ECOLOGIA BALKANICA
2021, Vol. 13, Issue 2 December 2021 pp. 145-154

Survey on Medicinal Plants Used in the Folk Medicine of Current Bulgarian Society as a Basic Information for Plant Protection

Asya P. Dragoeva, Zheni D. Stoyanova[*]*,*
Vanya P. Koleva, Borislava K. Pavlova

Konstantin Preslavsky University of Shumen, Faculty of Natural Sciences,
Department of Biology, 115 Universitetska Str., Shumen, BULGARIA
[*]Corresponding author: jenidim@gmail.com

Abstract. Traditional herbal medicine has gained increasing interest. Modern ethnobotany is focused on documentation of traditional knowledge as a base data for plant diversity protection. The present survey aimed to estimate the status of uses of medicinal plants in current Bulgarian society. The study is focused on most commonly used wild plants in studied regions as a basic information for development of plant protection strategies. Ethnobotanical information was collected during semi-structured interviews. Respondents have been selected based on their knowledge – people known to be particularly interested in traditional health practices. Respondents declare empiric knowledge as the major source of information. So, results revealed medicinal plants explored for decades in studied regions. A total number of 88 plant species, belonging to 43 families were recorded. The most dominant plant families were Asteraceae (28%), Lamiaceae (26%) and Rosaceae (19%). Majority of cited species are wild (60.2%), including protected species *Galanthus nivalis* L., *Primula veris* L., *Asplenium scolopendrium* L. and *Sideritis scardica* Griseb. (Balkan endemic). Herbs represent the majority (72.7%) of the reported plant species. The most used parts of the plants were leaves (40.9%). To our knowledge this is the first survey in Bulgaria only with selected respondents. The number of plants reported reflects well-preserved traditional knowledge in the investigated region. Quantitative analysis revealed the significance of species for local people. Majority of cited species are wild. From the point of view of sustainable ecology information to local people about the importance of preservation of natural habitats of wild species should be provided.

Key words: medicinal plants, questionnaire survey with key informants, plant protection.

Introduction

Plants have been used from ancient times for the improvement of overall well-being, for diverse physical and mental disorders (Hussain et al., 2019). In contemporary society a lot of people have returned to traditional medicine in spite of the access to conventional medicine (Karunamoorthi et al., 2013). Local people usually use both wild and cultivated plants. Nowadays ethnobotanical surveys represent a valuable tool for the environmental protection. Increased demand for natural remedies exerts a negative impact on the native habitats of many species. Documentation of indigenious knoweldge evaluated the utilization of wild species and provides basic data for development of appropriate conservation strategies (Axiotis et al., 2018; Tugume et al., 2016).

Contemporary surveys in Bulgaria revealed increasing utilization of natural remedies and consequently – the necessity of development of sustainable strategies.

Despite of the small national territory geographic specificity of Bulgaria has resulted in the development of a great plant diversity (Assyov et al., 2012). Ethnobotanical surveys in Bulgaria aimed to preserve and maintain traditional knowledge passed down through generations (Kozuharova et al., 2013). Different approaches have been used in order to collect data in modern ethnobotany. Some studies involved a large number of random informants, others – selected informants, or both of them (Leporatti & Impieri, 2007; Rajaei & Mohamadi, 2012; Tsioutsiou et al., 2019). Since variability of traditional knowledge between different countries and cultures in contemporary surveys researchers have applied different quantitative ethnobotanical indices (Hussain et al., 2019).

The aim of this study is twofold: to estimate the status of the uses of medicinal plants in current Bulgarian society and to document the most commonly used wild plants in studied regions as a basic information for development of plant protection strategies.

