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## EDIBLE MUSHROOMS IN THE PERM TERRITORY FORESTS (RUSSIA)

### SUMMARY

The Perm Territory is situated on the northeast of the East European Plain and adjacent western sides of the Northern and Medium Ural Mountains. The Territory stretches from the north to the south for approximately 600 km, between 56° 06' and 61° 39' of latitude north, and from the west to the east for 400 km (between 51 47' and 59° 39' of longitude east). The area of the Perm Territory is 160,6 ths sq. km. The climate is temperate continental. The territory belongs to taiga. The population uses edible mushrooms for food. Usually the people pick up about 20 species of mushrooms (5 – 7 species in the North) that decreases their crop capacity.

The objective of the research is to study species diversity of edible mushrooms. The research methods are route and stationary. The author started studying agarics systematically in 1975. At present 872 species of agarics have been discovered, 307 of them are edible. They generally can be found in the subzone of the southern taiga (266 species). Least of all edible fungi are found in the subzone of the middle taiga (103 species). These are mushrooms from the families *Russulaceae* (98 species), *Tricholomataceae* (63), *Boletaceae* (29) and *Agaricaceae* (24). Mushrooms forming mycorrhiza prevail (211 species). There are many mushrooms growing on the litter (53) and on the wood (44). Strict confinement to the substratum is not found. The mushrooms can belong not only to one, but several ecological groups.

Considering the distribution of mushrooms in the Perm Territory, it may be recommended to use for food 89 species with large fruit bodies and good taste qualities.

**Keywords:** Russia, Perm Territory, taiga, edible mushrooms.

### INTRODUCTION

For a long time people of the Perm Territory have been using wild-growing mushrooms for food. Scientific and popular literature has many data about nutritional value of mushrooms. The species composition of picked up mushrooms is traditional and limited. The population uses no more than 20 – 50 species for food. The people do not use the majority of mushrooms for food,

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because they are not aware of them and the fruit bodies of mushrooms are not large. According to data provided by mycologists who work in various regions of Russia, there are 200 – 300 species of edible mushrooms. There is not enough information about the variety and reserves of mushrooms in different regions. These data are necessary in order to expand the variety of the species in use and to preserve mushrooms that are picked up intensively. Constant picking up of one and the same species leads to their quantity reduction and mycelium weakening. This may have an adverse effect on the overall biogeocenosis structure, because mushrooms are its inherent component. In connection with extinction of some species of mushrooms and their resources reduction, it has become necessary to work for mushrooms preservation, especially that of rare ones. The objective of the research is to study species diversity of edible mushrooms.

### MATERIAL AND METHODS

The Perm Territory is situated in the northeast of the East European Plain and adjacent western sides of the Northern and Medium Ural Mountains. The Territory stretches from the north to the south for approximately 600 km, between 56° 06' and 61° 39' of latitude north, and from the west to the east for 400 km (between 51 47' and 59° 39' of longitude east). The area of the Perm Territory is 160,6 ths sq. km.

In the geological respect, Permian solid rocks prevail in the Territory. There is the northern part that undergone glaciation and the southern part, the nonglacial one (Максимович, 1958). Land sculpture of the Perm Territory is a long and complicated process. Low-lying plots alternate with ridged and hilly areas that prevail on the territory. In wholes, the relief is quiet due to gentle, almost horizontal rock bedding of the Russian Platform (Шимановский, 1970).

The climate is temperate continental. It is peculiar for the predominance of Atlantic and continental air masses from the west and southwest. They become cool at the slope of the Urals and fall in the form of precipitation (Шкляев, Матарзин, 1959). That is why the amount of atmospheric precipitation and the wintertime increase to the east and northeast. Moreover, cold air masses from the Arctic, Barents Sea and Kara Sea pass through the Perm Territory that causes temperate summer and cold winter. The Kama reservoir is created on the major waterway of the Territory – the Kama river. It plays an important role in forming the climate. The coldest month is January and the hottest month is July. For example, in Perm the average atmospheric temperature in January is – 15,1°C, while in July it reaches +18°C. Average vegetation length is 110 days. Average annual precipitation in Perm according to long-term data is 570 mm. The maximum is from June to August.

