

ETHNOBOTANICAL STUDY OF SOME MEDICINAL AND EDIBLE PLANTS IN NORTHEASTERN STATISTICAL REGION OF MACEDONIA

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Abstract :-

Background: Information regarding the local importance and the use of medicinal and edible plants in Northeast Region of Macedonia is not available in the literature, but collection of plants is still an important and widespread practice in these regions. The Northeastern Statistical Region comprises the extreme northeast part of the Republic of Macedonia. It borders Kosovo and Serbia to the north and Bulgaria to the east, while internally; it borders the Skopje and Eastern statistical regions. Our aim was to document and compare the use of medicinal and edible plants in northeastern region.

Methods: From April 2015 to December 2016, 45 key informants from 15 villages of northeastern region were interviewed during field research. The age of the each key informants were over 60 years. Interviews were conducted in a way to explore the data regarding medicinal and wild edible plants. To address our research questions more fully, we used the simple mixed methods approach through face-to-face interviews and focus group discussion with 45 key informants (19 male and 26 female) of diverse ethnicity (15=Macedonians, 15=Albanians, and 15=Serbs) who had knowledge about medicinal and edible plants or were dependent on the local resources for their survival.

Results: A total of 79 plant specimens were collected. The informants interviewed by the first author, were asked to answer question concerning the use of medicinal and edible plants, via a previous free listing of pathologies and related use of "home remedies". The cross-cultural comparison among three ethnic groups quoted in the field study shows that the three ethnic groups share some similar knowledge of plant uses between them (more than 50% common uses).

Conclusions: The present research documents the folk use of medicinal and edible plants in Northeastern region of Macedonia. This rapidly changing practice needs to be documented before it disappears or changes. Furthermore this study can be used as a basis for developing management plans for conservation, sustainable use and drug development.

Keywords - Ethnobotany, Folk knowledge, Key Informants, Macedonia, Comparison, Fidelity Level.

I. INTRODUCTION

In recent years, the use of plants in traditional medicine has increased the interest in ethno botanical studies throughout the entire Balkan Peninsula. The overwhelming part of the scientific research in the field of ethnobotany carried out so far in Balkans were mostly concentrated on the plants utilized in medication and foodstuff [12-28, 34-41] and finally, the interest in ethnobotany in Macedonia has progressed similarly to the increased interest in the other Balkan countries [10, 11] with the idea to prevent the traditional botanical knowledge from disappearing due to high pressures. As in many other Balkan countries rapid pace of development and socio-economic transformations have led to erosion of traditional botanical knowledge in Macedonia [11]. On the other hand traditional botanical knowledge, like any other form of knowledge, is developed within certain cultural groups over a given period of time and within specific environmental and social settings. At the same time, history has demonstrated how knowledge has been actively shared and exchanged among societies, and in this matter, holders of traditional knowledge are no different. They acknowledge, accept and adopt elements from other

knowledge systems, just as other societies adopt elements of traditional knowledge [9]. In addition to this the perceptions and knowledge of such people are in part shaped by their values, world views, environmental ethics, and religion in a broader sense. Therefore it is important to understand also the local perspectives in managing genetic resources because they represent a strong interest in being listened to, and in having a say in what is happening in the surroundings. So far, governments and intergovernmental organizations in Macedonia have made some attempts to officially recognize some aspects of traditional knowledge and as a result this tradition was officially made into national law on complementary and alternative medicine in 2014 where for herbal medicine or phytotherapy no specific regulation has been found [31]. Together with the recognition of importance of traditional knowledge, serious concern about the loss of knowledge could be observed in last few years throughout Macedonia [10, 11]. There is no doubt that the memory remains in elderly people, but the truth is that today a very small number of households with very low disposable incomes in Northeastern region of Macedonia rely on natural resources. Another contributing factor is the rural-urban migration within the country and the

massive immigration to more developed countries. Therefore the aim of this study was to compile and evaluate current available data on the plants traditionally used in Northeastern Region for human food and medicine. In order to achieve the common objectives this research aimed to: record plant knowledge in Northeastern Region of Macedonia; compare the data arising from the three considered ethnic groups and compare the collected data with the other ethnobotanical studies previously conducted in the Balkans.