Materials and Methods

This research was conducted by collecting ethnobotanical information during semi-structured interviews with local knowledgeable persons. Field study was carried out over a period of approximately 2 years in central and northeastern Bulgaria. Ethnobotany Club bachelor student members (Faculty of Natural Sciences, University of Shumen, Bulgaria) carried out the survey. The students were trained to conduct an ethnobotanical survey. Questionnaires were prepared in order to document the most frequently used herbs and their most popular application. Respondents (key informants) have been previously selected based on their knowledge – few people known to be particularly interested in traditional health practices. The demographic features of the people who accepted to participate in the interview were determined. Voluntary participation (informed consent obtained) was documented in questionnaires. Local plant names, growth form, source of plants (wild, cultivated, purchased) and utilized parts of the plants were recorded. As a first step of questionnairy, respondents were asked to show a sample of reported plant – raw or dried. The mentioned plants were identified by Zheni Stoynova, expert plant taxonomist. Botanical species names were presented according to WFO (2021): World Flora Online. The family list is structured according to Angiosperm Phylogeny Group IV (Stevens, 2017).

Quantitative ethnobotanical indices were estimated as described in other studies (Rehman et al., 2017; Tardío & Pardo-de-Santayana, 2008; Umair et al., 2017). The ethnobotanical indices are founded on the data obtained in the study: one of the respondents mentions the use of the reported species in the special use-category. Relative Frequency of Citation (RFC) is obtained by dividing the number of respondents who mention the use of the species, by the number of all respondents. It represents the fraction of informants that used a given plant and the local significance of plant species. Use Value (UV) demonstrates the significance of a species by considering number of use reports. This index represents the sum of number of use-reports of participants who mentioned each use of the specie, divided by the number of all respondents.

Results

One approach to collect ethnobotanical information is purposefully selection of informants (Gao et a.l, 2019). In present survey a total of 15 interviews were conducted with knowledgeable respondents

from urban and rural areas in Bulgaria (Fig. 1).

Fig. 1. Regions in Bulgaria where the interviews were conducted.

Data about the source of ethnobotanical knowledge of informants is summarized in Table 1. The age of the informants ranged from 40 to 88 years old, more than half of the informants aged between 60 and 80. The majority of the respondents are well educated. Only two of them, women living in rural area at age of 88 and 73, had not finished high school. Female informants predominated in our study. The respondents declared to have an experience in traditional practices for more than ten years. A matter of interest is the source of ethnobotanical knowledge (The sum of percentage is more than 100 since there are more than one answer). Majority of respondents (80.00%) declared as a source of knowledge their relatives. Friends were pointed from 33.33% of respondents. A large proportion of respondents (66.67%) acquires information from specialized books. Only 20.00% have used internet as a source of information.

Table 1. Source of ethnobotanical knowledge of respondents. *Legend:* W – woman, M – man.

Gender	Age (years)	Place of living	Education	Experience as a herbalist (years)	Source of ethnobotanical knowledge			
					Relatives	Friends	Books	Internet
W	40	Small town	university	>15	Relatives			x
W	40	City	high school	>20	Relatives	x		
W	43	City	high school	> 0	Parents		x	x
W	45	Village	high school	>20	Relatives		x	
W	56	Small town	high school	>10	Mother			
W	61	Small town	high school	>15	Relatives		x	
W	63	Small town	high school	>14		x	x	
W	63	City	university	>40			x	
W	70	Village	high school	>50	Relatives	x	x	
W	71	Small town	high school	>30	Grandmother herbalist		x	
W	73	Village	basic school	>30		x	x	
W	88	Village	primary school	>70	Mother& grandmother			
M	49	City	university	>10	Parents		x	x
M	60	Village	high school	>15	Father			
M	68	Village	high school	>20	Relatives	x	x	

Reported species are listed in Table 2, where plant families are cited in alphabetical order. Data on scientific name, local name, status (wild, cultivated or purchased) and parts used are included in the table. In this study were recorded a total number of 88 plant species, belonging to 43 families. The most dominant plant families were Asteraceae (28%), Lamiaceae (26%) and Rosaceae (19%). The second mentioned were Amaryllidaceae (9.3%) and Apiaceae (9.3%).