Soil of the Perm Territory is various (Копотаев, 1958). There are four soil subzones: 1) podzol and swampy soil subzone; 2) sod-podzol soil subzone; 3) forest-steppe soil subzone; 4) the Urals mountain soil subzone.

Flora and vegetation of the Perm Territory are dissimilar, because it stretches from the north to the south and has differences in the relief. Even the

first explorers of the flora (Крылов, 1882; Сюзёв, 1912) pointed out a mixture of European and Asian species on the Territory, despite the Urals as a natural border. At present there are about 1900 species of higher plants (Овеснов и др., 2007). S.A. Ovyosnov (1997) offered botanical-geographical zoning of the Perm Territory. There are six districts (Figure 1). Forests are 25% in the south and 80% in the north of the Territory (Малеев, 1990).



Figure 1. Botanical-geographical districts of the Perm Region (Овеснов, 1997)

- 1 – middle taiga fir-spruce forests: а – with a predominance of pine and spruce forests, б – with a predominance of fir-spruce forests;
- 2 – southern taiga fir-spruce forests: а – with a predominance of agricultural lands, б – with a predominance of aspen and birch forests in place of southern taiga dark coniferous forests;
- 3 – broad-leaved spruce-fir forests; 4 – insular Kungur forest-steppe;
- 5 – middle and southern taiga foothill fir-spruce and spruce-fir forests;
- 6 – northern and middle taiga cedar-spruce mountain forests.

From the north to the south the species composition of arboreal plants changes significantly. In middle taiga forests, that are often swampy, *Picea obovata* and *Abies sibirica* are predominant (Latin names are given according to Ovecnov et al., 2007).

Southern taiga spruce-fir forests have *Tilia cordata* in the arboreal layer. Sometimes pure linden forests are found. Broad-leaved coniferous forests, except for fir, spruce and linden, have also *Ulmus* sp., *Acer* sp. and sometimes *Quercus robur* in their arboreal layer. Pure oak-tree forests are found occasionally. In the northeast part of the Perm Territory mountain and partly foothill fir-spruce forests with *Pinus sibirica* and *Larix sibirica* are common.

Forests consisted of *Pinus sylvestris* are mostly distributed along the Kama river and the Chusovaya river valleys, on the slopes of watersheds, sometimes with the Siberian larch. Pure larch forests are found occasionally. All over, there are distributed secondary small-leaved forests that appeared in former places of glades and burnt-out forests. These are forests that include *Populus tremula* and *Betula pendula*. *Alnus incana* grows along small rivers. Various marsh vegetation is widely spread, especially in the north.

Recently dominant forest species have been changing. The area of fir-spruce forests is shrinking and the area of deciduous and pine forests is growing, as a result of human economic activity, influence of industrial emissions into the air and negative influence of the Kama reservoir. Meadows are attached mostly to river valleys.

On the whole, the geographical description of the Perm Territory is rather various, but only the southern zones are more favorable for agarics.

The study of mycobiota of the Perm Territory before our researches has been incomplete. Some data about mushrooms could be found in the work of scientists studying the flora of the Perm Territory. They recorded only 50 species of agarics. Since 1975 we have conducted a systematic study of the agarics of the Perm Territory. The research methods are route and stationary. Stationary researches have been pursued since 1975 until present in ten types of forests, in the southern taiga subzone. Condition of agarics' species composition has been monitored. Experimental areas (1000 sq.m.) have been installed in spruce, pine, birch, linden, aspen and older forests.

362 species of agarics had been found by Переведенцева (1980). In 1996 several expeditions took place. As a result of the researches, a list of agarics reached 665 species (Переведенцева, 1997). 872 species are known at present. A list of species is given in the text according to The Abstract of Agarics of the Perm Territory (Perevedentseva et al., 2007; Переведенцева, 2008).

