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Red Fly Agaric (*amanita muscaria*) Consumption Among Members of Internet Discussion Groups

ABSTRACT

Red fly agaric is one of the most recognizable species of mushrooms. Although its toxicity is widely known in Polish society, a rise in its recreational use has been observed in recent years. The aim of the study is to describe the phenomenon of red fly agaric consumption and to characterize those who use it in the context of individual and social conditions. The study was conducted using a proprietary questionnaire with questions about red fly agaric usage, issues related to mental health, and sociodemographic data. A total of 95 respondents were qualified for the research sample: 32 women, 60 men, and three people who declared a gender other than binary. They were divided into two groups: experimenters (OE) and regular users (OU). The frequency, form, dosage, and place of fly agaric consumption among the respondents was determined, as well as the circumstances of and sources for acquiring the substance. The subjects noted the effects—immediate and long-term—of taking fly agaric. The findings

KEYWORDS
red fly agaric, mushrooms, psychoactive substances, narcotics, intoxication, hallucinogens

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show that the use of psychoactive substances is constantly growing and that the changing trends make it necessary to reflect on the support system for people with addiction problems.

Introduction

Red fly agaric (*amanita muscaria*), thanks to its characteristic appearance, is one of the most recognizable mushroom species and it is widely known to be toxic in our society. It is therefore surprising to see reports on the "trend of eating fly agaric" emerging as a reaction to social media posts by so-called influencers (Marcinek 2022). The harmful consequences of promoting its consumption are evidenced by the fact that the first publications about the new trend were soon followed by reports of fly agaric poisoning and hospitalization in intensive care units (Trela 2022).

Red fly agaric consumption is not just a contemporary trend or a new phenomenon. Shamans and ancient priests used to ingest plants and mushrooms known as entheogens (in Greek, *en* means "in" and *theós* "god") in order to put themselves into a trance (Crocq 2007). *Amanita muscaria* was used as early as 4,000 years ago in Central Asia during religious rituals. Also, in ancient India, it played an important role as an ingredient in Soma, a sacred drink consumed during religious rituals. The mushroom was known to inhabitants of Siberia, as well (Chwaluk, Przybysz 2015). Depending on the region, its use was either purely medically and religiously motivated or was widespread. The red fly agaric, when properly prepared, was also used in 19th-century Poland. It was mainly used as a fly poison (as reflected in the etymology of its Polish name) and in folk medicine to treat rheumatism and dysentery (Trojanowska 2001).

Red fly agaric contains numerous chemical compounds, but the substances responsible for its psychoactive effects are mainly muscimol and ibotenic acid. Due to their structure, they mimic key neurotransmitters—substances responsible for transmitting signals between nerve cells at synapses. Muscimol mimics the inhibitory γ-aminobutyric acid (GABA) and it is a GABA-A and partly GABA-C receptor agonist (Johnston 2014). Ingestion of the substance causes stupor and drowsiness (Beuhler 2016: 2116). In contrast, ibotenic acid mimics the excitatory glutamate by binding to

the NMDA receptor, inducing changes in perception (Johnston et al. 2009). It is decarboxylated spontaneously in the acidic environment of the stomach, liver, and brain (Nielsen et al. 1985) or is dried to become muscimol (Chwaluk, Przybysz 2015). The latter does not produce such dangerous effects as its precursor in the form of epileptic seizures or brain changes resembling those in Alzheimer's disease (Stebelska 2013).

The statistics on the prevalence of psychoactive substances do not distinguish red fly agaric in a separate category; it is included in another group of substances: hallucinogens. The European School Survey Project on Alcohol and Other Drugs (ESPAD; The European Monitoring Centre for Drugs and Drug Addiction 2022) used a general category for hallucinogenic mushrooms, which were used by up to 1% of young adults (15–34 years) in European countries. It is worth noting, however, that red fly agaric has a different effect on the human central nervous system than mushrooms containing psilocybin, so it seems appropriate to separate categories for toadstools and other mushrooms. The results of nationwide studies on the general population aged 15–64, presented in the Report on the State of Drug Addiction in Poland (Krajowe Biuro ds. Przeciwdziałania Narkomanii 2020), also indicate a relatively low rate of consumption of hallucinogenic substances (other than LSD): 0.9% of respondents admitted using them at least once in their lives and only 0.1% in the year preceding the survey.

In Poland, although recreational use of red fly agaric is observed, cases of intoxication with it do not appear frequently in medical practice and account for a small percentage of mushroom poisonings in general (Chwaluk, Przybysz 2015: 95). Severe red fly agaric poisoning is rare; fatalities represent a small percentage of all cases and depend on the amount of toxin absorbed. Usually, the duration of clinical symptoms after poisoning is between 8 and 24 hours, but sometimes they persist for up to 5 days. The first symptoms may occur as early as 15 minutes after toadstool ingestion, in the form of gastrointestinal distress, including vomiting, diarrhea, and abdominal pain. From 30 minutes to 2 hours after toadstool ingestion, general weakness, confusion, dizziness, disorientation, dry mouth, pupil dilation, tinnitus, and visual and auditory hallucinations occur (Marciniak et al. 2010: 590–591; Mikaszewska-Sokolewicz et al. 2016:

182). After about two hours, fatigue and drowsiness follow, progressing to deep sleep, which is usually the last stage of poisoning. In more severe cases, symptoms additionally include increasing psychomotor agitation, muscle tension, convulsions, hot flashes, and body temperature elevated up to 40 °C. *In these extremely severe cases, intoxication may end in coma or respiratory failure*, leading to death (Michelot, Melendez-Howell 2003: 132; Mikaszewska-Sokolewicz et al. 2016: 182).