Majority of cited species (53 species) are wild, including protected species *Galanthus nivalis* L., *Primula veris* L.,

Asplenium scolopendrium L. and *Sideritis scardica* Griseb. (Balkan endemic). Furthermore, 32 plant species are cultivated in the gardens/houses. Among cultivated plants 17 species are non native – 14 of them are grown in gardens as food or for decorative purposes; remaining 3 exotic plants are reported to be purchased.

Herbs represent the majority (72.7%) of the reported plant species. The second group are shrubs (10.2%) and trees (11.4%). Two species are subshrubs and only one representative – shrub/small tree, climbing shrub and climbing herb. The most used parts of the plants (above ~ 20%) were leaves (40.9%), followed by aerial parts (27.27%), fruits (21.6%). The second group (above ~10%) included flowers/flower parts (19.3%), root and rhizomes (12.5%) and seed/ nuts/ kernel (9.1%). Rarely used are tubers (2.3%), barks (2.3%), stems (1.1%) and bulbs (1.1%).

In ethnobotanical surveys RFC and UV indices are used to select potential plant species for further scientific research **(Table 2).** The highest RFC was calculated for *Hypericum perforatum* (0.47), followed by *Sambucus nigra*, *Achillea millefolium*, *Thymus* sp. div., *Urtica dioica* (0.40) and *Matricaria chamomilla* (0.33). In the present study UV values of the reported species varied from 0.07 to 2.53. *Hypericum perforatum* (2.53), *Urtica dioica* (2.07), *Matricaria chamomilla* (1.80), *Achillea millefolium* (1.73), *Thymus* sp. div. (1.53) and *Anethum graveolens* (1.13) were the most utilized medicinal plant species with highest used value.

Table 2. List of plants used by respondents. *Legend*: Status: W – Wild, C – Cultivated, P – Purchased; Habit: H – herb, T – tree, S – shrub, sS – subshrub; S/T – shrub or small tree, Clh – climbing herb, Cls – climbing shrub; Part used: R – Root/rhizomes, St – Stem, L – Leaf, Fl – Flower, Fr - Fruit, Se – Seed, N – Nuts, AP – Aerial Parts, Tu – Tuber, B – Bulb, Bd – Buds, Ba – Bark, Stigma – Sgm, K – Kernel.

Family/Scientific name	Local name	Status	Habit	Part used	RFC	UV
Adoxaceae						
Sambucus ebulus L.	Trevist buz (Buzak)	W	H	Fr, L	0.07	0.47
Sambucus nigra L.	Cheren buz	W	S/T	Fr, Fl, R	0.40	0.87
Amaryllidaceae						
Allium sativum L.	Chesun	C	H	L, Bu	0.13	0.40
Allium ursinum L.	Div chesun (Levurda)	W	H	L	0.07	0.33
Galanthus nivalis L.	Kokiche	W	H	Fl	0.07	0.13
Allium siculum Ucria.	Samardala	C	H	L	0.07	0.40
Anacardiace						
Cotinus coggygria Scop.	Smradlika	W	S	L	0.2	0.87
Apiaceae						
Anethum graveolens L.	Kopur	C	H	Fr, AP	0.2	1.13
Apium graveolens L.	Tselina	C	H	R, L	0.07	0.6
Levisticum officinale W.D.J.Koch	Devisil	C	H	R, L	0.07	0.33
Pimpinella anisum L.	Anason	C	H	Fr	0.07	0.13
Asparagaceae						
Convallaria majalis L.	Momina sulza	C	H	Fl	0.07	0.13
Araceae						
Arum maculatum L.	Zmiyarnik	W	H	Tu	0.07	0.07
Araliaceae						
Hedera helix L.	Brushlyan	W	Cls	L	0.07	0.2
Asphodelaceae						
Aloe vera L.	Aloe	C	H	L	0.07	0.8

