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Macrofungi of Goygol National Park and surrounding areas with special reference to medicinal species

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Abstract: New macromycetes collected from Goygol National Park including surrounding areas and herbarium specimens deposited to the herbaria were involved to the study. The diversity of fungi registered in the area was studied by morphological approaches. In total, 26 species were registered, of the identified species, *Fomitopsis betulina* is a new record for Azerbaijan. Other species (*Agaricus campestris, Cerioporus squamosus, C. varius, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis pinicola, Ganoderma lucidum, Laetiporus sulphureus, Leccinellum pseudoscabrum, Peziza repanda, Polyporus tuberaster, Tarzetta catinus, Trametes hirsuta*) turned out to be new for the study area. Ecological groups and nutritional significance of the found fungi were clarified. Among them, 14 medicinal species were determined (*Cantharellus cibarius, Cerioporus squamosus, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis betulina, F. pinicola, Ganoderma lucidum, Hymenopellis radicata, Laetiporus sulphureus, Marasmius oreades, Panellus stipticus, Psilocybe coronilla, Trametes hirsuta*). Besides, six of them are nutritionally important.

Key Words: *distribution, ecology, fungi, herbaria, medicinal mushrooms, nutritional properties, protected area, taxonomy*

INTRODUCTION

Fungi are a necessary component of natural ecosystem, and affect its productivity and degradation. Many fungal species are decomposers of organic substances, some evolved mutualistic or parasitic relationships with vascular plants. In natural condition several hundred fungal species are assosiated with plants [Toju et al., 2013]. Both mutualistic and pathogenic fungi are depend on their hosts for carbon resources, but also play crucial role in the physicochemical and biological processes of their hosts and environment [Chen et al., 2019; Tedersoo, 2018]. Fungi creates links between different organisms and potentially change the type of relation and interaction among them [Cameron 2019, Bahram, Netherway, 2022].

Many fungi are of economic importance. Also, negative impact of fungi is well recognized, yet the effect of fungi poorly distinguished among different groups. Apart from this, fungi infect plants parasitizing on various vegetative and generative organs. From the other hand, roots of some plants cannot exist without support by mycorrhizal fungi [Anthony et al. 2022].

Wild edible mushrooms are important resources for many vital things in nature. To date, over 2000 species of edible and medicinal mushrooms have been determined. Many of those species are widely known and used as food [Marathe et al., 2021; Manoharachary, 2022]. Their health and nutritional benefits due to the varying contents of carbohydrates, proteins, vitamins, minerals, chitin, essential amino acids, low fat and calorie content are spurring numerous studies of fungal species complexes all over the world [Assemie, Abaya, 2022; Bal et al., 2018, Friedman, 2016; Wasser, 2014].

Conducting of monitoring assists in expanding our regional and global knowledge of mycobiota in natural communities [Crabtree et al., 2010]. Despite the contribution by various researchers since the last century, the fungal diversity of the country has not been widely studied. Some regions of Azerbaijan (Greater Caucasus within country, Lankaran-Astara) or some taxonomic groups of fungi (rust, smut, downy and powdery mildews) [Ulyanishchev, 1952, 1959, 1960, 1967] are better studied than others. The territory of the Lesser Caucasus within Azerbaijan and the adjacent territories have been relatively little investigated, and in the Karabakh region mainly soil and plant associated fungi were researched [Huseynova, 1961; Huseynov 1972; Melkumova, 1961]. Still little known about the diversity of mushrooms, especially of edible and poisonous species.

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One of such poorly investigated territories of Azerbaijan is Goygol National Park located on the northern slopes of the Lesser Caucasus, and designed to protect Lake Goygol and surrounding natural ecosystem. Our current research focused on revision of macrofungi diversity of the Goygol National Park and surrounding areas based on existing herbarium and recently collected specimens.

MATERIAL AND METHODS

Study territory. Goygol district is located in the western part of Azerbaijan, in the mountainous and foothill zone, the highest point is 3724 meters above sea level. Forests consist mainly of broad-leaved trees (beech, hornbeam, oak) and occupy 17.3% of the territory. Plant diversity of the area is well studied [Hajiyev, 1990; Babakishiyeva, Ibadullayeva, 2021].

