = ppm on Dry Weight).*

SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Agaricus abruptibulbus	1207	60500		0,05	76,24
A. abruptibulbus [1]	1530			1,71	175
A. abruptibulbus [3]		38460			
A. abruptibulbus [5]		60590 ±1220	0,9 ±0,01	762,4 ± 3,8	0,5 ± 0,04
A. abruptibulbus				0,39	60
Agaricus arvensis [3]		52120			
Agaricus arvensis [4]	1050	28600			410
Agaricus arvensis [6]					168 ± 30,4
Agaricus arvensis [7]	80	620		0,1	0,985
Agaricus arvensis/n.32	1298-2996	32369-66200	7924-18130	0,2-13	
Agaricus augustus [3]		27400			
Agaricus augustus [8]				0,8-1,8	
Agaricus augustus var.*albus*				<0,05	93,5
Agaricus benesii [4]	855	11560			210
Agaricus benesii [8]				1,4	
Agaricus bisporus	1180	46200		<0,1	460
Agaricus bisporus [9]-cap.		17336-26311			97,72-151,94
Agaricus bisporus [9]-stem		20216-26612			87,65-128,40
Agaricus bisoporus [10] -wild	4540 ± 210	19500 ± 1900			
Agaricus bisporus [8] -wild				0,08	
Agaricus bisporus [11]				1-1,25	
Agaricus bisporus [12] - ?	2690 ± 480	32870 ± 450			

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Agaricus bisporus [4]	1450	27490			110
Agaricus bisporus [13]			7900-14250		
Agaricus bisporus [5]		26400		0,2	68,1
Agaricus bisporus [8]				0,08-1,4	
Agaricus bisporus [14]		5400-15800			36,3-58,0
Agaricus bisporus [15]		3450			24,9
Agaricus bisporus [16]	900-1920	6460-23700			
Agaricus bisporus [18]		37000-41000			
Agaricus bisporus [19]		32569.54±9776.4			266.17 ±108.72
Agaricus bisporus [20]	983.1	5087			35,59
Agaricus bisporus [21]*-cap.*	100±50,99		1700	0,496±0,02	81,60±4,24
Agaricus bisporus [21]*-stip.*	230±71,21		730,33	0,565±0,06	89,80±22,63
Agaricus bisporus [22]	323±3			0,03±0,01	9,71±0,4
Agaricus bisporus [23] *- cultivated*		21960±377			61±4
Agaricus bisporus [24]*-white*	1300	47300		1,4	66
Agaricus bisporus [24]*-brown*	1410	46000		3,2	47
Agaricus bisporus/n.18	840-3294	37237-84500	9038-20040	0,11-13	
Agaricus bitorquis/n.2				0,05-0,1	5,4-8,8
Agaricus bitorquis [4]	1110	10650			260
Agaricus bitorquis [22]	297±3			0,16±0,01	13,4±0,6
Agaricus bitoquis [8]				2,1-7,8	
Agaricus bitorquis/n.24	1097-3390	18800-57700	5648-13572	2-27	
Agaricus campestris	1341	49983		1,03	135,7
Agaricus campestris/n.13				0,05-0,68	60,1-187,2
Agaricus campestris [4]	1170	13100			305
Agaricus campestris [16]	1570	17300			
Agaricus campestris [25]	9710	18070			58,6
Agaricus campestris [26]				1,8-5,7	
Agaricus campestris [8]				3,3-5,3	
Agaricus campestris [27]				0,133	4,13
Agaricus campestris/n.25	1450-2709	41700-88900	9212-26720	0,2-8	
Agaricus cupreobrunneus [28]	1165±59,4				81±3,9
Agaricus dulcidulus (purpurellus)(^)		46360			
Agaricus hortensis (bisporus)/n.2				0,09-0,19	97,9-105,2
Agaricus langei [4]	940	15350			360
Agaricus litoralis [4]	634	8930			54
Agaricus macrocarpus [8]				3,2-4,8	
Agaricus macrosporoides				0,14-0,38	82,9-83,7
Agaricus sylvaticus [3]		39320-51070			

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Agaricus sylvaticus [30]	2014,3 ± 222,3	1101,67 ± 26,74			28,28 ± 4,97
Agaricus sylvicola				<0,05-0,05	100,5-138,5
Agaricus sylvicola (=*essettei*) [22]	190 ± 3			0,16 ± 0,01	10,1 ± 0,6
Agaricus sylvicola [8]				2,4-4,5	
Agaricus sylvicola (var.*sylvicola*) [4]	1930	21500			970
Agaricus sylvaticus				0,23	107
Agaricus urinascens (=albertii) [25]	900	15500			143
Agaricus urinascens (=macrosporus)				0,05	96,8
Agrocybe cilindracea (aegerita) [4]	839	12950			170
Agrocybe aegerita (C.cilidrcea)/n.50	1100-2590	26600-55600	4637-15810	0,2-3	
Agrocybe cilindracea [20]	1622.5	7528			66,24
Agrocybe (Cyclocybe) cyilindracea- [60]	62,87				66,63
Agrocybe (Cyclocybe) cylindracea-	5630 ± 720	33590 ±2390			
Agrocybe cylindracea (aegerita)				<0,05	47,4
Agrocybe cylindrace (aegerita) [7]	111	1171		0,08	0,471
Albatrellus confluens	769	33600	5900	4,33	74,7
Albatrellus confluens [8]				1,1-3,1	
Albatrellus ovinus	763	28700	4940	3,40	73,4
A.ovinus [1]	648			0,36	39,5
A.ovinus [31]	910 ± 250	38000 ± 7900			44 ± 7
Amanita caesarea				0,15	62,3
A.caesarea	1405	41010	4210	2,0	59,6
Amanita caesarea [8]				2,6-4	
Amanita caesarea [11]	1490	51600		40	100
Amanita caesarea/n.21	932-2075	33588-63300	4076-10260	0,2-9	
A.caesarea [32]	833,1 ± 4,94				65,65 ± 0.48
Amanita ovoidea/n.3	456-1250	18699-35150	2360-4450	2-2,2	20-108
Amanita ovoidea [34]	980	18760			53,82
Amanita rubescens [33]	289,3	16654		1,48	115,2
Amanita rubescens				0,05	196
Amanita vaginata	133,6	53087		1,53	112,1
Amanita vaginata [33]	133,6	53087		1,53	112,1
Armillaria mellea/n.12				<0,05	31,1-54,3
Armillaria mellea				<0,05	30,3-128
Armillaria mellea [33]	148,2	35294		2,08	124
Armillaria mellea/n.19	961-2080	31700-72904	3034-12100	0,15-3	
A.mellea [32]	1063,1 ± 7,71				54,12 ± 0,92
A.mellea [34]	1160	20330			36,71

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
A.mellea (3)		51180			
A.mellea [36]					96,5±5,2
A.mellea [37]	3700±200	33700±210			59,4±2,8
A.mellea [38]				2,08	124,0
A.mellea [39]	1357±106	27847±688			95,6±8,8
A.mellea [40]	927±15			0,753±0,01	77,3±2,4
Armillaria ostojae [4]	614	18510			210
Armillaria ostojae	1175	44600	9250	2	
Armillaria tabescens [33]	113,6	48248		1,89	108,7
A.tabescens [32]	1150,7±41.45				64.45±0.68
A.tabescens [22]	795±5			0,19±0,01	15,9±1,1
Auricularia auricula-judae (^)		4320			
Auricularia auricula-judae [42]	2000	12000			60
Auricularia auricula-judae [43]	2000	12000			60
Auricularia auricula-judae [45] - ?		1844±22,5			264±11,5
Auricularia auricula-judae [17]	2014±222	1101±26			28,38±4,97
Auricularia auricula-judae [7]	123	441		0,07	
Auricularia auricula-judae/n.12	949-2820	1600-44600	321-2855	0,2-3	
Auricularia auricula-judae [8]				0,055	
Auricularia) polytricha [8]				0,02	
Auricularia polytricha [10]	2570±110	18600±2300			
Boletopsis grisea	1284	10670	2290	1,6	176
Boletus aereus				18,75	
Boletus aereus [41]				12,3±0,5	
B.aereus [7]/N.2	89-95	748-789		0,17-0,33	2,201-4,865
Boletus aereus/n.4				0,5-5,6	36,6-156,8
Boletus aereus	1035	33020	7630	28,8	121
Boletus aereus/Cap. [46]	758±67	11365±343		1,7/5,6 [2]	165±24
Boletus aereus/Stem [46]	556±35	7905±676		/	75±6
B.aereus [32]	775,1±7,33				89,45±2,21
B.aereus [11]				12.3	
B.aereus [44]	973±34	18512±3291		/	117±8
B.aereus [47] -cap.	766	31200		1,64	107
Boletus aereus/n.11	707-2630	19600-43000	2438-8181	5-79	
B.aereus [47] -stem	426	24000		1,85	57
B.aereus [47] -cap. / Vulcanic area	1060	29946		49,7	90
B.aereus [47] -stem / Vulcanic area	363	19903		12,5	41
Boletus aestivalis/n.14				0,9-4,68	40,5-226,04
Boletus aestivalis	1572	39910	4740	1,8	126

SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Boletus aestivalis [11]				48,5	
Boletus aestivalis [26]				11-21	
Boletus aestivalis [41]				48,9 ± 2,2	
Boletus aestivalis/n.20	661-1501	15900-40300	2007-9067	7-43	
Boletus appendiculatus/n.12	707-2630	19600-43000	3395-10921	5-79	
Boletus (Xerocomus) badiorufus				<0,05	254,6
Boletus edulis	832	24690		22,2	89
Boletus edulis/n.11				0,05-5,6	50,4-119
Boletus edulis			6540	46,6	74,7
B.edulis	297 ± 65	4865 ± 245			41 ± 33
B.edulis -cap.[46]	439 ± 54	9413 ± 567			88 ± 4
B.edulis -stem [46]	297 ± 65	4865 ± 245			42 ± 33
B.edulis [37]	2100 ± 110	18500 ± 600			38,5 ± 1,7
*B.edulis (*fo *persoonii)*	1442	43190	7560	6,7	110,3
B.edulis [48] - ?		20325,4			417,2
B.edulis [11]				14,9	
B.edulis [31]	820 ± 130	28000 ± 5900			80 ± 26
B.edulis (3)		20840-24810			
B.edulis [62]	910 ± 160	27000 ± 3000			160 ± 38
B.edulis [18]		20000-3800			
B.edulis [10]	2060 ± 320	20100 ± 1900			
B.edulis [49]	478,53 ± 159,4				89,649 ±26,43
B.edulis [19]		33561.72 ± 6795.54			69.54 ± 1.12
B.edulis [50]		11781,20		2,32	69,94
B.edulis [39]	1258 ± 95	26543 ± 878			55,2 ± 4,3
B.edulis [44]	574 ± 65	15744 ± 2294		/	76 ± 7
B.edulis [44]	1083 ± 99	27944 ± 6503		/	159 ± 14
B.edulis [40]	337 ± 25			4,18 ± 0,2	138 ± 0
B.edulis [41]				14,9 ± 1,3	
B. edulis/n.21	557-1101	19200-43600	4819-10080	9-96	
B.edulis [51]	17,43	5471	3006	115,4	
Boletus erythropus/n.2				0,3-3,0	124,2-210,1
Boletus erythropus				2,7-7,3	
Boletus (Neoboletus) erythropus	628	20830	4750	12,3	106,5
B.fragrans [11]				2	
B.fragrans [41]				2,05 ± 0,11	
B.fragrans				0,06	133,8
B.griseus (Leccinellum)-Cap.	577 ± 54	17310 ± 667		0,25/5,9 [2]	205 ± 55

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Boletus griseus [52]		4600±2400			
B.griseus/ Stem [46]	707±75	15308±565			125±52
B.erythropus	628	20830	4750	12,3	106,5
Boletus (Hemileccinum) impolitus	780	31470	5380	13,2	113,9
Boletus pinophilus/n.2				1,0-3,5	115,6-133,5
Boletus pinophilus [54] -*Bulgaria*	592,5-701,96	29040-32070			69.0
Boletus pinophilus [54]- *Virginia*	5100-5310	10000-10030			43,3-44,1
Boletus speciosus /Cap. [46]	909 ±158	9017±453			148±25
B.speciosus /Stem [46]	504±307	6105 ±829			56±26
B. pinophilus/n.17	379-1043	20500-48300	3208-9836	44-139	
B.pinophilus [7]	141	936		0,10	0,520
B.subtomentosus/3				<0,05-0,8	
B.subtomentosus	1780	47400	10680	0,6	492
B.subtomentosus	900/1200	43000/45000			110/190
B.subtomentosus [62]	1200±190	45000±10000			190±47
B.violaceofuscus [44]	619±57	10685±1134			47±5
Bovista plumbea [4]	785	20580			245
Bovista plumbea [39]	865±54	39800±670			64,5±5.4
Butyriboletus (Boletus) appendiculatus				1,9	57,3
B.appendiculatus [26]				7,3	
B.appendiculatus [50]		15332,99		0,84	112,92
B. appendiculatus/n.13	726-1060	16200-34800		3-13	
Butyriboletus (Boletus) fechtneri [50]		12033,63		1,41	92,61
Butyriboletus (Boletus) pseudoregius/n.2				0,9-1,3	57,3-95,1
Butyriboletus (Boletus) regius [50]		13676,07		1,67	78,71
Butyriboletus (Boletus) regius				0,52	99,7
B. regius/n.7	620-1036	14200-30300	2449-6425	2-6	
B.subtomentosus [41]				0,197±0,028	
B.subtomentosus	1780	47400	10680	0,6	492
B.violaceofuscus [31]	1300±58	34000±8400			49±36
Calocybe gambosa [34]	620	13430			47,28
C. gambosa	1155	35330	10540	5,1	128
C. gambosa/n.22	898-1658	28200-52800	7405-11624	2-12	
Calvatia cinerea [56]	438	521	4200	<0,01	111
Calvatia (Langermannia) gigantea [34]		24680			
Calvatia (Langermannia) gigantea [56]	1500	223	3300	0,091	103

SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Calvatia gigantea [8]				0,96-1,8	
Calvatia gigantea	1570	26220	10830	4,3	240,2
Calvatia (Handkea) utriformis [25]	1230	2100			63,9
Cantharellus cibarius/n.9				<0,05-0,14	11,8-53,7
Cantharellus cibarius	1048	51410	4930	<0,1	76
Cantharellus cibarius	1100-1900	42000-59000		0,05/0,14	69/100
C.cibarius [32]	866,3 ±11,9				53,29±1,23
C.cibarius [1)	1070			0,17	88,0
C.cibarius [62]	1200±130	49000±4600			82±9
C.cibarius [36]					149±8
C.cibarius [25]	2060	16500			62.4
C.cibarius [10]	1190±150	21300±1400			
C.cibarius [48] - ?		52894,5			417,2
C.cibarius [55]	895-1060				
C.cibarius [26]				0,04-1,3	
C.cibarius [19]		50027.5 ±9630.2			
C.cibarius [39]	732±58	26000±560			41.5±2,7
C.cibarius [40]	710±4			0,165±0,01	188±1
C.cibarius [41]				0,153±0,012	
C.cibarius [7]	111	863		0,12	3,297
C.cibarius [56]	462	479	5800	0,295	68,3
C.cibarius [28]	866±46,7				54,1±2,6
C. cibarius/n.28	790-1800	42200-64200	3233-6693	0,2-3	
Cantharellus cinereus/n.2	867-902	39500-55600	2628.2655	0,2	
Cantharellus lutescens [8]				0,96-1,6	
C.lutescens/n.36	447-920	29417-57400	520-2830	0,01-3	
Cantharellus melanoxeros	890	42400	3390	2	
Cantharellus pallens Pilat *[8]*				0,88-1,6	
Cantharellus subcibarius/n.3	860-1474	36800-62400	4649-12051	0,2-2	
Cantharellus tubaeformis [1]	584			0,14	60,0
SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Cantharellus tubaeformis [39]	1430±88	38960±780			78.6±6,8
Cantharellus tubaeformis [8]				0,11	
C.tubaeformuis				0,19	43,9
C. tubaeformis/n.7	466-914	32400-40700	1554-3263	0,2-2	
Clitocybe alexandri [34]	1100	18200			47,99
C. alexandri/n.6	811-1029	17400-28300	5763-8492	2-4	
C.cinerea [56]	438	521	4200	0,00017	111
Clitocybe geotropa				0,4	71,6