Aspleniaceae						
Asplenium scolopendrium L.	Volski ezik	W	H	L	0.07	0.2
Asteraceae						
Achillea millefolium L.	Byal ravnets	W	H	Fl, AP	0.40	1.73
Arctium lappa L.	Repey	W	H	R, L	0.13	0.40
Artemisia absinthium L.	Byal pelin	W	H	AP	0.07	0.07
Calendula officinalis L.	Neven	C	H	L, Fl	0.2	0.73
Carduus acanthoides L.	Magareshki trun	W	H	Fl	0.07	0.2
Cyanus segetum Hill	Sinya metlichina	W	H	Fl	0.07	0.2
Cichorium intybus L.	Sinya zhluchka	W	H	AP, R	0.13	0.40
Matricaria chamomilla L.	Layka	W	H	Fl	0.33	1.80
Tussilago farfara L.	Podbel	W	H	L	0.07	0.2
Silybum marianum (L.) Gaertn.	Byal trun	W	H	Fr	0.07	0.13
Solidago virgaurea L.	Zlatna pruchitsa	W	H	AP	0.07	0.07
Taraxacum campylodes G.E.Haglund	Glukharche	W	H	AP, R	0.2	0.93
Betulaceae						
Betula pendula Roth	Byala breza	C	T	L, Bd	0.07	0.27
Corylus avellana L.	Leska	W	S	L, Fr, Ba	0.13	0.47
Boraginaceae						
Symphytum officinale L.	Zarasliche	W	H	AP, R	0.07	0.07
Brassicaceae						
Armoracia rusticana P.Gaertn., B.Mey. & Scherb.	Khryan	C	H	R	0.13	0.60
Brassica nigra (L.) W.D.J.Koch	Cheren sinap	W	H	Se	0.07	0.27
Cannabaceae						
Humulus lupulus L.	Khmel	W	Clh	Fl	0.07	0.20
Caryophyllaceae						
Herniaria glabra L.	Izsiplivche	W	H	AP	0.13	0.20
Crassulaceae						
*Sedum maximum (*L.) Suter	Debela mara	W	H	L	0.07	0.07
Cucurbitaceae						
Cucurbita pepo L.	Tikva	C	H	Fr, Se	0.07	0.53
Ecballium elaterium (L.) A.Rich.	Luda krastavitsa	W	H	Fr	0.07	0.13
Ericaceae						
Vaccinium vitis-idaea L.	Chervena borovinka	W	sS	Fr, L	0.07	0.40
Equisetaceae						
Equisetum arvense L.	Polski khvosht	W	H	AP	0.07	0.33
Fabaceae						
Galega officinalis L.	Zhablek	W	H	AP	0.07	0.13
Phaseolus vulgaris L.	Fasul	C	H	Fr -husk	0.07	0.20
Gentianaceae						
Centaurium erythraea Rafn	Cherven kantarion	W	H	AP	0.07	0.20
Geraniaceae						
Geranium macrorrhizum L.	Zdravets	C	H	L	0.07	0.27
Pelargonium zonale (L.) L'Hér. ex Aiton	Mushkato	C	H	L	0.07	0.07
Ginkgoaceae						
Ginkgo biloba L.	Ginko	C	T	L	0.07	0.20
Hypericaceae						
Hypericum perforatum L.	Zhult kantarion	W	H	AP	0.47	2.53
Iridaceae						