Although red fly agaric has been taken by people for centuries, access to the internet has popularized the phenomenon. People without access to "traditional drugs" who are looking for ways to get intoxicated can obtain a range of information from online forums dedicated to the subject, including instructions on using the substance. Significantly, the information available online regarding its alleged medicinal properties red fly agaric is often not empirically confirmed or verified in any way. It is also disturbing that products containing red fly agaric and advertised as homeopathic remedies for a number of conditions can be purchased on one of the largest e-commerce platforms in Poland: if you type in the phrase *amanita muscaria*, you will easily find more than 100 such offers.

Methodology of the research

The purpose of this study was to describe the phenomenon of red fly agaric use and to characterize its users among members of online discussion groups in terms of their individual and social circumstances. This will make it possible to specify directions for future research in order to understand this phenomenon in more detail.

The following research questions were posed:

1. What is the frequency of red fly agaric use among the respondents?
2. In what forms and doses do the respondents take red fly agaric?
3. In what places and circumstances do they obtain and use red fly agaric?
4. What is the age at which the respondents start using red fly agaric, and what are the reasons for this?
5. What are the reasons for taking red fly agaric?

6. What immediate and long-term effects do the respondents experience after taking red fly agaric?
7. What are the respondents' sources of knowledge about red fly agaric, its preparation, and dosages?
8. What is the frequency of using other psychoactive substances among red fly agaric users?

Procedure, method, and research tools

The survey was quantitative in nature. It was conducted among participants in Polish social media discussion groups and online forums with between 400 and 43,000 members. The groups were randomly selected for the topics they dealt with: use of red fly agaric and other psychoactive substances, alternative medicine and herbs. Information about the research was published on the forums after permission was obtained from the administrators.

The study was carried out using a diagnostic survey method. It used a questionnaire prepared for the survey, via the MS Forms platform. This platform allows forms to be sent only when the closed questions are fully completed; missing or incomplete data in the responses was only allowed in the case of open-ended questions.

The questionnaire consisted of three parts. The first referred to sociodemographic data: gender, age, place of residence, education, relationship status, professional activity, and number of children. The second part of the survey addressed the phenomenon of red fly agaric use through both single-choice, multiple-choice, and open-ended questions. The respondents were asked about the frequency of red fly agaric use, the dosage and forms of taking it, poisoning, sources, money spent on red fly agaric, reasons for taking red fly agaric, age and reasons for first using red fly agaric, the immediate and long-term effects red fly agaric, and sources of knowledge about red fly agaric, dosages, and preparation. In the third part of the questionnaire, the respondents were asked about mental health issues, primarily diagnosed mental disorders and coping with them, the use of psychoactive substances, and treatment for substance abuse. Single-choice and open-ended questions were used for this purpose.

Before starting the survey, each person was informed of the purpose and procedure of the study. Informed consent to participate in the study was obtained each time. Participation was voluntary.

The software program SPSS was used for statistical analysis. For this purpose, the answers to the open-ended questions were coded into categories. Basic descriptive statistics were used in the study. The Mann–Whitney U test was used to compare the level of quantitative variables in the study groups and the χ^2 test was used to detect significant differences in qualitative variables. When the expected number was less than 5, the χ^2 test with Yates' correction for continuity was used. Cramér's V was used to determine the strength of the relationship between the frequency of use and the characteristics in question. The study adopted a significance level for Cronbach's α of 0.05 and the tests were two-sided.

Characteristics of the research sample

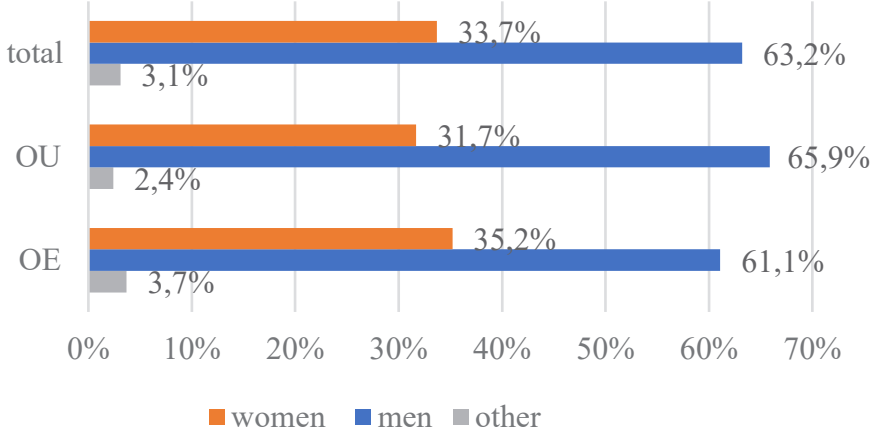
The sampling was non-probabilistic and voluntary. A total of 125 people took part in the study. Of the questionnaires collected, 30 (37.5%) were rejected because they did not meet the conditions of having taken red fly agaric at least once in the past 12 months or of being an adult.

