

WHICH ARE THE MAIN MEDICINAL PLANTS THAT COULD BE HARVESTED FROM EASTERN ROMANIA?

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Abstract

Worldwide, medicinal and aromatic plants play an important role for humanity. Thousands of medicinal plants are used across the world. Almost 300 medicinal plants are known and used in Romania. Their distribution is not uniform across the country, being depended in some cases of the presence of forest sites. The main goal of this paper was to estimate the maximum quantities of medicinal plants that could be harvested by the eight Forestry Directorates, managed by National Forest Administration Romsilva, from the eastern part of Romania. Several studies, papers, indicators and databases were taken into account. 38 medicinal plant species have potential in terms of harvesting in the Eastern Romania, with a total estimated quantity of more than 1.500 tons. The highest quantities could be harvested by Vaslui, Iași, Vrancea and Botoșani Forestry Directorates. The species with the highest potential were: bear's garlic, silver linden, elder, small-leaved lime, common nettle, large-leaved linden and common hawthorn. Harvesting and management measures aimed at protecting certain medicinal plant species were also proposed.

Key words: Eastern Romania, elder, linden, medicinal plants, Romsilva

INTRODUCTION

Nowadays, thousands of medicinal and aromatic plants are used in pharmaceutical, food, sanitary, cosmetic, agricultural and/or other related industries [12], [19], [22].

As regards the pharmaceutical use, it is estimated that 11% of main drugs are exclusively of vegetal origin [23]. Furthermore, in the recent decades, a rising interest for the alternative therapies that use products derived from plants was observed [26]. Natural products isolated from medicinal plants can constitute an essential component in searching for new remedies [1], as using primary biologic matter is in most of the cases much cheaper than using alternative chemical substances.

Even if it is difficult to assess the total number of plant species that were used for medicinal purposes at a certain time and even in the present, yet it is estimated that worldwide more than 70,000 plant species are used in popular medicine [11]. As a consequence,

there is a high demand of biological products – both for domestic and commercial uses – which leads to a huge local, regional, national and international trade.

For example, in China, one of the countries with a great potential as regards the medicinal plants, 4,941 species from a total of approximately 32,200 native species are used as medicinal plants in the traditional medicine [14]. If we take into account that worldwide, more than 422,000 superior plants were described [2], [13], we could say that China holds about 1.2% of the worldwide fund of medicinal plants.

Medicinal and aromatic plants with specific chemical profiles were important elements of religious and therapeutically practices from earlier world cultures [25]. Particularly, European countries have a long tradition of plant based medicine starting from the Greek and Roman periods [15].

Across European Union, more than 80 species of vascular plants are collected, consumed and recognized for their nutritional, economic and

cultural benefits [27]. Moreover, in many European countries, the harvesting of medicinal plants is a common recreational activity and sometimes even profitable [20].

On the current territory of Romania, medicinal and aromatic plants are used since two millennia ago, during the Thracians. The first medicinal Romanian book was published in 1862 and it described 217 phytotherapeutic remedies [17], [18] and the first European research institute dedicated to medicinal and aromatic plants was founded in 1904 at Cluj by Professor Béla Páter [18].

Due to the fact that Retezat Mountains (south-western part of Romania) is characterized by a high degree in terms of flora diversity, in 1916, Romanian botanist Alexandru Borza wrote a series of articles about the necessity of protecting certain regions from Retezat Mountains and initiated the establishment of the first Romanian national park [6], [17], that was done in 1935.

At present, it is estimated that approximately 283 medicinal plant species are harvested in Romania [21].

The main aim of this paper was to estimate the maximum quantities of medicinal plants that could be harvested by the Forestry Directorates from the eastern part of Romania. Secondly, a set of harvesting management measures aimed at reducing the impact on the environment was proposed.

MATERIALS AND METHODS

Eight Forestry Directorates from the eastern part of Romania (Bacău, Botoșani, Galați, Iași, Neamț, Suceava, Vaslui and Vrancea), managed by the National Forest Administration Romsilva, were the subject of the research.

It is well known that the plant's productivity depends on a complex array of ecological factors and based on them, oscillates from one year to another. The most important ones are in close connection with the biocenosis, together with all its attributes (species composition, percentage of soil coverage, age, production class).

Furthermore, the estimation of the quantities that could be produced by certain plants are

influenced by the amount of local precipitations as well as by the region's specific type of soil.

In order to estimate the quantities of medicinal plants that could be harvested in 2018 from the spontaneous flora included into the forest fund managed by the eight Forestry Directorates, the followings were taken into consideration:

- the reports realized in the last years by specialists from "Marin Drăcea" National Institute for Research and Development in Forestry (INCDS);
- the current area of the forest fund managed by the eight Forestry Directorates (Fig.1);

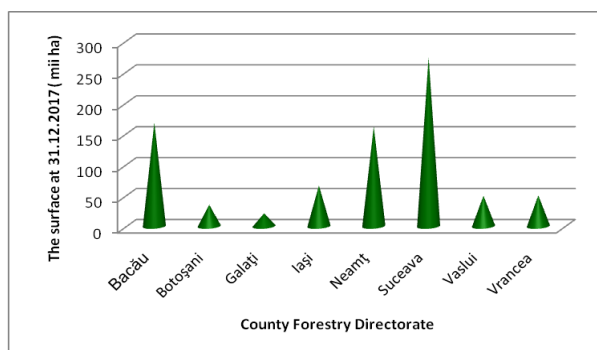


Fig.1. Surface of forest fund managed by the eight Forestry Directorates

Source: Romsilva, www.rosilva.ro.