Specimens. The specimens are stored in herbarium of the Institute of Botany (BAK), in addition to the recently obtained ones were inspected. Sampling sites (Fig. 1) were Maralgol (N 40°22'44.3" E046°18'45.8"), Goygol National Park (N 40°24'31.2" E0 46°19'08.2"), Ashyglu (N 40°32'14.9" E046°19'45.6"), Toghanaly villages (N 40°26'34.3" E0 46°19'48.9") and Hajikend settlement (N 40°30'48.9" E0 46°20'07.6").

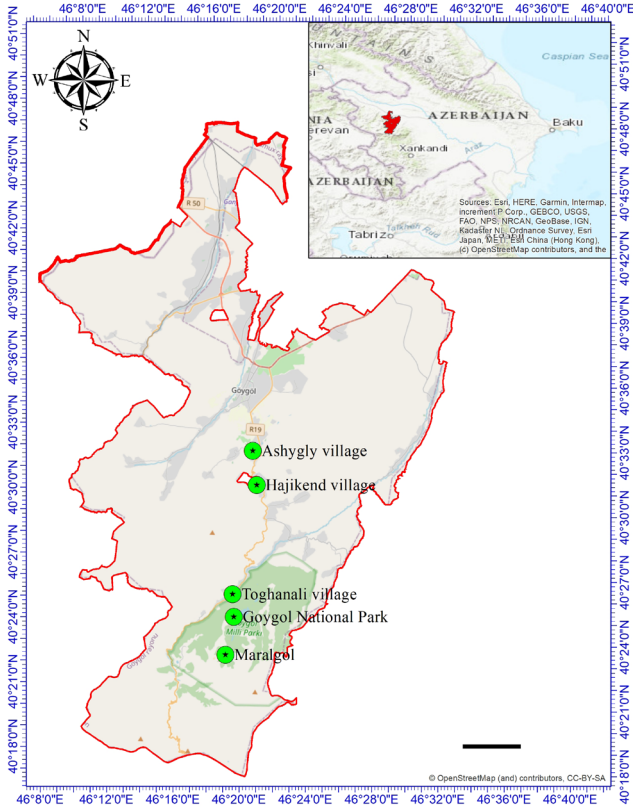

Figure 1. Study area, sampling sites are marked on the map**.** Scale bar 1 sm = 2 km.

Different basic identification techniques were used in order to determine found species [Lodge et al., 2004]. Along with macromorphological features, important microscopic diagnostic parameters (spores, structure, colour, size, shape of hymenial elements) of fungi were observed. Small sections of fungi were mainly mounted in sterile water with Congo red, 20 measurements were made for each taxonomically informative structure, under the 40 x lens of microscope and the average value of the measurements was included in the statistics. Micrographs were taken using a microscope (Axio Imager Vert. A1, Carl Zeiss, Germany) mounted digital camera (Axiocam Zeiss, 105 color). All identified mushroom specimens were deposited to the mycological herbarium in BAK.

Available literature [Arora,1986; Elkhateeb, 2019; Mustafabayli et al., 2021; Sadigov, 2001, 2007; Wasser, 2014] were used for identification. Fungal and plant names were checked according to the appropriate informative data resources [Index Fungorum, World Flora Online].

RESULTS AND DISCUSSION

Taxonomy. Collected specimens belong to 26 species of 24 genera and 18 families (Tab. 1). *Fomitopsis betulina* found on silver birch (*Betula pendula* Roth.) represents a new record for Azerbaijan (Fig. 2). Most of other species excluding *Hymenopellis radicata*, are new to the study area. Only four species of the genera *Jackrogersella* L. Wendt (Hypoxylaceae), *Peziza* Pers. (Pezizaceae), *Tarzetta* (Cooke) Lambotte (Tarzettaceae) and *Xylaria* (Xylariaceae) are represented in the phylum Ascomycota. Recorded species for the first time in the study area of the phylum Basidiomycota belong to the genera *Agaricus* L. (Agaricaceae), *Cantharellus* Adans. ex Fr. (Hydnaceae), *Coprinopsis* P. Karst. (Psathyrellaceae), *Crepidotus* (Fr.) Staude (Crepidotaceae), *Ganoderma* P. Karst. (Ganodermataceae), *Cerioporus* Quél., *Daedaleopsis* J. Schröt., *Fomes* (Fr.) Fr., *Lentinus* Fr., *Polyporus* P. Micheli and *Trametes* Fr. (Polyporaceae), *Fomitopsis* P. Karst. (Fomitopsidaceae), *Hymenopellis* R.H. Petersen (Physalacriaceae), *Laetiporus* Murrill (Laetiporaceae), *Leccinellum* Bresinsky & Manfr. Binder (Boletaceae), *Marasmius* Fr. (Marasmiaceae), *Panellus* P. Karst. (Mycenaceae), *Pluteus* Fr. (Pluteaceae), *Psilocybe* (Fr.) P. Kumm. (Hymenogastraceae) (Fig. 3). Most of families are represented with single species.