Ninety-five people were included in the study sample: 32 women, 60 men, and three people who declared a gender other than female or male. The subjects were allocated to two groups: experimenters, who use red fly agaric occasionally (OE), and regular users (OU). The inclusion criterion for a specific group was the respondents' declaration on the frequency of red fly agaric use. The OE group consisted of those who use red fly agaric once or several times a year, while the OU group consisted of those who use red fly agaric at least several times a month.

The OE group included 54 individuals: 19 women, 33 men, and two people who identified another gender. The OU group included 41 people: 13 women, 27 men, and one person who declared another gender. The majority of respondents in the overall sample and among the experimental users red fly agaric were men (Figure 1). This gender distribution in the study group and its subgroups follows the European trends and corresponds to the results presented in

the European Drug Report (The European Monitoring Centre for Drugs and Drug Addiction 2022).

Figure 1. Study group, by sex

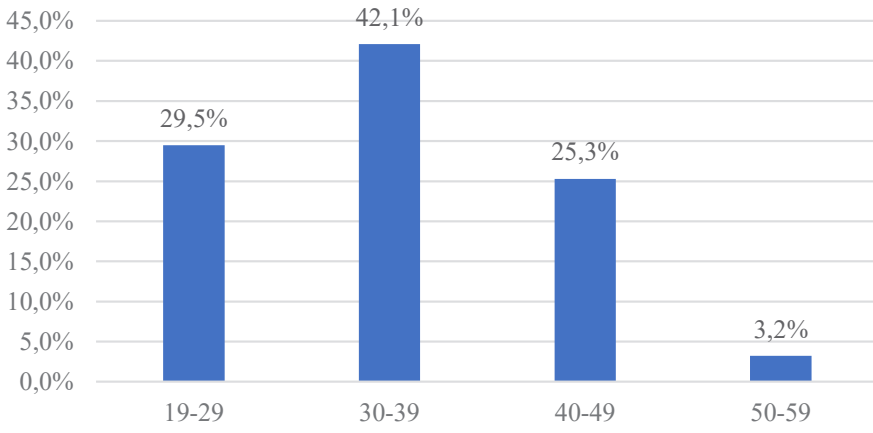


Source: Own study.

The age of the respondents in the entire study group ranged from 19 to 55 years. The largest group was comprised of 30–39 year olds. The youngest woman among the respondents was 23 years old, while the oldest was 49. The age of the male respondents ranged from 20 to 55. Among those who declared a gender other than female or male, the youngest was 19 years old and the oldest 37. The age of the respondents is shown in Figure 2.

The mean age of the people in the experimenters group of occasional red fly agaric (OE) users was 32.22 years (SD=8.25) and ranged from 19 to 55. In the group of regular toadstool users (OU), the mean age was 37.44 years (SD=6.85) and ranged from 23 to 55. The OE and OU groups were statistically significantly different in terms of age (Z=8.78; p<0.01).

Figure 2. Study group, by age



Source: Own study.

The respondents mostly live in large cities with more than 150,000 residents. One in three respondents lives in a city with up to 150,000 inhabitants. Approximately one fifth of them live in rural areas. The vast majority of the people surveyed (about 90%) are employed. About 17% of the respondents are university students, some of whom work at the same time. Unemployed people and pensioners made up the smallest percentage of the respondents. More than half of the respondents have a university degree. A slightly smaller percentage (about 40%) represented people with a secondary-school education. Those with a vocational-school education made up about 6%, while the fewest respondents had an elementary-school education (2.5%). This finding is most likely due to the fact that only adults took part in the survey.

The largest proportion of the respondents were people in informal relationships (about 37%). Almost one in three respondents is married, while about 30% declared that they are not in a relationship. Experimenters (OE) differed from regular users (OU) in terms of being involved in romantic relationships ($\chi^2(2)=10.11$; $p<0.01$). OE users were more likely to be in a romantic relationship (50%), while OU users were more likely to report not having a partner (39%). The strength of this relationship should be interpreted as moderate

(V=0.33). The majority (about 58%) of the respondents are childless. One in five respondents has two children and about 15% are parents of an only child. The smallest percentage (less than 6%) represented those with three or more children (Table 1).

Table 1. Sociodemographic characteristics of the study participants

Variable	Statistics	Number of respondents					
		OE		OU		Total	
		n	%	*n*	%	*n*	%
Place of residence	village	12	22,2	8	19,5	25	20,7
	city with up to 150,000 residents	16	29,6	16	39	38	31,4
	city with over 150,000 residents	26	48,1	17	41,5	58	47,9
Profession	unemployed	5	9,3	2	4,9	11	9,1
	student	8	14,8	6	14,6	21	17,4
	employed	48	88,9	38	92,7	105	86,8
	pensioner	2	3,7	0	0	2	1,7
Education	elementary	3	5,6	0	0	3	2,5
	vocational	3	5,6	4	9,8	8	6,6
	secondary	22	40,7	12	29,3	47	38,8
	university	26	48,1	25	61	63	52,1
Relationship status	no partner	10	18,5	16	39	36	29,8
	partner	27	50	8	19,5	45	37,2
	married	17	31,5	17	41,5	40	33,1
Number of children	none	35	64,8	17	41,5	70	57,9
	1	8	14,8	7	17,1	19	15,7
	2	7	13,0	14	34,1	25	20,7
	3 and more	4	7,4	3	7,3	7	5,8

Source: Own study.

Across the entire sample of red fly agaric users, around 18% of people had been diagnosed with a mental disorder. One in five regular users stated that they had received such a diagnosis, with a similar percentage of 17% in the experimental group. One in ten respondents had been diagnosed with an anxiety disorder and around 8%

with depression. The most common diagnoses in the entire sample and in both subgroups are shown in Table 2.