1.1 Ethnographic background

The study region is inhabited by a multitude of ethnic groups and relations among them have never been good. Notwithstanding the fact that the region has historically earned such a reputation for clashes and antagonisms, the fact is that it has been an important bridge and a place of transferring knowledge. Currently, the main ethnic groups in the region are Macedonians Slavs, who descended from the peoples who arrived in the Balkan in the sixth and seventh centuries. Currently, they are predominately of Christian Orthodox faith. The Muslim community is the second largest group in the region and is made up mainly of Albanians. It is generally accepted that the Albanians are indigenous nation (ethno-linguistic group) at the Balkans and Southeastern Europe as well. The national ideology insists on an unequivocal ethnic relationship with the ancient Illyrians [32]. Also, according to historical landfills and theory of Illirian-Albanian ethno-linguistic continuity it thought that the Albanians in today Macedonia are direct descendants of the ancient Balkan population. [32]. Regarding the Serbs of the Republic of Macedonia they are generally concentrated along the

northern border with Serbia. The population with the highest percentage of Serbs is the Cucer-Sandevo municipality. In the last decades, there has been a steady decline in the number of Serbs, mostly caused by the assimilation in the majority and ethnically close Macedonians.

II. MATHERIAL AND METHODS

2.1 Description of the study area

The Northeastern Statistical Region comprises the extreme northeast part of the Republic of Macedonia. It borders Kosovo and Serbia to the north and Bulgaria to the east, while internally; it borders the Skopje and Eastern statistical regions. The Republic of Macedonia is divided into eight arbitrary statistical regions and one of them is Northeastern Statistical Region (level 3 Eurostat) which is further divided into six municipalities: Kratovo Municipality; Kriva Palanka Municipality; Kumanovo Municipality; Lipkovo Municipality; Rankovce Municipality and Staro Nagoricane Municipality. It is one of the smallest regions (2,306 km²), covering only 9.3% of the country's total land area and with population density of 76.3 people per km². In 2015, 8.5% of the total population of the Republic of Macedonia lived in this region [2]. According to the last population census in 2002 the current population of the Northeastern Statistical Region is 172,787 citizens or 8.5% of the total population of the country. The largest ethnic group in the region are Macedonians (59%) followed by Albanians (31%), Serbs (6.1%) and Turks under 1%. [3]. But, unlike other regions the inhabitants of the northeastern region move the most from villages to towns almost with 40.8% of the population making the transition [1].



Figure 1. Map of the Study Area

2.2 Ethical Approval

The purpose of the study was explained to key informants in the Northeastern Region and informed consent was obtained from each of the respondents.

III. RESULTS AND DISCUSSION

3.1 Field study, data sampling and analysis

The northeastern region was visited and plant specimens were collected from April 2015 to December 2016 in 15 villages (Figure 1). The plants were pressed, dried, mounted on herbarium sheets and identified with the help of standard literature Flora of Macedonia [5], Flora e Shqipërisë [6] and double checked for confirmation at Study Program of Biology at University of Tetova. Plant data and their related information were entered into a data base. Interviews were conducted in a way to explore the data regarding medicinal and wild edible plants. Over the duration of this study, 79 plant specimens were collected. The informants interviewed by the first author, were asked to answer question concerning the use of medicinal and wild edible plants, according to a technique used by Ellena et al (2012) [4] via a previous free listing of pathologies and related use of "home remedies". For each listed item we asked for exact details of how the home medicine plant was prepared, its folk medical and food-edible utility, and its cultural significance.

3.2 Informant selection

To address our research questions more fully, we used the simple mixed methods approach through face-to-face interviews and focus group discussion with 45 key informants (19 male and 26 female) of diverse ethnicity (15=Macedonians, 15=Albanians, and 15=Serbs) over 60 years of age who had knowledge about medicinal and edible plants or were dependent on the local resources for their survival. The informants were identified with the help of Chairman of the local community, Islamic leader (Imam) and priest.