## RESULTS AND DISCUSSION

### 1. Mushrooms for food in different regions of the Perm Territory

Mushrooms are traditional food for the inhabitants of the Perm Territory. Mushrooms contain many proteins, carbohydrates, fats, organic acids and biologically active substances. Mushrooms have nutritional and medicinal value

thanks to containing vitamins A, B, D, PP and C. They have mineral substances as well: more of K and P, and less of Na, Ca and Fe. Many edible mushrooms have medicinal features. Using them for food supplies the human organism with various vitamins, enzymes, antibiotics and other essential substances.



Figure 2. Marketplace in Perm. Professor Perevedentseva L.G. with her university students at the excursion.

At the present time 307 species of edible mushrooms are known in the Perm Territory, that is 35.2 % from all revealed species. However, the population usually picks up not more than 20 – 50 species that is about 6 – 16 % of all the edible mushrooms.

Poisonous mushrooms are few (50 species, 5.7 %). Thereby, 515 species (59,0 %) are not used in food for various reasons, such as: small fruit bodies and unpleasant smell and taste. Poisonous species are not a threat to the inhabitants of the Perm Territory, because everyone knows them from their childhood and can recognize them. However, the death cap (*Amanita phalloides*) in the south of the Territory is dangerous, as it can easily be confused with edible russules (*Russula* sp.) and champignons (*Agaricus* sp.).

At the market, one can come across a wide range of edible mushrooms brought from the north and the south of the Perm Territory (Figure 2). Sometimes they even sell poisonous mushrooms, for example, *Amanita muscaria*. This mushroom is used in folk medicine for making remedies.

In the north of the Territory the species composition that is used in food, is more permanent than in the south. In the north the people generally pick up *Boletus edulis*; *B. pinophilus*; *B. betulicola*, *Lactarius deliciosus*, *L. resimus* and *L. torminosus* (Figure 3). In the south there are fewer forests, especially coniferous ones. Thus, there are fewer mushrooms, that is why the people gather the following species, besides the above-mentioned: *Leccinum aurantiacum*, *L. scabrum*, *L. versipelle*, *Suillus bovinus*, *S. granulatus*, *S. grevillei*, *S. luteus*, *S. variegatus*, *Lactarius necator*, *L. pubescens*, *L. rufus*, *Russula* sp., *Xerocomus subtomentosus*, *Tricholoma flavovirens* and *T. portentosum*. The population almost never uses wild-growing mushrooms from the genus *Agaricus* sp. In shops, there are many cultivated mushrooms of the genera *Agaricus* sp. and

*Pleurotus ostreatus*. We can observe an interesting disparity: people buy these mushrooms in the shops, but do not pick them up in the nature. Apparently, they are afraid to confuse them for some poisonous mushrooms and are unaware of the variety of edible mushrooms.

In the Perm Territory people fry mushrooms, make soup, sauces and store them up. For the latter purpose they dry, pickle and freeze them (right away or after pre-boiling).

For frying, they take different species. The more the quantity of species is, the more is the quantity of useful substances in them. It is recommended to use mushrooms without a prolonged thermal processing that destroys useful compounds. Famous scientist E.M. Булах (2001) suggests cutting mushrooms to slices, 1 cm thick, and fry from both the sides until light brown. In this case, a thermal processing happens on the outside, while the pulp of mushrooms remains almost raw and bioactive substances are practically not destroyed. Another important variant of cooking mushrooms is making broths or sauces from chopped mushrooms. Nutrients are inside the cells, which capsules contain chitin (it is similar to chitin of insects and crustacean). Human organism cannot digest chitin, that is why it is necessary to chop and grind mushrooms and then boil them to dissolve nutrients. It should be remembered that mushrooms are hard to digest, that is why people suffering from diseases of the gastrointestinal tract should take them in small quantities (better in broths). It is not advisable for kids and aged people to consume mushrooms.