Table 2. Diagnoses of mental disorders

Disorder/mental illness	OE	OU	Total
Anxiety disorders	11,1%	7,3%	9,5%
Depression	9,3%	7,3%	8,4%
Borderline personality disorders	3,7%	2,4%	3,2%
Bipolar disorder	1,9%	0%	1,1%
Eating disorders	0%	2,4%	1,1%
Adaptation disorders	1,9%	0%	1,1%
Schizophrenia	1,9%	0%	1,1%

Source: Own study.

The respondents with a mental disorder most often use pharmacotherapy and psychotherapy. About 35% try to cope with their disorders through self-medication. Lower percentages of respondents indicated meditation (23.5%), healthy eating (about 18%), or contact with nature (about 6%), that is, adaptive, constructive forms of coping with mental disorders. The respondents also choose non-adaptive ways of coping with their mental disorder: about 30% take fly agaric and about 18% take psychedelics (Table 3).

Table 3. Ways of coping with disorders

Ways of dealing	OE	OU	Total
Pharmacotherapy	55,6%	50%	52,9%
Psychotherapy	44,4%	37,5%	41,2%
Self-therapy	44,4%	25%	35,3%
Using red fly agaric	22,2%	37,5%	29,4%
Meditation	22,2%	25%	23,5%
Healthy diet	33,3%	0%	17,6%
Psychedelics	22,2%	12,5%	17,6%
Contact with nature	11,1%	0%	5,9%

Source: Own study.

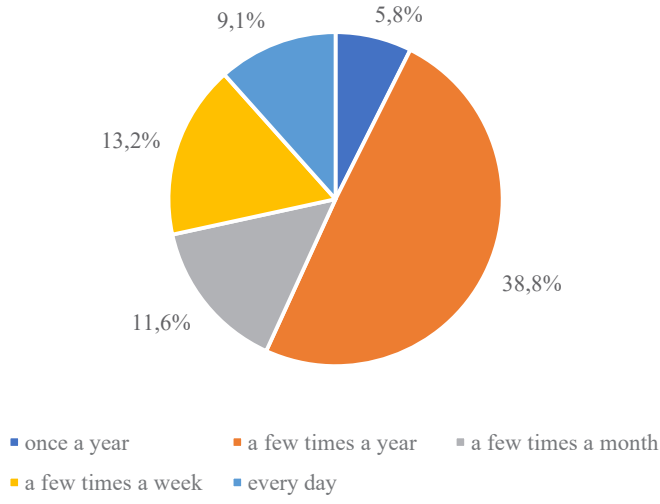
Presentation of the results

The analysis of the research material consisted in describing selected characteristics of red fly agaric consumption in the study group and in the subgroups: experimenters and red fly agaric(OE) regular red fly agaric users (OU). The statistical analysis did not show a relationship between the frequency of red fly agaric consumption and most of the selected characteristics; therefore, those results which were not significantly statistically different are not presented here.

Frequency of red fly agaric use

The majority of the respondents are red fly agaric users who take the mushroom several times a year. Those who use it several times a month or several times a week were similar in number. In contrast, almost one in ten respondents use red fly agaric on a daily basis. The smallest percentage in the study group represented those who use red fly agaric once a year. The results are shown in Figure 3.

Figure 3. Frequency of red fly agaric use

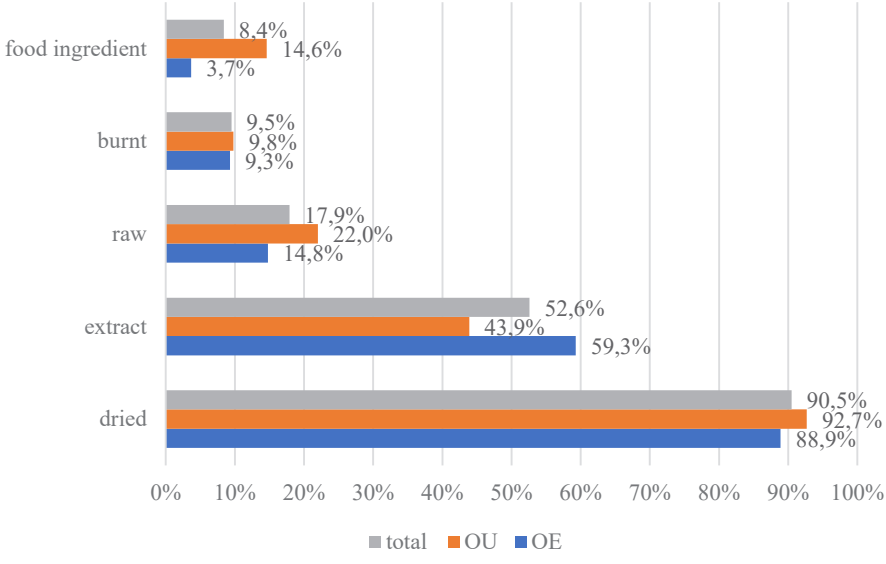


Source: Own study.

Forms of consumption and dosage of red fly agaric

Most respondents consume red fly agaric in a dried form. Raw mushrooms are consumed by about 18%. Just over a half of the respondents drink a specially prepared extract. The least popular forms of consumption were smoking and adding mushrooms to food.

