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## FUNGI IN THE LEGISLATION OF THE REPUBLIC OF SERBIA

**ABSTRACT:** Conservation and protection of fungi have lately been considered as extremely important elements of the environmental conservation, and numerous environmental, scientific, medical, economic, cultural, ethical, and other reasons for such attitude exist today. This paper presents an overview of official regulations on the protection of fungi in the Republic of Serbia from the Act of Protection of 1991 until today. The paper lists and analyses the good and bad provisions of individual legal regulations. It registers the effects of the adopted regulations on the actual efficiency of protection of endangered species of fungi (macrofungi, mushrooms), and considers the impact of chronological development of legislation on the population of fungi in nature, and presents general measures to improve protection of mushrooms in the future. These measures primarily include reliable information and study of fungi as a basis for their effective protection based on scientific knowledge.

**KEY WORDS:** conservation, fungi, legal regulations, protection, Republic of Serbia

### INTRODUCTION

The study of fungi and awareness of their unique position and ecological role in the environment came late as compared to plants and animals, although fungi comprise a very large and important group of organisms. It was not until the seventies of the twentieth century that it was finally accepted that they represented a separate group of organisms, taxonomically set aside in a separate Kingdom, and that they were substantially different from the plants with which they were usually grouped, as well as from the animals.

The ability to decompose dead organic matter and form symbiotic relations with a large number of vascular plants and parasitic species are dominant features of fungi that enable them to survive and to participate in their environment forming terrestrial ecosystems. Estimates indicate that between

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no less than 85% species (Kirk et al., 2001) and as many as 95% (Bundrett, 1991) plant species form mycorrhiza with fungi. In the process of matter cycle, fungi are the dominant group capable of decomposing lignin and cellulose from plant residues, allowing the recycling of plant material and its re-usage in the biocenosis. Without the fungi in the forest, the masses of fallen leaves and dry branches would bury trees to the crowns in a relatively short time, and life would become impossible.

The notion that fungi were threatened, just as many other organisms on our planet, and that there was a risk of reduction of their numbers and disappearance of some of their species came late. It was only in the second half of the last century, during the 70-ies, that a trend of decrease in their numbers or even disappearance of some fungi species was noticed and reported, especially those related to complex and well-preserved ecosystems (Janse & Lawrynowicz, 1991). Also observed at the time was a decrease in the number of species that were collected for food from nature. In the late eighties, after numerous reports of threats, international initiatives were launched to preserve mushrooms and subsequently the European Council for Conservation of Fungi – ECCF was formed. At that time, there already existed fully-fledged organizations and movements for protection of animal and plant species.

Generally, it is considered that the main reasons for categorization of mushrooms into the group of threatened organisms are the disappearance and contamination of their habitats, primarily due to human activities, such as pollution of the atmosphere, industrialized agriculture, unfavorable forestry practice, and anthropogenic alterations of large areas. All those issues lead to the degradation of fungal habitats. In addition, it is believed that uncontrolled and excessive commercial mass collecting of edible wild mushrooms in the limited space has long-term negative effects.

After substantial knowledge of vulnerability of macromycetes was collected, fungi slowly began to be incorporated into the programs of nature protection in the last decade of the twentieth century. A framework of actions that will address their conservation was becoming more and more formal and was recognized by some states to a greater or lesser extent. The need to introduce some kind of control because of massive collecting of edible mushrooms was also recognized in the Republic of Serbia around that time. The first regulations formally treating the collecting and trading of edible mushrooms in the territory of Serbia were adopted, attempting to regulate issues in this field. This was not conservation of fungi in the full sense of the word and it did not include what is now primarily considered as conservation and protection, relating essentially to the rare and threatened species that are vulnerable to a greater extent. Instead, this protection related to the commercial edible species that are usually very numerous. Nevertheless, the state administration recognized the need to establish some limitations on exploitation of at least a part of the population of mushrooms.

Because the preservation of fungi is an extremely important field, and there are numerous environmental, scientific, health, economic and other reasons that support this view, this paper presents an overview of legal provisions, especially

those regarding the protection of fungi (macromycetes) in nature. The main objective of this paper is a chronological review of regulations on the protection of fungi and the examination of the effects of enacted regulations on the population of mushrooms and improving their conservation in the future.