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
C. geotropa/n.22	759-1599	24700-36000	8513-14100	2-11	
Clitocybe gibba				0,88	70,7
Clitocybe gibba	1162,00	24400	12302	2,00	
Clitocybe gibba) [25]	1260	19900			68,2
Clitocybe maxima (gibba) [52]	538 ± 132				127 ± 24
Clitocybe gigantea (gibba) [56]	1500	223	3300	0,091	103
Clitocybe nebularis/n.3				0,10-0,38	70,6-111,1
Clitocybe (Lepista) nebularis (^)		24610-36440			
Clitocybe odora [2]		30370			
Clitocybe odora [31]	1600 ± 200	55000 ±11000			140 ± 52
Clitopilus prunulus/n.2				0,2-0,3	74,8-126,5
Clitopilus prunulus (^)		44940			
Clitopilus prunulus [6]					724 ± 10,3
Clitopilus prunulus [47] *(Vulcanic area)*	1476	54073		8,48	173
Coprinus comatus/n.3				0,59-2,4	84,3-102,8
Coprinus comatus [20]	742.7	7337			41,36
Coprinus comatus [26]				0,60-0,79	
Coprinus comatus [60]	62,39				58,69
Coprinus comatus [7]	133	1015		0,10	0,345
Coprinus comatus [8]				1,1-2,9	
Cortinarius (Rozites) caperatus [8]				1,6-2,2	
Cortinarius (Rozites) caperatus				0,10-0,19	44,1-45,9
Cortinarius caperatus	1153	41370	2770	1,6	83,1
Cortinarius praestans [8]				1,1-6,9	
Cortinarius praestans	1103	30860	6230	8,2	99,2
Craterellus cornucopioides				<0,05-0,05	75-95
C.cornucopioides	1080	50630	5010	0,7	148
C.cornucopioides/n.3				<0,05-0,05	75,3-95,3
Craterellus cornucopioides [52]	978 ± 35				61 ±11
Craterellus cornucopioides [36]					344 ± 12
Craterellus cornucopioides [37]				0,780 ±0,1	9,74
Craterellus cornucopioides [19]		50977 ± 3981			128.03 ± 5.74
Craterellus cornucopioides [8]				0,22-0,30	
C. cornucopioides/n.9	838-1512	41100-63600	2756-5180	0,2-4	
Craterellus cornucopioides [22]	498 ± 4			0,04 ± 0,01	16,7 ± 0,8
Craterellus cornucopioides [41]				0,135 ± 0,011	
Craterellus cornucopioides [41]				0,165 ± 0,012	
Craterellus cornucopioides [51]	17,6	9310	1462,44		

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Croogomphus rutilus [34]	1710	17160			145,27
Croogomphus rutilus [7]	102	1156		0,07	
Croogomphus tomentosus [13]			2640		
Fistulina hepatica	1376	57720		1,3	28
Fistulina hepatica			1470	0,05	18,6
Fistulina hepatica	1364	45760	2280	0,3	33.7
F.hepatica [32]	898,3±9,38				34,43±0,47
Flammulina velutipes [58]	680±100	28000±4800			48,02±0,01
Fomes fomentarius [42]	181,6±5,3			0,06±0,01	31,9±0,45
Ganoderma adspersum [42]	966,3±9,5			0,06±0,01	49,6±1,12
Ganoderma applanatum [42]	380,1±6,9			0,01±0,00	49,5±1,21
Ganoderma lucidum [14]		9100			52,2
Ganoderma lucidum [10]	1700±240	24600±2500			
Ganoderma lucidum	1030	39000			60,6
Ganoderma lucidum [59]	891±0,1	7421±1			22
Ganoderma lucidum [45] - ?		2462±66,2			308±23
Ganoderma lucidum [42]	988,9±5,1			0,04±0,00	10,9±0,8
Ganoderma lucidum [51]	16,19	1345.07	1663,06	2,47	
Gomphidius glutinosus					
Gomphidius glutinosus [31]	1900±410	58000±7500			120±99
Gomphidius glutinosus				<0,05	17,9
Gomphidius glutinosus (3)		37600			
Gomphus clavatus [34]	1130	14850			90,82
Gomphus clavatus [13]			3894,9		
Gomphus clavatus [10]	2380±110	15800±1800			
Gomphus floccosus [13]			5189		
Gomphus floccosus [56]	1360	187	3400		130
Grifola frondosa/3				<0,05-033	27,1-57,2
Grifola frondosa	1211	25010	4430	1,7	80.9
Helvella crispa		13800		<0,05	290
Helvella crispa/n.2				<0,05	340-343
Helvella crispa	2100				
Helvella crispa	1130	32880	18420	1,2	750
Helvella crispa [10]	2470±320	20100±2000			
Helvella crispa [8]				0,07-0,08	
Helvella lacunosa [4]	560	12100			220
Helvella lacunosa [25]	1190	20200			42,1
Helvella lacunosa [27]				0,113±0,04	10,16±0,1
(Hemileccinum impolitum (50)		15871,56		0,22	173,37

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
H.(Boletus) impolitum	1041	30200		5	
Boletus impolitus			8263		
Hericium coralloides [52]	1310±38	20970			47,6±4,8
Hericium erinaceus [52]	856±34,2				21,1±1,2
Hericium erinaceus [10]	1920±110	22100±1200			21,1±1,2
Hericium erinaceus [59]	758,1	29120			34,1
Hericium erinaceus [37]	12,77	4572,73	2121,17	1,75	
Hohenbuehelia petaloides [4]	982	10450			79
Hortiboletus (Boletus) rubellus-cap. [46]	773±65	11606±428			223±54
H. (Boletus) rubellus -stem [46]	631±76	10732±345			131±86
Hydnum albidum/n.7	640-1290	41700-67100	2939-4987	0,2-4	
Hydnum repandum/n.4				<0,05-0,1	14,8-30,5
Hydnum repandum [10]	1900±340	17600±2100			55±8
Hydnum repandum [37]	2300±120	28900±160			57,2±2,4
Hydnum repandum [8]				0,01-1,7	14,8-30,5
Hydnum repandum [39]	1247±79	25670±757			74,2±6,3
H. repandum/n.18	581-1201	10700-63800	3008-8390	0,2-4	
Hydnum repandum	627	35060	4350	0,4	29,3
Hydnum rufescens/n.3				<0,05-0,1	30,1-31,6
Hydnum rufescens	802	48760	4150	0,7	36
Hydnum rufescens [8]				0,09	
H. rufescens/n.4	780-1202	44800-64700	3942-6333	0,2-3	
Hygrophorus eburneus				114,2	<0,05
Hygrophorus penarioides /n.2				0,05-3,28	39,4
Hygrophorus russula [32]	758,4±8,29				57,01±0.87
Kuehneromyces mutabilis /n.8	1052-1951	19900-34100	4231-8493	0,2-3	
Imleria (Xerocomus) badia				0,05	133
Imleria badia [55]	795-1005				
Imleria badia [49]	440,08±142,6				137,453±24,57
Imleria badia [50]		16588,82		0,13	53,69
Kuehneromyces mutabilis [8]				0,18	
Laccaria amethiystea [52)	1482±241				59±35
Laccaria laccata [39]	1008±77	22875±605			42,4±3,7
Laccaria laccata	1210	41740	8330	1,3	37,4
Lactarius deliciosus				0,33	200
Lactarius deliciosus [34]	1270	20970			230,85
Lactarius deliciosus [10]	1230±410	25400±2100			
Lactarius deliciosus [10]	1376.8	6350			44,88

