

# Medicinal plants in Bulgaria: diversity, legislation, conservation and trade

Ljuba Evstatieva<sup>1</sup>, Rayna Hardalova<sup>2</sup> & Kalina Stoyanova<sup>2</sup>

<sup>1</sup> Institute of Botany, Bulgarian Academy of Sciences, Acad. Georgi Bonchev St., bl. 23, 1113 Sofia, Bulgaria, e-mail: liuba44@bio.bas.bg (author for correspondence)

<sup>2</sup> Ministry of Environment and Water, Sofia, Bulgaria, e-mail: hardalovar@moew.government.bg

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**Abstract.** Biodiversity of the medicinal plants in Bulgaria is assessed. The legislative acts dealing with their protection and management are examined. The factors and conditions influencing the extent of their usage are analyzed. Data are presented on the export of medicinal plants during the last years. The trends, measures and approaches determined by the economic conditions in the country are outlined. Collaboration on national and international scale is shown, as well as the role of the scientific and administrative institutions in the process of management and conservation of the genetic and the biological potential of medicinal plants.

**Key words:** biodiversity, conservation, cultivation, legislation, medicinal plants, trade

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## Introduction

Wild-growing medicinal plants are a major renewable resource of Bulgaria. Bulgarian medicinal plants have a broad diversity of species and rich composition of active ingredients. They represent a traditional export product and are well placed on the international markets. There are about 770 species of medicinal plants constituting 20% of the Bulgarian flora. Of these, 200 are currently in use and over 250 herbal drugs are derived from them and presently used in the prophylaxis, medicine, cosmetics, and the food industry.

## Assessment of the diversity of medicinal plants

In the last 15 years systematic research has been under way into biodiversity of the medicinal plants in

Bulgaria. Priority has been given to the territories of the national and nature parks, as well as to regions of important economic usage, such as Mt Plana, Mt Batashka, West Rodopes, Mt Osogovska, Eastern Balkan Range, and parts of the Danubian Plane. The conducted research confirms the great biodiversity of medicinal plants. The families *Asteraceae*, *Lamiaceae*, *Rosaceae*, *Fabaceae*, *Apiaceae*, etc. (Genova & al. 1996; Hardalova & al. 1998; Evstatieva & Hardalova 2000; Evstatieva & Vitkova 2000; Vitkova & Evstatieva 2000a; Evstatieva 2003) are represented by the greatest number of species.

Of all identified medicinal plants, 50% are perennial herbaceous plants, 20% are annual plants, 25% are shrubs and trees, and the smallest contribution of 5% goes to biannual herbaceous plants.

Reproduction of medicinal plants is carried out with seeds, spores, or in a vegetative way, which prevails in the case of perennial plants.

In some regions of Bulgaria with clear floristic endemism and in active ecological *hotspot areas* many endemic and rare species are distributed, which morphologically are very close to some of the widest-used medicinal plants. This is illustrated best by the species of genus *Alchemilla*, such as *A. achtarowii*, *A. asteroantha*, *A. jumrukczalica* as well as by other species, such as *Viola balcanica*, *Betonica bulgarica*, etc. Collecting herbs in the regions of their distribution may expose them to a serious risk of extinction.

The great biodiversity of medicinal plants and the resource characteristics of many of them have established Bulgaria as a depot of promising conserved medicinal plants and, along with this, offer a good chance for sustainable use of these resources.

## Resources

Assessment of the resources of medicinal plants was included in different projects relating to the national parks (NP) and some of the nature parks (Vitkova & Rousakova 1994; Hardalova & al. 1998; Evstatieva & Hardalova 2000; Vitkova & Evstatieva 2000b; Evstatieva & al. 2003; Vulchev & Boteva 2003; Vitkova & Vulchev 2003; Vitkova & Gyurova in press).

During the development of management plans for the three Bulgarian national parks – the Central Balkan, Rila and Pirin, and for the Rila Monastery Nature Park, there have been included the corresponding chapters and technical projects dealing with the medicinal plants. They are now in the process of the implementation. Medicinal plant species are also included in the forest management projects and in the municipal ecological programs. Attention should be paid to the difficulties originating from the specificity of their resources, including their dynamics and dependence on the climatic conditions time-wise (Vitkova & al. 1993; Vitkova & Rousakova 1994). Generally, the state of resources could be assessed as good, with possibilities for regeneration. A special regime for protection and use of the species with limited natural supply has been applied for more than 15 years and, judging by its good results, is represents an appropriate approach to their management.

In respect to the use of resources, the conclusion is that most medicinal herbs are collected in the mountainous and semi-mountainous regions of the coun-

try. This is determined by the allocation of resources, as well as by such socio-economic factors as employment and income of the population. Intensification of farming in the lowlands has led to a decrease in the number of certain species (*Tribulus terrestris*, *Chamomilla recutita*, *Centaurea cyanus*, *Papaver rhoeas*, etc.), owing to the application of herbicides. These resources could be restored after the effect of herbicides is discontinued, but cultivation is an alternative to this approach.

On the basis of their distribution in Bulgaria, the wild medicinal plants are divided into five groups by their conservation status, resources of natural habitats and prospects for collection (Hardalova & al. 1998; Evstatieva & Hardalova 2000). Groups I and II include the species of conservation concern, groups III and IV include the species with very good and good utilization resources, while group V comprises species with distinct distribution, but no economic importance.

## Conservation of medicinal plants

The documents drawn and enforced on international level are mainly aimed at the conservation of habitats and natural resources, including the introduction of norms and standards for sustainable use, application of good harvesting, agricultural and manufacturing practices, and education. Such documents are developed by different international organizations like the World Health Organization (WHO), World Conservation Union (IUCN), Convention on Biological Diversity (CBD), and also by many professional organizational unions of herb users. Only the production of pure and high-quality herbs, proper usage of the existing resources, and application of the good practices can ensure a good position on the international market.

The Medicinal Plant Specialist Group of IUCN-SSC, WWF-Germany and the German Federal Agency for Nature Conservation (BfN) have developed criteria and indicators for the sustainable wild collection of medicinal and aromatic plants (Medicinal Plant Specialist Group 2007). Their standard will be applicable on a wide geographical, ecological and economic scope. Its implementation will be accompanied by tests and evaluations in order to ensure objective and practical application.