- INCDS' databases regarding the medicinal plants;
- information present in special works (research themes, scientific papers, reports, etc.).

The restrictive ecologic factors that control the forest ecosystem's productivity were also taken into consideration, namely the altitude, quantity of average annual precipitations and soil type [4], [7], [8], [9]. Furthermore, the average quantities of the medicinal plants resources from the main forest formations (*i.e.* spruce stands, common beech-resinous mixed stands, oak stands) were also taken into consideration.

The meteorological prognosis for the current year is essential for estimating the resource productivity, due to the fact that these quantities can fluctuate very much from one year to another, depending on the humidity recorded during the blooming and growth seasons.

RESULTS AND DISCUSSIONS

Based on all the ecological factors as well as the data from the forestry directorates management plans and the literature, the estimated quantity of medicinal plants that could be harvested in 2018 in the eastern part of Romania is of 1,565 tons.

40% of the total quantity could be harvested from Vaslui, 20% from Iași, 12% from Vrancea and 11% from Botoșani Forestry Directorates, respectively. Less percentages (4-5%) were obtained in the case of the other four counties (Fig.2).

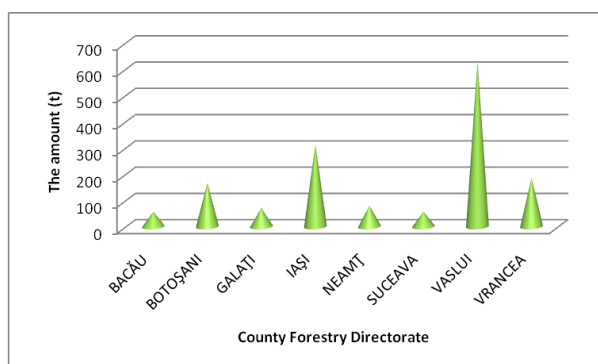


Fig.2. Quantity of medicinal plants that could be harvested from Eastern Romania
Source: Original.

Across the forest stands managed by the eight forestry directorates, it is estimated that 38 species of medicinal plants could be harvested, namely: silver fir (*Abies alba* Mill.), common yarrow (*Achillea millefolium* L.), horse-chestnut (*Aesculus hippocastanum* L.), bear's garlic (*Allium ursinum* L.), marsh-mallow (*Althaea officinalis* L.), edible burdock (*Arctium lappa* L.), absinthe (*Artemisia absinthium* L.), birch (*Betula pendula* Roth.), shepherd's purse [*Capsella bursa-pastoris* (L.) Medik.], celendine (*Chelidonium majus* L.), common hawthorn (*Crataegus monogyna* Jack.), common horsetail (*Equisetum arvense* L.), European beech (*Fagus sylvatica* L.), alder buckthorn (*Frangula alnus* Mill.), St John's-wort (*Hipericum perforatum* L.), Persian walnut (*Juglans regia* L.), white nettle (*Lamium album* L.), chamomile (*Matricaria chamomilla* L.), yellow melilot [*Melilotus officinalis* (L.) Pall.], squaw mint (*Mentha*

pulegium L.), white mulberry (*Morus alba* L.), Norway spruce [*Picea abies* (L.) H.Karst.], Scots pine (*Pinus sylvestris* L.), common knotgrass (*Polygonum aviculare* L.), cowslip primrose (*Primula officinalis* L.), pedunculate oak (*Quercus robur* L.), black locust (*Robinia pseudocacia* L.), raspberry (*Rubus idaeus* L.), elder (*Sambucus nigra* L.), common dandelion [*Taraxacum officinale* (L.) Weber ex F.H. Wigg], wild thyme (*Thymus serpyllum* L.), small-leaved lime (*Tilia cordata* Mill.), large-leaved linden (*Tilia platyphyllos* Scop.), silver linden (*Tilia tomentosa* Moench), coltsfoot (*Tussilago farfara* L.), common nettle (*Urtica dioica* L.), European blueberry (*Vaccinium myrtillus* L.) and mistletoe (*Viscum album* L.).

Among them, the medicinal plant species for which higher quantities could be harvested are represented by: bear's garlic (24%), silver linden (16%), elder (8%), small-leaved lime (7%), common nettle (7%), large-leaved linden (5%) and common hawthorn (5%), respectively (Fig.3).