Ecology. The found species can be easily divided into three trophical groups: humus saprobes including *Agaricus campestris*, *Coprinopsis atramentaria*,

Table 1. Fungal species used in this study.

Phyla	Order	Family	Species	BAK №
Ascomycota	Pezizales	Pezizaceae	*Peziza repanda* Wahlenb. ex Fr.	1741
	Incertae sedis	Tarzettaceae	*Tarzetta catinus* (Holmsk.) Korf & J.K. Rogers	1737
	Xylariales	Hypoxylaceae	*Jackrogersella cohaerens* (Pers.) L. Wendt, Kuhnert & M. Stadler	2869
		Xylariaceae	*Xylaria carpophila* (Pers.) Fr.	10297
Basidiomycota	Agaricales	Agaricaceae	*Agaricus campestris* L.	1758
		Crepidotaceae	*Crepidotus cesatii* (Rabenh.) Sacc.	605
		Hymenogastraceae	*Psilocybe coronilla* (Bull.) Noordel.	1146
		Marasmiaceae	*Marasmius oreades* (Bolton) Fr.	918
		Mycenaceae	*Panellus stipticus* (Bull.) P. Karst.	127
		Physalacriaceae	*Hymenopellis radicata* (Relhan) R.H. Petersen	1495
		Pluteaceae	*Pluteus caldariorum* (Henn.) Sacc. & P. Syd.	1039
		Psathyrellaceae	*Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo	1736
			Psathyrella spadiceogrisea (Schaeff.) Maire	1494
	Boletales	Boletaceae	*Leccinellum pseudoscabrum* (Kallenb.) Mikšík	1734
	Cantharellales	Hydnaceae	*Cantharellus cibarius* Fr.	88
	Polyporales	Polyporaceae	*Cerioporus squamosus* (Huds.) Quél.	1762
			Cerioporus varius (Pers.) Zmitr. & Kovalenko	1735
			Daedaleopsis tricolor (Bull.) Bondartsev & Singer	1732
			Fomes fomentarius (L.) Fr.	1733
			Lentinus arcularius (Batsch) Zmitr.	5495
			Polyporus tuberaster (Jacq. ex Pers.) Fr.	1740
			Trametes hirsuta (Wulfen) Lloyd	1738
		Fomitopsidaceae	*Fomitopsis betulina* (Bull.) B.K.Cui, M.L. Han & Y.C. Dai (Syn.: *Piptoporus betulinus* (Bull.) P. Karst.)	1739
			Fomitopsis pinicola (Sw.) P. Karst.	1760
		Laetiporaceae	*Laetiporus sulphureus* (Bull.) Murrill	1761
		Ganodermataceae	*Ganoderma lucidum* (Curtis) P. Karst	1759
2	7	18	26	26

Hymenopellis radicata, *Marasmius oreades*, *Panellus stipticus*, *Peziza repanda*, *Pluteus caldariorum*, *Psathyrella spadiceogrisea*, *Psilocybe coronilla*, *Tarzetta catinus*; mycorrhizal including *Cantharellus cibarius*, *Leccinellum pseudoscabrum*; xylotrophic including *Cerioporus squamosus*, *C. varius*, *Crepidotus cesatii*, *Daedaleopsis tricolor*, *Fomes fomentarius*, *Fomitopsis betulina*, *F. pinicola*, *Ganoderma lucidum*, *Jackrogersella cohaerens, Laetiporus sulphureus*, *Lentinus arcularius*, *Polyporus tuberaster*, *Trametes hirsuta* and *Xylaria carpophila.*

