STUDIES CONCERNING MEDICINAL AND AROMATIC PLANTS IN THE MINIŞULUI VALLEY

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Abstract: *Research was carried out in the grassland area of the Minişului Valley, between Anina and Bozovici, and surrounded by the Aninei Mountains. The goal of the present paper is, on one hand, to identify medicinal and aromatic plants of value in the area and, on the other hand, to determine the amount of dry vegetal product recommended to be harvested. In the quantitative assessment, we took into account the laws of conservation of biodiversity and the need to recover the productive potential of the area. Irrational valorisation of some species can lead to serious ecological unbalance and even to their extinction. Taking into account the importance of ecological produce lately, harvesting medicinal and aromatic plants from the spontaneous flora should be a reliable alternative. Therefore, this study is of help for land owners in the research area, ensuring incomes with low costs. They could take into account either direct harvesting of the species or the introduction of some species of interest in cultivation, if they identify local populations of value from the point of view of the study of their active principles, or the promotion of agritourism based on the harvesting of medicinal plants too. The working method is the one introduced by Alexan, Bojor and Crăciun in 1983, regarding the economic mapping of medicinal plants. Economic mapping does not imply the entire inventorying of spontaneous medicinal flora in a certain location, but only species harvestable from the area that observe nature protection laws. The method is based on a large number of samples that aim at both maximal density areas and at minimal density areas of medicinal and aromatic species. In determining these areas we followed a zigzag line taking into account the even relief. The results of the present study are part of a research project PN II IDEI no. 1077/2009, project code ID-865 financed by the Ministry of Education, Research, Youth and Sport, through the National Council for Scientific Research in Higher Education. The topic of the project is „Identifying medicinal and aromatic plants in the Aninei Mountains with a view to valorisation".*

Key words: *medicinal and aromatic plants, quantitative assessment, Minişului Valley*

INTRODUCTION

The research area presented in this paper is located in south-western Romania, in the Aninei Mountains, at the border between two national parks: Semenic – Cheile Caraşului in the north of the Aninei Mountains and Cheile Nerei – Beuşniţa in the south of the Aninei Mountains. The two parks have a large number of important nature reserves among which: the Caraşului Gorges, the Gârliştei Gorges, the Caraşului Springs, the Buhui Reserve, the Mărghitaş Reserve for the first national park and the Nera – Beuşniţa Gorges, the Ciclovei Valley – Ilidia, the Bigăr Spring, and Lisovacea for the second one. (BADESCU *et al*. 1998).

Due to its geographical position, Banat has a temperate climate with a moderate continental feature and with sub-Mediterranean influences, more or less considerable in certain geographical areas. Within this climate, there are several topo-climates determined mainly by the form of relief. The soils within the Caraş River basin are distributed as a mosaic, following the forms of relief and the existing bio-climate conditions. They are represented by lime redzines with a short horizon and a high content in iron compounds (of the terra rosa type) on lapises or detrituses On the hill slopes with relatively low inclination on the hill bottom and on

the plateaus covered by forests, rendzines turn into preluvosoils with deeper profile, yet with the same neuter-basic reaction (ROGOBETE & TĂRĂU 1997).

MATERIAL AND METHODS

The field study proper was preceded by a thorough documentary study which allowed us to draw a list of medicinal and aromatic plants of interest in the area. The making of this list was much eased by the fact that part of the working team were familiarised with the species in the area as a result of the research of flora and vegetation of the main botany or mixed reserves in the two national parks mentioned above.

As we have already mentioned in the introduction above, the working method was that of economic mapping of both medicinal and aromatic plants from the spontaneous flora introduced by ALEXAN *et al.* (1983) and by BOJOR (1991).

As far as botanical mapping of herbaceous plants is concerned, we proceeded according to this method, sampling 1/1 m^2 plots and, within each sample, numbering individuals that can be valorised. The number of samples on a 1 ha hill varied, depending on the frequency and species constancy, between 20 and 30 samples. The areas with higher uniformity in species distribution needed a smaller number of samples unlike low uniformity ones. Later, we interpreted the samples and we calculated mean density per m^2 relating it to the area of data collection. The calculus of analysed areas was done by consulting area ortho-photo plans on which we overlapped the samples with mapped area. In this way, the amount in dry substance related to mapped area is much more accurate. If we had calculated analysed areas on the ground of topographical maps we could have not eliminated areas with arable lands, areas occupied by the fern *Pteridium aquilinum*, settlements, orchards, and forest enclaves.

Results of the study were expressed taking into account the laws of environmental protection and the necessity of recovering area potential. Thus, we considered we can harvest only 30% of the rhizomes, bulbs, bulbo-tubers, and roots every five years. Aerial parts (*herba*) can also be harvested 30-40% but annually (we considered it 30%), while flowers, leaves, fruits, and seeds can be harvested annually between 40 and 60% of the individuals, without endangering species perpetuation (we considered it 50%).