Other regulations which deal with macromycetes very indirectly, such as laws on forestry, national parks and similar, which govern nature conservation in general, but do not explicitly mention mushrooms, have not been considered. Neither was considered the laws governing other fields related to fungi, such as regulations in food industry related to mushrooms, regulations on the protection of materials, medical or pharmaceutical and related aspects, and similar.

## RESEARCH ON FUNGI AS A BASIS OF THEIR PROTECTION IN SERBIA

The vital requirement for the preservation of fungi or any other organisms is the awareness of the existing problems, their thorough study, updated and satisfactory taxonomic inventories, and ecological and chorological research. Although mycological research data were collected for about a century in the Republic of Serbia, it was done randomly and non-systematically, as a result of individual enthusiasm rather than a result of systematically conducted researches and these data were not sufficient for making well-grounded decisions and regulations on the protection and preservation of mushrooms (Ivančević, 1995).

Adequate protection of fungi can be established only when solid and reliable data are available, collected through systematic and long-term scientific studies. It is therefore necessary to make substantial investment in prior fundamental mycological research. Another necessary requirement for determining the state of endangered fungi is monitoring, specifically, monitoring of population size, their abundance, diversity, and distribution over a continued long period, using standardized methodology. Based on all data collected, a Red List of threatened fungi can be formed, preferably by using the generally accepted IUCN classification (IUCN, 2001). On the other hand, it is not wise to put off protective measures until such time as the optimum level of knowledge of mushrooms is reached (Ivančević, 2001). Rather, general feasible measures ought to be taken based on general knowledge and experience from similar territories, relying on a greater experience and more researches (Matavulj et al., 1998; Matavulj and Karaman, 2004).

Although the first data for a Red List of threatened mushrooms were published long ago (Ivančević, 1993) and the first preliminary Red List of Serbian fungi was published by the end of the last century (Ivančević, 1998), the opportunity to obtain for the Red List the status of an official, scientifically verified document that could be a basis for establishment and implementation of appropriate measures to preserve and protect fungi, has not been used in Serbia. In addition, a list of macromycetes was published that have the status of globally significant species in the territory of Serbia. The Serbian state has a special responsibility for these species, even though they are not endangered to a significant degree in the territory of Serbia (Ivančević, 1995).

## MATERIAL AND METHODS

For the overview of legal regulations on the protection of fungi in the Republic of Serbia, the legal provisions of the Republic of Serbia (laws and other regulations) relating to environmental protection were used:

- *Закон о заштити природе. Службени гласник Социјалистичке Републике Србије бр. 29, 1988*; [Nature Conservation Law, 1988]
- *Одлука о сављању под заштиту биљних врста као природних рећкошти. Службени гласник Социјалистичке Републике Србије 11, 17. 03. 1990*; [Decision on putting plant species under protection as natural rarities, 1990]
- *Одлука о изменама и доунама одлуке о сављању под заштиту биљних врста као природних рећкошти. Службени гласник СРС 49, 15. 08. 1991*; [Decision on amending the decision on putting plant species under protection as natural rarities, 1991]
- *Закон о заштити живојне средине. Службени гласник Републике Србије 66/1991, 83/1992, 53/1993, 67/1993, 48/1994 и 53/1995*; [Environmental Protection Law, 1991]
- *Уредба о заштити природних рећкошти; Службени гласник Републике Србије 50, 09. 07. 1993*; [Regulation on the Protection of Natural Rarities, 1993]
- *Наредба о контроли коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 50, 09. 07. 1993. и 36/1994*; [Directive on control of use and trade of wild plant and animal species, 1993]
- *Наредба о сављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 16, 05. 04. 1996. и 44/1996*; [Directive on control of use and trade of wild plant and animal species, 1996]
- *Наредба о сављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 17, 07. 04. 1999*; [Directive on control of use and trade of wild plant and animal species, 1999]
- *Закон о заштити живојне средине. Службени гласник Републике Србије 135/2004 и 36/2009*; [Environmental Protection Law, 2004 – **Actual**]
- *Уредба о сављању под контролу коришћења и промета дивље флоре и фауне. Службени гласник Републике Србије 31/2005, 45/2005-испр., 22/2007, 38/2008, 9/2010*; [Regulation on putting the use and trade of wildlife under control, 2005 – **Actual**]
- Convention on the Conservation of European Wildlife and Natural Habitats – the Bern Convention (Republic of Serbia has signed and ratified this convention on 9 January 2008 and it began to be implemented from May 1 2008)