The field mushroom (*Agaricus campestris*) was noted in the forest, along the road growing in small groups. *Coprinopsis atramentaria* was noted in the forest under the dried hornbeam tree. The Deep root mushroom (*Hymenopellis radicata*) recorded on the forest floor rich with old rotten leaves, under the hornbeam trees. The fungus is saprobic and occurs in Europe and North America. It is characterised by a moist to glutinous pileus. The Airy ring mushroom (*Marasmius oreades*) is native to Europe and North America. As it is known mushroom frequently grows as ring like forms in lawns, meadows, and other grassy areas and was collected from on grassy soil in the study area. This mushroom contains a wide variety of lectins, also in fruiting bodies. Lectins of the fungus are part of the fungal defence system against parasites and predators. *Panellus stipticus* is distributed in Asia, Australia, Europe and North America. The fungus was collected in a beech-hornbeam mixed forest, and differs from most other mushrooms by its ability to bioluminescence. *Peziza repanda* produces cup-shaped, epigeous, sessile, pulvinate apothecia. The specimen was collected on the soil in the forest edge. Species of the genus *Peziza* prefer alkali soil and in some cases a low content of organic matter. The majority of them

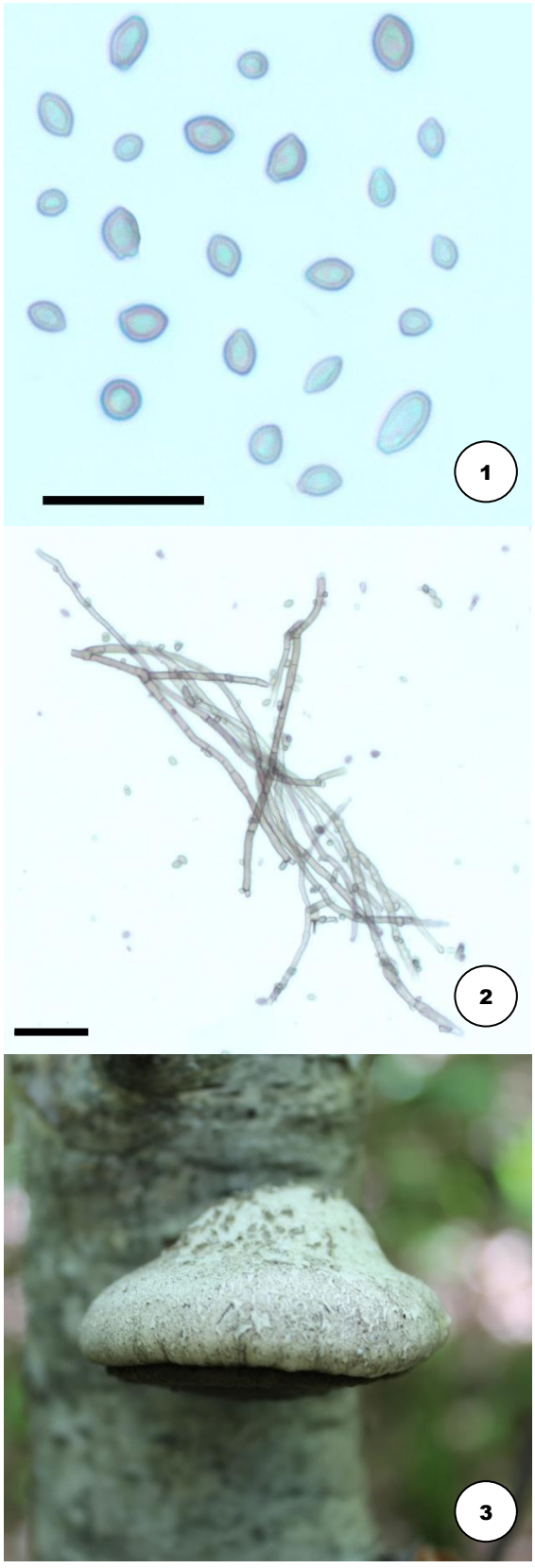

Figure 2. *Fomitopsis betulina:* 1. Spores, 2. Hyphal mycelium, 3. Fruiting body.
Scale bars: 1. 20 µm; 2. 50 µm.

are saprobes and only a few species are claimed to be ectomycorrhizal. *Pluteus caldariorum* is also a saprobic fungus, collected from the rotted stumps in the forest. *Psathyrella spadiceogrisea* usually prefers the moist soils and marshy places. In this case it was collected on the rotted leaves in the hornbeam forest. *Psilocybe coronilla* (= *Stropharia coronilla*) is a native species in Europe and North America. The fungus noted in the forest floor, attached to manure. The genus *Psilocybe* was studied mainly by R. Singer [1949], and it gained interest due to the discovery of the hallucinogenic ability of the fungi [Wasson, Wasson, 1957]. This particular species has no hallucinogenic effect, but considered as poisonous. *Tarzetta catinus* is another apothecial mushroom, has small flask shape structure, appearing in the decidous tree forests. The size of apothecia is an important criterion for species diagnosis. Fungus usually grows in small groups, but in this case a single specimen was collected on the forest soil.