The amount of dry substance for each of these species represents the mean of readings with electronic scales. Assessing amounts was done on dry raw matter subjected to valorisation from the basin and expressed in kg of dry substance. For a highest accuracy of data recorded in most species analysed, we have established average amounts of dry matter through our own weighing. Results of quantitative estimates are expressed in kg of dry matter

Species identification was done using Flora României vol I-XIII (1952-1976), Flora României - CIOCÂRLAN (2009) şi a Florei Europaea (http://rbg-web2.rbge.org.uk/FE/fe.html).

RESULTS AND DISCUSSIONS

As a result of field studies the last year, we collected data to assess medicinal and aromatic species harvestable from the area. To express amounts to be valorised, we delimited three larger areas covering either one or several of the closest hills: I - Zăbăl Hill (197 ha), II – Hills between Zăbăl and Tăria (55 ha), III - Tăria Hill and Globu Tăriei Hill (258 ha).

Two of the three areas are included in the National Park Cheile Nerei – Beuşniţa. The hills Tăria and Globu Tăriei are located in the vicinity of the two parks but they are not included in the park areas.

The main medicinal and aromatic plants that can be harvested in the studies area are presented below, in an alphabetical order (Tab.1).

The studied area is located near two nature reserves – the Izvorul Bigăr Nature Reserve and the Buhui Reserve. The maps included in the soft România Digitală downloaded

in the GPS, allow the exact location of our position at the time of sampling, so that we could establish with accuracy whether the area we were mapping within was or not within the protected perimeter.

Table 1

Medicinal and aromatic plants recommended to be harvested in the area

Scientific name	Product used	Average amount of dry matter in g	Amounts to be harvested in kg of dry matter
Zăbăl Hill - 197 ha			
Achillea sp.	herba	0.8	331
Achillea sp.	flos	0.4	276
Agrimonia eupatoria	herba	1.3	154
Bellis perennis	herba	0.1	24
Crataegus monogyna	folium cum flos	200	118
Crataegus monogyna	fructus	1000	591
Eryngium campestre	radix	4.8	284
Filipendula vulgaris	flos	0.3	30
Filipendula vulgaris	herba	0.6	35
Fragaria vesca	folium	0.3	443
Galium verum	herba	0.8	142
Juniperus communis	fructus	10	7
Plantago lanceolata	folium	0.25	98
Rosa canina	fructus	0.35	90
Rubus sp.	folium	20	95
Salvia pratensis	folium	1.1	217
Salvia pratensis	flos	0.5	99
Teucrium chamaedrys	herba	0.4	615
Thymus sp.	herba	0.08	567
Hills Tăria and Globu Tăriei - 258 ha			
Achillea sp.	herba	0.8	495
Achillea sp.	flos	0.4	413
Agrimonia eupatoria	herba	1.3	201
Crataegus monogyna	flos	200	219
Crataegus monogyna	fructus	1000	1096
Eryngium campestre	radix	4.8	743
Filipendula vulgaris	flos	0.3	619
Filipendula vulgaris	herba	0.6	743
Fragaria vesca	folium	0.3	580
Galium verum	herba	0.8	1610
Genista sagittalis	herba	0.1	735
Hypericum perforatum	herba	2.1	650
Plantago lanceolata	folium	0.25	484
Rhinanthus rumelicus	herba	0.85	789
Rosa canina	fructus	0.35	117
Rubus sp.	folium	20	124
Salvia pratensis	folium	1.1	993
Salvia pratensis	flos	0.5	451
Stachys officinalis	herba	3	1858
Teucrium chamaedrys	herba	0.4	2477
Thymus sp.	herba	0.08	539
Hills between Zăbăl and Tăria – 55 ha			
Achillea sp.	herba	0.8	185
Achillea sp.	flos	0.4	154
Agrimonia eupatoria	herba	1.3	86
Crataegus monogyna	flos	200	58
Crataegus monogyna	fructus	1000	289
Filipendula vulgaris	flos	0.3	99

Filipendula vulgaris	herba	0.6	119
Fragaria vesca	folium	0.3	116
Galium verum	herba	0.8	317
Genista sagittalis	herba	0.1	144
Hypericum perforatum	herba	2.1	589
Plantago lanceolata	folium	0.25	48
Rhinanthus rumelicus	herba	0.85	112
Rosa canina	fructus	0.35	50
Rubus sp.	folium	20	53
Salvia pratensis	folium	1.1	121
Salvia pratensis	flos	0.5	55
Stachys officinalis	herba	3	99
Teucrium chamaedrys	herba	0.4	627
Thymus sp.	herba	0.08	158
Viola tricolor	herba	0.5	58