Figure 3. *Boletus pinophilus* in the forest and at the market

They dry generally pore fungi. The most valuable are *Boletus edulis*; *B. pinophilus*; *B. betulicola*. They pickle mainly pore fungi as well, such as *Boletus edulis*; *B. pinophilus*; *B. betulicola*, as well as *Leccinum aurantiacum*, *L. scabrum*, *L. versipelle*, *Suillus bovinus*, *S. granulatus*, *S. grevillei*, *S. luteus*. Then they use dried mushrooms for making soups, sauces, pies and so on.

Both pore and lamellar fungi can be frozen. Fruit bodies are cut in large pieces, washed and put in plastic bags into the freezer. The following method is more popular: mushrooms are boiled within 20 minutes with a little amount of salt, then filtered and put into the freezer.

People generally pickle lamellar mushrooms. The most delicious are *Lactarius deliciosus*, *L. resimus*, *Lactarius necator*, *L. pubescens*, *L. torminosus*, and mushrooms of the genus *Russula* sp. are also tasteful.

Many species are used for therapy. One can use edible medicinal mushrooms in different ways: in food; for making powder from dried mushrooms; for preparing aqueous and alcoholic infusions and ointments for external application.

The rest of the 515 species are considered inedible for a number of reasons. Taking into account occurrence, abundance, sizes and taste of the fruit bodies of edible mushrooms, we may recommend for the population to pick up 89 more species, such as *Pleurotus ostreatus*, *P. pulmonarius*, *Xerocomus chrysenteron*, *Chroogomphus rutilus*, *Gomphidius glutinosus*, *Hygrophorus hypothejus*, *Cantharellula umbonata*, *Clitocybe clavipes*, *C. gibba*, *C. odora*, *Clitopilus prunulus*, *Collybia butyracea* var. *butyracea*, *C. butyracea* var. *asema*, *C. dryophila*, *Flammulina velutipes*, *Laccaria laccata*, *Lepista nebularis*, *L. nuda*, *Marasmius scorodoni*, *M. oreades*, *Melanoleuca melaleuca*, *Oudemansiella plathyphylla*, *Tricholoma focale*, *T. terreum*, *T. scalpturatum*, *Amanita crocea*, *A. fulva*, *A. rubescens*, *A. vaginata*, *Pluteus atricapillus*, *Agaricus abruptibulbus*, *A. silvicola*, *A. silvaticus*, *Lepiota clypeolaria*, *L. alba*, *Macrolepiota procera*, *M. rhacodes*, *Cystoderma amiantinum*, *C. granulorum*, *Coprinus comatus*, *Kuehneromyces mutabilis*, *Cortinarius alboviolaceus*, *C. armillatus*, *C. collinitus*, *C. mucosus*, *C. pholideus*, *Rozites caperatus*, *Lactarius theiogalus* and others.

## 2. Distribution of edible mushrooms in the Perm Territory

Route researches have been conducted since 1975 on almost all the geobotanical districts of the Perm Territory. The majority of species has been found in the southern taiga. 266 species of edible mushrooms have been discovered. (Figure 4).

This diversity of mushrooms is connected not only with the species composition of arboreal plants, but also with the fact, that stationary researches have been done in this subzone since 1975 and it helps to find the maximum number of species. In the southern taiga – the central part of the Perm Territory, – the population is more aware of various species of edible mushrooms and uses them in food. The least quantity of mushrooms, 103 species, is found in the middle taiga. It is the northern part of the Perm Territory.

There are many bogs and some heavy-going places. Density of population is not much. High productivity of mushrooms is typical. There are many edible mushrooms in the mountain taiga (182 species).