Mycorrhizal fungi were represented only by two species. *Cantharellus cibarius* is ectomycorrhizal fungus, under the oak, on forest soil tree that had limited decay. *Leccinellum pseudoscabrum* was found in association with hornbeam.

Cerioporus squamosus and *C. varius* are annual wood-inhabiting corticoid fungi. *C. varius* was collected on the small branches of hornbeam and *C. squamosus* on the fallen birch. They commonly cause heart rot of the wood. *Crepidotus cesatii* is characterised by circular to semicircular or roundedly flabelliform pileus, laterally attached to the substrate. It was found in small groups of the dead and living branches of hornbeam tree.

Polypor species were resigned to the tree families (Polyporaceae, Fomitopsidaceae, Ganodermataceae). Agaricales includes species with more diverse in terms of habitat and substrate. *Daedaleopsis tricolor* is a perennial plant pathogenic fungi, found on dry branches that have fallen on the forest floor. *Fomes fomentarius* is a perennial, large size that develops as parasite or saprotroph on the deciduous trees. *Fomitopsis betulina* was found on silver birch is a necrotrophic parasite, causes a brown rot and occurs only in the Northern hemisphere. *Fomitopsis pinicola* is a stem decay fungus, perennial and registered on dried hornbeam in a mixed forest dominated by beech, hornbeam and yew trees. *Ganoderma lucidum* has a limited distribution in Asia and Europe and grows on decaying hardwoods. In the study area, it was found on a rotten trunk of *Quercus iberica* M. Bieb. in a forest edge next to the road. *Laetiporus sulphureus* is recognised as saprophyte

or a weak parasite, causing brown cubical rot. Golden-yellow, soft fruiting body of the fungus had shelf-like structures and was about three-four kilograms growing on the main stem of the hornbeam tree. *Lentinus arcularius* is an annual, saprobic fungus, found on dry branches of beech tree. The genus *Polyporus* includes morphologically heterogenous species, with stipitate, pileate or resupinate basidiocarps. *P. tuberaster* is common is Asia and Europe. The fungus was registered on dry branches in the hornbeam forest. *Trametes hirsuta* is known as saprobic on the deadwood of hardwoods, but rarely on conifers, grows in clusters on logs and causes white rot. The fungus is noted on the trunk of the hornbeam. *Xylaria carpophila* is found on hard outer shells of beech seeds.

Use possibilities. Medicinal species. The medicinal and nutritional value of mushrooms has been refined based on available literature and indigenous knowledge.

As a result, 14 of the identified species are of medical importance and five are nutritionally important (Tab. 2). These include *C. cibarius*, *C. squamosus*, *C. atramentaria, D. tricolor*, *F. fomentarius*, *F. betulina*, *F. pinicola*, *G. lucidum*, *H. radicata*, *L. sulphurous*, *M. oreades*, *P. stipticus*, *P. coronilla*, *T. hirsuta.* The antioxidant activity of some mushroom (*C. cibarius*, *C. squamosus*, *D. tricolor*, *F. betulina, G. lucidum, L. sulphureus*, *M. oreades*, *P. coronilla, T. hirsuta*) extracts is mainly combined with anti-inflammatory action. Among these mushrooms *C. cibarius*, *F. fomentarius*, *F. betulina*, *H. radicata*, *M. oreades* possess antiviral, *C. squamosus*, *F. fomentarius* anti-inflammatory effect, *C. cibarius*, *F. betulina*, *F. pinicola, L. sulphureus* anti cancer effect.

As it is known, bioactive components of *Cantharellus cibarius* are used in food supplements or medicines. Fungus has a number of different biological activities, such as polysaccharides, antioxidant, anti-tumor, anti-cancer, immunomodulatory and stimulating, chemical-prophylactic, nerve-protective and prebiotic properties. Also, its raw extract is known as heart-protective, antimicrobial, viral, anti-aging effects [Uthan et al., 2021].