Crocus sativus L.	Shafran	C	H	Sgm	0.07	0.07
Juglandaceae						
Juglans regia L.	Orekh	C	T	L, N, green husk	0.13	0.80
Lamiaceae						
Lavandula latifolia Medik.	Lavandula	C	H	L, Fl	0.13	0.93
Marrubium vulgare L.	Pchelnik	W	H	AP	0.07	0.07
Melissa officinalis L.	Matochina	W	H	AP	0.27	0.53
Mentha spicata L.	Dzhodzhen	W	H	AP	0.13	0.53
Mentha sp.	Menta	W	H	AP	0.13	0.60
Ocimum basilicum L.	Bosilek	C	H	L	0.13	0.53
Origanum vulgare L.	Rigan	W	H	AP	0.27	0.87
Rosmarinus officinalis L.	Rozmarin	C	S	L	0.07	0.27
Salvia officinalis L.	Gradinski chay	C	sS	L	0.07	0.27
Sideritis scardica Griseb.	Mursalski chay	W	H	AP	0.13	0.67
Thymus sp.div.	Mashterka	W	H	AP	0.40	1.53
Lauraceae						
Laurus nobilis L.	Dafinov list	P	T	L	0.07	0.13
Malvaceae						
Malva sylvestris L.	Kamilyak, slez	W	H	L, Fl	0.07	0.33
Tilia sp.	Lipa	W	T	Fl	0.2	0.47
Moraceae						
Ficus carica L.	Smokinya	C	T	L, Fr	0.13	0.93
Papaveraceae						
Chelidonium majus L.	Zmiysko mlyako	W	H	AP	0.13	0.33
Pinaceae						
Pinus sylvestris L.	Byal bor	W	T	L, young shoots	0.13	0.33
Plantaginaceae						
Plantago major L.	Zhivovlek	W	H	L	0.13	0.47
Poaceae						
Avena sativa L.	Oves	C	H	Se, St	0.13	0.60
Zea mays L.	Tsarevitsa	C	H	Se, Sgm	0.13	0.60
Polygonaceae						
Persicaria hydropiper (L.) Delarbre	Vodno piperiche	W	H	AP	0.07	0.13
Primulaceae						
Primula veris L.	Iglika	C	H	Fl, R	0.07	0.20
Ranunculaceae						
Nigella sativa L.	Posevna chelebitka	C	H	Se	0.07	0.07
Rosaceae						
Agrimonia eupatoria L.	Kamshik	W	H	AP	0.07	0.07
Aronia melanocarpa (Michx.) Elliott	Aroniya	C	S	Fr	0.07	0.20
Crataegus monogyna Jacq.	Glog	W	S	L, Fr, Fl	0.40	0.87
Fragaria vesca L.	Gorska yagoda	W	H	L, Fr	0.07	0.27
Prunus persica (L.) Batsch	Praskova	C	T	Fr, K	0.07	0.47
Rosa canina L.	Shipka	W	S	Fr	0.27	0.80
Rosa damascena Herrm.	Roza	C	S	Fl	0.07	0.27
Rubus idaeus L.	Malina	C	S	L, R, Fr	0.13	0.60
Rubiaceae						
Galium verum L.	Enyovche	W	H	AP	0.07	0.07
Salicaceae						
Salix alba L.	Byala vurba	W	T	Ba	0.07	0.33
Sapindaceae						
Aesculus hippocastanum L.	Konski kesten	W	T	Se	0.07	0.13

Solanaceae						
Lycium barbarum L.	Godzhi beri	C	S	Fr	0.07	0.40
Solanum tuberosum L.	Kartof	C	H	Tu	0.07	0.07
Urticaceae						
Urtica dioica L.	Kopriva	W	H	AP L R	0.40	2.07
Zingiberaceae						
Curcuma longa L.	Kurkuma	P	H	R	0.07	0.40
Zingiber officinale Roscoe	Dzhindzhifil	P	H	R	0.13	0.47

Discussion

Analysis of the source of ethnobotanical knowledge of respondents demonstrate persistence of oral empiric folk knowledge in Bulgaria nowadays. Specialized books usage is connected with well documented during years knowledge and valuable books written in the past (Kozuharova et al., 2013). It should be noted, that people who pointed internet as a source of information declared also relatives. So, ethnobotanical data revealed medicinal plants explored for decades in these regions.

