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Ethnomycological research in the field of wild mushrooms and medicinal plants

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Abstract: *During the recent years, there is an increased interest in the problems of wild mushrooms and medicinal plants in all over the world. An intensive research is currently performed in order to further clarify the peculiarities of numerous edible, toxic and cultivated wild mushrooms and medicinal plants. Both traditional and contemporary knowledge of the population is assessed by means of a variety of ethnomycological and ethnobotanical methods. The manners of usage by the population of wild edible mushroom and medicinal plants are intensively studied in many countries, too. In the present review article, the results from some recent investigations by Bulgarian and foreign authors devoted to the knowledge and use of some popular wild mushrooms and medicinal plants are summarized. The necessity for the intensification of the collaborative ethnomycological and ethnobotanical research in Europe is outlined.*

Keywords: edible wild mushrooms, medicinal plants, ethnomycology, ethnobotany, knowledge, usage

Introduction

Since millennia, people are aware of mushrooms and medicinal plants. During the recent decades, the investigations of the various species of wild mushroom and medicinal plants have contributed to the disclosure of a large number of their essential features. The number of these identified species which are analyzed in a versatile manner uninterruptedly increases worldwide.

The interest in mushrooms is determined by their rising significance not only for the biological variety in living nature but also for their considerable usage by the population in the developing and developed

countries as valuable food and for medical treatment as well. Numerous medicinal plants are traditionally used by the population, indeed.

In the present concise review, some recent data from ethnomycological and ethnobotanical investigations within and outside Europe devoted to some essential peculiarities of contemporary knowledge and use of popular wild mushrooms and medicinal plants in terms of their social importance are summarized.

Knowledge of edible and toxic wild mushrooms - ethnomycological aspects

Local population's knowledge of wild edible mushrooms and their cultural importance are assessed and compared by means of various qualitative and quantitative methods indicating that non-used resources can be the object of a deep traditional knowledge and have a vast cultural importance [1].

During an ethnomycological field study by means of a total of 695 semi-structured interviews among local informants in 38 localities in Mazovia, a mycophilic region of Poland, 92 taxa identified to the species or genus level are recorded [2]. The mean number of edible taxa mentioned per interview is 9.5. Frequent interaction with mushroom collectors enables the transcription of local folk taxonomy into proper taxonomic classification and the definition of changes in local preferences concerning wild mushroom collection.

In Menge District, Benshangul Gumuz Region, Ethiopia, an ethnomycological study of wild edible and medicinal mushrooms is carried out by means of semi-structured interviews, focus group discussions, participant observations and walk-in-the-woods among a total of 240 respondents, 127 males and 113 females [3]. Of them, 54 are aged 15-29 years, 101 are aged 30 years, and 85 are aged >50 years. Only six respondents are with tertiary, 26 are with secondary and 40 are with primary education. A total of 20 ethnomycologically important wild mushroom species belonging to ten genera and six families are identified. There are 15 edible species in this district. The *Lyophyllaceae* family is represented by nine species (45%) followed by *Agaricaceae* by seven species (35% of the cases).

The results from the interviews of 448 respondents belonging to 13 ethnic groups in Côte d'Ivoire concerning the phytogeographical and sociolinguistical patterns of mushroom diversity and distribution as well as the ethnomycological knowledge and considerations of these local people indicate the identification of 68 useful wild fungal species, belonging to 17 families and 23 genera [4].

The ethnomycological perceptions of farmers the Cerrado biome in the city of Goiás, Brazil, are assessed in order to verify historical management practices and producers' knowledge about phytopathogenic fungi [5]. Male respondents prevail and are an average age of 53 years while female ones are at an average age of 41 years. Most respondents (37,5%) are with high school education, 21,4% are with completed elementary school while 14,2% are with technical training in agriculture and higher education each. In general, farmers are capable of identifying the representatives of the mushrooms found in their daily life.

The ethnomycological field survey of the traditional knowledge of mushrooms among ten rural communities in Cameroon between 2014 and 2015 by means of semistructured questionnaires, focus group discussions and pictorial methods provides information on edibility, local names, indigenous knowledge and the role of macrofungi [6]. Local names are a very important factor in distinguishing between edible, medicinal and poisonous mushrooms.