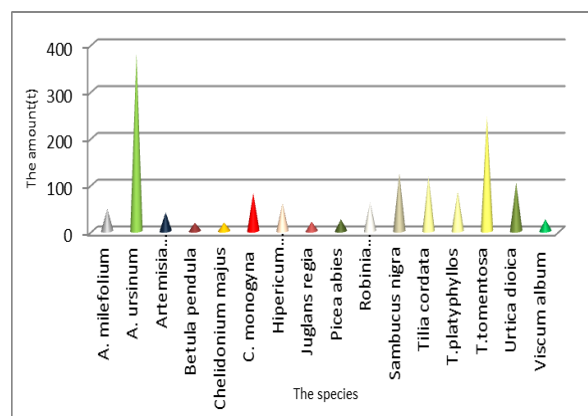


Fig.3. Medicinal plant species that could be harvested from Eastern Romania
Source: Original.

In Romania, only the three mentioned linden species occur. Among them, the most widespread is small-leaved linden, while the less common are large-leaved linden and silver linden [16].

Silver linden commonly grows in pure stands in the hilly area, and rarely in mixed plain or mountain forests.

Small-leaved linden is resistant to drought, being sensitive to temperatures. As such, it grows well in plain forests from the eastern

part of the country.

Large-leaved linden has higher requirements as regards temperature and light. As such, it is rarely found at the limit between plain and hill.

These species bloom between June-July, when the flowers (*Flores Tiliae*) are mainly harvested. The harvesting is very difficult to be done mainly due to the height of the trees.

Thanks to special mucilage, the linden flowers are reducing respiratory inflammations, especially in bronchitis. Furthermore, there are good as sedative in nervous conditions or insomnias [3].

Widespread in Europe, Asia and North Africa, in Romania, the elder is a common species in plain and hilly areas, reaching even inferior mountain areas.

The plant is exigent to climatic conditions, especially in regard with the soil. As such, it prefers warm areas and fertile soils, rich in humus [28].

It develops well in semi shadow, a reason for which it can be found especially in forest clearings, at the forest edges or near fences. The flowers are harvested during May-June, while the fruits (*Fructus Sambuci*) in September-October, in the same way as the flowers.

The flowers are used as sudorific in feverish states, coughs, congestion, bronchitis, pharyngitis, gout, rheumatism or urinary infections. The fruits can be used, in moderation, for constipation. As an external usage, compresses with elder infusions are used for treating abscesses, eyesores, acne, gout, conjunctivitis or frostbites [3], [10].

Management measures concerning the harvesting of medicinal plants

Long-lasting and sustainable harvesting is more and more seen as the most important conservation strategy for most medicinal and aromatic plants harvested from the wild (spontaneous) flora, by taking into consideration their current and potential contribution for local economies and their high value for people involved in their long term harvest.

In order to achieve a non-destructive harvesting of medicinal plants from the spontaneous flora, it is recommended to

follow some management measures that will ensure the maintenance of populations, species and also the ecosystem's biodiversity, such as:

- species of plants with a special protection regime, according to the Romanian legislation, will not be harvested;

- medicinal plants will be harvested only in favorable climatic conditions, without significantly affecting the ecosystem's equilibrium and biodiversity and by respecting the special recommendations for each species;

- medicinal plants will not be harvested from areas belonging to natural protected areas, as they are defined according to the legislation [24], regardless of the protected area's objective;

- the plants will be harvested in the period of the maximum concentration of active principles (generally in the moment preceding the anthesis) for above-ground organs and at the end of the vegetation season for the subterranean ones;

- for a rational exploitation, we recommend the alternation of the harvesting period at one to three years;

- a partial harvest of medicinal plants will be realized, keeping provisions in order to ensure a trophic base for the existing dependent fauna;

- the harvest of medicinal plants must be realized by trained persons and under the close supervision of specialists who are able to recognize the taxa for which special recommendations or restrictions regarding the protection regime exist;

- in order to maintain the spontaneous flora basin's productive potential, the spontaneity method is recommended to be applied [5];

- harvestings will not be realized from isolated populations or represented by a small number of individuals;

- in order to obtain the necessary quantities of medicinal plants both for the internal and external markets in remarkable and advantageous economic conditions as well as for protecting and conserving the spontaneous flora's biodiversity, rare or endangered species should be promoted through specialized and controlled cultures.

CONCLUSIONS

The remarkable importance of medicinal plants in conservation refers to the values that they represent for humanity. These values encompass the contributions that medicinal plants can bring towards health, financial income, cultural identities or security of livelihoods.

From among the 283 plant species that are harvested from our entire country, it is estimated that 38 species (or parts of) are collected from the eastern part, some of them being the most harvested (bear's garlic, linden, elder, nettle and hawthorn).

The conservation methods and management measures must respect future provisioning and dispositions regarding species conservation for all these medicinal plants that are estimated to be harvested from the eastern part of our country.

We support the ideas of IUCN, WHO and WWF, according to which the cultivation of medicinal plants represents the best and most promising method to satisfy the extended market request for these prime material.

However, there is an economic-social aspect that assists in the future collecting of medicinal plants from the spontaneous flora as this endeavor can become an additional income or even the only income of people from rural or poor areas of some countries.

Regardless of these future directions, the medicinal plants that are highly requested and the ones that are crucially under threat of supra-exploitation or loss of habitat, the cultivation is certainly the only method of stopping the population's decline and for ensuring their long term survival.

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