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Lactarius deliciosus [8]				0,52-1,8	
Lactarius deliciosus/n.8	810-1288	17000-26900	2726-4865	2-4	
Lactarius deliciosus [51]	17,36	4848,35	2162.92	8.75	
Lactarius pergamenus	797	26740	3800	3,1	145
Lactarius salmonicolor				0,37	39,8
Lactarius salmonicolor	1311	19840			
Lactarius salmonicolor	952	26650	4350	0,9	83,2
Lactarius salmonicolor [28]	855±41,9				94,5±3,9
Lactarius sanguifluus				0,14	67,2
Lactarius sanguifluus [10]	1650±150	24200 ±1600			
Lactarius semisanguifluus [4]	970	10540			44
Lactarius volemus [36]					330±9
Lactarius volemus [39]	1687±132	46753±870			135±12
Lactarius volemus	1135	29020	3760	2,0	49
Lactarius volemus					
Laetiporus sulphureus	982	30220	3060	0,4	30,1
Leccinellum pseudoscabrum [50]		21192,31		0,38	130,33
L. (Leccinum) pseudoscabrum [18]		40000±3000			
L.pesudoscabrum (carpini)/n.2	1310-1580	29100-54000	6494-6754	2	
L.(Leccinum pseudoscabrum/n.2				0,10-0,19	82,9-98,7
L.(Leccinum pseudoscabrum/n.3				0,14-5,9	52,7-93,6
L. pseudoscabrum (carpini)	850	36230	3850	0,8	86
SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Leccinellum crocipodium [50]		18856,85		0,62	68,46
Leccinellum crocipodium /n.11	722,45-1580	24000-50500	3117-7958	0,46-7	
Leccinum aurantiacum [62]	1100±380	35000±7500			112±76
Leccinum aurantiacum				0,5	77,5
Leccinum aurantiacum (3)		32780			
L.aurantiacum/n.8	629-1230	28500-44500	4004-8961	2-7	
Leccinum duriusculum [18]-cap.		37000±3000			
Leccinum duriusculum/n.13	513-1413	16400-54700	1224-6781	0,2-5	
Leccinum duriusculum	835	21420	9250	2,6	72,6
Leccinum rufum [18]-cap.		31000-41000			
Leccinum griseum	834	36800	4926	2	
Leccinum nigellum	1125	41300	9171	2	
Leccinum quercinum/n.9	763-1176	38800-45900	5258-7322	2-9	
Leccinum rufum [26]				0,44-1,7	
Leccinum scabrum (=scaber)/n.2				0,09-2,25	
Leccinum scabrum (=scaber)				0,3	214

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Leccinum scabrum [25]	2150	21500			40,3
Leccinum scabrum [49]	312,17 ± 63,34				34,74 ±17,70
Leccinum scabrum [20]	539.1	7171			30,16
Leccinum scabrum [31]	910 ± 0490	32000 ± 15000			100 ± 52
Leccinum scabrum [18]-cap.		34000-52000			
Leccinum scabrum/	766	35100	3529	2	
Leccinum versipelle	1400 ± 150	41000 ± 400			190
Leccinum versipelle [20]	632.2	8598			57,84
Leccinum versipelle [31]	730 ± 400	30000 ± 12000			88 ± 58
Lentinula edodes [60]	407 ± 121	13020 ± 1010	769 ± 64,1	1,82 ± 0,1	94,4 ± 2,4
Lentinula edodes	1274	50200	8083	0,2	
Lentinula edodes [52]-*cultived*	407 ±12				94,4 ± 24
Lentinula edodes [17]-*cultived*	1320 ± 245	1534 ± 22			76,6 ± 3,47
Lentinula edodes [16]-*cultived*	1650	14300			
Lentinula edodes [18]		26000	769 ± 64,1		
Lentinula edodes [13]			4760		
Lentinula edodes [51]	24,78	5346.11	3061,48	1,85	
Lentinula edodes [59)-cultived	1020	21740			67,1
Lentinula edodes [24]-*cultived*	1550	26700		0,033	92
Lentinula edodes [30]-*cultived*	1320 ± 245,67	1534,12 ± 22,4		0,033	76,61 ± 3,47
Lentinula edodes [23]		14090-20674			33 ±2 - 85 ± 2
Lentinula edodes [63]	407 ± 12	13020 ± 1010		1,82 ± 0,1	94,4 ± 2,4
Lepista nuda/n.4				<0,05-0,5	60,3-119,4
Lepista nuda [32]	949,8 ± 13,38				98,99 ± 1,10
Lepista nuda (3)		38290-42330			
Lepista nuda [4]	500-850	11520-15555			100-185
Lepista nuda [25]	3410	21200			75,5
Lepista nuda [20]	705.2	6384			33,32
Lepista nuda [60)	62,29				72,72
Lepista nuda [39]	965 ± 79	35760 ± 470			86,7 ± 7,4
Lepista nuda [22]	600 ± 5			0,16 ± 0,01	21,2 ± 0,8
Lepista nuda [41]				0,291 ± 0,016	
Lepista personata [25]	3930	21900			26,7
SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Lepista personata [20]	691.2	6864			54,65
Lepista (Clitocybe) subconnexa [52]	1489 ± 136				63,7 ± 6,4
Leucopaxillus giganteus [52]	50 ± 20				85 ± 20
Leucopaxillus giganteus (3)		29560-37610			
Leucopaxillus (Clitocybe) giganteus	1500	223	3300	0,091	103

SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
[56]					
Lycoperdon molle [34]	2670	20570			190,86
Lycoperdon molle [4]	1020	12050			666
Lycoperdon molle [60]	67,23				81,12
Lycoperdon perlatum	1900±250	28000±2500		0,79	66,7/200
Lycoperdon perlatum/n.5				0,28-1,0	100,1-172,8
Lycoperdon perlatum [64]				14.20	134,00
Lycoperdon perlatum [36]					47±3,1
Lycoperdon perlatum [25]	2380	13700			93,6
Lycoperdon perlatum [31]	1800±210	26000±6300			140±1
Lycoperdon (Vascellum) pratense [25]	2470	16200			185
Lycoperdon pyriforme				0,3	132,2
Lycoperdon pyriforme [4]	1950	14120			45
Lycoperdon pyriforme [39]	1150±86	37420±934			150±14
Lycoperdono umbrinum				0,93	150,2
Lyophyllum decastes/n.4				<0,05-1,13	32,95-88,63
Lyophyllum decastes [42]	515,8±4,7			0,10±0,01	18,7±1,80
Macrocybe gigantea [52]	550±170				160±49
Macrolepiota excoriata /n.2				0,6-0,68	67,9-83,3
Macrolepiota excoriata [34]	1860	22920			62,93
Macrolepiota konradii/n.3				0,23	51,7-59,4
Macrolepiota konradii				0,1	56,1
Macrolepiota permixta/n.2				0,2-0,43	47-81,2
Macrolepiota procera		25000-35000			87,2
Macrolepiota procera [4]	614	14415			170
Macrolepiota procera [20]	1538.8	5852			46,39
Macrolepiota procera/n.9				<0,05-0,44	47,5-77,9
Macrolepiota procera	1022	30690	8310	4,4	92,2
M. procera [3]		25040-33440			
M. procera [1]	1300			1,68	82,5
M. procera [37]	3300±115	18200±110			74,5±3,3
M. procera [25]	1390	16100			78,2
M.procera [18]-cap.		26000±4000			
M.procera [18]-cap.		49000±14000			
M.procera [24]/n.4 -stalk				1,5-5,8	65-80
M.procera [24]/*n.4* -cap.				2,5-3,9	74-120
M.procera [27]					10,77±0,1
M.procera/n.15	983-1845	23200-56600	5364-17660	0,2-6	

SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Marasmius oreades	1443	36800		2,0	125
Marasmius oreades [4]	630	20785			260
Marasmius oreades [11]				1,5	
Marasmius oreades [25]	4540	17000			61,2
Marasmius oreades [19]		40308.8 ±4024.2			119.04 ±17.03
Marasmius oreades [51]	24,71	5631,02	6159,45	11,26	
Marasmius oreades/n.47	999-1857	19400-71400	6799-24320	2-5	
Marasmius scorodonius	797,0	183000	4243,0	0,20	
Melanoleuca arcuata [52]	230±100				85±12
Melanoleuca cognata [34]	1360	23270			78,05
Melanoleuca graminicola				0,24	70,2
Melanoleuca melaleuca [4]	1060	7250			52
Morchella semilibera	1530	37700		4,0	167
Morchella semilibera [20]	845.8	8184			46,12
Mitrophora semilibera/n.29	940-2964	28400-61000	10529-20627	0,03-3	
Morchella costata [27]				0,293±0,03	10,72±0,4
Morchella crassipes [4]	1045	9290			81
Morchella deliciosa [34]	656	23390			104,8
Morchella deliciosa [52]	130±35				58±36
Morchella elata [34]	2990	19370			92,5
Morchella elata [65]	870±220	21000±2100			150,32±20
Morchella elata/n.5	948-1580	13300-38100	12141-15971	0,2-3	
Morchella elata [8]				0,07-0,10	
Morchella esculenta	1456	43810	18830	0,4	99,0
Morchella esculenta [8]				0,67-2,0	
Morchella esculenta/n.20	868-1531	23500-63400	8323-19922	0,04-3	
Morchella esculenta [25]	1810	23500			98,0
Morchella esculenta [19]		46349.87 ± 6696.68			112.01 ±34.20
Morchella esculenta [20]	514.1	4511			23,18
Morchella esculenta [26]				0,065-1,8	
Morchella esculenta [7]	288	896		0,11	10,934
Morchella esculenta var. *conica*	1056	24040	11420	0,9	89,0
Morchella esculenta fo.*vulgaris* [25]	1920	20400			133
Morchella esculenta fo.*rigida* [4]	760	10290			60
Morchella esculenta fo.*vulgaris* [4]	790	13830			240
Morchella esculenta fo.*vulgaris* [4]				0,08-0,16	
Morchella esculenta (var.*conica*) [8]				0,07-0,2	
Morchella esculenta var.*conica* [10]	1230±190	15400±1600			

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Morchella esculenta var.*conica* [51]	26,31	7399.77	5947,36	0.47	
Morchella hortensis	1798	54880	15360	0,73	
Morchella tridentina/n.11	976-3178	20900-71700	10275-16051	0,2-2	
Pleurotus cornucopiae/n.2	1680-2280	35200-37600	6890-10645	2-3	
Pleurotus djamor [52]	316±17			0,48	92,1
Pleurotus djamor [63]	316±17	36340±1220	7432±298	1,1±0,4	92,1±0,3
Pleurotus djamor [10]	1380 ±180	22300 ±1400			
Pleurotus dryinus [34]	1280	22540			20,31
Pleurotus eryngii [4]	1130	8420			35
Pleurotus eryngii [58]	740±230	17600±4200			27,91±0,01
Pleurotus eryngii [65]	740	17600			27,91
Pleurotus eryngii [25]	1380	17500			43,2
Pleurotus eryngii [23]		20887±321			78±2
Pleurotus eryngii [20]	1187.6	10370			50,62
Pleurotus eryngii (var.*ferulae*) [4]	180	8430			280
Pleurotus (var, *fuscus*) *eryngii* [4]	180	8430			280
Pleutotus ostreatus (var.florida) [52]	359±19			1,1	50,6±0,4
Pleutotus ostreatus (var.florida) [10]	3280±170	20400±1100			
Pleutotus ostreatus (var.florida) [23]	359±19	12343±705			79±5
Pleutotus ostreatus (var.florida) [63]	259	24720±2070		0,48±0,2	50,6±0,4
Pleutotus ostreatus (var.florida) [60]	359±19	24720±2070	6402±80	0,48±0,2	50,6±0,4
Pleurotus ostreatus [42]	757,9±5,0			0,09±0,01	9,34±0,7
Pleurotus ostreatus [34]	1270	11980			53,52
Pleurotus ostreatus [51] */n.4*	21,22-26,83	4454-5513	2407-3276	0,01-9,97	
Pleurotus ostreatus [3]		19930			
Pleurotus ostreatus [64]				2,64	41,30
Pleurotus osrteatus [4]	1130-1540	17775-18270			250-265
Pleurotus osrteatus [14]		7700-22500			30,1-75,5
Pleurotus ostreatus [16]	2120	20600			
Pleurotus ostreatus [20]	901.7	5523			40,85
Pleurotus ostreatus [25]	1700	21900			142
Pleurotus ostreatus [59]	1254	23950,4			142
Pleurotus ostreatus/n.15	988-2133	21000-42500	4509-13547	0,2-3	
Pleurotus ostreatus [60]	61,8				110,9
Pleurotus ostreatus [21]*-cap.*	390±60,81		1700,61	0,270±0,02	48,90±4,95
Pleurotus ostreatus [21]*-stip.*	670±121,1		630,33	0,370±0,03	65,10±16,26
Pleurotus ostreatus [24]*-cultivated*	2000	37300		0,15	83
Pleurotus ostreatus [23]*-cultivated*		15117±737			97±8
Pleurotus ostreatus [18]-cap.		31000±6000			

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Pleurotus ostreatus [13]			13480		
Pleurotus pulmonarius [3]		24500-40200			
Polyporus squamosus	1118	26400	6830	1,4	172
P.salmoneostramineus (P.djamor)-S		24054±2261			119±3
Ramaria aurea				0,91	57
Ramaria aurea [26]				1,3-5,1	
Ramaria aurea [66] -?	920±115	72±10			
Ramaria aurea [8]				0,73-11	
Ramaria botrytis [8]				0,65-1,4	
Ramaria botrytis [66] (?)	1570±312	2300±100			
Ramaria botrytis [13]			4410		
Ramaria botrytis [51]	24,07	7766,46	2386,51	21,68	
Ramaria flava [13]			625,1		
Ramaria flava [34]	1170	22710			31,50
Ramaria flava [22]	804±6			0,19±0,01	14,5±1
Ramaria flava [29]	1560	9000		4	54,0
Ramaria flava [29] - ?	1120±310	94±10			
Ramaria flava [39]	879±75	47540±569			178±16
Russula aeruginea				0,3	172,4
Russula alutacea/n.2				<0,05-0,05	58,7-80,3
Russula anatina				2,63	617,1
Russula aurea				<0,05	63,4
Russula brevipes [10]	2150±230	21500±2400			
Russula brevispora [56]	2172	355	5100	0,00528	67,6
Russula cyanoxantha/n.9				0,29-0,64	41,2-66,1
Russula cyanoxantha					
Russula cyanoxantha [41]				0,797±0,052	
SPECIE	*Mg ppm*	*K ppm*	*P ppm*	*Se ppm*	*Zn ppm*
Russula cyanoxantha [41]				0,635±0,067	
Russula cyanoxantha [11]				0,72	
Russula cyanoxantha [3]		31760			
Russula cyanoxantha	756	31840	3850	1,6	55
Russula delica				1,4	75,2
Russula delica [32]	688,7±65				56.58±0.54
Russula delica [34]	510	11150			230,23
Russula delica [4]	380	12080			190
Russula delica [42]	395,8±6,9			0,28±0,02	36,8±1,02
Russula delica [39]	1326±97	31250±700			102±10
Russula delica [25]	2000	18700			89,9