Figure 4. Forms of red fly agaric consumption



Source: Own study.

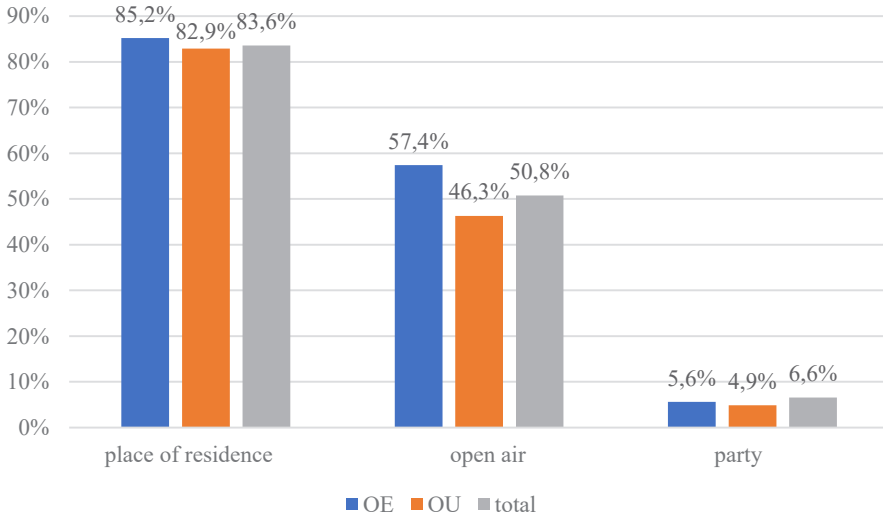
An attempt was also made to determine the minimum, average, and maximum doses of red fly agaric taken by the respondents. As more than half of them found it difficult to determine the dosage and the others used different units, no statistical analysis was carried out. In addition to doses given in grams, the respondents used units such as caps ("4 medium caps"), teaspoons ("a heaping teaspoon"), drops ("5 drops"), or intuitively ("always more or less").

Places and circumstances of obtaining and using red fly agaric

The most common place in which the respondents consume red fly agaric is at their place of residence. Just over a half of the

respondents declared that they consume mushrooms outdoors. The least frequently indicated place was entertainment venues: clubs, pubs, or bars (Figure 5).

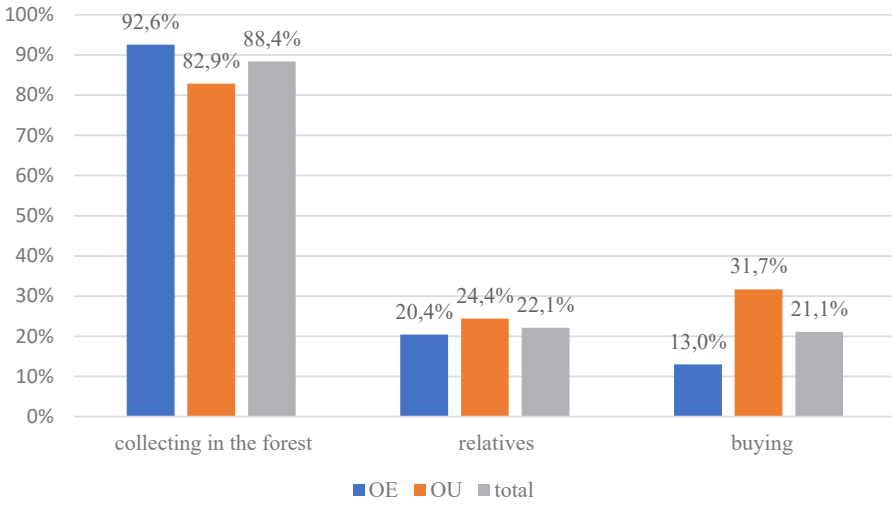
Figure 5. Place of using fly agaric



Source: Own study.

The majority of the respondents declared that they collect red fly agaric by themselves in the forest. About 22% of the respondents receive it from family, friends, or acquaintances. One in five users purchase it and occasional users differ significantly from experimenters in this respect ($\chi^2(2)=4.93$; $p<0.05$). One in three people in the OU group declared buying mushrooms, while one in eight in the OE group does the same. The strength of this relationship was weak ($V=0.23$). Detailed data is shown in Figure 6.

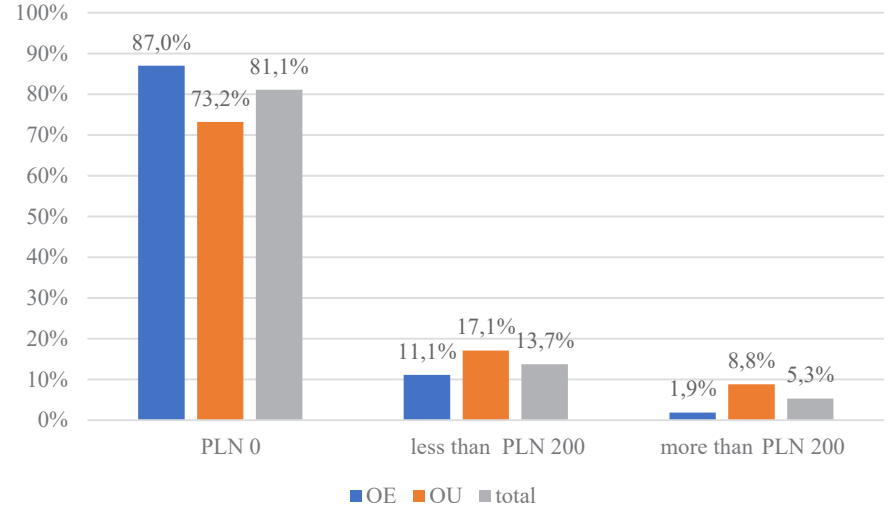
Figure 6. Sources of red fly agaric



Source: Own study.