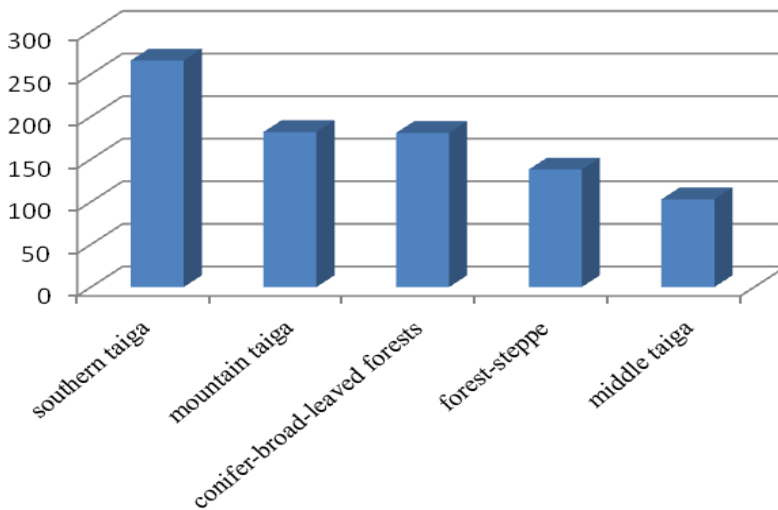


Figure 4. Quantity of the species of edible mushrooms in the geobotanical districts of the Perm Territory

There are specific species – symbionts *Pinus sibirica*. In conifer-broad-leaved forests the quantity is roughly the same (181 species). There are 138 species of edible mushrooms in the forest-steppe. Agriculture in this region is well developed. Forests are few, that is why there are few mushrooms, too: both in the number of species and in the number of fruit bodies.

### 3. Ecologo-trophic analysis of edible mushrooms

Edible mushrooms grow on different substrata: on the wood, soil, litter and humus. They belong to seven ecologo-trophic groups. These are such groups as saprotrophs (*St* – on the litter, *Hu* – on the humus, *Le* – on the wood, *M* – on the mosses, *Ec* – on the excrements); symbiotrophs (*Mr* – mycorrhizal); parasites (*P* – on the trees and bushes) (Коваленко, 1980; Urbonas et al., 1986). Many species may belong to several ecologo-trophic groups, that are why we have considered all the variants.

As the researches have shown, the majority of species of edible mushrooms comes in symbiosis with arboreal plants and is mycorrhizal. There are 204 species of such mushrooms. The species composition of these mushrooms is connected, in many respects, with the diversity of arboreal plants. These are mainly mushrooms with large fruit bodies. For example, mushrooms of the genera *Boletus*, *Suillus*, *Leccinum*, *Lactarius*, *Russula* and some others. The quantity of edible mushrooms growing on the litter and on the wood is almost the same (about 40 species). *Pleurotus ostreatus*, *Kuehneromyces mutabilis*,



Flammulina velutipes and other species grow on the wood of deciduous trees. Unfortunately, the people practically do not pick up these species. *Lepista nuda* is a litter saprotroph (probably, a mycorrhizal mushroom) that is rarely used in food. There are 27 species of humus saprotrophs. Mushrooms of the genus *Agaricus* are the most popular and widespread. Oddly enough, the population does not pick them up in the nature, but buys them in the cultivated forms in the shops. Mushrooms of the genus *Armillaria* are considered optional parasites.

This mushroom is the most popular in the central part of the Perm Territory and in its southern regions where disturbed forests abound. It is mainly pickled or dried by the population.

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#### 4. Taxonomic analysis of edible mushrooms of the Perm Territory

In the Perm Territory, agarics belong to 20 families. Mushrooms from the families *Tricholomataceae*, *Cortinariaceae* and *Russulaceae* are the most widespread, that is typical for a forest area. Edible mushrooms are found in 19 families (Table 1). They mostly belong to the families *Russulaceae* (98 species out of all the edible mushrooms, or 32 %) and *Tricholomataceae* (63 species, or 21 %) (Figure 5).



Figure 5. The ratio of the species of edible mushrooms in different families of agarics in the Perm Territory.