Recently, results of numerous ethnobotanical studies in different parts of the world have been published. Such researches are necessary to protect ethnobotanical data and to estimate dynamic of local knowledge in modern society (Menale et al., 2016; Pardo-de-Santayana et al., 2015). Depending on geographic, sociological and cultural distinctives every local study contributes to global knowledge. Our data could be compared with other data from the same region. We found some differences about prevalent plant families, but Lamiaceae, Asteraceae and Rosaceae are amongst the most represented families in other studies in Greece (Tsioutsiou et al., 2019), Turkey (Akaydin et al., 2013) and previous surveys in Bulgaria (Kozuharova et al., 2013; Kültür & Sami; 2009; Leporatti & Ivancheva, 2003).

Different plant parts are used to treat different diseases because of specific chemical constituents (Nguyen et al. 2019). Reported preferred use of leaves could be considered as a sustainable harvesting approach, since the whole plant is not damaged. Similar results have been presented in other studies (Axiotis et al., 2018; Chaachouay et al., 2019; Rehman et al., 2017). Leaves are easily collected and being metabolitically most active parts of plant contain numerous valuable chemical compounds (Khan et al., 2018).

Results of present study revealed predominant use of wild plants. Cited exotic plants revealed dynamics of traditional knowledge. It is known that during centuries foreign medicine plants have been incorporated into local practices (Quave et al., 2012). Wild plant species are cited in other surveys as a major source for remedies, including endemic and endangered species (Tsioutsiou et al., 2019). In Bulgaria, *Galanthus nivalis* L. and *Primula veris* are included in Biological Diversity Act (2002), Annex 3 and Annex 4. *Asplenium scolopendrium* L. and *Sideritis scardica* Griseb are under a regime for special protection and use determined by Ordinance № RD – 162/25.02.2021 (State Gazzette, № 20/2021) issued by the Minister of Environment and Water. Their gathering for trade use is prohibited throughout the country. The same order sets eligible quantities for collection of *Primula veris*. Habitat destruction is a major problem of exploration of wild medicinal plants (Axiotis et al. 2018). It should be noted that one and the same medicinal plant grown in particular regions could possess different therapeutical properties. Epigenetic factors may explain phenotypic variations. Contemporary studies have established that plant chemical constituents depend on

environmental conditions (Hao & Xiao, 2018). So, education of local people, sustainable utilization of plants and preservation of natural habitats are of global importance.

In recent decades ethnobotanical studies have been provided in different regions of Bulgaria, but quantitative methods have only very recently received attention. Relative frequency of citation (RFC) and use value (UV) revealed prevalent use of well-known species and their proven pharmacological properties. RFC signifies the local importance of each species (Umair et al., 2017). Reported species with highest RFC are widely distributed in the studied regions. Obviously, these plants are commonly used by respondents. In some cases, the most common species reported are in agreement with those cited from Bulgaria neighbouring countries – *Matricaria chamomilla* (Axiotis et al., 2018; Tsioutsiou et al., 2019), *Urtica dioica, Hypericum perforatum* (Akaydin et al., 2013). Only *Hypericum perforatum* and *Matricaria chamomilla* were mentioned in previous survey in Bulgaria (Kozuharova et al., 2013). UV evaluates use reports of the species known locally (Axiotis et al., 2018). The high UV indicates the extensive use of listed species for the treatment of various ailments (Hussain et al., 2019).

Conclusion

To our knowledge this is the first survey in Bulgaria only with selected respondents. The number of plants species reported reflects well-preserved traditional knowledge in the studied region. Relatives were pointed as a basic source of information indicating that this valuable heritage passed down through the generations. So, traditionally used in the studied region species were listed in the paper. Quantitative analysis revealed the significance of species for local people. Majority of cited species are wild. From the point of view of sustainable ecology information to local people about the importance of preservation of natural habitats of wild species should be provided.