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Russula delica [26]	13600				
Russula delica [61]	307±1	910±11,5		26,9±0,1	105±1,6
Russula delica [20]	532,4	930±11,5			83,17
Russula delica [29]	7,3	99			83,17
Russula emeticicolor	880	32170	3070	1,3	49
Russula grisea	1047	36460	6910	1,2	61
Russula heterophylla [3]		27340-33810			
Russula integra				<0,05	61,2
Russula integra [56]	3270	410	2400	0,0269	105
Russula ionochlora	703	24360	3420	1,2	78
Russula lepida [61]	3270±16,1	4100±35			95±2,7
Russula mustelina [61]	2520±20,4	850±2,3			63,2±0,3
Russula romellii	724	32320	2850	0,2	89,1
Russula rosacea Pers. [3]		24780			
Russula rosacea/n.2				<0,05-0,05	36,1-68
Russula rosea/n.2				0,59-1,1	69,2-139,2
Russula vesca				<0,05	66,3
Russula vesca	981	42800	5470	0,8	83
Russula vesca [3]		27320			
Russula vesca [8]				1,4-2,1	
Russula vinosobrunnea/n.2				<0,05	80,3-144,6
Russula virescens				<0,05	83,9
Russula virescens [7]	119	846		0,12	0,959
Russula virescensa [8]				0,52-2,1	
Russula xerampelina [3]		30770			
Russula zvarae	1136	43450	4780	2,1	66
Sarcodon imbricatus [8]				0,57-0,69	
Sarcodon imbricatus [36]					80±5
Scutiger pes-caprae	969	29660		39	85
Scutiger pes-caprae					
Scutiger pes-caprae/n.3	734-830	17200-26600	3800-5460	90,4-122	37-79,1
Scutiger pes-caprae	730±100	21000±500		110±10	57±20
Scutiger (Albatrellus) pes-caprae [8]				41-76	
Sparassis crispa [10]	1810±410	23500±2300			
Sparassis crispa [27]				0,002 ±0,0006	14,69 ±0,4
Strobilomyces strobilaceus	636	33470	2420	0,9	62
Stropharia rugosoannulata [52]	1135±421				102±37
Suillellus luridus /Cap. [46]	556 ±81	11206±667		0,3/0,4 [2]	131±18
Suillus bovinus [7]	110	797		0,13	1,00

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Suillus bovinus [31]	1200±230	29000±2700			
Suillus brevipes [4]	550	6960			15
Suillus collinitus [8]				2,2-3,7	
Suillellus (Boletus) luridus /Cap. [46]	556 ±81	11206±667		0,3/0,4 [2]	131±18
Suillellus luridus /Stem [46]	340±223	7594 ±434		/	51±23
Suillellus luridus [3]		25230-25950			
Suillellus luridus [44]	1583±207	21654 ±3833		/	93±8
Suillellus luridus [44]	959±105	14779 ±2211		/	35±2
Suillellus luridus/n.2				0,3-0,38	69,5-284,3
Suillellus luridus	901	37000	7140	0,7	120
Suillus brevipes [4]	550	6960			15
Suillus granulatus		30000/35000			
Suillus granulatus [3]		30840/35350			
Suillus granulatus/n.7				0,10-0,54	67,9-78,7
Suillus granulatus	543	25000		0,4	39
Suillus granulatus [8]				0,46-2,1 (4,5)	
Suillus granulatus [25]	2740	29100			169
Suillus granulatus/n.17	658-2070	20100-46400	3166-7950	0,2-6	
Suillus grevillei [26]				0,37-1,1	
Suillus luteus	1300	40000			120
Suillus luteus [34]	1170	20720			122,51
Suillus luteus [62]	1300±140	45000±13000			49±25
Suillus luteus [4]	500	12700			146
Suillus luteus [65]	580±110	21400±200			60,27±20
Suillus luteus [31]	570±240	40000±9100			100±22
Suillus luteus [25]	2290	14700			111
Suillus luteus [26]				0,70-3,3	
Suillus luteus [20]	1686.1	7693			58,76
Suillus luteus/n.17	646-1630	20300-52500	3276-8286	0,2-9	
Tricholoma acerbum/n.4				0,47-4,4	25,7-56,2
Tricholoma columbetta/n.2				2,24	274,1-274,1
Tricholoma columbetta	1051	40670	2870	0,8	195,0
Tricholoma columbetta/n.10	949-1324	42100-68000	3529-5207	0,2-3	
Tricholoma gausapatum/n.5	1144-2167	53000-73800	3743-8775	2-4	
Tricholoma imbricatum [6]					166±39
Tricholoma imbricatum [39]	746±60	47689±860			75,3±6,2
Tricholoma imbricatum/n.4	961-1250	40600-54100	4344-8064	2-4	
Tricholoma matsutake	800	41000		/	80
Tricholoma matsutake [53]	130-350	830-1200			35-100

SPECIE	Mg ppm	K ppm	P ppm	Se ppm	Zn ppm
Tricholoma matsutake [52]	570±34				69±29
Tricholoma matsutake [57]	370±74	2400±1300			62±28
Tricholoma myomyces [34]	1660	14690			99,41
Tricholoma myomyces/n.7	1080-1633	48500-87400	2599-8710	0,2-3	
Tricholoma orirubens/n.9	1184-1588	54900-90100	5538-9390	0,2-4	
Tricholoma portentosum/n.4	810-1257	39448-66900	4256-6154	0,03-2	
Tricholoma terreum/n.4				0,05-0,23	60,1-142,9
Tricholoma terreum [3]		46650			
Tricholoma terreum [6]					155±31,2
Tricholoma terreum [60]	62,07				81,82
Tricholoma terreum	23,92	8579,85	2718,40		
Tricholoma terreum/n.10	1138-2289	48300-91600	3446-8419	0,2-3	
Tuber aestivum/n.2	810-891	22900-30530	6510	10-16	103-478
Tuber aestivum [27]				0,217±0,05	6,24±0,06
Tuber magnatum	226-239	5260-6400			
Tuber melanosporum	238	5260			
Vascellum (Lycoperdon) pratense [4]	1215	17100			420
Verpa bohemica	300	22900		2,0	
Verpa bohemica [8]				1,6-2,9	42,5-94,6
Volvariella volvacea [14]		13500			36,5
Volvariella volvacea [59]	1456±3	35470			75
Volvariella volvacea [7]	109	1546		0,09	0,759
Volvariella volvacea [13]			9780-13370		
Xerocomellus chrysenteron [3]		47210			
Xerocomellus chrysenteron [28]	739±34,0				78,5±3,5
Xerocomellus chrysenteron/n.2				0,09-0,2	59,5-63,2
Xerocomellus chrysenteron [25]	2570	21100			84,7
Xerocomellus chrysenteron [50]	14136,24			0,04	17,64
Xerocomellus pruinatus				<0,05	95,1

Nutritional information from ISS/ Rome

Magnesium, (Mg)

The daily requirement of this mineral is generally taken with the diet because magnesium is widely used in many foods. Recommended intake values are 250-350 mg per day for adults and the elderly and 450 mg for pregnant and breastfeeding women.
Magnesium deficiencies can sometimes be observed in alcoholic individuals and in patients undergoing surgery. Symptoms are anorexia, vomiting and increased muscle excitability.

Potassium, (K)

The average daily requirement is about 3100 milligrams / day for men and women, while for children it varies according to age: from. 4-6 years is 1100 md / day, while from 7-10 years it is 2000 mg / day. For EFSA, the recommended daily dose is higher. Potassium deficiency is manifested by muscle weakness, arrhythmias, tachycardia, confusion states and somnolence. Low potassium intake is associated with an increase in blood pressure and an increased risk of stroke.

Selenium, Selenio (Se)

The amount of dietary selenium (such as DL-selenomethionine) required to saturate the extracellular GSHPx selenium requirement was used as one of the approaches to define a reference dietary intake for selenium in the United States in 2000 (55 μg / day for adult men and women) (NAS, 2000). The so-called reference intake of the population of 55 μg selenium per day for adults, but also other levels of intake on the basis of other criteria, was established by the Scientific Committee for Food of the European Commission (1993).