Ethnomycological knowledge assessment using semi-structured interviews with 62 participants from different mycological associations in Serbia demonstrates its higher level among males than females [7]. The ethnomycological questionnaire investigation of several edible wild mushroom species from Pakistan reveals that the local communities are familiar with the morphological features, habitats and qualities of these mushrooms [8]. The results from a study of 100 informants from three communities in Amealco, Quéretaro, México, between August 2013 and November 2014 concerning the traditional ethnomycological knowledge demonstrate that both mushroom searching and collection are crucial for the transfer of this knowledge through generations [9].

Good knowledge of mushrooms as a food supplement as estimated by using a structured questionnaire is established in 178 out of a total of 250 respondents in Nigeria (in 71.2% of the cases) [10]. Within a total of 695 semi-structured interviews with 556 respondents in 38 localities of Mazovia, Poland, a large mycophilous region of Europe, 35 mushroom taxa are mentioned by at least five respondents [11]. Drought is the main reason for a steady mushroom abundance decrease.

The results from an inquiry investigation through face-to-face interviews in 2021 of a total of 200 randomly selected subjects, 100 males and 100 females, from several towns and villages in the Region of Varna, Bulgaria, demonstrate a sufficient awareness of the population about edible wild mushrooms [12]. There are some significant differences between males and females in terms of their residence and educational level, on the one hand, and knowledge acquisition about these mushrooms, on the other hand.

Taxonomic knowledge concerning the diversity and distribution of some *Tricholoma* spp. of the genus *Gerhardtia* is analyzed by morphological and molecular methods based on 70 collections from Yunnan, China, 45 from Central Europe, 32 from Colorado, USA, nine from Japan, and three from Ukraine [13].

The evaluation of traditional ecological knowledge concerning the use of wild and cultivated mushrooms for human health, food, maritime, and agricultural purposes in Sicily, Italy, by means of in-depth semi-structured interviews with 48 participants shows that its documentation before it disappears from oral history is a key factor in reducing the loss of biocultural diversity [14].

Recently, two comprehensive analyses of noteworthy data of plants, algae and mushrooms in South Eastern Europe and adjacent regions within international investigations are reported [15, 16].

Knowledge of medicinal plants - ethnobotanical aspects

Some recent publications by European and Asian authors will be briefly mentioned only.

The review of published material of traditionally used medicinal plants of South Tyrol in Northern Italy, Southern Alps, identifies a total of 276 species, including three mushrooms and three lichens [17]. They belong to 72 families, most frequently to the *Asteraceae*, *Rosaceae* and *Lamiaceae*. The most frequently cited species are *Hypericum perforatum* L., *Urtica dioica* L. and *Plantago lanceolata* L. Some 27 species are endangered, of which 16 are not protected and two are now already extinct.

The results from ethnobotanical and floristic studies carried out in the area of Malatya City and its counties, Eastern Anatolia, Turkey, contribute to the identification of a total of 189 medicinal aromatic plant species [18]. Their aesthetic properties such as flower, leaf and fruit characteristics, sensory properties such as scent and texture, the seasonal change characteristics including flowering period and colour change and use areas such as flower parterres, solitary plantings, live fences and site coverings of the plants are analysed. A total of 157 species are herbaceous plants. Eighty aromatic medicinal species conform to the planting design criteria and could be used in landscape designs in Malatya City.

The ethnobotanical study of traditional knowledge of medicinal plants of the local population in the North Black Sea coast area presents the impact of some demographic indicators such as gender, age, education and place of residence [19]. A tendency of decreasing interest in medicinal plants among the younger generation living in this area is observed, which on its behalf is weakening the traditional knowledge on medicinal plants and its continuity [20]. The local population in this area possesses a sufficient knowledge of the medicinal plants and herbal remedy treatment [21].

The ethnobotanical survey by means of semi-structured questionnaires of 328 subjects from six municipalities in Northern Italy and in Central Alps, Italy, indicates that in this area of high naturalistic interest, ethnobotanical knowledge is at the risk of passing covering a secondary role compared to other aspects of the local culture [22].

Some features of various medicinal plants most commonly used by the population living in the area of the Bulgarian North Black Sea coast in terms of population's knowledge are studied [23].

The analysis of 178 articles devoted to traditional knowledge of medicinal plants and their applications for several skin diseases in India identifies a total 119 records of plant' uses across the country against 39 different diseases [24]. The localities of reports, parts used, and preparation and administration of the ethnodermatological methods are systematized.

The results from an ethnobotanical study using semi-structured questionnaires with 98 informants in 15 villages of Pauri district of Uttarakhan, India, display a total of 236 medicinal plant species belonging to 80 families and 188 genera [25]. They are applied for the treatment of 82 disorders. The most represented

families are *Asteraceae* (23 species), *Rosaceae* (16 species) and *Lamiaceae* (13 species). The most utilized species are *Urtica dioica* L., *Bergenia ciliata* Haworth, *Viola canescens* Wall., *Rhododendron arboretum* Smith and *Ocimum tenuiflorum* L.