## Legislation

The major act regulating the conservation and use of the medicinal plant resources is the **Medicinal Plants Act** (*State Gazette*, no. 29/2000) and the **Regulations** for its implementation. Some of the medicinal plant species unlisted in the Medicinal Plants Act are subject to the **Forestry Act** (SG, no. 125/1997). The issues relating to the Government policy on the plant varieties and the production of sowing and seedling material are subject to the **Sowing and Seedling Materials Act** (SG, no. 20/2003). The institutions in charge of these acts are respectively the Ministry of Environment and Water, the Ministry of Agriculture and Forestry and the National Forestry Board. In addition to the above-mentioned acts, the following laws also deal with the medicinal plants: the framework **Environmental Protection Act** (SG, no. 91/2002), the special **Biodiversity Act** (SG, no. 77/2002) and the **Protected Areas Act** (SG, no. 133/1998).

**A. The Medicinal Plants Act** regulates all activities related to the conservation and use of medicinal plants, and the obligations for conservation of biological diversity and medicinal plants resources on the part of the physical and juridical persons and of the institutions. The main purpose of this Act is to ensure conditions for sustainable use of the medicinal plants on the territory of Bulgaria.

The legislation provides for two categories of conservation-significant species: protected species and species under a special regime of conservation and use.

The medicinal plants with critically limited natural resources are declared **protected** under the Bulgarian national legislation (Table 1). They are prohibited for picking up, gathering, cutting, rooting up, and storing into herbaria, and destruction and/or intended damage to their habitats is also forbidden. Collection of their seeds, bulbs, roots, and other reproductive parts is also banned, as well as attempts at owning these plants, taking them abroad, trading them off, offering them for sale, and/or exchanging these species or parts thereof, whether fresh or dried.

Exceptions from the ban are possible with a permit from the Ministry of Environment and Water for scientific purposes, creation and replenishment of specialized collections, cultivation, regeneration of populations, and/or reintroduction of these species into nature.

Other wild-growing species with a conservation status are put under a special regime of conservation and use case of a downward trends in biodiversity or in the resources. The regime includes: banning the collection of any type of herbs on the territory of the entire country or in specified regions; annual quotas determined for the different regions and localities; application of regenerating measures for the populations and habitats. Every year the Minister of Environment and Water issues an order specifying the proper usage of medicinal plants under a special regime. It is forbidden to gather medicinal plants under such a regime in the national parks and in unlisted areas under the regime. The regime does not apply to medicinal herbs intended for personal use.

For the year 2006, the regime was regulated by **Ordinance no. RD-71/2007** (SG, no. 17/2007), which listed 36 species of medicinal plants. The usage of 10 of these species was regulated and for the remaining 26 gathering for commercial purposes was prohibited. Some of these species are easily cultivated, which helps meet the national and international demand (Table 1).

The order and conditions for the redistribution of medicinal herbs under a regime for special protection and use are determined by **Ordinance no. RD-88/16.02.2001** (SG, no. 18/2001) issued by the Minister of Environment and Water.

### Permits and charges for the use of medicinal plants

Gathering of herbs for trade and/or processing is allowed after obtaining a permit and paying the due charges thereto. The permits are issued by the administration which controls the corresponding territories: the State Forestry Offices, National Park Directorates, Municipalities, and Districts. The charge rates are determined by the Council of Ministers by **Decree no. 94/2000** (SG, no. 46/2000) on state-owned lands and forests, and by the District Councils for the district territories. The collected funds are used for maintenance, regeneration, assessment of the resources, creation of an information system, and education programs related to medicinal plants.

Gathering of herbs in the protected areas is subject to special requirements. It is absolutely prohibited to gather herbs in the reserves and managed reserves, as well as in spots of high biodiversity, which can be affected by that process. Gathering of herbs on the territories of the national parks is restricted. The national parks manage-

Table 1. List of medicinal conservation-significant plant species subject to national legislation in Bulgaria.

Protected medicinal plants ( <i>Medicinal Plant Act</i> , 2002)	Medicinal plant species under special regime of protection and use ( <i>Ordinance no. RD-71/2007</i> )	
	Gathering for trade use is prohibited	Regulated by annual quotas
<i>Acanthus spinosus</i> <i>Acorus calamus</i> <i>Adiantum capillus-veneris</i> <i>Aesculus hippocastanum</i> <i>Alchemilla achtarowii</i> <i>Alchemilla asteroantha</i> <i>Alchemilla jumrukczalica</i> <i>Alchemilla mollis</i> <i>Anemone sylvestris</i> <i>Anacamptis pyramidalis</i> <i>Angelica archangelica</i> <i>Aquilegia nigricans</i> <i>Artemisia lerchiana</i> <i>Aristolochia rotunda</i> <i>Caluna vulgaris</i> <i>Campanula lanata</i> <i>Chamaecytisus ratisbonensis</i> <i>Cicuta virosa</i> <i>Cyclamen coum</i> <i>Dianthus ponederae</i> subsp. <i>kladovanus</i> <i>Diphasiastrum alpinum</i> <i>Drosera rotundifolia</i> <i>Ephedra distachya</i> <i>Eryngium maritimum</i> <i>Euphorbia peplis</i> <i>Galanthus elwesii</i> <i>Galanthus nivalis</i> <i>Gentiana lutea</i> <i>Gentiana punctata</i> <i>Glycyrrhiza glabra</i> <i>Haberlea rhodopensis</i> <i>Himantoglossum caprinum</i> <i>Hippophae rhamnoides</i> <i>Hottonia palustris</i> <i>Hypericum androsaemum</i> <i>Ilex aquifolium</i> <i>Juniperus sabina</i> <i>Ligularia glauca</i> <i>Limonium vulgare</i> <i>Menyanthes trifoliata</i> <i>Nymphaea alba</i> <i>Nuphar lutea</i> <i>Opopanax chironium</i> subsp. <i>bulgaricum</i> <i>Orchis militaris</i> <i>Orchis papilionacea</i> <i>Orchis provincialis</i> <i>Orchis spitzelii</i> <i>Osmunda regalis</i> <i>Pedicularis palustris</i> <i>Prangos ferulacea</i> <i>Potentilla palustris</i> <i>Pyrola rotundifolia</i> <i>Quercus coccifera</i> <i>Rheum rhaponticum</i> <i>Rhodiola rosea</i> <i>Ruta graveolens</i> <i>Salix pentandra</i> <i>Sideritis syriaca</i> <i>Taxus baccata</i> <i>Verbascum pseudonobile</i>	<i>Adonis vernalis</i> <i>Althaea officinalis</i> <i>Angelica panicii</i> <i>Arctostaphylos uva-ursi</i> <i>Artemisia alba</i> <i>Artemisia santonicum</i> <i>Asarum europaeum</i> <i>Asplenium trichomanes</i> <i>Cetraria islandica</i> <i>Cnicus benedictus</i> <i>Convallaria majalis</i> <i>Cystoseira barbata</i> <i>Glaucium flavum</i> <i>Helichrysum arenarium</i> <i>Huperzia inundata</i> <i>Hyssopus officinalis</i> subsp. <i>aristatus</i> <i>Inula helenium</i> <i>Juniperus oxicedrus</i> <i>Lycopodium clavatum</i> <i>Orchis sp. diversa</i> <i>Origanum vulgare</i> subsp. <i>hirtum</i> <i>Phyllitis scolopendrium</i> <i>Ruscus aculeatus</i> <i>Salvia tomentosa</i> <i>Sideritis scardica</i> <i>Valeriana officinalis</i>	<i>Alchemilla vulgaris</i> complex <i>Atropa belladonna</i> <i>Berberis vulgaris</i> <i>Betonica officinalis</i> <i>Carlina acanthifolia</i> <i>Frangula alnus</i> <i>Galium odoratum</i> <i>Paeonia peregrina</i> <i>Primula veris</i> <i>Sedum acre</i>

