

Resources of medicinal plants and herbs collector's calendar of Pirot County (Serbia)

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Abstract:

Marković, M., Matović, M., Pavlović, D., Zlatković, B., Marković, A., Jotić, B., Stankov-Jovanović, V.: Resources of medicinal plants and herbs collector's calendar of Pirot County (Serbia). *Biologica Nyssana*, 1 (1-2), December 2010: 9-21.

The results of study of medicinal plants from Pirot County (E Serbia), have been presented. The presence of a large number of plant species that are of accepted application in official and also in traditional medicine has been registered. The period of harvesting and collection of plant material by months related to natural characteristics of the area has been shown. For each species, plant drugs that are produced from have been listed, the type of habitat has been noted, as well as an overview of main active ingredients that effect remedial action. The representatives of the rare medicinal species are separately reviewed which is essential for their protection and management of resources of medicinal plants in the area.

Key words: Pirot County, medicinal plants, time of harvesting, habitat, active compounds, rare herbs

Introduction

Pirot County, as a part of the river Nišava basin, includes the municipalities of Pirot, Dimitrovgrad and Bela Palanka. The County is located in the central part of the Balkan Peninsula and its wider natural frame makes the Balkan mountain area with plateaus, numerous ravines and valleys (Ćirić 1965).

The County includes the following mountain ranges: the E slopes of the Suva Mt and Svrlijske Mts (Bela Palanka municipality), S slope of the Stara Mt, W and C part of Vidlič, Belava, Sedlar, Vlaška Mts (Pirot municipality), the Greben Mt and the E slopes of Vidlic Mt (Dimitrovgrad municipality). The mentioned mountain areas are rich in wealth and diversity of medicinal plant

species. The most significant natural object in the area is Stara Mt that dominates the relief of the County, but which also represents the richest mountain in terms of resources of medicinal plants as well as flora and vegetation in general (Mijović et al. 2007).

Pirot County climate is temperate continental (Petrović 1998), with the transitional climatic variations to sub-mountain and mountain climate at altitude over 600 meters (Vidano vić 1960). The specificity of climatic, geomorphological, geological and edaphic characteristics is cause of the great diversity of plant life of entire region.

Medicinal plants represent about 10% of the total flora of Serbia which contain large quantities of different compounds, products of metabolism or active ingredients that are used as medicinal

remedies, or as raw material for medicines (Stevanović et al. 1995).

Part of the territory processed within current study, was earlier object of investigations according resources of medicinal plants. List of 93 medicinal plants was shown by Randjelović et al. (1991), while in the limestone massif of the Vidlič Mt were reported 60 medicinal species-rich in essential oil (Marković et al. 2009).

Salubrity of medicinal herbal drugs largely depends on choice of collection time and plant material primary processing. However, the timing of collection of medicinal raw materials of plant origin is a relative term that depends on several factors, primarily climatic and physical-geographical characteristics of each region. The aim of this paper is to define the average dynamics, selection and characteristics of harvested plant material from the specific area in form of plant collector's calendar. Its practical value is primarily reflected in the proper planning of activities to collect, purchase and process medicinal plants. On the other hand, the results of this study may be useful to organizations involved in the protection and rational use of resources of medicinal plants.

Material and methods

Researches of medicinal plants resource of Pirot County were conducted in the period from 2002-2010 year. Plant material was collected and recorded by visiting the studied area throughout the growing seasons. Herbarium material was established while the basic information about the habitat of medicinal plant species and a photo-documentary material were collected directly on multiple sites. Determination of plant material was carried out using the keys from the regional flora reference (Josifović, ed. 1970-1977, Velčev, ed. 1982-1989) and affiliation of registered taxons to the group of medicinal plants were determined on the basis of the monograph "Medicinal Plants of SR Serbia" (Sarić, ed. 1989). Collected plant material is deposited in the Herbarium Moesiacum, University of Nis (HMN). Nomenclature according to IOPI databases:

<http://plantnet.rbgsyd.nsw.gov.au/iopi/iopihome.htm>.