- Закон о зашћивању природе. Службени гласник Републике Србије 36, 12.05.2009. и 88/2010; [Nature Conservation Law, 2009 – **Actual**]
- Правилник о проглашењу и зашћивању строго зашћивених и зашћивених дивљих врста биљака, животиња и гљива. Службени гласник Републике Србије 5, 05. 02. 2010; [Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi, 2010 – **Actual**]

## RESULTS AND DISCUSSION

### LEGISLATIVE AND REGULATIVE ANALYSIS

Under the amendments to the Decision on putting plant species under protection as natural rarities (1990) based on Nature Conservation Law (1988), the following mushrooms have been listed as protected species since 1991: *Boletus edulis*, *Pleurotus ostreatus*, *Cantharellus cibarius*, all species of genera: *Morchella*, *Agaricus*, and *Lactarius*.

Environmental Protection Law (1991) does not include fungi. Furthermore, Regulation on the Protection of Natural Rarities (1993) does not include fungi, too.

Directive on control of use and trade of wild plant and animal species (1993) – mushroom species placed under control (protected): all species of *Morchella* and *Lactarius* genera, all edible species of the genus *Agaricus*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Boletus edulis*, *Amanita caesarea*, *Pleurotus ostreatus*, *Bovista nigrescens* and *Bovista plumbea*.

Directive on control of use and trade of wild plant and animal species (1996) – mushroom species placed under control (protected): all species of *Morchella* and *Lactarius* genera, all edible species of the genus *Agaricus*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Boletus edulis*, *Amanita caesarea*, *Pleurotus ostreatus*, *Bovista nigrescens* and *Bovista plumbea*.

Directive on control of use and trade of wild plant and animal species (1999) – the species of mushrooms placed under control (protected): *Agaricus* spp., *Boletus aereus*, *Boletus aestivalis*, *Boletus edulis*, *Boletus pinophilus*, *Bovista nigrescens*, *Bovista plumbea*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Lactarius deliciosus*, *Lactarius deterrimus*, *Lactarius salmonicolor*, *Lactarius sanguifluus*, *Lactarius semisanguifluus*, *Marasmius oreades* and *Pleurotus ostreatus*.

Environmental Protection Law (2004) and Regulation on putting the use and trade of wildlife under control (2005) – Under the latest amendments to this Regulation from 2010, the following species of mushrooms are protected by being placed under control: *Boletus aereus*, *Boletus reticulatus*, *Boletus edulis*, *Boletus pinophilus*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Lactarius deliciosus*, *Lactarius deterrimus*, *Lactarius salmonicolor*, *Lactarius sanguifluus*, *Lactarius semisanguifluus*, *Marasmius oreades*, *Tuber magnatum* and *Tuber aestivum*.

Nature Conservation Law (2009) and Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi (2010) – list of strictly protected and protected fungal species:

Strictly protected fungal species:

<i>Albatrellus ovinus</i>	<i>Geastrum schmidelii</i>	<i>Myriostoma coliforme</i>
<i>Amanita vittadinii</i>	<i>Hapalopilus croceus</i>	<i>Panaeolus semiovatus</i>
<i>Battarrea phalloides</i>	<i>Hericium alpestre</i>	<i>Phallus hadriani</i>
<i>Boletus dupainii</i>	<i>Hericium cirrhatum</i>	<i>Phylloporus rhodoxanthus</i>
<i>Boletus impolitus</i>	<i>Hericium coralloides</i>	<i>Podoscypha multizonata</i>
<i>Boletus regius</i>	<i>Hericium erinaceus</i>	<i>Polyporus umbellatus</i>
<i>Boletus rhodoxanthus</i>	<i>Hygrocybe calyptriformis</i>	<i>Psilocybe serbica</i>
<i>Boletus satanas</i>	<i>Hygrocybe coccineocrenata</i>	<i>Pycnoporellus alboluteus</i>
<i>Catathelasma imperiale</i>	<i>Hygrocybe punicea</i>	<i>Rhodotus palmatus</i>
<i>Entoloma bloxamii</i>	<i>Hygrophorus marzuolus</i>	<i>Sarcosphaera coronaria</i>
<i>Fomitopsis rosea</i>	<i>Leccinellum crocipodium</i>	<i>Scutigera pes-caprae</i>
<i>Geastrum fornicatum</i>	<i>Leucopaxillus giganteus</i>	<i>Strobilomyces strobilaceus</i>
<i>Geastrum melanocephalum</i>	<i>Mutinus caninus</i>	

Protected fungal species:

<i>Amanita caesarea</i>	<i>Craterellus cornucopioides</i>	<i>Morchella elata</i>
<i>Boletus aereus</i>	<i>Hydnum repandum</i>	<i>Morchella esculenta</i>
<i>Boletus edulis</i>	<i>Hygrophorus russula</i>	<i>Morchella vulgaris</i>
<i>Boletus pinophilus</i>	<i>Lactarius deliciosus</i>	<i>Russula cyanoxantha</i>
<i>Boletus reticulatus</i>	<i>Lactarius deterrimus</i>	<i>Russula virescens</i>
<i>Cantharellus amethysteus</i>	<i>Lactarius salmonicolor</i>	<i>Tuber aestivum</i>
<i>Cantharellus cibarius</i>	<i>Lactarius sanguifluus</i>	<i>Tuber macrosporum</i>
<i>Cantharellus cinereus</i>	<i>Lactarius semisanguifluus</i>	<i>Tuber magnatum</i>
<i>Cantharellus friesii</i>	<i>Marasmius oreades</i>	

A review of the existing regulations may provide an insight into a few basic trends that have determined the approach to protection of fungi in Serbia. On one hand, the need to protect certain species of mushrooms was recognized in Serbia relatively early, already in the late eighties of the twentieth century. The rapid growth of interest in edible wild mushrooms led at that time to a significant increase of economic investments and financial flows related to the activities of organized collecting and purchase of wild mushrooms. For a while, the then Yugoslavia was the world's largest exporter of bolete mushrooms, a large share of which was collected in the territory of Serbia. There was a legitimate concern that the uncontrolled collecting of mushrooms in large quantities may lead to a decrease in their number and to their vulnerability.

On the other hand, the interest of the state administration was to place collecting of wild mushrooms under control in order to raise funds from the trade of wild mushrooms. Although there were expert draft proposals relating

primarily to fungi protection, that included, among other things, limiting the allowable amount that an individual can collect daily, mushroom pickers licensing, supervision of the amount of collected carpophores (fruiting bodies) and other measures that would enable monitoring of populations of macrofungi and their effective protection, they were not included in the adopted legislations. When they were eventually included, it was in a modified form or without tools that could enable control of their application. The role of the adopted measures was primarily to ensure a regular payment of taxes for the mushroom wholesale trade, and initially, to provide more favorable conditions of mushroom wholesale to the companies from Serbia by limiting administratively the maximum purchase price for the collected mushrooms. Thus the companies outside of Serbia were no longer able to offer a higher purchase price and thus obtain priority in wholesale. Allegedly, the low purchase price was supposed to make the picking of wild mushrooms unprofitable, and thus protect them from over-exploitation. Despite the early expressed concern for the protection of fungi, the precautionary protection measures turned out to be ineffective.

Based on the Nature Conservation Law from 1988, certain species of fungi were for the first time placed under protection in 1991, as “natural rarities threatened by exploitation and trade”, under the Decision on amending the decision on putting plant species under protection as natural rarities (1991). In addition to a completely inadequate formulation of “natural rarities,” comprising the species that were collected on a large scale for commercial purposes, mushrooms were considered as a plant species. The taxonomic nomenclature of these mushroom species contained grave mistakes. The regulation provided for two measures of fungi protection, including a ban on collecting young and underdeveloped fruiting bodies and a ban of harvesting more than 90% of a “total number” in the area of picking. In addition, it stipulated that mushroom collecting should not be performed at the waste dumping sites and near traffic junctions, which was supposed to protect the users of the collected mushrooms.