The majority of the respondents do not spend money on red fly agaric because they source it themselves. If they do purchase it, they are more likely to spend up to PLN 200 per year than more than PLN 200 per year (5.3%).

Figure 7. Annual expenditure on *amanita muscaria* purchases



Source: Own study.

Age of initiation with red fly agaric use and reasons

Another analyzed aspect was the age of initiation of red fly agaric use. More than half of the respondents (approximately 61%) was below the average age. Among occasional users, more than a half of the respondents (about 56%) were below the mean age, while among regular users about 48% were below the mean age. Statistically significant intergroup differences were found for the average age of first red fly agaric consumption (Table 4).

Table 4. Age of initiation with red fly agaric use

Group	*M*	*SD*	*min*	*max*	*Z*	*p*
OE	28,56	8,28	14	49	14,1	<0,001
OU	35,48	7,31	13	50		
Total	31,5	8,56	13	50		

Source: Own study.

Half of those surveyed tried red fly agaric for the first time out of curiosity. One in four were motivated by the expected potential medicinal effects attributed to red fly agaric supplementation; one in five wanted to meet their spiritual needs; and one in ten wanted to increase their mental function (Table 5).

Table 5. Reasons for first using red fly agaric

Reasons for initiation	OE	OU	Total
Curiosity	50%	51,2%	50,5%
Healing effects	25,9%	19,5%	23,2%
Spiritual needs	18,5%	26,8%	22,1%
Increasing the capacity of the mind	9,3%	12,2%	10,5%
Pleasure	9,3%	0%	5,3%
Peer pressure	7%	0%	4,2%
Personal problems	1,9%	2,4%	2,1%

Source: Own study.

Reasons for taking red fly agaric

The most common reasons for taking red fly agaric indicated by the respondents in the entire sample were the expected medicinal effects, spiritual needs, and increased mental performance. Half of the respondents indicated curiosity among their reasons for taking it, and around 33% indicated relaxation. Pleasure-seeking was the reason declared by one in four respondents. Personal problems led 16% of the respondents to take fly agaric. The fewest (only 3% of respondents) attributed their use to peer pressure (Table 6).

Table 6. Reasons for using red fly agaric

Reasons	OE	OU	Total
healing effects	70,4%	87,8%	77,9%
spiritual needs	75,9%	73,2%	74,7%
increasing the capacity of the mind	72,2%	75,6%	73,7%
curiosity	53,7%	43,9%	49,5%
relax	24,1%	43,9%	32,6%
pleasure	31,5%	19,5%	26,3%
problems in personal life	9,3%	24,4%	15,8%
pressure of the environment	3,7%	2,4%	3,2%

Source: Own study.

Experimenters differed in a statistically significant manner from regular users in terms of the reasons for taking red fly agaric. About 88% of the OU respondents consume it for its healing effects, while in the OE group the percentage was about 70% ($\chi^2(7)=4.11$; $p<0.05$). Significant intergroup differences were also observed for relaxation ($\chi^2(7)=4.17$; $p<0.05$), with around 44% of the OU group declaring this motive and one in four respondents in the OE group doing so. Problems in one's personal life also proved to be a reason with statistically significantly differences ($\chi^2(7)=4.01$; $p<0.05$): in the OU group, it was one in four respondents, while in the OE group it was one in ten users. The effect size for these relationships was $V=0.21$, indicating that the strength was weak.

Immediate and long-term effects after taking red fly agaric

The effects observed both up to a few hours after taking red fly agaric (Table 7) and long-term (Table 8) were more often positive effects, according to the respondents. With regard to immediate effects, they most often declared increased insight, relaxation, and mental performance. One in four respondents indicated improved mood, one in six to improved energy and motivation, and one in seven to somatic effects. When it comes to positive long-term effects, the respondents most frequently observed improved mental health. One in three users indicated higher mental function, while slightly fewer indicated spiritual development. One in five respondents noted peace of mind and slightly fewer noted improved somatic health.

Most of the respondents do not perceive negative immediate or long-term effects from consuming red fly agaric. A half of them did not mention negative consequences immediately after taking red fly agaric. One in four users declared gastrointestinal problems; about 13% reported somatic symptoms other than gastrointestinal problems. One in ten people experience drowsiness and slightly fewer respondents experience anxiety. The least frequently observed effects were cognitive impairment and the *bad trip* phenomenon: a mental state after using psychedelic substances defined as a negative experience manifested in unpleasant hallucinations accompanied by severe anxiety and panic, among other symptoms (Motyka, Marcinkowski 2014: 508). The vast majority of the respondents (around 90%) did not report negative long-term effects from red fly agaric use. Approximately 4% experience psychological discomfort. A bad taste in the mouth and cognitive impairment were declared by about 2% of respondents (Table 7).