Results and discussion

In the Pirot County were recorded 326 plant species that are considered as officinal or used in traditional medicine. For proper use and effect of medicinal plants, it is necessary to determine precisely, as far as possible, the calendar of their

harvest. Medicinal plants from the region are shown in **Table 1**, sorted in relation to the time of harvesting and collection of selected parts that are used as raw materials in the production of herbal drugs. The largest number of medicinal plants in the territory of the County is collected during the summer, in June.

After process of primary treatment, aerial parts of plants in bloom are produced mostly (135 plants), in comparison to all other drugs of plant origin. In 92 plant species leaves are used in medicinal purposes, fruits in 42, and bark from the tree and the young branches in 29 species.

The roots of 44 representatives are extracted for the purposes of obtaining medicinal raw materials, while in 27 medicinal plant species, healing substances are located in the rhizome. The tuber of 13 plants represented in the area of the county are collected for the same purpose. Seeds are collected from 16 plant species. The complete list of considered taxa is presented in **Table 2**.

The largest number of medicinal plant species of the County as a core group of active ingredients containing tannins (166), then plants with a high content of flavonoids (102), essential oils (78), saponin plants (68), species with glycosides (67), species with a high content of mucus (50) and the alkaloid plants (38), plants connecting resin (38), plants with fatty oil (17) and plants with heterosides (10) (**Fig. 2**). Special precautions for the collection and processing of raw materials and use of herbal drugs should be applied to species that contain toxic substances of intense action in higher concentrations.

Fifty five or 16,87% of the total number of plants shown in **Table 1** are used, though their ingredients can produce very toxic effect. Only several of them, most frequently used, are listed below: *Daphne mezereum*, *Atropa belladonna*, *Pulsatilla montana* subsp. *bulgarica*, *Adonis vernalis*, *Conium maculatum*, *Cotinus coggygria*, *Fumaria officinalis*, *Paeonia peregrina*, *Artemisia absinthium*, *Colchicum autumnale*, *Bryonia alba*, *Cynanchum vincetoxicum* and *Tamus communis*. At markets of Pirot County, very often can be found in illicit trade species *Tamus communis* and *Cyclamen hederifolium* which are very toxic but very popular species in ethno medicine of entire E, SE and S Serbia.

Great wealth of resources of medicinal plants of Pirot County creates opportunities for its rational exploitation, but also implies the need for its protection from overuse, and pressure on populations of plant species. Some medicinal plant species have been collected so much that they

Table 1. Overview of medicinal plant species and Plants collector's calendar of Pirot County (Pravilnik o proglašenju i zaštiti strogo zaštićenih i zaštićenih divjih vrsta biljaka, životinja i gljiva ♣; Uredba o stavljanju pod kontrolu korišćenja i prometa divlje flore i faune - ■; rare species that are not under legal Protection - ♦; plants with toxic effects - !