Phosphorus, (P)

Phosphorus plays a fundamental role in the construction of proteins and in the energy exploitation of food: it is an integral part of many fundamental biological molecules, including the ATP involved in the transfer of energy in biological systems, as well as actively participating in the formation of molecules of RNA and DNA.
It is rare to be suffering from phosphorus deficiency, because many foods contain moderate quantities: milk, cheese, meat, fish and vegetables are particularly rich.
The daily requirement of phosphorus is equal to that of calcium, or for adults it is about 800 mg; 1000 mg in the elderly and 1200 mg in adolescents and pregnant or lactating women. Any phosphorus deficiencies are generally due to substances present in foods that hinder their absorption, or to antacids used for therapeutic purposes. In this case the observed symptoms are weakness, bone demineralization, anorexia and malaise.
On the contrary, the excess syndromes cause hypocalcemia, calcification and ossification of the soft tissues.

Zinc, (Zn)

The recommended dietary amounts establish that the European population reference (PRI) for zinc (SCF, 1993) for adult males and females is 9.5 mg / day and 7.0 mg / day, respectively. In the United Kingdom, the reference nutrient intake (RNI) for zinc is the same as the European PRI and was established in 1991 (Department of Health, 1991). Estimated average requirements (EAR) are 7.3 mg / day and 5.5 mg / day respectively for males and females. In the United States, the new guidelines recommend daily intakes of 11 mg / day and 8 mg / day for men and women respectively (Institute of Medicine, Food and Nutrition, 2001). Clinically defined zinc deficiency in humans is rare. Zinc deficiency, however, was observed in patients with total parenteral nutrition, patients taking penicillamine chelating agent and in acrodermatitis enteropathica, a genetic disease that led to zinc deficiency. The main clinical manifestations of zinc deficiency are growth retardation, delayed sexual maturation, diarrhea, increased susceptibility to infections, dermatitis, appearance of behavioral changes and alopecia. Symptoms of mild / marginal zinc deficiency include delayed wound healing, reduced resistance to infections and reduced growth rate (Walsh et al., 1994, WHO, 1996).

Table 2. *Nutritional information from EFSA - Mg, Adequate Consumption in mg/die.*

7-11 months	Males 80	Females 80
1-< 3 years	170	170
3-< 10 years	230	230
10-< 18 years	300	250
≥ 18 years	350	300 (Including pregnant and nursing women)

Table 3. *Nutritional information from EFSA - K, Adequate Consumption in mg/die.*

childrens aged 1 to 3 years	800 mg
childrens aged 4 to 6 years	1100 mg
childrens aged 7 to 10 years	1800 mg
childrens aged 11 e 14 years	2700 mg
adolescents aged 15 to 17 years	3500 mg
adults, including pregnant women	3500 mg
nursing women	4000 mg

Table 4. Nutritional information from / ANSES/ FR - P, Adequate Consumption in mg/die.

childrens aged 1 to 3 years	460 mg
childrens aged 4 to 6 years	450 mg
childrens aged 7 to 9 years	600 mg
childrens aged 10 -12 years	830 mg
adolescents aged 13-15 -boys	830 mg
adolescents aged 13-15 -girl	800 mg
childrens aged 16-19	800 mg
adults (20-64) man and women	750 mg
adults (25-74) man	750 mg
adults (25-74) women	800 mg
adults (≥75) man and women	800 mg

EFSA (Adequate Intakes (AIs)

The AI is 160 mg/day for infants aged 7-11 months and between 250 mg/day and 640 mg/day for children. For adults, the AI is 550 mg/day. Taking into consideration adaptive changes in phosphorus metabolism that may occur during pregnancy and lactation, it was considered that the AI for adults also applies to pregnant and lactating women.

Table 5. Nutritional information from EFSA - Se, Adequate Consumption in μg/die.

7-11 months	15 μg
1-3 years	15 μg
4-6 years	20 μg
7-10 years	35 μg
11-14 years	55 μg
15-17 years	70 μg
18 -24 years	70 μg

Table 6. Nutritional information from EFSA - Zn Adequate Consumption in mg/die.

7-11 months	2,9 mg
1-3 years	4,3 mg
4-6 years	5,3 mg
7-10 years	7,4 mg
11-14 years	10,7 mg
15-17 years (Males) 14,2 mg	(Females) 11,9 mg
>18 years (Males) 9,4-16,3 mg	(Females) 7,5-12,7 mg

Table 7. Nutritional Tables for some common Mushrooms.

Composition	Boletus edulis - dw	Cantharellus cibarius - dw	Lentinula edodes - dw	Pleurotus ostreatus - dw	Grifola frondosa - dw
Proteins	32,5%	21,5%	16,5%	23,8%	21,9%
Carbohydrates	46,95	34,6%	38,5%	40,7%	39,5%
Sugars	12,7%	2,5%	14,8%	6,7%	8,3%
Fats	2,85%	1,4%	3,4%	4,9%	3,9%
Saturated fats	0,6%	0,3%	<0,1%	0,72%	0,4%
Dietary Fiber	5,0%	22,7%	23,1%	15,2%	22,7%
Salt	50 mg	200 mg	40,4 mg	52 mg	48 mg
Moisture	8,7%	12,0%	12,1%	8,4%	0%
Ash	4,0%	7.0%	6,4%	7%	12%
Kcal	343	237	251	302	281
KJ	1438	992	1049	1265	1175

Composition	A. campestris dw	S. pes-caprae dw	M. esculenta dw	M. oreades dw	M. procera dw
Proteins	23,1%	20,4%	30%	33,1%	26,5%
Carbohydrates	34,1%	40,1%	22,4%	37,4%	47,4%
Sugars	11,7%	6,44%	4,3%	13,5%	1,8%
Fats	1,90%	7,2%	4,3%	2,99%	1,9%
Saturated fats	<0,1%	1,09%	1%	0,46%	0,5%
Dietary Fiber	26,4%	25,5%	26%	7,4%	6,8%
Salt	91 mg	99	100 mg	122 mg	452 mg
Moisture	11%	/	12,6%	9,1%	9,8%
Ash	3,5%	6,8%	4,6%	10%	7,6%
Kcal	229	307	248	309	313
KJ	958	1284	1040	1293	1309

The data sheets in the tables below are from the USDA, United States Department of Agriculture, Agricultural Research Service, National Nutrient Database for Standard Reference.

Table 8. Nutritional Values for Agaricus bisporus (White) - 100 g/Raw.

Proximity /Values	Amount %	% DV
Moisture	88,42	/
Energy Kcal	36,1	/
Energy KJ	151,04	/
Proteins (Valine) (Leucine)	3,28 (0,41) (0,15)	 6,56

Proximity /Values	Amount %	% DV
(Threonine)	(0,12)	
Fats	0,58	1,65
Saturated fats	0,06	/
Carbohydrates	4,44	3,41
Sugars	2,25 (dextrose)	/
Dietary Fiber	2,23	5,87
Ash	1,05	/

Elements	Amount	% DV
Ca, calcium	3,30 mg	0,33
Fe, iron	0,39 mg	4,96
Mg, magnesium	13,22 mg	3,15
P, phosphorus	134,7 mg	19,24
K, potassium	437,2 mg	9,30
Na, sodio	10,74 mg	0,72
Zn, zinc	0,65 mg	5,93
Cu, copper	0,39 mg	43,24
Mn, manganese	0,066 mg	2,91
Se, selenium	21,9 µg	39,82

Water-soluble vitamins	Amount	% DV
Vitamin B1/ Thiamine	0,072 mg	5,99
Vitamin B2 /Riboflavin	0,403 mg	31,02
Vitamin B3/Niacin	6,25 mg	39,10
Vitamin B5/Pantothenic acid	1,262 mg	25,24
Vitamin B6/Pyridoxine	0,122 mg	9,40
Vitamin B9/ Folate	19 µg	4,75
Folic acid	0 µg	ND
Folate, Food	19 µg	ND
Folate -DEF	19 µg	ND
Choline (Vitamin J)	32,81 mg	5,96

Fat-soluble vitamins	Amount	% DV
Betaine	11,48 mg	ND
Vitamin D/ D2+D3	0,33 µg	2,20
Vitamin D2 /Ergocalciferol	0,33 µg	ND
Vitamin D3/Cholecalciferol	0 µg	ND