Table 7. Direct effects of red fly agaric ingestion

Direct effects							
Positive				**Negative**			
	OE	**OU**	**Total**		**OE**	**OU**	**Total**
Better insight into oneself	40,7%	48,8%	44,2%	None	48,1%	51,2%	49,5%
Relaxation	44,4%	41,5%	43,2%	Gastric problems	33,3%	14,6%	25,3%

Direct effects							
Positive				Negative			
	OE	OU	Total		OE	OU	Total
Increased mental function	48,1%	34,1%	42,1%	Other somatic symptoms	13%	12,2%	12,6%
Change in mood	27,8%	24,4%	26,3%	Sleepiness	9,3%	9,8%	9,5%
Energy and motivation	16,7%	17,1%	16,8%	Anxiety	7,4%	9,8%	8,4%
Somatic effects	14,8%	14,6%	14,7%	Weaker cognitive functions	3,7%	2,4%	3,2%
Changes in perception	9,3%	12,2%	10,5%	*Bad trip*	0%	4,9%	2,1%

Source: Own study.

One significant difference was found between experimenters and regular users in terms of the negative effects observed immediately after taking red fly agaric. It concerns gastrointestinal problems ($\chi^2(6)=4.32$; $p<0.05$), with one out of three people in the OE group and one out of seven in the OU group indicating this effect. The strength of this relationship should be interpreted as weak ($V=0.21$).

Table 8. Long-term effects of red fly agaric use

Long-term effects							
Positive				Negative			
	OE	OU	Total		OE	OU	Total
Mental health improvement	38,9%	43,9%	41,1%	None	96,3%	80,5%	89,5%
Increased mental function	24,1%	46,3%	33,7%	Mental discomfort	0%	9,8%	4,2%
Spiritual development	31,5%	31,7%	31,6%	Bad taste in the mouth	0%	4,9%	2,1%
Calmness	22,2%	14,6%	18,9%	Weaker cognitive function	1,9%	2,4%	2,1%
Somatic health improvement	16,7%	19,5%	17,9%	Gastric problems	0%	2,4%	1,1%
Energy and motivation	11,1%	7,3%	9,5%	Sleepiness	0%	2,4%	1,1%

Source: Own study.

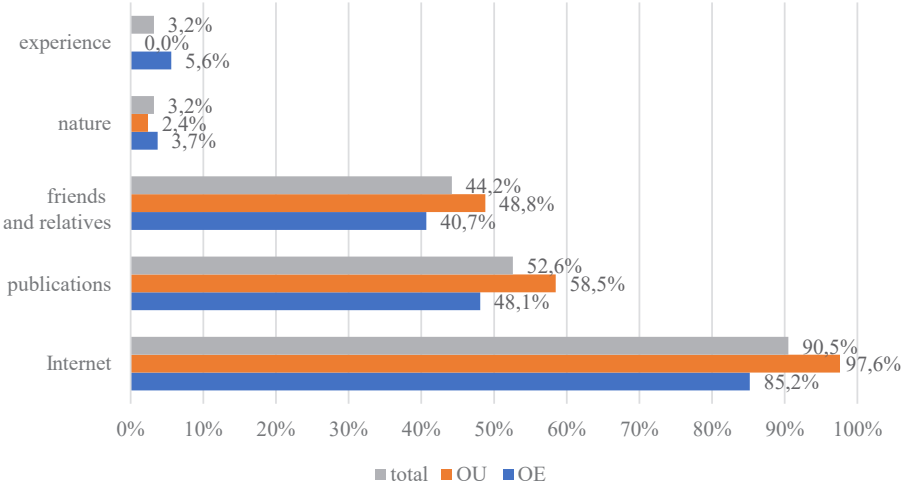
For long-term effects, the groups differed when it comes to indicating an increase in mental performance ($\chi^2(5)=5.17$; $p<0.05$) and the absence of consequences of red fly agaric use ($\chi^2(5)$, with Yates correction=4.62; $p<0.05$). For the former, about half of the regular users and one in four experimenters declare higher mental performance. The absence of long-term negative consequences was declared by the majority of the respondents in both groups: about 96% of those in the OE group and about 81% of those in the OU group. The effect sizes were $V=0.23$ and $V=0.26$, respectively, indicating that the relationships were weak.

In the context of the consequences of red fly agaric use, the respondents were also asked whether they subjectively felt a loss of control over the use of the substance. This was felt by about 23% of the respondents. Red fly agaric poisoning should also be mentioned at this point. One in ten respondents stated that they had experienced red fly agaric poisoning (9%). The relatively low percentage of poisonings may be due to the relatively low toxicity of red fly agaric or to the respondents' knowledge of an appropriate dosage to avoid severe poisoning and the decarboxylation of ibotenic acid in muscimol as a result of drying (Chwaluk, Przybysz 2015: 95).

Sources of the respondents' knowledge of red fly agaric, its preparation, and dosages

The vast majority of the respondents get their information about red fly agaric from the internet. The second most common source was scientific publications, which are used by about half of the respondents. Friends, family, and acquaintances are the source of knowledge about the mushroom for about 44%. The respondents were least likely to indicate "nature" and experience (Figure 8).

Figure 8: Sources of knowledge about red fly agaric



Source: Own study.

When it comes to knowledge of red fly agaric dosage, the respondents also get their knowledge mainly from the internet; one in three respondents learn from friends and family and around 28% learn from scientific publications. One in five respondents indicated their own experience as the source of knowledge. Also, when it comes to preparing red fly agaric, the internet was the most common source. Approximately 39% respondents use scientific publications in this regard and 37% rely on the knowledge of people who are close to them.