ment plans determine the places, where the herbs can be collected and the quantities allowed for picking.

### Regulations pursuant to the Medicinal Plants Act

Two regulations have been enforced pursuant to the Medicinal Plants Act. They introduce concrete rules and requirements for herbs collecting, as well as requirements for the organization and operation of the stations for primary herbs-processing and herbs stores. Some general conditions relating to the traditional processing of herbs are laid down in the regulations, as well as scientifically supported requirements and elements of the good practices in the domain of herbs collecting and processing:

1. *Regulation no. 2/2004 on the rules and requirements for collecting of herbs and genetic material from medicinal plants* (SG, no. 14/2004).

2. *Regulation no. 5/2004 on the requirements for the herbs-processing stations and/or herbs stores* (SG, no. 85/2004).

### B. Other Acts

Medicinal plants that do not meet the specifications of the listed plants in the Appendix to the Medicinal Plants Act are subject to the **Forestry Act**. Their use is based on the principles mentioned above. Permits are issued and charges are determined for the commercial gathering of these medicinal plants, under the *Council of Ministers Decree no. 266/1998* (SG, no. 146/1998).

Some other plant species, such as *Leucojum aestivum*, are subject to a regime of protection and regulated use pursuant to the **Biodiversity Act**. The populations of interest to the pharmaceutical industry are included in the protected areas. The order and conditions for use of *Leucojum aestivum* are regulated by **Ordinance no. RD-521/2003** (SG, no. 42/2003) of the Minister of Environment and Water. The annual usage is determined after the assessment of the population status. A population can be used only once every two calendar years.

**The Sowing and Seedling Material Act** regulates the assessment and tests, approval and enlistment of the varieties in the official varieties list of the Republic of Bulgaria. This Act also provides for the production control, distribution, trade, and storage of sowing and seedling material; it deals with quality control and control and authentication of sowing and seedling material. The Act includes two regulations, which relate to the medicinal plants:

- *Regulation no. 24/2004 on the Production and Trade in Sowing and Seedling Material from Medicinal and Aromatic Plants* (SG, no. 24/2004).
- *Regulation no. 48/2003 on the Production and Trade in Seeds of Oil- and Fibre-Yielding Cultures* (SG, no. 103/2003).

### *In-situ* and *ex-situ* conservation of the genetic fund of medicinal plants

The genetic fund of medicinal plants is protected in the natural habitats (*in-situ*), under a network of protected areas in Bulgaria totalling 550 000 ha. Species diversity is well presented in the national and nature parks, reserves and protected sites. They include the most representative ecosystems and plant communities. About 50 areas are declared protected so as to safeguard the medicinal plant habitats (*Leucojum aestivum*, *Paeonia peregrina*, *Glycyrrhiza glabra*, *Sideritis syriaca*, etc.).

*Ex-situ* conservation of medicinal plants is carried out in specialized live collections at some scientific institutes: the Institute of Botany of the Bulgarian Academy of Sciences, the Institute of Roses and Essential-Oil Cultures in Kazanluk, and the Institute of Plant Genetic Resources in Sadovo, where the material from medicinal plants is stored in the National Genetic Seed Bank.

### Cultivation

Protection and utilization of medicinal plants is of great importance not only for the Bulgarian flora but also for the world flora. One of the best ways to combine these two controversial activities is cultivation of species. Cultivation allows for high-quality biological products from medicinal plants to be exported on the international market in line with international standards.

In the case of critically endangered plant species by excessive exploitation, the only method to stop their decline and to ensure their long-term survival is certainly cultivation.

Cultivation of medicinal plants is traditional in Bulgaria, but it contributes up to 50(60)% of the total annual harvest of medicinal plants in the country. In the last five or six years the interest in cultivation has considerably increased. Today, about 30–40 medicinal and aromatic plants are cultivated in Bulgaria. The most important of them are: *Mentha ×piperita*, *Coriandrum sativum*, *Silybum marianum*, *Tilia* spp., *Aesculus hypopocastanum*, *Hypericum perforatum*, *Valeriana officinalis*.



*nalis*, *Althaea officinalis*, *Foeniculum vulgare*, *Glaucium flavum*, *Chamomilla recutita*, and *Melissa officinalis*.