3.3 Fidelity level

The percentage of informants claiming the use of a certain plant for the same major ailment was calculated for the most frequently reported ailments to evaluate species consensus [29]. Table 1 showed the Fidelity level (FL) values for some medicinal and edible plants that were claimed to be used by informants against the corresponding ailment. The highest FL of 100% for all three ethnic groups was recorded for medicinal species species such as *Chamomilla recutita* L., *Hypericum perforatum* L., *Morus nigra* L., *Rosa canina* L., *Thymus serpyllum* L. and *Urtica dioica* L., followed by *Ocimum basilicum* L., *Prunus domestica* subsp. *Institita* (L) C.K. Schneid., *Rubus ceasius* L., *Mentha piperita* L., and *Rubus fruticosus* agg. L., (more than 90%), while species with the lower FL were *Robinia pseudoacacia* L., *Daucus carota* L. and *Spinaceae oleracea* (Less than 60%). While the results of FL analyzed separately for each ethnic group indicate that the species with highest FL of 90 to 100% reported by macedonians were *Melissa officinalis* L., *Allium sativum* L., *Artemisia absinthium* L., *Calendula officinalis* L., *Cichorium intybus* L., *Ficus carica* L., *Juniperus communis* L. and *Sambucus nigra* L. Highest results of FL from Albanian ethnic group were *Achillea millefolium* L., *Allium cepa* L., *Cucurbita pepo* L., *Malus sylvestris* Miller and *Pyrus amygdaliformis* Vill. Highest FL indicated only by Serbs does not exceed more than 70% (*Helianthus annuus* L., *Juniperus communis* L., *Lavandula officinalis* Mill., *Morus alba*., and *Rumex acetosa* L.). The lower FL of 33% recorded by Macedonians were for *Equisetum arvense* L., *Galium verum* L. and *Prunus prostrata* Labill., with 13% of FL. On the other hand lower FL reported by Albanians is recorded for species: *Juniperus communis* L., *Lavandula officinalis* Mill., *Petroselinum crispum* (Mill) Nyman & A.W.Hill., *Plantago lanceolata* L., *Rosmarinus officinalis* L. and *Salix alba* L. Finally the species with lower FL reported by serbs were: *Chelidonium majus* L., *Cornus mas* L., *Petroselinum crispum* (Mill) Nyman & A.W.Hill. and *Phaseolus vulgaris* L.

Scientific name of species	Ailment	Total number of citation	independent number of informants			Fidelity level (%)		
			MK D	ALB	SRB	MK D	ALB	SRB
<i>Achillea millefolium</i> L.	Stomach pain	39	13	12	14	86	93	53
<i>Allium cepa</i> L.	Cold	38	13	14	11	86	93	73
<i>Allium sativum</i> L.	Hypertension	39	14	12	13	93	80	86
<i>Artemisia absinthium</i> L.	Stomach pain; Diabetes; Venom	38	14	13	11	93	86	73
<i>Artemisia absinthum</i> L.	Diabetes; Stomach pain	38	14	13	11	93	83	73
<i>Calendula officinalis</i> L.	Acne	29	14	6	9	93	40	60
<i>Chamomilla recutita</i> L.	Skin problems; Hemorrhoids	45	15	15	15	100	100	100
<i>Chelidonium majus</i> L.	Psoriasis	25	11	11	3	73	73	20
<i>Crataegus monogyna</i> Jacq.	Focus and concentration	27	9	11	7	60	73	46
<i>Ficus carica</i> L.	Haemorhoids	44	14	15	15	93	100	100