Frequency of use of other psychoactive substances among red fly agaric users

The most popular psychoactive substance among red fly agaric users was cannabis, which is used by around 85% of the respondents, with one in seven using it every day. The results here are similar to the use of alcohol and caffeine, which are used by around 84% of the respondents. Red fly agaric users are more likely to use psychedelics than stimulants. They hardly ever take depressants such as GHB (4%) and benzodiazepines (9%).

The vast majority (92%) of experimental red fly agaric users take cannabis, while alcohol is consumed by around 84% of the respondents. In contrast, for regular users, the most common substances of choice are caffeine, which is used by all respondents, alcohol (the percentage of those consuming it is the same as in the OE group), and cannabis, which is used by 78% of the respondents.

Table 9. Frequency of taking selected psychoactive substances

Substance	Never	Once a year or less	A few times a year	A few times a month	A few times a week	Every day
Marijuana	14,7%	22,1%	14,7%	17,9%	15,8%	14,7%
Alcohol	15,8%	8,4%	33,7%	29,5%	10,5%	2,1%
Caffeine	15,8%	2,1%	9,5%	18,9%	21,1%	32,6%
Psylocybin	27,4%	32,6%	36,8%	2,1%	0%	1,1%
Nicotine	36,8%	10,5%	10,5%	3,2%	9,5%	29,5%
LSD	42,1%	42,1%	14,7%	1,1%	0%	0%
MDMA	50,5%	33,7%	15,8%	0%	0%	0%
DMT	58,9%	33,7%	7,4%	0%	0%	0%
Cocaine	66,3%	26,3%	7,4%	0%	0%	0%
Amphetamine	72,6%	15,8%	8,4%	2,1%	1,1%	0%
Mephedrone	81,1%	15,8%	1,1%	2,1%	0%	0%
Mescaline	83,2%	16,8%	0%	0%	0%	0%
Ketamine	87,4%	6,3%	4,2%	2,1%	0%	0%
Opiates	89,5%	6,3%	1,1%	2,1%	0%	1,1%
Benzodiazepines	90,5%	8,4%	0%	1,1%	0%	0%
Benzydamine	92,6%	7,4%	0%	0%	0%	0%
GHB	95,8%	3,2%	1,1%	0%	0%	0%

Source: Own study.

The respondents were also asked about past or current substance abuse treatment/therapy in inpatient or outpatient health centers. For the entire sample, the proportion of users in substance abuse

treatment and therapy programs was 7.4%. One in ten of the regular users is in such a program and around 6% of the experimenters.

Conclusions and practical implications

Over the past several years, the phenomenon of recreational red fly agaric use has been observed in Poland, although its scale is admittedly relatively small (The European Monitoring Centre for Drugs and Drug Addiction 2022). At the same time, studies are emerging that point to an alarming trend among users of psychoactive substances as one of the undesirable consequences of national drug policies. This involves the search for new, legal, and inexpensive drugs (Dyer et al. 2014: 77). The fly agaric, as a natural, accessible, free, and legal source of psychoactive substances, seems to fit into this trend.

The results of the study indicate that the majority of those who use red fly agaric occasionally and regularly are men aged 19–49 years. They are residents of small and large cities. They have a secondary-school or higher education. The vast majority of them work; some additionally study. They are married or in informal relationships, most of them without children. Almost one in five of them has a diagnosed mental disorder— the most common being an anxiety disorder or depression, which they cope with using pharmacotherapy and psychotherapy, self-medication, or red fly agaric.

Red fly agaric users mostly use it several times a year. Their patterns of use of toadstool as a psychoactive substance can be described as recreational and supportive of functioning in various life roles: work, family, and social (Czabała 2008: 4–5). Most often, they consume it at home, either in a dried form or as a specially prepared extract. They generally obtain it themselves, so they do not have to pay for it. They learn about its effects and proper dosage and preparation from the internet, friends and family, or scientific publications. Most of them tried red fly agaric for the first time out of curiosity or for the expected medicinal effects, which are, along with spiritual needs and increased mental capacity, the main motives for continuing to use the substance. They focus mainly on the positive effects it produces, while overlooking the negative aspects. This may be due to the positive expectations they attribute to the effects of red fly agaric. It is also worth noting here that, among those surveyed, almost one in

five declared having being diagnosed with a mental disorder, which may be the reason for the use of psychoactive substances. In this context, the psychoactive substance is used by the person as a more or less conscious attempt to self-medicate, to alleviate the symptoms of the disorder, or, for those on medications, to reduce the undesired side effects (Błachut et al. 2013: 336; Just, Ogłodek 2013: 299). Only one in five feel that they have lost control of their use, and one in ten have been poisoned by it. It should be stressed, however, that the analysis presented herein relates only to respondents from selected online discussion groups and therefore cannot be extrapolated to the entire population of toadstool users in Poland.

Psychoactive substance use is a phenomenon that is developing extremely quickly. Constantly changing trends make it necessary to integrate the existing support system and to search for new forms of support and changes in the approach to the problem itself. Drug use affects not only children and adolescents or people from groups at risk of social exclusion, but also educated and working adults. In this context, it is important to regularly amend the law to follow contemporary trends and to evaluate the prevention strategies used so far. In addition to the state's ongoing efforts to improve the healthcare system, the context of current lifestyles and the determinants of people's engagement in various risk behaviors that can affect their health is important.

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