According to the data placed at our disposal by the Ministry of Agriculture and Forestry, an area of 43 243 ha is under medicinal and aromatic cultures (*Rosa damascena*, *Lavandula vera*, *Mentha piperita*, *Valeriana officinalis*, *Coriandrum sativum*, *Foeniculum vulgare*, *Silybum marianum*, *Hypericum perforatum*, *Glaucium flavum*, *Rosa rugosa*). However, these data are not quite precise, owing to the obtaining system of information gathering. The real values, as well as the diversity of cultivated species must be higher, because the areas of personal farms have not been included. Data on cultivation in different regions of the country of such species as *Atropa bella-donna*, *Althaea officinalis*, *Majorana hortensis*, *Origanum vulgare* subsp. *hirtum*, *Salvia officinalis*, *Plantago* spp., *Taraxacum officinalis*, etc. have also not been taken into account.

Presently, there have been increasing efforts to regenerate by cultivation some wild gathered endangered and valuable species. The last three years have witnessed good practical results from cultivation of such protected species in Bulgaria as *Sideritis scardica* (a Balkan endemic) and *Rhodiola rosea*. The most important results were obtained at the Institute of Botany with the Bulgarian Academy of Sciences, at the two experimental centres for researching the possibilities for cultivation of new medicinal plant species.

Introduction of organic agriculture for cultivation of medicinal plants shall bring about ecologically sound production and is expected to meet the standards for quality of organic herbs by adopting in full the ISO 9000 for medicinal plants and species.

## Utilisation and trade in medicinal plants

The annual harvest of medicinal plants in Bulgaria amounts to about 15 000–17 000 tons, 80 % of which is exported. During the last 15 years Bulgaria has attempted to increase its harvests from wild collection of medicinal aromatic plants (Table 2. Data on export licences).

The good biological resources and quality of medicinal herbs have put forth Bulgaria as the biggest exporter of herbs in Europe (Lange 1998, 2002) for that period. The exports are destined to about 50 countries, with prevailing amounts in the Bulgarian annual exports for

Germany (65 %), and to a lesser extent for Spain (10 %), Italy (5 %), France (5 %), and other countries (15 %).

Some 200 medicinal herbs from over 140 medicinal plant species are exported every year. Only a limited number of species constitutes the huge amount of exported herbs and many of them are cultivated. Mainly about 25 species are of primary interest to the international markets, which accounts for 76.9 % of the exported quantities (Table 3).

The average quantity of herbs declared for export in the period 2001–2005 was 16 427 631 kg (Table 2). The collected medicinal herbs can be divided into the following elements: radices & rhisomata 25, folia 56, herbae 91, flos 31, fructus 30, semen 4, cortex 8, diversae 7.

An analysis of the above-mentioned data shows several groups of herbs, according to the average volume of quotas declared in the export licences (Data of the Ministry of Environment and Water).

### • Over 100 000 kg

This group includes 32 herb types derived from 23 plant species, accounting for over 80 % of the quota declared for export. The natural resources of the species are very good or they are traditionally cultivated. Among them are: *Tilia* sp., *Urtica dioica*, *Hypericum perforatum*, *Crataegus monogyna*, *Mentha piperita*, *Melissa officinalis*, *Lavandula vera*, *Chamomilla recutita*, *Valeriana officinalis*, *Rosa* spp. div., *Prunus spinosa*, *Rubus idaeus*, *R. caesius*, *Juniperus sibirica*, *Vaccinium uliginosum*, etc. In this group, cultivated herbs constitute half of the total amount. The berries claim a significant share in the exports (40 %).

### • From 50 000 to 100 000 kg

This group includes 19 herb types derived from 18 cultivated or widely spread plant species with good resources (*Urtica dioica*, *Taraxacum officinale*, *Euphrasia* spp., *Althaea officinalis*, *Ononis spinosa*, and *Vaccinium vitis-idaea*). Some of them occur as weeds in the arable lands (*Tribulus terrestris*, *Agropyrum repens*). The cultivated herbs amount to about one-third of the total quantity for the group.

### • From 10 000 to 50 000 kg

This group has a significant diversity of plant species, from which 47 herb types are derived. The number of cultivated medicinal plants is 12. About one-fourth of the total drug quantity in the group is derived from them.

- **From 5 000 to 10 000 kg**

This group includes 31 herb types. About one-fourth of the total drug quantity in the group is derived from cultivated medicinal plants, including *Althaea officinalis* and *Salvia officinalis*.

- **From 1 000 to 5 000 kg**

This group includes 44 herb types. About one-fifth of the total quantity is derived from cultivated medicinal plants, including *Aesculus hippocastanum*, *Althaea officinalis* and *Salvia officinalis*. Here also belong some species subject to a special regime of protection and use.

- **Under 1 000 kg**

This group manifests a significant diversity of plant species and herbs (92). They are offered as an assortment and constitute only an insignificant part of the exports (0.15 %). Herbs from species subject to a special regime of protection and use, such as *Galium odoratum*, *Carlina acanthifolia*, *Betonica officinalis*, *Primula officinalis*, *Paeonia peregrina*, *Sedum acre*, *Alchemilla vulgaris* complex, etc., derived from their natural populations, belong here. About one-fifth of the total herbs quantity in the group is cultivated.

**Table 2.** Export quantities (kg) for medicinal plant species from Bulgaria, officially declared by licences during the period 2001–2005 (Source: Ministry of Environment and Water).