Taxon	Herbal drug	Collecting period	Habitat	Occurrence in the County	Compounds
<i>Abies alba</i> Mill.	acicula, strobuli, cortex	III	forests of the mountain belt	Stara Mt, Suva Mt	essential oil
<i>Acer platanoides</i> L.	succus	II-III	forests of the mountain belt	widespread	glycosides
<i>Acer tataricum</i> L.	cortex, folium	II-IV, VI-VII, IX-X	thermophilous forests	widespread	tannins
<i>Achillea clypeolata</i> Sibth. & Sm.	folium, flos	VI-VIII	bedrocks and thermophilous pastures	Stara Mt, Vidlič, Greben Mt, Vlaška Mt Belava	tannins
<i>Achillea crithmifolia</i> W. et K.	herba, flos, folium	VI-VII	bedrocks and thermophilous pastures	widespread	bitter substance, essential oil
<i>Achillea millefolium</i> L. ■	herba, flos, folium	VI-VII	meadows	widespread	bitter substance, essential oil
<i>Aconitum burnatii</i> subsp. <i>pentheri</i> (Hayek) Jalas ♦!	tuber	III, IX-X	high mountain pastures	Stara Mt (Arbinje, Dojkinci)	alkaloids, starch, resin, organic acids
<i>Adiantum capillus-veneris</i> L. ♣	herba	VI-VIII	the tufa, thermal springs	Zvonce	bitter substance, tannins, mucus
<i>Adonis vernalis</i> L. ♣!	herba	IV	steppe-like grasslands	Tepoš, Sarlah, Belava, Vidlič	cardiotonic glycosides
<i>Aegopodium podagraria</i> L.	herba	V-VII	brush-woods, meadows	widespread	essential oil, vitamin C
<i>Aesculus hippocastanum</i> L.	cortex, flos, folium, semen	III, V, IX-X	grown in the parks	settlements	starch, sugar, proteins, pfatty oil, saponins
<i>Agrimonia eupatoria</i> L.	herba	VI-VII	ruderal places	widespread	tannins, bitter substance
<i>Elymus repens</i> (L.) Gould	rhizoma	II-III, IX-XI	cultivated grounds	widespread	carbohydrates, mucus, sugar alcohols, saponins
<i>Ajuga reptans</i> L.	herba	V-VI	meadows	widespread	tannins, phenolic acids
<i>Alchemilla vulgaris</i> sp. div. ■	herba, folium	V-VIII	meadows	Stara Mt, Suva Mt	tannins, bitter substance
<i>Allium ursinum</i> L. ■	herba recens, bulbus recens	IV-V; IX-X	beech forests	Stara Mt, Vidlič, Suva Mt	sulfuric essential oil, vitamins, mineral substances
<i>Allium victorialis</i> L. ♦	bulbus recens, folium recens	V-VI	mountain tall-herb communities	Žarkova Čuka (Stara Mt)	sulfuric essential oil, vitamins
<i>Alnus glutinosa</i> (L.) Gaertn.	cortex, folium, fructus	III, V, IX-XII	forests along the rivers	widespread	tannins, phenolic acids
<i>Alnus viridis</i> (Chaix) Lam. ♦	cortex, folium, fructus	III, V, IX-XII	stream-sides and springs of highmountain belt	Stara Mt (Žarkova Čuka, Šošine Vunije, Tri Čuke)	tannins, phenolic acids
<i>Althaea officinalis</i> L. ■	radix, folium, flos	III, VI, IX-XI	wet meadows and riversides	widespread	mucus, pectins
<i>Alcea rosea</i> (L.) Cav.	flos	VI-X	gardens and fields	subspontaneous, widespread	mucus, tannins, anthocyanins
<i>Anacamptis pyramidalis</i> (L.) Rich. ♦	tuber	VI-VII	meadows, brush-woods, thermophilous forests	Belava, Vidlič, Suva Mt	mucus, starch, proteins
<i>Anagallis arvensis</i> L. !	herba	V-X	ruderal places	widespread	saponins, tannins
<i>Anchusa officinalis</i> L.	herba	V-IX	cultivated ground, lawns, roadsides	widespread	alkaloids, tannins, mucus
<i>Angelica sylvestris</i> L.	radix, fructus	III, IX	forests, brush-woods	Stara Mt	essential oil, resin, bitter substance
<i>Antennaria dioica</i> (L.) Gartn. ■	flos, herba	V-VII	bedrocks and highmountain pastures	Stara Mt	tannins, saponins, flavonoids
<i>Anthyllis vulneraria</i> L. ■	flos, herba	V-IX	meadows and pastures	widespread	tannins, saponins, flavonoids
<i>Apium graveolens</i> L. var. <i>rapaceum</i> (Mill.) DC.	radix recens, folium recens, fructus	VI-X	gardens	grown in the region	essential oil, fatty oil, coumarins, flavonoids
<i>Aquilegia vulgaris</i> L.	semen, folium, flos	V-IX	forests and rocks, subspontaneous	rare	cyanogenetic heterosides, vitaminC
<i>Arctium lappa</i> L. ■	radix	III, IX-XI	ruderal places	widespread	inulin, mucus, essential oil, fatty oil,