Fat-soluble vitamins	Amount	% DV
Vitamin D IU	14 IU	ND

Polyunsaturated fats	Amount	% DV
Linoleic acid	0,232 g	ND

Table 9^ - Nutritional Values for ***Boletus edulis*** *- 100 g/Raw.*

Proximity /Values	Amount %	% DV
Moisture	92,12	/
Energy Kcal	37,35	/
Energy KJ	156,27	/
Proteins	2,5	
Alanine - Arginine	0,187 - 0,123	5,0
Lysine - Proline	0,252 - 0,176	
Aspartic acid – Glutamic acid	0,228 - 0,428	
Fats.	0,1	0,28
Saturated fats	0,014	/
Carbohydrates	4,3	3,30
Sugars	1,72	/
Dietetic Fiber	0,6	1,58
Ash	0,98	/

Elements	Amount	% DV
Ca, calcium	18 mg	1,8
Cu, copper	0,50 mg	55,43
Fe, iron	0,40 mg	5,08
Mg, magnesium	9,00 mg	2,14
P, phosphorus	120 mg	117,14
K, potassium	448 mg	9,53
Na, sodium	6 mg	0,40
Zn, zinc	1,2 mg	10,92
Mn, manganese	0,142 mg	6,26
Se, selenium	26 µg	47,2

Water-soluble vitamins	Amount	% DV
Vitamin B1/ Thiamine	0,095 mg	7,90

Water-soluble vitamins	Amount	% DV
Vitamin B2 /Riboflavin	0,49 mg	37,72
Vitamin B3/Niacin	3,8 mg	23,77
Vitamin B5/Pantothenic acid	1,50 mg	30,0
Vitamin B6/Pyridoxin	0,11 mg	8,47
Vitamin B9/Folate	25 µg	ND
Folate Food	25 µg	ND
Folate, DFE	25 µg	ND
Fat-soluble vitamins	**Amount**	**% DV**
Vitamin D/ D2+D3	0,1 µg	0,66
Vitamin D2 /Ergocalciferol	0,1 µg	ND
Vitamin D3/Cholecalciferol	0 µg	ND
Vitamin D IU	3 IU	ND
Vitamin E (alpha-tocopherol)	0,01 mg	
Vitamin J (Choline Tot.)	22,1 mg	4,02[46]
Polyunsaturated fats	**Amount**	**% DV**
Linoleic acid	0,090 g	ND

Nota: US Recommended Daily Intake (RDI) for Adults. [46] Food and Nutrition Board of the Institute of Medicine of the National Academy of Sciences of USA: the recommended daily intake of choline for men and women is 550 mg/day and 425 mg/day.

Table 10. *Nutritional Values for Cantharellus cibarius - 100 g/Raw.*

Proximity /Values	Amount %	% DV
Moisture	85,99	/
Energy Kcal	38,18	/
Energy KJ	159,74	/
Proteins	1,48	2,96
Fats	0,54	1,54
Saturated fats	0,11	
Carbohydrates	6,85	5,27
Sugars	1,16	/
Dietetic Fiber	3,88	10,21
Ash	1,26	/

Elements	Amount	% DV
Ca, calcium	14,8 mg	1,48
Fe, iron	3,46 mg	43,25
Mg, magnesium	12,96 mg	3,09
P, phosphorus	57,4 mg	8,20
K, potassium	505,55 mg	10,75
Na, sodium	9,26 mg	0,61
Zn, zinc	0,76 mg	6,9
Cu, copper	0,35 mg	38,88
Mn, manganese	0,28 mg	12,18
Se, Selenium	2,22 µg	4,03

Water-soluble vitamins	Amount	% DV
Vitamin B1/ Thiamine	0,0148 mg	1,24
Vitamin B2 /Riboflavin	0,214 mg	16,52
Vitamin B3/Niacin	4,08 mg	25,53
Vitamin B5/Pantothenic acid	1,07 mg	21,48
Vitamin B6/Pyridoxine	0,044 mg	3,42
Vitamin B9/ Folate	1,85 µg	0,46
Folic acid	0 µg	ND
Folate, Food	1,85 µg	ND
Folate -DEF	1,85 µg	ND

Fat-soluble vitamins	Amount	% DV
Vitamin D/ D2+D3	2,9 -12,9 µg	35,79
Vitamin D2 /Ergocalciferol	2,9 -12,9 µg	ND
Vitamin D3/Cholecalciferol	0 µg	ND
Vitamin D IU	114 - 507 IU	ND

Fats	Amount	% DV
Campesterol	1 mg	ND

3. Results

Many wild and inedible mushrooms of high biological and cultural importance were identified in the study area (Val Taro and Val Ceno/PARMA/Italy). We collected, dried, and analyzed them, then compared the analytical results with extensive data from the specific literature.

The mushrooms were collected by mycologists of the Analytical Laboratory and by mycologists from the Parma Local Health Authority; some were provided by local collectors or companies in the sector.

The species studied were identified by the aforementioned mycologists, who analyzed over 150 mushroom species traded in the markets of Western Emilia, more specifically in the Tuscan-Ligurian-Emilian Apennines.

The dry matter content varied very little among the various species, and in general, the mushrooms contained approximately 90% moisture and 10% dry matter. We did, however, note some differences, albeit insignificant, compared to the average values. These differences were attributed by the authors to fluctuations in environmental factors during growth and storage, which influence mushroom metabolism. Differences in dry matter are mainly due to the fungal species, climatic conditions, growth substrates, and geographic distribution. Ash content varied little among the different species, but overall we reported low ash percentages in both wild and cultivated edible mushrooms.

Nutritional metal content varies depending on the growing medium, and in fact we had already noted large variations, especially in potassium (K), which is high in our geographical area (already highlighted in our important research on K40)).

While our studies on nutritional value show few differences in proteins, fats, carbohydrates, and total fiber, in the current research the differences are not only in potassium but also in magnesium, phosphorus, selenium, calcium, iron, etc.

Some general considerations, however, must be made.

For example, wild mushrooms have higher levels of phosphorus and potassium. Therefore, mushrooms are rich in minerals and represent an excellent source of minerals.

In this study, we report high calcium (Ca) and magnesium (Mg) contents in mushrooms.

We observed that in mushrooms They also have a good zinc (Zn) content.

This technical report, presented in Perugia (Italy) in November 2018, is one of the first to demonstrate the nutritional contribution of wild edible mushrooms to the diets of people who consume them. The research shows that these mushrooms have a high mineral content, which contributes to diet improvement and dietary diversification.

4. Conclusions

The nutritional profile of the studied wild edible mushrooms was characterized by high K, Mg, P, Se, Zn concentrations, as an interspecific variation in micronutrient composition. Dietary intake of these mushrooms provides significant nutritional supplementation to consumers, with greater dietary relevance for ethnic populations who use them as traditional food sources.

Acknowledgments

As you can read in the full text this Technical Report first tackled a thorough research on what has been done and published by the various international authors.

Then we dug and found in our Archives (Analytical snc) any analysis on the fresh, dry and otherwise preserved mushroom: many analyzes were targeted, with the criteria then, to the nutritional analysis while many others (more numerous) to the environmental analysis (made these with the collaboration of the ex-PMP / PR).

From these (n ˃ 1000) last we extracted the data related to Se and Zn. The data in Bleu are very recent and performed according to the EU criteria for labeling.

We therefore thank Dr Sara Reverberi (ex-PMP / PR) who materially performed the environmental analyzes on samples delivered by us as AUSL n.6 / PR.

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Finally, we would like to thank all the Authors mentioned in the Bibliography, who have enabled us to have an overall and complete evaluation of these nutritional metals.

Thanks also to all of you for having listened (I hope) this theme a little foreign to Traditional Mycology but that the friend Visentin wanted to insert.

A special THANK YOU therefore to the AMB for the cultural sensitivity demonstrated in having wanted to introduce this new topic in the scientific debate.

The full text is in English and therefore very simple to read and understand.

Conflicts of Interest

The authors declare no conflicts of interest.

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