<i>Hypericum perforatum L</i>	Depression; skin injuries; Excretory problems	45	15	15	15	100	100	100
<i>Juglans regia L</i>	Stomach pain	32	12	12	8	80	80	53
<i>Juniperus communis L</i>	Prostate health	29	14	4	11	93	26	73
<i>Mentha piperita L</i>	Cough, bronchitis; Relaxation of nerves	40	14	15	11	93	100	73
<i>Morus alba L.</i>	<i>Haemorrhoids</i>	29	7	12	10	46	80	66
<i>Morus nigra L</i>	<i>Haemorrhoids</i>	45	15	15	15	100	100	100
<i>Ocimum basilicum L</i>	Cough, inhalation	42	14	15	13	93	100	86
<i>Papaver rhoeas L.</i>	Cold, cough	33	11	15	7	73	100	46
<i>Robinia pseudoacacia L.</i>	Strength immunity	26	7	11	8	46	73	53
<i>Rosa canina L</i>	Kidney stones and for improvement of the immunity	45	15	15	15	100	100	100
<i>Rumex acetosa L</i>	Digestion	37	11	15	11	73	100	73
<i>Sambucus nigra L.</i>	Cough, bronchitis, tuberculosis	26	14	12	0	93	80	-
<i>Tanacetum vulgare L.</i>	Bronchitis	18	10	8	0	66	53	-
<i>Taraxacum officinale F.H.Wigg.</i>	Kidney stones	14	13	1	0	86	100	-
<i>Thymus serpyllum L</i>	Cough, bronchitis, tuberculosis	45	15	15	15	100	100	100
<i>Tilia cordata Mill</i>	Respiratory problems	33	12	12	9	80	80	60
<i>Urtica dioica L</i>	Prostate health; <i>Rheumatism</i> ; Hair loss	45	15	15	15	100	100	100

Table 1 Fidelity level (FL) values for some medicinal plants claimed to be use by informants against corresponding ailment.

Botanical name of the cited species, family and voucher specimen	Local names	Identification of origin of availability	Used part(s)	Use categories	Methods of preparation and administration	Ethnic informants and Fidelity Level (Friedman et al. 1986)		
						MK D	ALB	SRB
Altogether 79 specimens reported	Local names: Macedonian Albanian and Serbian	Wild, Semi-domesticated Cultivated in garden, Cultivated in Agricultural filed	Description of the plant part(s) used	Medicinal Food Symbolic	Decoctions Tinctures Infusions	Values of Fidelity Level		
The following example was used and added in database for all 79 reported species								
<i>Achillea millefolium L.</i> (Asteraceae) RMSWR104	Ajduchka treva, Mesechinka MKD Bishtamith, Barpezmi ALB Ajduchka treva SRB	Wild	Aerial parts (dried)	MU Digestive system Stomach pain MU Respiratory system Flu, cough, Breathing problems FP Used as spice SU Orthodox event	Decoction: The dried aerial parts are boiled in a container covered with a lid for 10-15 minutes, then cooled and filtered	0.86	0.93	0.53

Table 2. Main ethnobotanical information on the traditionally useful plants and values of FL in the Northeastern Region of Macedonia.

Family					
Number of species					
Rosaceae	18	Asteraceae	12	Lamiaceae	9
Fabaceae	3	Moraceae	3	Malvaceae	2
Amaryllidaceae	2	Apiaceae	2	Cucurbitaceae	2
Papaveraceae	2	Plantaginaceae	2	Poaceae	2
Polygonaceae	2	Adoxaceae	1	Amaranthaceae	1
Brassicaceae	1	Cornaceae	1	Crassulaceae	1
Cupressaceae	1	Equisetaceae	1	Graminaceae	1
Hypericaceae	1	Juglandaceae	1	Oleaceae	1
Phytolaccaceae	1	Rubiaceae	1	Rutaceae	1
Salicaceae	1	Solanaceae	1	Urticaceae	1

Table 3 Distribution of Medicinal and edible plant species according to their family

3.4 Identification of the plant origin

The results of the study shows that most of the cited plants have native origin (more than 90%), but probably as a result of the socio-political and economic changes in the region we have noticed that

the local pharmacopoeia have been influenced from external factoros. This change certainly happened when locals have tried new experiments with cosmopolitan cultivars, commercially traded species and naturalized species.