					tannins
<i>Arctium tomentosum</i> Miller ♦	radix	III, IX-XI	roadsides, ruderal places	Stara Mt (Kopren), Smilovci	inulin, mucus, essential oil, fatty oil, tannins
<i>Arctostaphylos uva-ursi</i> (L.) Spreng. ♦	folium	V-VI	rocky slopes, highmountain region	Stara Mt (Tri Čuke, Kopren), Suva Mt	glycosides (arbutin), tannins, flavonoids
<i>Artemisia absinthium</i> L. !	herba	VII- IX	ruderal places	widespread	bitter substance, essential oil, flavonoids
<i>Artemisia alba</i> Turra	herba	VII- IX	bedrocks and thermophilous pastures	Stara Mt, Vidlič, Greben Mt, Vlaška Mt	essential oil, flavonoids, bitter substance
<i>Artemisia pontica</i> L.	herba	VII- IX	walls, vineyards	near Dimitrovgrad	essential oil, bitter substance
<i>Artemisia vulgaris</i> L.	herba	VII-IX	ruderal places	widespread	essential oil, bitter substance, tannins
<i>Arum maculatum</i> L. !	rhizoma	III	forests	widespread	starch
<i>Asarum europaeum</i> L. ■!	herba cum radicibus	VI-VIII	beech forests	widespread	essential oil, tannins, glycosides, alkaloids
<i>Asparagus officinalis</i> L.	rhizoma, radix	IX-X	meadows and thermophilous forests	widespread	asparagine, saponins
<i>Galium odoratum</i> (L.) Scop. ■	herba	V-VIII	beech forests	widespread	coumarin heterosides, bitter substance, tannins
<i>Atropa bella-donna</i> L. !	radix, folium	III-IV; VI-X	beech forests, fire sites	widespread	alkaloids
<i>Ballota nigra</i> L.	herba	VI-VII	ruderal places	widespread	bitter substance, tannins, essential oil
<i>Bellis perennis</i> L.	herba, flos, folium	IV-X	meadows and lawns	widespread	bitter substance, tannins, saponins
<i>Berberis vulgaris</i> L.	cortex, radix, folium, fructus	III, VI-X	brush-woods	Suva Mt, Vlaška Mt, Greben Mt, Vidlič	alkaloids, tannins, vitaminC,
<i>Betula pendula</i> Roth. ■	gemmae, folium	II-III, VI-VIII	forests, fire sites	Stara Mt	flavonoids, tannins, resin, saponins, essential oil
<i>Bidens tripartita</i> L.	herba	VII-IX	along rivers, wet meadows	widespread	tannins, flavonoids, essential oil
<i>Bryonia alba</i> L. !	radix	VIII-X	ruderal places	widespread	resin, glycosides, alkaloids, starch
<i>Calamintha nepeta</i> (L.) Savi ♦	herba	VII-IX	bedrocks and thermophilous pastures	Vidlič (Vučje, Krupac)	essential oil
<i>Calamintha officinalis</i> Moench.	herba	VII-IX	forests	widespread	tannins, bitter substance, essential oil
<i>Campanula glomerata</i> L.	herba, radix	V-VIII	meadows	widespread	inulin
<i>Campanula rapunculus</i> L.	herba, radix	V-VII, IX	oak forests, orchards	widespread	inulin
<i>Campanula trachelium</i> L.	herba, radix	VII-IX	forests	widespread	inulin
<i>Capsella bursa-pastoris</i> (L.) Medic.	herba	IV	ruderal places	widespread	flavonoids, tannins
<i>Cardamine amara</i> L.	stipes, folium	IV-VII	around springs and streams	Stara Mt	sulfuricglycosides, vitamin C, carotene
<i>Cardamine flexuosa</i> With.	stipes, folium	IV-VII	forests, wet places	widespread	Sulfuric glycosides, vitamin C, carotene
<i>Cardamine impatiens</i> L.	stipes, folium	IV-IX	around springs and streams	widespread	Sulfuric glycosides, vitamin C, carotene
<i>Cardamine pratensis</i> L.	folium	VI-VII	springs and streams	Krupac, Smilovci	sulfuricglycosides, vitaminC, carotene
<i>Carlina acaulis</i> L. ■	radix	IX-X	meadows and bedrocks	widespread	inulin, essential oil, tannins, resin
<i>Carum carvi</i> L.	fructus	VII-VIII	meadows, pastures	Stara Mt, Vidlič, Suva Mt	essential oil, fatty oil, proteins, carbohydrates
<i>Centaurea cyanus</i> L.	flos	VI- IX	cultivated grounds, roadsides	widespread	anthocyanins, кумарин, glycosides, tannin
<i>Centaurium erythraea</i> Rafn ■	herba	VII-IX	meadows	Stara Mt, Vidlič	glycosides, flavonoids
<i>Asplenium ceterach</i> L.	folium	VI-VIII	rock fissures	widespread	not studied
<i>Chelidonium majus</i> L.	radix, herba	III-IV, IX-X	ruderal places	widespread	alkaloids, flavonoids, saponins
<i>Cichorium intybus</i> L.	herba, radix	VII-VIII, IX-X	ruderal places	widespread	inulin, glycosides, tannins, pectins