The ethnobotanical study of 102 informants from three different communities (Dard, Kashmiri and Gujjar) in the district of Kupwara of the Kashmir Himalaya identifies 107 plant taxa belonging to 52 families used as medicines for the treatment of 15 disease categories and 81 biomedical disorders [26]. *Asteraceae*, *Rosaceae*, *Lamiaceae*, *Malvaceae*, *Ranunculaceae*, *Poaceae*, *Solanaceae*, *Polygonaceae*, *Plantaginaceae* and *Brassicaceae* are the most dominant families.

During an ethnobotanical study of the Lhoba people in Douyu Village in Longzi County, Tibet, China, semi-structured interviews and group discussions are carried out with 41 informants aged between 18 and 75 years [27]. A total of 91 wild species belonging to 71 genera and 39 families are documented. Both *Pimpinella xizangense* and *Wikstroemia lungtzeensis* are endemic to this area while *Sinopodophyllum hexandrum* and *Paeonia ludlowii* are endangered species in China. There are 29 species of medicinal plants.

Within an ethnobiological study from February to September 2019, a total of 85 species of medicinal plants and fungi belonging to 51 families and 71 genera are recorded with the help of 104 Naxi folk healers in the Dongba Sutras, Southwest China [28]. Most species are used for the treatment of digestive, respiratory and musculoskeletal diseases.

Between February 2018 and February 2020, the semi-structured interviews in the course of an ethnobotanical investigation of 185 local people and traditional healers in the district of Bahawalpur, Pakistan, document a total of 20 indigenous medicinal plants from 17 families [29]. These plants are claimed to be used for the treatment of ten respiratory disorders. The *Glycyrrhiza glabra*, *Acacia arabica* and *Mentha piperita* are the species with a higher use value and significant potential therapeutic activity for these diseases.

Among 58 plant species from 28 taxonomic families known by 200 experienced respondents in Southern Punjab, Pakistan, *Poaceae* remains the most predominant family followed by *Solanaceae* and *Asteraceae* [30]. The local communities depend on medicinal plants for daily curing of several diseases such as bronchial asthma, common cold, sore throat, fever, cardiovascular diseases, and digestive disorders.

Within an ethnobotanical survey in the Mastuj Valley at the extreme north of Chitral District, Pakistan, using 30 in-depth semi-structured interviews with local knowledge holders, 81% of a total of 43 wild food plants are recorded as food-medicines or medicinal foods [31].

Between 2015 and 2017, information of ethnomedicinal plants is obtained using a planned questionnaire and interviews from 80 local people and traditional healers in Haripur District, Pakistan [32]. A total of 80 plant species such as 33 herbs, 24 trees, 21 shrubs and two climbers from 50 families are used in

human and veterinary medicine. *Lamiaceae* is the most dominant family with seven species followed by *Fabaceae* with six species and *Moraceae* with five species.

In a cross-sectional ethnobotanical study among 217 herbal healers using semi-structured questionnaires, open interviews, and field surveys in Kerman province, Southeast of Iran, a total of 402 medicinal plants belonging to 273 genera of 73 families are listed [33]. There are 367 dicotyledons, 27 monocotyledons and seven cryptogam species as well as one gymnosperm species. The traditional medicinal use of 292 plant species in this region is identified for the first time. The families of Asteraceae, Apiaceae, Lamiaceae and Fabaceae dominate.

Contemporary usage of edible wild mushrooms - ethnomycological aspects

Wild mushrooms are a vital source of income and nutrition for many poor communities and of value to recreational foragers [34]. Mushroom's biological content exerts a positive effect on human welfare which is called 'nongreen revolution' [35]. There is evidence that mushrooms can be a healthy food alternative to meat.

According to the results from the bibliometric study of 200 European publications in 2001-2016 mainly from Turkey, Poland, Spain, and the Czech Republic about the contamination of mushrooms by selected elements, there is a need to assess the risk to human health arising from the consumption of contaminated mushrooms taken from various habitats [36].

The results from an ethnomycological study of wild edible mushrooms in Menge District, Benshangul Gumuz Region, Ethiopia, show that their collection habit and practice is statistically significantly influenced by gender, age, and literacy level ($p < 0.05$) [3].