Measures aimed at control of mushroom collecting included an approval issued by the Serbian Institute for Environmental Protection subject to payment of an appropriate tax, and the obligation on part of the purchaser of wild mushrooms (legal or natural person) to submit data on purchased quantities of mushrooms to the Institute. Optionally, Article 4 of the Decision envisaged, in respect of the fungi listed as natural rarities, that “a program of protection and development will be adopted which will establish conditions for complete information and popularization of the protected natural rarities.” It was not envisaged how to implement the control of two proposed measures of fungal protection, and expert proposals that involved additional measures of protection were not included in the regulations. However, even this flawed document was useful in terms of raising general awareness that mushrooms have the importance and place in the living world and that we cannot use them as an inexhaustible natural source without any restrictions.

After the Nature Conservation Law (1988), the Government of the Republic of Serbia adopted the Environmental Protection Law in 1991. This Law governed the protection of threatened plant and animal species that were still

designated as “natural rarities,” which was an inadequate definition largely criticized by environmentalists and scientists who were experts on endangered species. Based on this Law from 1991, the Regulation on the Protection of Natural Rarities (1993) was adopted, but, unfortunately, the endangered species of fungi were not included, and their protection was omitted, although at that time there already existed data on the species of fungi that were endangered in Serbia (Ivančević, 1993).

Mushrooms were still perceived in our public as a less important part of the plant kingdom and their unique and important role in nature was not understood. Based on Environmental Protection Law (1991), only the Directive on control of use and trade of wild plant and animal species (1993) was adopted, which included commercial species and largely reiterated the provisions of the previous Decisions on control of trade from 1991, perhaps otherwise phrased. Thus instead of the earlier ban on harvesting more than 90% of the existing specimens, the Directive provided that 10% of existing fruiting bodies was not allowed to be collected. The only novelty was Article 7, providing that the collecting may not be done in the same area every year and that a period of at least one year had to elapse before collecting may be resumed in the same area. However, the implementation of that provision was not mandatory if it was estimated that there was no need for such a measure. Unfortunately, there were no criteria and instruments for objective assessment. The list of included species was somewhat extended due to the interest to enable commercial collecting of species not covered by the previous Decision. Some of the errors in the nomenclature of these species were fixed but some still existed, which indicated a lack of cooperation of legislators and experts mycologists.

New Directive on control of use and trade of wild plant and animal species from 1996 brought nothing new and reiterated the earlier positions. The term “individual mushrooms” (in Serbian “јединке љљива“) was wrongly and consistently replaced by the term “identical mushrooms” (in Serbian “једнаке љљиве“) in several places, so Article 5. became confusing and meaningless. The provision about leaving a number of fruiting bodies in nature no longer specified the exact amount.

That was the time of the biggest disparity between the inadequate legal protection and the enormous pressure on nature and mushroom habitats, which became seriously endangered due to mass collecting of commercial species and numerous negative or indirect consequences of such collecting, including permanent removal of mushroom fruiting bodies from certain areas, soil compacting, intentional destruction of all other mushroom species, littering and pollution of the environment (Ivančević, 1998b). The trade control included only fresh mushrooms while dried and processed mushrooms were not controlled and were exported to the Western markets in large quantities. Young immature specimens of bolete mushrooms, whose collecting was formally forbidden, were exported in brine. Table 1 shows quantities of some of the species that were traded in that period, based on the data from the Ministry for the environment.

Due to the alarming situation with the protection of fungi in Serbia, which was similar to that in some other countries of Southeast Europe, the European

Council for the Conservation of the Fungi expressed its concern at the meeting in 1997 in Vipiteno, Italy, and it was scheduled to hold an international scientific symposium ECCF at Tara Mountain in Serbia on 22-27 September 1998, with the participation of experts from Serbia. This meeting was cancelled at the last minute because of concerns of some participants because of the armed conflict in Kosovo, which escalated in that time. After the 1999 war, and the turbulent social upheaval that followed, ECCF offered an official advisory support to the Government of the Republic of Serbia in 2001, through the Directorate for Environmental Protection of the then Ministry of Health and the Environment (Anders Bohlin in lit.), but that offer was not accepted.