<i>Clematis recta</i> L. ♦	herba	VI	thermophilous forests and rocky places	Vidlič, Suva Mt, Jerma gorge	glycosides, saponins
<i>Clematis vitalba</i> L.	herba	VI	thermophilous forests and brush-woods	widespread	glycosides, saponins
<i>Colchicum autumnale</i> L. !	semen, tuber	VII-VIII, IX-XI	meadows	widespread	alkaloids
<i>Conium maculatum</i> L. !	folium, herba, fructus	IV, VII-VIII	ruderal places	widespread	alkaloids
<i>Convallaria majalis</i> L. !	herba, folium, flos	V-VI	shady forests, around rocks	Vidlič, Suva Mt	cardiotonic glycosides, saponins, flavonoids
<i>Cornus mas</i> L. ■	cortex, folium, fructus	III, IV-VI, VIII-X	forests and brush-woods	widespread	tannins, pectins, organic acids
<i>Cornus sanguinea</i> L.	semen	VIII-IX	forests and brush-woods	widespread	fatty oil
<i>Coronilla scorpioides</i> (L.) Koch. !	herba	IV-VI	bedrocks and thermophilous pastures	widespread	heterosides
<i>Coronilla varia</i> L. !	herba	V-IX	meadows, ruderal places	widespread	heterosides
<i>Corydalis cava</i> subsp. <i>marschalliana</i> (Pallas) Chater !	tuber	III-IV	beech forests	Suva Mt, Vidlič, Belava, Greben Mt	alkaloids
<i>Corydalis solida</i> (L.) Clairv. !	tuber	III-IV	forests	widespread	alkaloids
<i>Corylus avelana</i> L. ■	cortex, folium, semen	III-IV, V-VI, IX-X	forests	widespread	tannins, flavonoids, fatty oil
<i>Corylus colurna</i> L.	cortex, folium, semen	III-IV, V-VI, IX-X	forests	Suva Mt, Belava, Vidlič, Stara Mt	tannins, flavonoids, fatty oil
<i>Cotinus coggygria</i> Scop. !	folium	V-VI	brush-woods, thermophilous forests	widespread	tannins, flavonoids
<i>Crataegus monogyna</i> Jacq. ■	flos, folium, fructus	V-VI, IX-X	brush-woods and forests	widespread	flavonoids
<i>Crataegus laevigata</i> (Poir.) DC. ■	flos, folium, fructus	V-VI, IX-X	brush-woods and forests	Topli Do, Vidlič	flavonoids
<i>Crocus adamii</i> J. Gay !	stigma	III	bedrocks and pastures	widespread	alkaloids, carotenoids
<i>Crocus tommasinianus</i> Herbert !	stigma	III	brush-woods	Belava	alkaloids, carotenoids
<i>Crocus veluchensis</i> Herbert !	stigma	III	pastures of highmountain region	Stara Mt	alkaloids, carotenoids
<i>Cuscuta epithimum</i> L.	herba	V-VI	meadows and bedrocks	widespread	not studied
<i>Cuscuta europaea</i> L.	herba	V-VI	meadows, in the crops	widespread	not studied