Type of herb	wild collected (1); cultivated (2)	2001	2002	2003	2004	2005	Average
1	2	3	4	5	6	7	8
Cortex Betulae	1,2	1 776	0	638	1 600	0	802
Cortex Diversae	1,2	0	0	0	15 000	0	3 000
Cortex Frangulae	1	0	0	0	258	353	122
Cortex Fraxini	1	28 728	0	3 500	0	1 145	6 674
Cortex Platanidis	1	0	0	0	0	19 500	3 900
Cortex Quercus	1	21 500	10 174	28 550	32 851	2 386	19 092
Cortex Salicis albae	1	74 880	28 284	56 592	59 254	29 933	49 788
Cortex Tiliae spp.	1,2	0	0	2 500	0	2 500	1 000
Flos Achilleae clypeolatae	1	250	167	0	100	0	103
Flos Achilleae millefolii	1	32 000	49 689	35 085	42 960	20 920	36 130
Flos Althaeae	2	700	0	0	200	0	180
Flos Calendulae	2	2 500	8 663	400	9864	9 825	6 250
Flos Centaureae cyani	1	23 127	14 710	4 600	8 250	4 000	10 937
Flos Chamomillae	1,2	200 000	414 131	375 000	340 000	65 120	278 850
Flos Consolidae	1	1 800	1 723	3 400	4 187	261	2 274
Flos Crataegi ox.	1	0	0	46 400	1 200	0	9 520
Flos Crataegi ox.cum follis	1	711 500	678 665	271 000	275 182	175 655	422 400
Flos Farfae	1	130	0	0	0	0	26
Flos Filipendulae	1	4 800	2 735	5 935	4 966	1 040	3 895
Flos Helianthi annui	2	73 000	21 318	55 000	42 300	23 600	43 043
Flos Hippocastani	2	15	65	0	48	0	25
Flos Hyperici perforatae	1,2	0	25	7 200	600	1 300	1 825
Flos Lavandulae	2	60 700	101 309	131 000	117 000	182 167	118 435
Flos Malvae	1	600	1 094	1 600	4 700	2 088	2 016
Flos Onopordi	1	100	0	0	0	0	20
Flos Paeoniae sine calycibus	1	729	2 589	540	1 021	1 336	1 243
Flos Rhoeados	1	0	0	282	0	0	56
Flos Primulae cum calycibus	1	3 220	1 600	3 040	3 496	2 508	2 772
Flos Robiniae	2	25 000	6 408	6 286	6 000	3 658	9 470
Flos Rosae damascenae	2	160	0	0	550	520	246
Flos Sambuci ebuli	1	0	442	0	0	1 400	368
Flos Sambuci nigri	1	71 700	80 403	26 000	85 200	40 837	60 828
Flos Syringae	1,2	0	0	0	15	0	3
Flos Tanacetii	1	6515	5 500	11 000	6 068	0	5816
Flos Tiliae	1,2	1 259 039	501 000	1 511 000	2 163 600	796477	1246 223
Flos Trifolii pratensis	1,2	36	2 321	665	4660	377	1 611
Flos Valerianae	2	0	0	0	75	0	15

Table 2. Continuation

1	2	3	4	5	6	7	8
Flos Verbasci	1	55	1915	0	0	300	454
Flos Violae odoratae	1	30	0	0	0	0	6
Folia Hippocastani	2	3800	1447	25	1025	2000	1659
Folium Allii ursini	2	0	4443	7264	33000	5925	10126
Folium Althaeae	2	4300	2144	10140	7300	9400	6656
Folium Artemisiae vulgaris	1	0	200	350	300	300	230
Folium Bardanae	1	200	487	300	1000	0	397
Folium Basilici	2	0	0	4 200	23 000	0	5440
Folium Belladonnae	2	200	0	6 131	1 442	1 112	1 777
Folium Betulae	1,2	140 394	1 846	72 627	47 070	101 867	72 760
Folium Bidentis	1	0	0	0	0	294	58
Folium Buxi		9 712	4 600	17 115	10 700	3 411	9 107
Folium Coryli	1	27 225	21 495	22 245	64 200	3 250	27 683
Folium Cotini	1	0	1 500	4 700	4 000	1 800	2 400
Folium Crataegi	1	26 406	32 171	0	400	0	11 795
Folium Cytisi laburni	2	0	0	0	0	20	4
Folium Stramonii	1	0	1 384	0	300	0	336
Folium Farfarae	1	18 270	14 340	8 942	11 076	14 225	13 370
Folium Caricae	1,2	0	0	500	0	0	100
Folium Filicis- maris	1	0	225	400	200	60	177
Folium Fragariae moschatae	2	81 000	34 750	81 144	91 705	50 150	67 749
Folium Fragariae vescae	1	0	100	0	2 000	0	420
Folium Fraxini	1,2	0	3 301	2 000	3 547	11 105	3 990
Folium Hederae	1	36 500	46 370	35 040	65 473	49 613	46 599
Folium Helianthi annui	2	0	0	500	0	0	100
Folium Juglandis	1,2	10 300	16 200	16 300	9 750	10 853	12 680
Folium Majoranae	2	0	0	0	800	0	160
Folium Malvae	1	16 600	6 000	1 622	17 037	4 650	9 181
Folium Melissaе	1,2	549 180	320 583	215 500	184 300	383 582	330 629
Folium Menthae piperitae	2	1 971 681	1 228 825	238 784	774 400	508 718	944 481
Folium Mori albae	2	2 700	728	930	495	130	996
Folium Myrtilli	1	3 900	2 432	7 920	3 181	8 798	5 246
Folium Nasturtii	1	0	0	0	3000	0	600
Folium Origani heracleotici	2	0	16 500	25 110	0	31 784	14 678
Folium Petasiti	1	1 000	0	6 300	1 000	0	1 660
Folium Pini sylvestris	1	0	2 200	4 750	5 000	0	2 390
Folium Plantaginis majoris	1	700	4 056	18 490	47 000	24 822	19 013
Folium Plantaginis lanceolatae	1	84 669	4 440	10 500	2 800	0	20 481
Folium Populi	1,2	0	0	0	1040	0	208
Folium Populi tremulae	1	0	0	3 500	0	1 700	1 040
Folium Pulmonariae	1	7 678	10 167	3 966	6 372	3 304	6 297
Folium Quercus		0	0	0	80	0	20
Folium Rubi fruticosi	1,2	233 262	198 252	276 000	229 007	132 072	213 718
Folium Rubi idaei	1	137 543	49 890	126 000	96 120	18 759	85 662
Folium Rumicis	1	0	0	0	0	74	14
Folium Salicis albae	1	6 685	1 500	2 400	2 850	5 210	3 729
Folium Salviae	2	4 400	3004	3 080	8 380	12 500	6 272
Folium Sambuci nigri	1	0	0	0	0	1 340	268
Folium Saturejae hortensis	2	143 000	138 819	78 000	24 000	0	76 763
Folium Symphyti	1	7 122	4 570	10 118	19 150	5 090	9 210
Folium Syringae	1,2	100	0	0	135	110	69
Folium Taraxaci	1	4 305	16 797	10 195	12 572	4 940	9 761
Folium Thymi serpylli	1,2	0	8 240	0	320	0	1 712
Folium Tiliae	1,2	84 500	306 853	106 000	84 446	261 430	168 645
Folium Urticae	1	498 000	1 332 363	993 000	872 405	957 210	930 595
Folium Verbasci	1	17 200	10 228	10 960	10 262	36 179	16 965
Folium Visci	2	7 826	1 500	5 000	0	4 700	3 805