Tab. 1. – The quantities of mushrooms collected in the Republic of Serbia during 1993-1997

Year		The quantities of mushrooms purchased (in kg)					
		<i>Boletus edulis</i>	<i>Cantharellus cibarius</i>	<i>Craterellus cornucopioides</i>	<i>Morchella</i> spp.	<i>Lactarius</i> spp.	<i>Amanita caesarea</i>
	Requested	9 769 200	5 778 300	?	963 570	115 000	0
1993	Allowed	5 186 100	2 605 500	?	36 610	63 000	0
	Requested	15 688 600	6 545 700	167 500	127 900	82 000	17 000
1994	Allowed	1 212 981	631 004	18 800	1 800	40 000	0
	A priori	4 500 000	2 000 000	?	?	60 000	0
1995	Approval issued for	3 792 036	1 502 027	119 200	2 520	0	0
	A priori.	5 000 000	3 000 000	100 000	15 000	100 000	100 000
1996	Approval issued for	3 948 682	1 192 950	65 550	1 130	60000	5 000
1997	A priori	5 000 000	1 500 000	100 000	2 000	300 000	5 000

Legend: In 1993 and 1994, buyers applied for amounts of mushrooms for purchase (“Requested”) and based on such applications they were allowed the maximum amount they could purchase from individual collectors (“Allowed”). The allowed amounts were determined based on the assessment after all applications were submitted. From 1995 onward, a competition was opened for the maximum amount of mushrooms that can be collected that year, determined in advance, at the very beginning of that year (“A priori”). The total amount that buyers were actually requesting was calculated at the end of the year (“Approval issued for”). Buyers were paying for the license for purchase regardless of whether or not they collected the requested amount of fungi. ? = Missing data.

In the meantime, because of many signals pointing to a bad situation of endangered mushrooms, in late 1998 in Serbia started work on new documents that were supposed to provide adequate protection for the commercial species of mushrooms, as well as for other species of fungi that were endangered. Therefore, some edible species that were relatively rare were planned to be included in the list of the endangered fungi, which, however, could be collected commercially, subject to a prior estimate and evaluation. As result, Directive on control of use and trade of wild plant and animal species (1999) was issued during the war and the devastating bombardments of Serbia by the NATO. That was the first document to list fungi separately from the plants. The nomenclature of species’ names was corrected. Finally, some provisions

on how to protect endangered species were included in the text – the way of picking, keeping accurate records of the amounts of collected mushrooms. Unfortunately, it was not done in the form proposed by the consulted mycologists, thus Article 8 prescribed that the “...fruiting bodies should be collected in the container that allows ventilation for dissemination of the spores.” Proper packaging serves for conserving the quality of harvested mushrooms, and dissemination of spores during transport is a phenomenon that, in our opinion, does not affect the protection of mushrooms\*.

This provision was copied from the regulations of the countries in the region that were published at that time (Pirman, 1994), probably due to a lack of understanding of foreign experience on part of the lawmakers. Furthermore, the form of the approved quantities of wild mushrooms that were allowed to be collected was specified for the first time, *i.e.* whether they were fresh or dried mushrooms (weight ratio 10:1). The reports on the collected amounts were required for the first time to indicate the site where the mushrooms were picked and to keep track of collected quantities of protected species for monitoring purposes. Consequently, this regulation finally brought some positive changes, though not all that was needed. (Earlier, the purchaser had to provide general information on the amounts collected and sold). Picking more than 66% (two thirds) fruiting bodies in the area of collecting was prohibited. Members of the genus *Morchella* were no longer among the protected species, since they were intended to be covered by other regulations on endangered species. However, the state of war and subsequent social changes delayed the adoption of such regulations for a decade.