There are rather many edible mushrooms in the families *Boletaceae* (29 species, or 9 %) and *Agaricaceae* (24 species, or 8 %). Thereby, approximately 70 % of edible mushrooms (214 species) belong to the four above-mentioned families. The least of edible mushrooms are in such families as *Bolbitiaceae*, *Hygrophoropsidaceae* and *Strobilomycetaceae* (one species in each). 58 genera that contain edible species have been revealed altogether. The quantity of species in the genera is different. We have singled out the following groups: 1 – the

quantity of species is from 1 to 5; 2 – the quantity of species is from 6 to 10; 3 – the quantity of species is over 10. 44 genera have from 1 to 5 species. The most popular mushrooms from this group are those of the genus *Armillaria* (the central and the southern parts of the Territory). 18 genera have turned out to have one species each. These are mainly little known edible mushrooms. The most familiar of them are *Rozites caperatus*, *Marasmius oreades*, *Kuehneromyces mutabilis* and *Flammulina velutipes*. Unfortunately, the population almost never uses these species in food.

Table 1. Taxonomic structure of edible agarics of the Perm Territory

Family	Quantity of genera	Quantity of species	Genera (with an indication of the quantity of species and intraspecific taxa)
<i>Agaricaceae</i>	7	24	<i>Agaricus</i> (10), <i>Chlorophyllum</i> (1), <i>Cystoderma</i> (4), <i>Lepiota</i> (3), <i>Leucoagaricus</i> (2), <i>Leucoprinus</i> (1), <i>Macrolepiota</i> (3)
<i>Amanitaceae</i>	2	12	<i>Amanita</i> (9), <i>Limacella</i> (3),
<i>Bolbitiaceae</i>	1	1	<i>Agrocybe</i> (1)
<i>Boletaceae</i>	3	29	<i>Boletus</i> (7), <i>Leccinum</i> (10), <i>Suillus</i> (12)
<i>Coprinaceae</i>	2	6	<i>Coprinus</i> (3), <i>Psathyrella</i> (3)
<i>Cortinariaceae</i>	3	17	<i>Cortinarius</i> (15), <i>Phaeolepiota</i> (1), <i>Rozites</i> (1)
<i>Crepidotaceae</i>	1	3	<i>Crepidotus</i> (3)
<i>Entolomataceae</i>	2	2	<i>Clitopilus</i> (1), <i>Entoloma</i> (1)
<i>Gomphidiaceae</i>	2	7	<i>Chroogomphus</i> (4), <i>Gomphidius</i> (3)
<i>Gyrodontaceae</i>	2	4	<i>Boletinus</i> (2), <i>Gyroporus</i> (2)
<i>Hygrophoraceae</i>	3	13	<i>Cuphophyllum</i> (2), <i>Hygrophorus</i> (10), <i>Pseudohygrocybe</i> (1)
<i>Hygrophoropsidaceae</i>	1	1	<i>Hygrophoropsis</i> (1)
<i>Lentinaceae</i>	2	5	<i>Phyllotopsis</i> (1), <i>Pleurotus</i> (4)
<i>Pluteaceae</i>	2	10	<i>Pluteus</i> (7), <i>Volvariella</i> (3)
<i>Russulaceae</i>	2	98	<i>Lactarius</i> (36), <i>Russula</i> (62)
<i>Strobilomycetaceae</i>	1	1	<i>Fuscoboletinus</i> (1)
<i>Strophariaceae</i>	3	7	<i>Kuehneromyces</i> (1), <i>Pholiota</i> (4), <i>Stropharia</i> (2)
<i>Tricholomataceae</i>	18	63	<i>Armillaria</i> (4), <i>Calocybe</i> (1), <i>Cantharellula</i> (1), <i>Clitocybe</i> (6), <i>Flammulina</i> (1), <i>Gymnopus</i> (3), <i>Laccaria</i> (4), <i>Lepista</i> (8), <i>Lyophyllum</i> (5), <i>Marasmius</i> (2), <i>Megacollybia</i> (1), <i>Melanoleuca</i> (3), <i>Rhodocollybia</i> (3), <i>Strobilurus</i> (3), <i>Tricholoma</i> (14), <i>Tricholomopsis</i> (2), <i>Xerula</i> (1), <i>Callistosporium</i> (1)
<i>Xerocomaceae</i>	1	4	<i>Xerocomus</i> (4)
Total	58	307	

There are up to ten species in nine genera, such as *Lyophyllum* (5), *Clitocybe* (6), *Boletus* (7), *Pluteus* (7), *Lepista* (8), *Amanita* (9), *Agaricus*, *Hygrophorus* and *Leccinum* (ten species accordingly). The most valuable and popular mushrooms are those of the genera *Boletus* and *Leccinum*. Connoisseurs

of mushrooms pick up *Lepista nuda* occasionally, while other species are never used, even mushrooms of the genus *Agaricus*.