Table 2. Continuation

1	2	3	4	5	6	7	8
Folium Vitis-idaeae	2	1 100	250	3 000	10 600	1 800	3 350
Fructus Hyppocastani	2	618 600	418 030	332 000	327 000	373 215	413 769
Fructus Coriandri	2	2 900 725	590 520	105 700	23 500	76 011	739 291
Fructus Corni	1	0	0	0	0	20 000	4 000
Fructus Crataegi	1	185 000	209 364	441 705	381 662	214 501	286 446
Fructus Crataegi pentagynae	1	0	0	250	0	0	50
Fructus Crataegi-frozen	1	60 550	60 050	90 800	30 000	62 120	60 704
Fructus Foeniculi	2	176 000	212 000	156 000	125 200	170 530	167 946
Fructus Fragariae vescae-frozen	1	9 150	2 547	11 392	1 544	4 800	5 886
Fructus Juglandis - cortex	1,2	16 200	5 190	7 250	11 853	6 011	9 300
Fructus Juniperi	1,2	264 000	312 017	216 000	185 150	176 430	230 719
Fructus Mali	1,2	22 600	211 300	108 330	98 500	30 404	94 226
Fructus Mali sylvestris	1	0	43	37551	0	0	7518
Fructus Myrtilli	1	144545	381105	343546	309875	90525	253919
Fructus Paliuri	1	7650	0	16	600	0	1653
Fructus Phaseoli sine semina	2	33 019	8 043	0	12 000	1 500	10 912
Fructus Alkekengi	1	1 700	0	50	1 793	300	768
Fructus Pruni spinosae	1	13 680	0	222 000	50 000	25 457	62 227
Fructus Pruni spinosae-frozen	1	330 600	599 859	961 596	664 441	1 071 582	725 615
Fructus Quercus	1	0	0	0	0	25 200	5 040
Fructus Rhamni cathartici	1	0	0	280	0	0	56
Fructus Rosae	1,2	27 900	93 055	1 200	3 000	1 000	25 231
Fructus Rosae cum semini	1,2	880 300	1 396 779	1 061 000	1 465 193	640 703	1 088 795
Fructus Rosae-frozen	1,2	478 400	168 700	107 680	329 180	259 480	268 688
Fructus Rosae-semini	1,2	146 739	1 266 706	1 013 000	329 300	628 436	676 836
Fructus Rubi fruticosi	1,2	385 780	785 393	764 000	694 160	603 390	646 544
Fructus Rubi idaei	1,2	242 400	347 800	738 542	591 850	477 750	479 668
Fructus Sambuci ebuli	1	641 583	339 193	455 145	354 780	266 218	411 383
Fructus Sambuci ebuli-frozen	1	10 700	0	0	22 000	0	6 540
Fructus Sambuci nigri	1	0	34 145	58 244	44 320	23 825	32 106
Fructus Sambuci nigri-frozen	1	4 600	0	0	630	0	1 046
Fructus Sorbi	1	5 572	14 170	2 000	2 818	1 993	5 310
Fructus Vaccinii vitis idaeae	1	25 232	125 650	13 014	152 986	85 820	80 540
Gemmae Pini sylvestris	1	3 429	2 591	0	0	1 560	1 516
Herba Absinthii	1	150 000	6 440	8 250	32 100	1 850	39 728
Herba Agrimoniae	1	18 300	11 256	10 635	15 860	9 392	13 088
Herba Alchemillae	1,2	0	0	300	400	470	234
Herba Allii ursini	1	320	4 300	4 000	0	59 041	13 532
Herba Allii ursini -frozen	1	0	0	0	0	104 180	20 836
Herba Aristolochiae	1	480	445	400	0	120	289
Herba Artemisiae	1	0	129 156	218 000	155 800	133 772	127 345
Herba Artemisiae vulgaris	1	2 600	700	100	5 200	5	1 721
Herba Asperulae	1	136	67	1 450	612	571	567
Herba Basilici	2	8 432	20 428	21 000	0	6515	11 275
Herba Betonicae	1	4 500	405	4 325	4 050	3 195	3 295
Herba Bidentis	1	300	1 100	950	600	1 250	840
Herba Bursae pastoris	1	4 500	3 948	7905	4 050	3 359	4 752
Herba Centaurii	1	18 400	19 200	4 100	1 387	43 500	17 317
Herba Chamomillae	2	1 400	0	0	3000	0	880
Herba Chelidonii	1	8 300	37366	10 880	22 044	13 401	18 398
Herba Cichorii	1	300	0	385	50	0	147
Herba Clematidis vitalbae	1	0	0	60	1 000	0	212
Herba Consolidae	1	0	0	7 000	0	0	1 400
Herba Epilobii parvifolii	1	9 300	8 950	0	19 220	31 510	13 796
Herba Equiseti	1	180 000	133 766	314 000	174 700	170 885	194 670
Herba Eringii	1	0	0	500	1 270	50	364
Herba Euphrasiae	1	69 000	41 341	32 500	11 5000	53 227	62 213