Acknowledgments

This work has been supported by the Bulgarian Ministry of Education and Science, grant no. RD-08-67/25.01.2021.

References

Akaydin, G., Simşek, I., Arituluk, Z.C., & Yeşilada, E. (2013). An ethnobotanical survey in selected towns of the Mediterranean subregion (Turkey). *Turkish Journal of Biology, 37*, 230–247. doi: 10.3906/biy-1010-139.

Assyov, B., Petrova, A., Dimitrov, D., & Vassilev, R. (2012). *Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements*. Fourth revised and enlarged edition. Sofia, Bulgaria: Bulgarian biodiversity foundation.

Axiotis, E., Halabalaki, M., & Skaltsounis, L.A. (2018). An Ethnobotanical Study of Medicinal Plants in the Greek Islands of North Aegean Region. *Frontiers of Pharmacology, 9*, 409. doi: 10.3389/fphar.2018.00409.

Biological Diversity Act. (2002). *State Gazzette, 77*, 09.08.2002. (In Bulgarian).

Chaachouay, N., Benkhnigue, O., Fadli, M., El Ibaoui, H., & Zidane, L. (2019). Ethnobotanical and ethnopharmacological studies of medicinal and aromatic plants used in the treatment of metabolic diseases in the Moroccan Rif. *Heliyon, 5*(10), e02191. doi: 10.1016/j.heliyon.2019.e02191.

Gao, L., Wei, N., Yang, G., Zhang, Z., Liu, G., & Cai, C. (2019). Ethnomedicine study on traditional medicinal plants in the Wuliang Mountains of Jingdong, Yunnan, China. *Journal of Ethnobiology & Ethnomedicine, 15*, 41. doi: 10.1186/s13002-019-0316-1.

Hao, D.-C., & Xiao, P.-G. (2018). Deep in shadows: Epigenetic and epigenomic regulations of medicinal plants. *Chinese Herbal Medicines*, *10*(3), 239–248. 10.1016/j.chmed.2018.02.003.

Hussain, S., Hamid, A., Ahmad, K.S., Mahmood, A., Nawaz, F., & Ahmad, H. (2019). Quantitative ethnopharmacological profiling of medicinal shrubs used by indigenous communities of Rawalakot, District Poonch, Azad Jammu and Kashmir, Pakistan. *Revista Brasileira de Farmacognosia, 29*, 665–676. doi: 10.1016/j.bjp.2019.06.008.

Karunamoorthi, K., Jegajeevanram, K., Vijayalakshmi, J., & Mengistie, E. (2013). Traditional Medicinal Plants: A Source of Phytotherapeutic Modality in Resource-Constrained Health Care Settings. *Journal of Evidence-Based Complementary & Alternative Medicine, 18*(1), 67–74. doi: 10.1177/2156587212460241.

Khan, M.T., Ahmad, L., & Rashid, W. (2018). Ethnobotanical Documentation of Traditional Knowledge about Medicinal Plants used by Indigenous People in Talash Valley of Dir Lower, Northern Pakistan. *Journal of Intercultural Ethnopharmacology, 7*(1), 8-24. doi: 10.5455/jice.20141211071136.

Kozuharova, E., Benbassat, N., & Getov, I. (2014). Ethnobotanical records of not yet documented therapeutic effects of some popular Bulgarian medicinal plants. *Emirates Journal of Food and Agriculture, 26*(7), 647–651. doi: 10.9755/ejfa.v26i7.18200.

Kozuharova, E., Lebanova, H., Getov, I., Benbassat, N., & Napier, J. (2013). Descriptive study of contemporary status of the traditional knowledge on medicinal plants in Bulgaria. *African Journal of Pharmacy and Pharmacology, 7*(5), 185–198. doi: 10.5897/AJPP12.871.

Kültür, Ş. & Sami, S.N., 2009. Medicinal plants used in Isperih (Razgrad-Bulgaria) district. *Turkish Journal Of Pharmaceutical Sciences, 6*(2): 107–124.