Cerioporus squamosus is used as a diuretic, cytotoxic, immunomodulatory, antimicrobial, anti-inflammatory, liver protection, antioxidant properties and also stimulates hair growth.

Coprinopsis atramentaria possesses antimicrobial and demelanizing activities due to the its organic acids, and methylated and glucuronated derivatives. Its antifungal activity is stronger than the antibacterial effects [Heleno et al., 2014]. According to literature [Elkhateeb et al., 2019] the ethanol extract from

Table 2. Fungal species with biological activities.

Species \ Use possibilities	Anti-age activity	Anti-fungal activity	Anti-hyperglisemic activity	Anti-inflammatory activity	Anti-microbial activity	Anti-oxidant activity	Antiseptic	Anti-tumor activity	Anti-viral activity	Demelanizing activity	Gastric disease	Heart-protective	Immunomodulatory	Rheumatism	Sedative	Wound treatment
Cantharellus cibarius	+				+	+		+	+			+	+			
Cerioporus squamosus				+	+	+							+			
Coprinopsis atramentaria		+			+					+						
Daedaleopsis tricolor						+										
Fomes fomentarius					+		+		+							
Fomitopsis betulina					+	+		+	+		+		+		+	+
Fomitopsis pinicola								+								
Ganoderma lucidum				+		+						+				
Hymenopellis radicata					+				+							
Laetiporus sulphureus			+		+	+		+			+		+	+		
Marasmius oreades						+			+							
Panellus stipticus																+
Psilocybe coronilla						+										
Trametes hirsuta						+										

Figure 3. Some new species for the study area: 1. *Peziza repanda*, 2. *Hymenopellis radicata*, 3. *Coprinopsis atramentaria*, 4. *Leccinellum pseudoscabrum*, 5. *Cantharellus cibarius*, 6. *Cerioporus squamosus*, 7. *Fomes fomentarius*, 8. *Polyporus tuberaster*, 9. *Fomitopsis pinicola*, 10. *Laetiporus sulphureus*, 11-12. *Ganoderma lucidum*.

basidiocarp and mycelium of *Daedaleopsis tricolor* has proved to have antioxidant potential (88.65%). It has been established that *Fomes fomentarius* has significant effects on microbial infection and has been widely used as a styptic by surgeons and dentists [Grienke et al., 2014; Gáper et al., 2016]. *Fomitopsis betulina* has anti-fatigue, antimicrobial, immunomodulatory, sedative properties. It is also used in folk medicine for the treatment of wounds, gastric diseases and colon cancer due to its anti-parasitic, antimicrobial, antiseptic, disinfectant properties. DNA protective effect and antioxidant properties of the fungus is also suggested [Pleszczyńska et al., 2017]. Ethyl acetate extract of the polypor medicinal mushroom *Fomitopsis pinicola*, has significant antineoplastic and anti-cancer activity [Bishop, 2020].

Ganoderma lucidum is inedible fungus, but is used in traditional Chinese medicine to improve health. The fungus has both antioxidative and antiflammatory effects, noticeable decreses both infarct area and neuronal apoptosis [Zhonghui et al., 2014].

Hymenopellis radicata contains musidin and has a strong antiviral and antimicrobial effects [Niego, 2021]. In traditional medicine *Laetiporus sulphureus* has been used for treatment of coughs, gastric cancer and rheumatism, widely used as an antipyretic. This species is considered a natural reserve of both food and medicine. It is a source of biological active compounds such as antimicrobial, anti-tumor, antioxidant, antihyperglycemia, immunomodulatory, also phenols, polysaccharides [Khatua et al., 2017]. *Marasmius oreades* produces secondary bioactive metabolites such as agrocybin, drimane, sesquiterpenes, and extract of fungus has remarkable effects on antioxidant defence system enzymes [Shomali et al., 2019]. In medical history, *Panellus stipticus* has been used as a blood thickener to stop bleeding wounds [Prasher et al., 2014].

Psilocybe coronilla has antioxidant capacity and is considered the richest source of phenolic compounds [Selem et al., 2021]. Extracts of fruiting bodies and mycelia of the species of the genus *Trametes* have significant antioxidative potentials which varied depending on species. The mycelium extract of *T. hirsuta* has rich metabolite content (triterpenes, sugars, polyphenols) and its biologically active compounds and their synergistic effects has medicinal potential [Knežević et al., 2018].