The results from semi-structured interviews involving 160 informants randomly selected from six different ethnic communities reveal that rainforests from the Yangambi Biosphere reserve and Yoko forest reserve in the province of Tshopo, Democratic Republic of the Congo, provide a relatively high number of wild edible ectomycorrhizal mushrooms, more than local people actually use [37]. Mixed forest stands hold the highest diversity in saprotrophic edible mushrooms ($p < 0.001$). There is no significant difference concerning the number of saprotrophic and ectomycorrhizal fungi within monodominant forests.

Field and ethnomycological surveys are conducted among 448 informants, 285 women and 163 men, living in three most protected areas of Côte d'Ivoire and in surrounding villages in order to invent the wild useful mushrooms and their respective surrounding sociolinguistic groups, according to climatic and phytogeographical gradients [4]. Rural people report four categories of mushroom usage such as food, medicinal, belief and recreational, with a dominance of food (56 species) and medicinal uses (16 species). The useful mushrooms are either saprotrophic, or symbiotic (ectomycorrhizal or termitophilic).

The inquiry study by means of face-to-face interviews of 200 randomly selected respondents, 100 males and 100 females, living in several towns and villages in the Region of Varna, Bulgaria, reveals several concrete manners of edible wild mushroom usage along with some considerable gender differences concerning respondents' residence and educational level, on the one hand, and attitude towards preparation and consumption of these mushrooms, on the other hand, as well as some moderate residence-related differences between male and female respondents when their individual attitude towards and everyday usage of wild edible mushrooms are concerned [12].

The analysis of a total of 2786 mushroom species from 99 countries identifies 2189 edible mushroom species of which 2006 can be consumed safely while other 183 ones either require some form of pretreatment prior to safe consumption, or are associated with allergic reactions [33].

Among 92 mushroom taxa identified by local informants in 38 localities in a mycophilic region of Poland, 76 species are used as food, 21 taxa are known as toxic, and 11 taxa are applied for non-culinary purposes [2]. The consumption of three edible wild-growing mushroom species such as *Imlera badia*, *Boletus subtomentosus* and *Xerocomellus chrysenteron* from 60 environmentally loaded localities in Slovakia is associated with health risks for adults and children due to mercury content arising from their ingestion [38]. The results from a survey questionnaire among 408 participants in Turkey demonstrate that mushroom consumption accounts for 13.2% of meat consumption at the time of mushroom collection period [34].

The results from a structured questionnaire assessing mushroom utilization by 250 study participants in Nigeria show that 82% of the respondents utilize mushrooms as a food supplement [10]. These mushrooms are the most cost-effective source of a healthier diet tackling food insecurity, diversification and malnutrition for the families in this region of the country. The role and utilization patterns of 19 wild edible mushrooms in meeting the food, nutrition and household income of indigenous communities under the biodiversity rich landscape in Central India is examined [39]. These mushrooms are collected, consumed and surplus is marketed by the communities. Some remarkable differences among Baiga, Gond, Kol, and Oraon ethnic communities in the Achanakmaar-Amkantak Biosphere Reserve of Central India as well as between location (core, buffer and transition zone) effect on utilization pattern of 19 wild edible mushrooms are found out. The average amount of these mushrooms collected annually by households is 5-35 kg.

Among 45 adult respondents from an indigenous peasant community in Oaxaca, Mexico, there is a high frequency of the traditional consumption of edible wild or cultivated mushrooms (>3 times per week) that significantly correlates to lower energy, lipids, saturated fatty acids and sodium intake, as well as to higher intake of cobalamin and zinc [40].

A total of 54 species of mushrooms are currently sold in the open air markets of Luang Prabang, Laos PDR [41]. These markets are visited 38 times in four seasons: the dry season, early monsoon, mid-monsoon,

and end-of-monsoon, at least 8 times per season and are among the richest in species of wild edible mushrooms in Asia and in the whole world.

Four macrofungi species with ecological relationship to birch (*Betula* sp.) are collected near the town of Vimperk in the Bohemian Forest, the Czech Republic [42]. The lifestyle of *Fomitopsis betulina* and *Inonotus obliquus* is parasitic and they are used in alternative medicine.