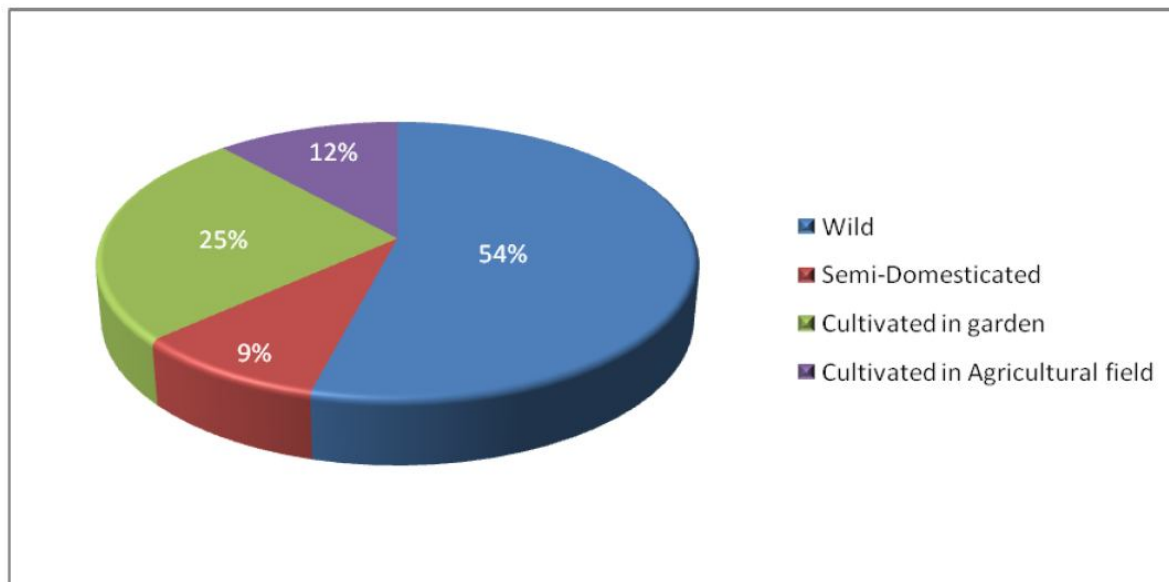


Figure 2 Origin of availability

3.5 Plant part(s) used

Plant part(s) used for medicinal purposes indicated that fruit 33 (35%) is the plant part widely used followed by Aerial parts 30 (31%), leaves 12 (11%)

and flower 11 (12%), while the rest include root 5 (3%), stem 5 (3%), seed 5 (3%), tuber 2 (1%) and cortex 2 (1%).