The actual Environmental Protection Law was adopted in 2004 and based on this Law a new Regulation on putting the use and trade of wildlife under control (2005) was passed. Positive innovations in this Regulation included the provisions on the procedures for collecting hypogeous species of mushrooms, as well as inclusion of two species of genus *Tuber* in the list of protected mushrooms. This Regulation without significant alterations applies even today. The unnecessary provision on packaging related to ventilation to enable spore dissemination still exists in the text, which shows how difficult it is for mycologists to exert influence on lawmakers.

The actual Nature Conservation Law, (2009), the first since 1988, was adopted in 2009. This Law introduced many new solutions, because of the desire to be aligned with the EU regulations. Article 59 defined which parts of that law, currently inactive, would begin to apply upon the accession of the Republic of Serbia to the European Union. Mushrooms were listed as a separate group of organisms, different from and on a par with plants and animals. Under Article 27, protected natural goods also included protected species, which could have the status of a protected or a strictly protected species. Protection measures for strictly protected species finally allowed inclusion of rare and endangered species of wild mushrooms, in addition to the commercial

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\* Packaging that allows dissemination of spores was referred to in the first version of Slovenian regulation on protection of wild mushrooms from 1994 (*Uradni list RS 38/94*) but was excluded from the text in the next version of 1998 (*Uradni list RS 57/98*).

species. A large number of Articles of the Law provided for the protection of species' habitats, as the necessary requirement of protection of the very species. This allowed introduction of new, more effective conservation measures. Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi (2010) was published in accordance with this Law. The list contained 38 strictly protected fungi and 26 protected fungal species. It was not ensured, in accordance with the Law, that the lists of protected species should be formed based on the Red List, or well-documented studies, instead, the species were defined arbitrarily, in a very short time, which later resulted in problems and criticism of experts for certain groups of organisms.

The Nature Conservation Law (2009) provided for the protection and preservation of nature, previously was governed by the still applicable Environmental Protection Law (2004). Therefore, with regard to wild mushrooms, this led to parallelisms and inconsistencies. The Regulation on the Control of Trade (2005) has a "senior" position and originates from an earlier period than the Regulation on Protected Species (2010), and provisions of these regulations do not refer one document to the other. The Environmental Protection Law (2004), which was used for preparing the Regulation on putting the use and trade of wildlife under control (2005), does not recognize the new Nature Conservation Law (2009) as it was accepted much earlier. The Nature Conservation Law (2009) does not include ordinances from the Regulation on putting the use and trade of wildlife under control (2005) which was prepared according to the older Environmental Protection Law (2004), so one subset of species protection is regulated according to the old Environmental Protection Law (2004) and another by the new Nature Conservation Law (2009). In this way both laws are broken by the same activity but the supervising inspection services are not having any evidence. The nomenclature of scientific names in these two laws is different, as well as some of the vernacular names used for the same species in the simultaneously applicable regulations prepared according to these different laws.

In addition to domestic legislation, there are obligations originating from the international conventions signed by Serbia that have obligatory character. The Bern Convention, which protects the flora, fauna and habitats of species in Europe, came into force in Serbia in mid 2008. Mushrooms have not yet been officially included in the lists of species covered by the Bern Convention, primarily for administrative and political reasons, and their protection under the provisions of the Bern Convention is not mandatory in Serbia. The list of fungal species that have been proposed for inclusion in the Bern Convention is now in the form of an official proposal confirmed by the Standing Committee of the Bern Convention. On this basis, the Council of Europe adopted a Recommendation on the conservation of wild mushrooms in Europe whose implementation by signatory countries is desirable (Recommendation 132; 2007).

The Recommendation invited the countries to define management and maintenance of habitats as a priority with the aim of protecting the European species of mushrooms; to take into account the Directive of the European Council to protect European macromycetes and to apply it when developing and

implementing their national policies to protect macromycetes; and to include those who have profit from wild mushrooms in the protection mushroom habitats. This presented a powerful tool for correction of national legislation, relating to the protection of the wild mushrooms. Unfortunately, the public, experts as well as competent authorities and institutions are poorly acquainted with this Recommendation that applies to the Republic of Serbia as well. In the first half of 2011, the Council of Europe demanded a national report on the implementation of this recommendation, and this was the first opportunity to analyze the contribution of and the possibilities of acting in accordance with the Recommendation in Serbia.