The Zăbăl Hill is characterised by the presence of the species *Juniperus communis* found only sporadically on the other analysed pastures, including those in the northern area of the Aninei Mountains. In this area, we identified an increased frequency of the species *Juniperus communis*, with a mean of 120 individuals/ha. Taking into account the fact that the species is unisexually dioic, we considered we could harvest pseudo-fruits from 50% of the total mature individuals. From one individual we can harvest about 100 fruits and the volume of 10 dry pseudo-fruits is 1.02 g, i.e. a total of 10 g per individual. Thus, we calculated that we can harvest 0.6 kg of dry substance from one ha. Juniper has a higher density of the number of individuals per about 11 ha. Therefore, total amount is below 10 kg of dry substance (6.6 kg dry substance). We did not take into account smaller individuals, immature ones, or burnt ones.

To also notice the presence of the species *Primula verris*, but on a smaller area and in small amounts: this made it unharvestable and, therefore, excluded it from the table.

The fern *Pteridium aquilinum* is present on a total area of 5 ha, and mean density of the individuals in all analysed samples is 14 individuals per m^2. The species is not sued at present and the fires set by the locals two or three times a year endanger all species, including medicinal ones, most affected being dog rose (*Rosa canina*), blackberry (*Rubus fruticosus*), blackthorn (*Prunus spinosa*) and common hawthorn (*Crataegus monogyna*). Exploiting bracken as a medicinal resource could solve a series of problems for which there has been no acceptable solution for the owners of the lands affected. (IMBREA *et al*., 2009). Advancing towards Bozovici, we could note the absence of the fern on the other pastures we analysed.

Dog rose (*Rosa canina*) has a mean density of 26 harvestable individuals (mature, fruitful ones) per ha. If one individual yields on the average 50 fruits weighing 0.7 g dry weight per fruit we can harvest 35 g per individual.

There are species of *Rubus* present all over the area which have a lager number of harvestable individuals – on the average 48 per ha. The amount of harvestable leaves from an individual is on the average 20 g of dry substance.

Teucrium chamaedrys is a plant used in popular tradition, being ised for its active principles (bitter tonic, gastric excitant, febrifuge, stomachic, antiseptic, spasmolitic, antihelmintic, coleretic, and colagogue (PÂRVU C., 2000). Latest research confirm the antimicrobial and antioxidating properties of its phenolic compounds (GURSOY & TEPE 2009). But the species is prohibited for trade in Romania and in other countries (such as Italy, France), being associated with the appearance of some hepato-toxicity cases. (RADER *et al*., 2007, Özel *et al*., 2006) In the U.S.A., the species is sued to aromatise alcoholic drinks. In the area, it is present in considerable amounts: this is why we took into account its mapping.

CONCLUSIONS

In this region, there is a variety of the vegetal cover in which there are biota occupied by forests and shrubbery, meadows and rock associations. From the point of view of biodiversity, this area is a very rich one both from the point of view of the landscape and of the botany.

Total amount of raw dry matter to be assessed and that we present in the order of their scientific names are: *Achillea* sp. –herba 1011 kg, *Achillea* sp. – flos 843 kg, *Agrimonia eupatoria* – herba 441 kg, *Bellis perennis* – herba 154 kg, *Crataegus monogyna* – folium cum flos 395 kg, *Crataegus monogyna* – fructus 1976 kg, *Eryngium campestre* – radix 1027 kg (5 years intervals), *Filipendula vulgaris* – flos 748 kg, *Filipendula vulgaris* – herba 897 kg, *Fragaria vesca* – folium 1139 kg, *Galium verum* – herba 2069 kg, *Genista sagittalis* – herba 879 kg, *Hypericum perforatum* – herba 1239 kg, *Juniperus communis* – fructus 7 kg, *Plantago lanceolata* – folium 630 kg, *Pteridium aquilinum* – rhizome 14000 kg (5 years interval), *Rhinanthus rumelicus* – herba 901 kg, *Rosa canina* – fructus 257 kg, *Rubus caesius* – fructus 272 kg, *Salvia pratensis* – folium 1331 kg, *Salvia pratensis* – flos 605 kg, *Teucrium chamaedrys* – herba 3719 kg, *Thymus* sp. – herba 1264 kg, *Viola tricolor* – herba 58 kg.

It is necessary to underline the importance of perserving area biodievrsity and the necessity of observing harvestable amounts from each individual depending on the product used.

Taking into account the importance of ecological products, harvesting medicinal species from the spontaneous flora represent an aletrnative to be taken into account. Identifying basins for the harvesting of certain species, doubled by the study fo active principles, can support land owners in the studied area ensuring safe incomes with low costs.

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