The geographic and climatic conditions of the collection site of the honey fungus (*Armillaria mellea*) and the parasol mushroom (*Macrolepiota procera*) collected from Northern Morocco and Portugal influence upon biomolecule compounds and antioxidant properties of these wild edible mushrooms [43]. The analysis of the element content of several wild edible and inedible mushroom species gathered in the Belgrad Forests and the Ilgaz Mountain National Park in Turkey indicates that *Bovistella utriformis* copper concentration and cadmium levels of *B. utriformis*, *Agaricus campestris*, *Armillaria ostoyae* and *Pleurotus ostreatus* exceed the legal limits determined by authorities and these mushrooms should be consumed in a controlled manner [44].

Morchella conica (*M. conica*) Pers. is one of six wild edible mushrooms that are widely used by Asian and European countries for their nutritional value and antidiabetic activity [45]. Between 2014 and 2015, among ten rural communities in Cameroon, eight edible mushrooms species are used as food and medicine while other nine ones are applied as medicine in traditional health care [6].

Some 33 mushrooms species are registered by 100 informants within a study of mushroom usage and consumption between August 2013 and November 2014 in three communities in Amealco, Quéretaro, México [9]. People harvest mushrooms in the forest mainly during the rainy season. Both mushroom searching and collection strengthen the family ties.

Ethnobotanical aspects of contemporary medicinal plant usage

The role of the mushroom geographic distribution and inhabitants' residence is assessed in several recent ethnobotanical investigations, too.

The ethnobotanical study of the usage of medicinal plants and herbal remedy treatment by the inhabitants in several towns and villages on the territory of the Region of Varna, Bulgaria, establishes the impact of some demographic indicators such as place of residence, gender, age and educational level [19, 20]. These subjects present with a steady positive attitude towards the use of medicinal plants and herbal remedy treatment [20]. Neither regional, nor local differences are outlined [21].

The ethnobotanical study using face-to-face interviews among the rural population in Mersin province, Turkey, identifies 93 plant taxa belonging to 43 families and records a total of 189 medical usages in folk medicine [46]. There are 83 wild and ten cultivated taxa. The most commonly used plants belong to

Lamiaceae family and represent 15.0% of the cases. The *Rosaceae*, *Malvaceae*, *Hypericaceae*, *Asteraceae* and *Cupressaceae* families each represent another 5.4%.

The results from 343 interviews carried out in 36 Adriatic islands in Croatia demonstrate that medicinal plants are mainly used to make herbal infusions or decoctions, occasionally medicinal liqueurs, syrups, compresses, or juices squeezed out of raw plants [47]. The use of 146 taxa is reported. Of them, 131 taxa are applied with at least one medicinal purpose and 15 ones are used only for tea. There is devolution of local knowledge along with disappearance of gathering practices due to specialization in tourism, modernization and depopulation.

According to recent ethnobotanical research, much of the numerous traditional medicinal uses of the species *Chiliadenus glutinosus* (L.) Fourr., along with the biological activity of its phytochemicals, are supported by scientific evidence [48]. There is growing interest in preserving the ethnopharmacological knowledge related to the botanical diversity existing in Spain.

A field medical-ethnobotanical study using interviews and questionnaires among 131 participants, 76 women and 55 men, while gathering medicinal plants between March 2017 and November 2019 in the city center and 22 rural settlements of Hasankeyf, Turkey is performed [49]. A total of 94 plant taxa belonging to 40 families are identified. The most common medicinal plant families are *Lamiaceae* (13), *Asteraceae* (eight), *Rosaceae* and *Malvaceae* (six species each), *Amaryllidaceae* (five), *Brassicaceae* and *Solanaceae* (four species each). The most common preparations are infusion, fresh application and crushing.

The recent ethnobotanical survey carried out in Caspoggio, Valmalenco, Italian Alps, Italy, reveals 59 medicinal plant species attributable to 30 families [50]. Of them, *Asteraceae*, *Pinaceae*, *Malvaceae* and *Lamiaceae* families are most cited. *Arnica montana* exerts anti-inflammatory effect and is used for traumas and musculoskeletal pains; *Pinus mugo* is used as expectorant; *Malva sylvestris* acts as anti-inflammatory and soothing agent while *Achillea moschata* is a digestive means. There is scientific evidence for at least one traditional activity for 50 species.

The results from semi-structured anonymous ethnobotanical interviews among 161 respondents living in ten villages in the River Timok region and in ten villages in Mountain Svrljig region, Eastern and South-Eastern Serbia and the analysis of 2199 use-reports show a total of 195 autochthonous medicinal and ritual plant taxa [51]. The species recorded in the Timok region are classified into 47 families and those in the Svrljig region - into 64 families. Only 52 species are included in the European Pharmacopoeia 9.0. *Hypericum spp.*, *Matricaria chamomilla*, *Mentha x piperita*, *Urtica dioica* and *Juglans regia* are most commonly used plants in the first region while *Satureja montana*, *Sambucus nigra*, *Polygonum aviculare*, *Marrubium vulgare* and *Teucrium chamaedrys* are most frequently used in the second region.