Edible and conditionally edible mushrooms represent a fascinating group of fungi. Mushrooms have been seen as an important food source by mankind for centuries [Cohen et al., 2014; Podkowa et al., 2021]. Of these, *Cantharellus cibarius*, *Cerioporus squamosus*, *Laetiporus sulphureus*, *Leccinellum pseudoscabrum* are considered particularly good edible fungi. *Hymenopellis radicata* is generally considered an edible mushroom, but is rare and therefore not highly rated. *Coprinopsis atramentaria* is a wild, and conditionally edible mushroom. According to D. Arora [1986] the mushroom contains disulfram-like compound, called 'coprin' that reacts with alcohol and causes vomiting. The use of mushrooms for food is a growing concern due to the number of accidents that occur during the mushroom season each year. This partially initiated by mistaken species.

Information using fungi/mushrooms for healing in Azerbaijan is scares. For this purpose, plant have been widely used. At present, the traditional and medicinal properties of mushrooms are of particular interest along with their nutritional properties. In this study, 13 species with such potential were noted and further research will be focused on revealing of their detailed composition.

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Göygöl Milli Parkı və ətraf ərazilərin makrogöbələkləri, tibbi əhəmiyyətli növlərə istinadən

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Tədqiqat işinə Göygöl Milli Parkı və ətraf ərazilərdən yeni toplanılmış və herbariyə depozit olunmuş makromiset nümunələri cəlb edilmişdir. Ərazidə qeydə alınmış göbələklərin müxtəlifliyi, morfoloji yanaşmalarla araşdırılmışdır. Ümumilikdə 26 növ qeydə alınmış, təyin edilən növlər arasında *Fomitopsis betulina* Azərbaycan üçün yenidir. Digər növlər (*Agaricus campestris, Cerioporus squamosus, C. varius, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis pinicola, Ganoderma lucidum, Laetiporus sulphureus, Leccinellum pseudoscabrum, Peziza repanda, Polyporus tuberaster, Tarzetta catinus, Trametes hirsuta*) tədqiqat ərazisi üçün yeni aşkar edilmişdir. Göbələklərin ekoloji qrupları və qida əhəmiyyəti araşdırılmışdır. Ümumilikdə 14 tibbi əhəmiyyətli növ (*Cantharellus cibarius, Cerioporus squamosus, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis betulina, F. pinicola, Ganoderma lucidum, Hymenopellis radicata, Laetiporus sulphureus, Marasmius oreades, Panellus stipticus, Psilocybe coronilla, Trametes hirsuta*) müəyyən edilmişdir. Bundan başqa, onlardan altısı qida əhəmiyyətlidir.

Açar sözlər: *yayılma, ekologiya, göbələk, herbari, tibbi əhəmiyyətli göbələklər, qida xüsusiyyətləri, qorunan ərazi, taksonomiya*

Макрогрибы Гёйгёльского национального парка и прилегающих территорий с акцентом на лекарственные виды

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К исследованию были привлечены новые образцы макромицетов, собранных Гёйгёльском Национальном Парке и на прилегающих к нему территориях, а также образцы, депонированные в гербарий. Разнообразие грибов зарегистрированных на территории изучено морфологическими подходами. Всего зарегистрировано 26 видов, из идентифицированных видов *Fomitopsis betulina* является новым для Азербай-джана. Для остальных видов (*Agaricus campestris, Cerioporus squamosus, C. varius, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis pinicola, Ganoderma lucidum, Laetiporus sulphurous, Leccinellum pseudosabrum, Peziza repanda, Polyporus tuberaster, Tarzetta catinus, Trametes hirsuta*) установлены новые места произрастания для исследованной территории. Определены экологические группы и пищевое значение выявленных грибов. Среди зарегистрированных видов выявлено 14 (*Cantharellus cibarius, Cerioporus squamosus, Coprinopsis atramentaria, Daedaleopsis tricolor, Fomes fomentarius, Fomitopsis betulina, F. pinicola, Ganoderma lucidum, Hymenopellis radicata, Laetiporus sulphureus, Marasmius oreades, Panellus stipticus, Psilocybe coronilla, Trametes hirsuta*) обладающих лечебными свойствами, 6 из которых имеют также и пищевое значение.

Ключевые слова: *распространение, экология, грибы, гербарии, лекарственные грибы, питательные свойства, охраняемые территории, таксономия*