Leporatti, M.L., & Impieri, M. (2007). Ethnobotanical notes about some uses of medicinal plants in Alto Tirreno Cosentino area (Calabria, Southern Italy). *Journal of Ethnobiology and Ethnomedicine, 3*:34. doi: 10.1186/1746-4269-3-34.

Leporatti, M.L. & Ivancheva, S. (2003). Preliminary comparative analysis of medicinal plants used in the traditional medicine of Bulgaria and Italy. *Journal of Ethnopharmacology, 87*, 123–142. doi: 10.1016/s0378-8741(03)00047-3.

Menale, B., De Castro, O., Cascone, C., & Muoio, R. (2016). Ethnobotanical investigation on medicinal plants in the Vesuvio National Park (Campania, Southern Italy). *Journal of Ethnopharmacology. 192*, 320-349. doi: 10.1016/j.jep.2016.07.049.

Nguyen, T.S., Xia, N.H., Chu, T.V., & Sam, H.V. (2019). Ethnobotanical study on medicinal plants in traditional markets of Son La province, Vietnam. *Forest and Society, 3*(2), 171–192. 10.24259/fs.v3i2.6005.

Pardo-de-Santayana, M., Quave, C., Sõukand, & R., Pieroni, A. (2015). Medical Ethnobotany and Ethnopharmacology of Europe. In M. Heinrich, & A.K. Jäger (Eds.). *Ethnopharmacology*. (First Edition, pp. 343–355). UK: Wiley. doi: 10.1002/9781118930717.ch29.

Quave, C.L., Pardo-de-Santayana, M., & Pieroni, A. (2012). Medical Ethnobotany in Europe: From Field Ethnography to a More Culturally Sensitive Evidence-Based CAM? *Evidence-Based Complementary and Alternative Medicine*, Article ID 156846, 17 pages. doi: 10.1155/2012/156846.

Rajaei, P., & Mohamadi, N. (2012). Ethnobotanical Study of Medicinal Plants of Hezar Mountain Allocated in South East of Iran. *Iranian Journal*

of Pharmaceutical Research, 11(4), 1153–1167..

Rehman, M.N., Mushtaq, A., Shazia, S., Muhammad, Z., & Sarah, E. (2017). Relative popularity level of medicinal plants in Talagang, Punjab Province, Pakistan. *Rev. Bras. Farmacogn., 27*(6), 751–775. doi: 10.1016/j.bjp.2017.09.004.

Stevens, P. F. (2017). Angiosperm Phylogeny Website. Version 14. Retrieved from mobot.org (Accessed 30 April 2021).

Tardío, J., & Pardo-de-Santayana, M. (2008). Cultural importance indices: A comparative analysis based on the useful wild plants of southern Cantabria (Northern Spain). *Economic Botany, 62*, 24–39. doi: 10.1007/s12231-007-9004-5.

Tsioutsiou, E.E., Giordani, P., Hanlidou, E., Biagi, M., De Feo, V., & Cornara, L. (2019). Ethnobotanical Study of Medicinal Plants Used in Central Macedonia, Greece. *Evidence-Based Complementary and Alternative Medicine*, Article ID 4513792, 22 pages. doi: 10.1155/2019/4513792.

Tugume, P., Kakudidi, E.K., Buyinza, M., Namaalwa, J., Kamatenesi, M., Mucunguzi, P., & Kalema, J. (2016). Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. *Journal of Ethnobiology & Ethnomedicine, 12*(5). doi: 10.1186/s13002-015-0077-4.

Umair, M., Altaf, M., & Abbasi, A.M. (2017). An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. *PLoS ONE*, 12(6), e0177912. 10.1371/journal.pone.0177912 .

WFO. 2021. *World Flora Online.* Retrieved from worldfloraonline.org. (Accessed 30 April 2021).

Received: 09.06.2021
Accepted: 17.11.2021