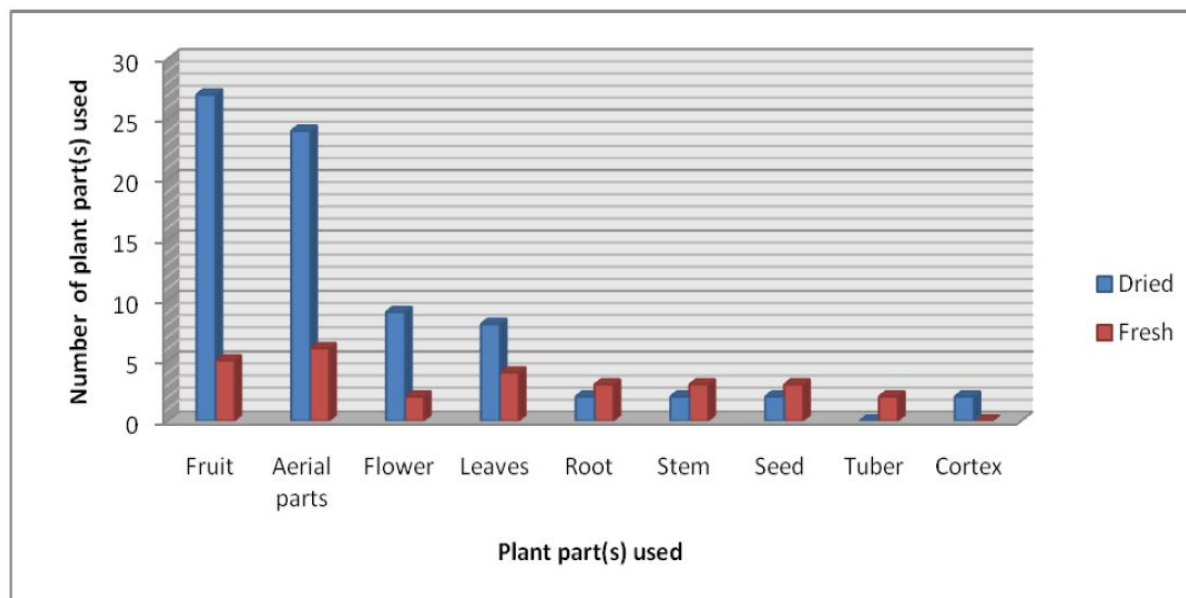


Figure 3 Portion of Plant part(s) used

3.6 Medicinal plants condition

The local healers of the study area employ several collections of plant conditions. Seventy six (73%)

preparations are made from fresh dry, followed by fresh 28 (27%).

Group of Ailments	Ailments treated	Total reported number per each ailments
Digestive system	Stomach pain; Diarrhea; Gastritis, Intestinal problems (fart); Ulcers; Digestive facilitator; removal of fluid from the abdominal cavity	23
Respiratory system	Cold, bronchitis, asthma, flu, fever, tuberculosis, , inflammation	41
Nervous system	Depression; Sedative; Calming eye; Focus and concentration; Nose breathing relaxation	20
Circulatory system	High blood pressure; Thrombus (blood clot); Against venous thrombosis; Heart attack	9
Excretory system	Kidney stones; Better urination and Prostate	16
Dermatological system	Acne, Psoriasis; Rashes; Blister; Deep cuts; Hair loss; Wounds; Insect stings; Burns and sunburns	11
Endocrine system	Diabetes;	1
Immune system	Improvement of the immunity in general	3
Sensory-motor system	Ear pain	3

Table 4 Number of main diseases under body systems

3.7 Cross-cultural comparison among three ethnic groups

Our cross-cultural approach of the study relies on a comparison of data across ethnic groups. The overlap for all use-categories quoted in the field study shows that the three ethnic groups share some similar knowledge of plant uses between them (more than 50% common uses). The Orthodox Macedonians and Muslim Albanians show more than 10% differences between them, while Orthodox Serbs with Muslim Albanians show 50% differences between them. So the both Orthodox ethnic groups showed idiosyncratic use with Muslim Albanians. Figure 4 Four-Circle Venn diagram showing overlaps of differences and similarities between four ethnic groups. [x] Symbol shows use(s) cited only by one ethnic group.

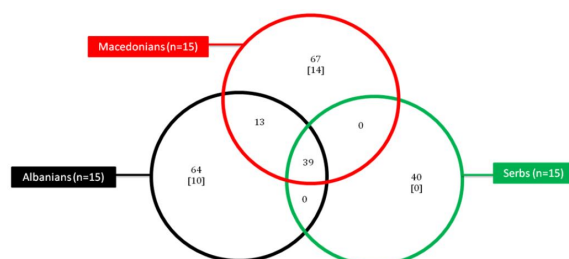


Figure 4 cross-cultural comparisons among Macedonians, Albanians and Serbs.

CONCLUSION

The information collected in Northeastern Statistical Region of Macedonia and presented here provides insight into Macedonian ethnobotanical knowledge, which has received minimal study and documentation in the past. Northeastern Region is an excellent example of a rapidly changing area where local traditions compete with modern ways of life. Although traditional botanical knowledge have been lost in the past years, the residents of old age still preserves still preserves knowledge about plants. There were relatively similar traditions of plant use by each ethnic group with some minor differences and these were mostly due to religion.

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Authors' contributions

The author participated in the design of the study and writing the paper. Author read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

Prior informed consent was obtained from all informants in this study

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