The ethnobotanical survey among 200 informants, competent villagers, herbalists, and traditional healers from the provincial region of Taza city, Morocco, through direct interviews using a structured questionnaire identifies 55 plant species belonging to 28 families used in the folk medicine [52]. The most frequently used plants are *Origanum compactum*, *Mentha pulegium*, *Rosmarinus officinalis* L., *Aloysia citrodora*, *Calamintha officinalis* Moench, and *Artemisia herba-alba* Asso. This region has an important floristic biodiversity of medicinal plants which are used in traditional medical practice.

The similarities and differences of medicinal ethnobotany among people living in highland pastures in the Western Lesser Caucasus on both sides of the Georgia-Turkey border between 2017 and 2018 using semi-structured interviews among 74 participant in Turkey and 45 ones in Georgia are assessed [53]. There are 1506 use-reports for 152 native wild plant species, more than one half of which are in common on both sides of the border. Out of 817 species-use combinations, only 9% of the use incidences are shared between both communities. Only 33 species have similar use reports in both countries, most important of which are *Plantago major*, *Urtica dioica*, *Picea orientalis*, *Anthemis* spp., *Sambucus ebulus* and *Achillea millefolium*. The most common medicinal plant use is drinking the water infusion of aerial parts with flowers.

The usage of plants for food and medicinal preparations by Hutsuls, a cultural and linguistic minority group living in the Carpathian Mountains of Northern and Southern Bukovina (South-West Ukraine and North-East Romania, respectively) is assessed within an ethnobotanical investigation [54]. Semi-structured interviews regarding the use of plants for medicinal and food preparation purposes and the sources of such knowledge are performed among 31 Hutsuls in Ukraine and 30 ones in Romania. Fifty-three taxa of wild plants are used for medicinal purposes in both countries, 47 are used in Ukraine only and 11 in Romania only. Despite a common cultural and linguistic background, ethnobotanical knowledge transmission occurs in different ways on each side of the border. Family is a primary source of this transmission.

The ethnobotanical study of medicinal plants in Aziziye District, Erzurum, Turkey, reveals a total of 77 species pertaining to 30 families [55]. Sixty-two species grow naturally and 15 ones are cultivated. The most widespread medicinal plant families are *Asteraceae* (14), *Rosaceae* (seven), *Lamiaceae* and *Apiaceae* (five species each). The medicinal plants in the region are a major source of herbal drugs for primary healthcare utilized among the rural communities.

During a four-year period, interviews with 136 participants in 37 market locations in Yerevan, Armenia concerning the wild plants and mushrooms sold are performed [56]. There are records of 163 plant species belonging to 44 families and 110 genera. This includes 148 wild food species, 136 medicinal species, 45 species sold for decoration, 15 species of wood and nine species of insect repellents as well as 14 wild mushroom species including 12 food species. Some species such as *Angelica tatianae*, *Ferulago setifolia* and

Heracleum chorodanum have never been reported as human food neither in wild edible plant word lists, nor in ethnobotanical publications.

The manual systematic search in various relevant historical works focused on the traditional use of medicinal plants in Romania between 1860s and 1970s establishes a total of 153 species belonging to 52 families as having ethnopediatric significance [57]. The following species have the highest scores of the ethnopediatric relative therapeutic versatility index: *Dryopteris filix-mas* (100%), *Gratiola officinalis* (85.71%), *Allium sativum*, *Eryngium planum*, *Juglans regia*, *Matricaria chamomilla* and *Plantago major* (71.42% each).

The application of some ornamental medicinal plants for human use has been examined, however, their use as ornamental species has not been described yet [58]. The results from a questionnaire study of a total of 709 respondents from the local population along the Northern Black Sea coast in Bulgaria demonstrate that a significant proportion of these individuals make use of medicinal plants for decorative purposes [59]. These plants amount to 73 species belonging to 61 genera from 30 families.

Conclusion

Nowadays problem-oriented ethnomycological studies dramatically prevail in Asia over Europe although numerous toxic, edible wild and cultivated mushrooms are relatively well-known worldwide. There is, obviously, a need for a further and much more intensive international collaboration and a purposeful interdisciplinary ethnomycological and ethnobotanical research in Europe.

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