Table 2. Continuation

1	2	3	4	5	6	7	8
Herba Filicis -maris	1		300	0	0	6 000	5 122
Herba Filipendulae ulmariae	1	7 100	13 469	4 200	4 300	5 065	6826
Herba Fumariae	1	41 300	20 421	31 517	41 380	23 944	31 712
Herba Galegae	1	14 000	2 200	3 115	39 600	7 819	13 346
Herba Galii aparinis	1	6 275	2 975	2 986	27 425	11 200	10 172
Herba Galii veri	1	5 700	2 383	5 200	8 700	550	4 506
Herba Gei urbani	1	30	0	650	1000	0	336
Herba Geranii macrorrhizi	1	2 945	0	250	4 100	700	1 599
Herba Glauci flavi	2	1 750	2 000	520	0	0	854
Herba Glechomae	1	0	0	0	0	7515	1 503
Herba Helichrysi arenarii	1	0	0	0	100	0	20
Herba Herniariae hirsutae	1	25 400	5 812	7 515	1 245	7 865	9 567
Herba Hieracii pilosellae	1	43 500	16 648	50 350	13 800	12 898	27 439
Herba Hyperici	1,2	340 000	197 962	210 150	111 930	231 656	218 339
Herba Hyssopi	2	0	0	1 100	1 019	500	523
Herba Lactucae	1	2 000	0	0	0	0	400
Herba Lavandulae	2	0	0	0	500	3 100	720
Herba Leonuri cardiaca	1	2 699	8 077	4 875	2 955	2 955	4 312
Herba Leucoji aestivi	1,2	0	0	3 310	0	0	662
Herba Lithospermi officinalae	1	2 600	1 100	0	0	0	740
Herba Majoranae	2	0	0	0	700	45	149
Herba Malvae	1	1 755	750	0	1 400	0	781
Herba Marrubii	1	7 300	6495	17 341	13 800	8 633	10 713
Herba Meliloti	1	61 130	100 923	38 945	4614	53 200	51 762
Herba Meliloti	1	0	0	0	10 100	6 994	3 418
Herba Melissa	1,2	83 500	114 108	92 291	150 000	154 301	118 840
Herba Melissa stipites	1,2	0	0	0	6 500	50 500	11 400
Herba Menrhae piperitae stipites	2	488 400	567 910	633 250	48 500	66 460	36 0904
Herba Menthae aquatica	1	150	0	0	920	0	214
Herba Menthae piperitae	1,2	1061 031	189 225	137 300	7 800	60 000	291 071
Herba Millefolii	1	19 751	12 836	34 000	44 984	22 669	26 848
Herba Myrtilii	1	3 800	100	5 195	10 180	7 941	5 443
Herba Nasturtii	1	16 600	11 009	15 285	16 300	22 404	16 319
Herba Ononidis	1	0	0	0	275	0	55
Herba Origani heracleotici	2	58 300	30 300	41 000	91 352	13 767	46 943
Herba Origani	1	52 000	77 743	10 250	18 165	47 334	41 098
Herba Petasitides	1	0	0	0	0	20	4
Herba Polygoni hydropiperis	1	45	0	0	0	0	9
Herba Polygonii avicularis	1	4215	2 300	2 240	12 500	2 000	4 651
Herba Pulmonariae	1	0	0	1 250	0	3 750	1 000
Herba Rutae	2	0	0	120	0	1 000	224
Herba Salviae	2	0	0	2 600	15 800	23 113	8 302
Herba Saponariae	1	0	0	0	1 970	0	394
Herba Saturejae hortensis	2	76 600	111 453	160 160	80 000	24 551	90 552
Herba Sedi acris	1	0	0	0	128	198	65
Herba Silybi	2	0	0	5 500	500	0	1 200
Herba Solidaginis virgae aureae	1	10 000	9 655	4 300	6 150	14 050	8 831
Herba Stellariae mediae	1	18 072	5 200	16 150	28 740	4 600	14 552
Herba Synphyti	1	0	1 030	560	0	0	318
Herba Tanacetii	1	1 380	832	0	7919	6 000	3 226
Herba Taraxaci	1	148 116	136 945	50 323	73 514	95 463	100 872
Herba Teucree chamaedrys	1	100	3 292	0	400	0	7 58
Herba Teucree pollii	1	100	110	0	0	0	42
Herba Thymi serpylli	1,2	45 000	63 690	33 600	64 150	51 721	51 632
Herba Tribuli terrestris	1	148 050	113 900	97 400	73 444	17 623	90 083
Herba Trifolii	1,2	0	0	2 000	0	0	400
Herba Urticae	1	89 100	57 000	12 500	19 656	87 300	53 111