Over ten species pertain to five genera: *Suillus* (12), *Tricholoma* (14), *Cortinarius* (15), *Lactarius* (36) and *Russula* (62). They use mushrooms of the genera *Russula* and *Suillus* practically in full. Five species of the genus *Lactarius* are usually picked up. Mushrooms of the genus *Cortinarius* are not used. As for the genus *Tricholoma*, they have recently started using and even selling at the market *Tricholoma flavovirens* and *T. portentosum*.

### CONCLUSIONS

- Agarics of the Perm Territory have been studied since 1975. 872 species have been found, 307 of them are edible.
- The population uses 20 – 50 species in food. In the north, the people are more conservative and generally pick up pore fungi and some lamellar mushrooms (*Lactarius*, *Russula*). The population does not use wild-growing mushrooms of the genera *Agaricus* and *Pleurotus*.
- The majority of species (266) is typical for the southern taiga. There are least of all the edible mushrooms (103) in the middle taiga, though high productivity has been recorded.
- Edible mushrooms belong to seven ecological groups. Mycorrhizal mushrooms, xylophages and litter saprotrophs prevail.
- The majority of edible mushrooms is in the families *Russulaceae* and *Tricholomataceae*. Out of 58 genera, over 10 species belong to 5 genera. In 44 genera the quantity of species is from 1 to 5.
- For the purpose of protecting nature and rational use of natural resources, the range of edible species of mushrooms picked up by the population should be expanded.

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## JESTIVE GLJIVE U ŠUMAMA PERMSKOG KRAJA (RUSIJA)

### SAŽETAK

Permski kraj nalazi se na sjeveroistoku Istočnoevropske nizije, uz zapadne obode Sjevernih i Srednjih Uralskih planina. Dužina Kraja od sjevera do istoka iznosi oko 600 km, između 56° 06' i 61° 39' sjeverne geografske širine a od zapada ka istoku oko 400 km (između 51 47' i 59° 39' istočne geografske dužine). Površina Permskog kraja iznosi 160.600 km<sup>2</sup>. Kilma je umjerena kontinentalna. Teritorija pripada tajgi. Stanovništvo sakuplja jestive gljive za ishranu. Ljudi obično beru oko 20 vrsta gljiva (5-7 vrsta na sjeveru) što smanjuje rodnost.

Cilj istraživanja jeste da se prouči diverzitet vrsti jestivih gljiva. Metodi istraživanja su maršrutni i stacionarni. Autor je počeo sistematsko pručavanje pečuraka 1975. godine. Do danas je otkriveno 872 vrste pečuraka, od čega 307 jestivih. Generalno, mogu se pronaći u podzoni južne tajge (266 vrsta). Najmanje svih jestivih gljiva nalazi se u podzoni srednje tajge (103 vrste). To su gljive iz familija *Russulaceae* (98 vrsta), *Tricholomataceae* (63), *Boletaceae* (29) i *Agaricaceae* (24). Preovlađuju mikorizne gljive (211 vrsta). Mnogo gljiva raste na đubrištu (53) i na drvetu (44). Nije otkriveno strogo ograničavanje samo na supstrat. Gljive mogu pripadati više nego jednoj ekološkoj grupi.

S obzirom na rasprostranjenost gljiva u Permskom kraju, za ishranu se može preporučiti 89 vrsta sa velikim tijelom, dobrog ukusa.

**Ključne riječi:** Rusija, Permska oblast, tajga, jestive gljive