A project for making a revised version of the Red List of fungi, with a detailed evaluation of their vulnerability factors, was offered to the state authorities in 2007 (Ivančević, et al., 2007), but its implementation has not been approved so far. Meanwhile, Article 36 of the Nature Conservation Law (2009) provided that: "The species that are or may become endangered shall be protected as strictly protected wildlife, or protected wildlife. The species protected under this law shall be determined on the basis of national and international Red Lists or Red Books, professional findings and scientific knowledge." The same Article provided that the Red Book or Red List may be adopted by the Ministry of Environmental Protection. Consistent application of these legal provisions, once they are enforced, should provide a scientific basis for protection measures and help align Serbian legislation with the legislation of the countries that have had more developments in this field.

## CONCLUSION

The first regulations on the protection of fungi in Republic of Serbia were adopted in 1991. They were related to several edible wild species that were collected for commercial purposes. The aim of adopted measures was protection of wild mushrooms against excessive collecting and the threat that it might bring, but in practice, they secured collecting of revenue for the state from the use and trade in wild mushrooms. Subsequently, during the last twenty years, new regulations were adopted several times, but only with minor changes, while the basic purpose remained the same, and provisions that would ensure protection based on advanced experience of other countries and on scientific data were not incorporated in the legislation, although it was possible. The initial positive effect of such regulations, which showed to the public the threat to wild mushrooms, was lost over the years, and even turned into the opposite, based on the opinion that when something was paid for (tax for collecting wild mushrooms) then it may be fully disposed of without much regard. The effect of the prescribed measures on wild mushroom protection was not significant and did not prevent the removal of huge amounts of fruiting bodies from nature in certain territories, accompanied with habitat disturbance and a number of harmful side effects.

The first major changes occurred with the adoption of the Law on Nature Protection in 2009, which finally placed under protection the rare and endan-

gered species of fungi and their habitats, in addition to the commercial species. Owing to the provisions of this Law, the first study was drafted with the aim of protecting an area exactly because it was a habitat of strictly protected species of wild mushrooms. The proposed protected area, located on Ada Ciganlija near Belgrade, had the size of 21 ha. At the time of submission of this paper to print, the procedure for official declaration of protection was in the final stage. Only a formal final decision on declaration was missing, which would make the Republic of Serbia one of the first countries in Europe to protect a fungal habitat, in accordance with the recommendations of the Bern Convention. Therefore, the application of these legal provisions is expected to bring developments to the adequate protection of fungi in the Republic of Serbia and to have a positive effect on populations of endangered species.

When the actual Nature Conservation Law (2009) and bylaws were adopted, the existing errors and omissions were not removed, and the legal provisions on the election and proclamation of protected species were not fully observed, therefore it is necessary to do so in the future. Other regulations should also be amended, especially the Law on Environmental Protection, and other regulations dealing with the protection of fungi. They should also be brought in line with one another. The evolution of legislation concerning wild mushroom protection in Serbia has become closer to the stage when acceptable and more effective modes of protection are being prescribed, but it took unnecessarily too long, and changes that would allow the optimum state of affairs are yet to be undertaken.

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## ГЉИВЕ У ЗАКОНОДАВСТВУ РЕПУБЛИКЕ СРБИЈЕ

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### Резиме

Очување и заштита гљива изузетно су важна област и за то постоје многобројни еколошки, научни, здравствени, економски, културни и други разлози. Приказан је преглед прописа који се баве заштитом гљива у Србији, почев од акта заштите из 1991. Наведене су и анализиране добре и лоше одредбе појединачних прописа. Сагледани су ефекти донетих прописа на стварну ефикасност заштите угрожених врста гљива, процењено је какав утицај хронолошки развој законодавства има на популације гљива у природи и размотрене су опште мере ради побољшања заштите гљива у будућности. Те мере пре свега подразумевају добро познавање и проучавање гљива као основу за њихову ефикасну заштиту утемељену на научним сазнањима.

КЉУЧНЕ РЕЧИ: гљиве, законска регулатива, заштита, очување, Република Србија

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