Table 2. Continuation

1	2	3	4	5	6	7	8
Herba Verbasci	1	0	0	350	0	0	70
Herba Verbenae	1	28 687	48 887	16 779	26 600	14 573	27 105
Herba Veronicae	1	49 300	34 613	43 696	63 058	29 909	44 115
Herba Vincæ minoris	2	7 840	1 727	1 3000	0	700	4653
Herba Violæ tricoloris	2	7 860	3 950	13 954	15 277	14 269	11 062
Herba Visci	1	9 600	7 000	6 00	8 200	6 470	7 494
Herba Armoraciae	2	0	0	0	267	0	53
Herva Gentianæ asclepiadeae	1	30	0	0	0	0	6
Lichen Parmeliae	1	10 400	1 015	0	3 600	3 300	3 663
Lichen Quercus	1	0	1 104	1415	22 000	1 000	5 103
Radix Althaeae	2	143 580	111 023	34 400	55 648	56 663	80 262
Radix Althaeae cortex	2	6 685	5 350	9 697	14 487	4 549	8 153
Radix Angelicae	1	12 823	6 450	1 1000	17 608	6 155	10 807
Radix Bardanae	1	48 313	34 642	78 230	44 334	24 029	45 909
Radix Belladonnae	2	0	0	20	158	288	93
Radix Betonicae	1	0	0	0	357	627	196
Radix Bryoniae	1	250	1 130	530	0	0	382
Radix Carlinae	1	0	0	190	1 112	229	306
Radix Chelidonii	1	140	20 500	120	0	0	4152
Radix Cichorii	1	5 200	0	0	621	0	1 164
Radix Echinacei	2	0	0	0	900	0	180
Radix Eryngii	1	0	0	0	0	20	4
Radix Filipendulae	1	0	0	0	0	5	1
Radix Fragariae moschatae	2	0	0	100	3 400	100	720
Radix Fragariae	1	150	0	48	0	0	39
Radix Gei urbani	1	0	0	137	0	0	27
Radix Glycyrrhizae	1,2	0	0	0	1 700	16 000	3 540
Radix Hellebori	1	0	100	0	0	0	20
Radix Inulae	1	1 225	4 000	4 438	3 740	570	2 794
Radix Levistici	2	53 200	94 975	122 630	127 688	5 400	80 778
Radix Ononidis	1	125270	63 348	41 125	112 268	77 064	83 815
Radix Paeoniae	1	0	250	0	181	0	86
Radix Primulae	1	0	0	83	158	122	72
Radix Rubiae tinctorum	1,2	0	0	0	0	25	5
Radix Sambuci ebuli	1	0	0	1 100	1 582	350	606
Radix Symphyti	1	23 431	11 570	15 470	11 682	34 061	19 242
Radix Taraxaci	1	11 260	18 598	18 393	29 239	25 752	20 648
Radix Urticae	1	150 800	587 260	1 035 000	358 160	32 682	432 780
Rhizoma Bistortae	1	0	450	0	0	0	90
Rhizoma Calami	1	0	0	0	0	5	1
Rhizoma Cynodonis dactylonis	1	90 700	70 029	76 200	70 092	30 983	67 600
Rhizoma Filicis maris	1	3 000	6 624	9 950	11 800	14 500	9 174
Rhizoma Geranii macrorrhizi	1,2	0	0	0	100	0	20
Rhizoma Iridis	2	0	0	0	270	0	54
Rhizoma Petasitidis	1	2 2545	3 200	6 380	1 950	2 825	7 380
Rhizoma Rumicis alpini	1	0	1000	2100	1100	0	840
Rhizoma Valerianae	2	463 900	152 404	421 497	141 280	50 243	245 864
Rhizoma Veratri albi	1	0	1 100	0	60	0	232
Semen Colchici	1	0	0	0	930	0	186
Semen Lini	2	0	0	200	0	65	53
Semen Silybi	2	153 675	478 645	301 300	642 000	889 530	493 030
Stigmata Maydis	2	39 000	34 550	35 000	24 000	20 322	30 574
Stipites Pruni avii	2	43 200	12 800	38 000	11 000	5 000	22 000
Strobili Lupuli	2	0	100	12 855	33 200	12 244	11 679
<b>TOTAL</b>		<b>19 280 140</b>	<b>17 501 795</b>	<b>17 044 177</b>	<b>15 725 445</b>	<b>12 586 580</b>	<b>16 427 631</b>

**Table 3.** Export quantities for the 25 most exported medicinal plant species from Bulgaria, officially declared by licences (Source: Ministry of Environment and Water).

Type of herb	Wild collected (1); Cultivated (2)	Years/Volume (kg)					
		2001	2002	2003	2004	2005	Average
Flos Tiliae	1, 2	1 259 039	501 000	1 511 000	2163 600	796 477	1246 223
Fructus Rosae cum semini	1, 2	880 300	1 396 779	1 061 000	1465 193	640 703	1088 795
Folium Menthae	2	1 971 681	1 228 825	238 784	774 400	508 718	944 481
Folium Urticae	1	498 000	1 332 363	993 000	872 405	957 210	930 595
Fructus Coriandri	2	2 900 725	590 520	105 700	23 500	76 011	739 291
Fructus Pruni spinosae-frozen	1	330 600	599 859	961 596	664 441	1071 582	725 615
Fructus Rosae-semini	1, 2	146 739	1 266 706	1 013 000	329 300	628 436	676 836
Fructus Rubi fruticosi	1, 2	385 780	785 393	764 000	694 160	603 390	646 544
Semina Silybi	2	153 675	478 645	301 300	642 000	889 530	493 030
Fructus Rubi idaei	1, 2	242 400	347 800	738 542	591 850	477 750	479 668
Radix Urticae	1	150 800	587 260	1 035 000	358 160	32 682	432 780
Flos Crategi ox.cum foliis	1	711 500	678 665	271 000	275 182	175 655	422 400
Fructus Aesculi hypocastani	2	618 600	418 030	332 000	327 000	373 215	413 769
Fructus Sambuci ebuli	1	641 583	339 193	455 145	354 780	266 218	411 383
Herba Menrhae piperitae stipitis	2	488 400	567 910	633 250	48 500	66 460	360 904
Folium Melissaе	1, 2	549 180	320 583	215 500	184 300	383 582	330 629
Herba Menthae piperitae	2	1 061 031	189 225	137 300	7 800	60 000	291 071
Fructus Crataegi	1	185 000	209 364	441 705	381 662	214 501	286 446
Flos Chamomillae	1, 2	200 000	414 131	375 000	340 000	65 120	278 850
Fructus Rosae-frozen	2	478 400	168 700	107 680	329 180	259 480	268 688
Fructus Myrtilli	1	144 545	381 105	343 546	309 875	90 525	253 919
Rhizomata Valerianaе	2	463 900	1 524 04	421 497	141 280	50 243	245 864
Fructus Juniperi	1	264 000	312 017	216 000	185 150	176 430	230 719
Herba Hyperici	1, 2	340 000	197 962	210 150	111 930	231 656	218 339
Folium Rubi fruticosi	1, 2	233 262	198 252	276 000	229 007	132 072	21 718
<b>Total of top 25 species</b>		<b>15 299 140</b> <b>79.4%</b>	<b>13 662 691</b> <b>78.0%</b>	<b>13 158 695</b> <b>77.2%</b>	<b>11 804 655</b> <b>75.0%</b>	<b>9 227 646</b> <b>73.3%</b>	<b>12 630 565</b> <b>76.9%</b>
<b>Total declared export</b>		<b>19 280 140</b>	<b>17 501 795</b>	<b>17 044 177</b>	<b>15 725 445</b>	<b>12 586 580</b>	<b>16 427 631</b>

## Future trends

A further sustainable development of the herbs branch in Bulgaria, maintenance of the current positions on the international market and meeting its contemporary requirements outline the following trends:

- A growing demand in herbs
- Higher quality requirements
- Higher market competition
- Need in resource assessment
- Monitoring of the resources
- Certification of harvesting regions
- Production of biological/ecological herbs
- Application of the good harvesting, agriculture and manufacture practices

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