<i>Cydonia oblonga</i> Mill.	folium, fructus, semen	IV-VI, IX-XI	brush-woods of thermophilous belt	subspontaneous	organic acids, vitaminC, tannins, mucus
<i>Vincetoxicum hircundinaria</i> Medicus !	rhizoma	IX	brush-woods, thermophilous forests	widespread	toxic compounds (vincetoxin), resin
<i>Cynodon dactylon</i> (L.) Pers.	rhizoma	II, III, IV	weedy places and meadows	widespread	starch
<i>Cynoglossum officinale</i> L.	radix, herba, folium	III-IV, V-X	roadsides and in the crops	widespread	alkaloids, tannins, resin, saponins
<i>Daphne mezereum</i> L. !	cortex	I- III	mountain forests, rocky places	Vidlič, Stara Mt, Suva Mt	resin, flavonoids, glycosides, coumarins
<i>Datura stramonium</i> L. !	folium, semen	VI-IX, X	ruderal places	widespread	alkaloids
<i>Daucus carota</i> L.	radix, fructus	IX-XI	meadows, fiels, thermophilous forests	widespread	carotenes, vitamins, pectins; essential oil, fatty oil
<i>Dictamnus albus</i> L.	herba, radix	V, IX-X	thermophilous forests, brush-woods	Vidlič, Suva Mt, Belava, Jerma gorge	essential oil, alkaloids, bitter substance
<i>Digitalis ambigua</i> Murr. !	folium	VI-IX	forests	widespread	cardiotonic glycosides, saponins, flavonoids
<i>Digitalis ferruginea</i> L. !	folium	VII-VIII	forests	Suva Mt, Stara Mt	cardiotonic glycosides, saponins, flavonoids
<i>Digitalis lanata</i> Ehrh. !	folium	VI-VIII	forests, brush-woods, meadows	widespread	cardiotonic glycosides, saponins, flavonoids
<i>Drosera rotundifolia</i> L. ♣	herba	VI-VIII	peat bogs	Stara Mt (Jabučko Ravnište, Dojkinci, Šošine Vunije)	essential oil, tannins, flavonoids
<i>Dryopteris filix-mas</i> (L.) Schott !	rhizoma	III-IV, IX-X	forests	widespread	floroglucyne derivatives, tannins, fatty oil
<i>Epilobium angustifolium</i> L.	herba, folium	VI-VIII	forests edges , fire sites	widespread	tannins, flavonoids, mucus
<i>Epilobium parviflorum</i> Schreber ■	herba, folium	VII-IX	forests edges , fire sites	widespread	tannins, flavonoids, mucus

<i>Equisetum arvense</i> L. ■	herba	VI-VIII	cultivated ground, streamsides	widespread	mineral substances, flavonoids
<i>Erodium cicutarium</i> (L.) L. Hérít.	herba	IV-VII	ruderal places, meadows	widespread	tannins, flavonoids
<i>Eryngium campestre</i> L.	radix	III, X-XI	ruderal places	widespread	saponins, tannins, essential oil
<i>Eupatorium cannabinum</i> L.	radix, herba	III, VI-VII	wet meadows, streamsides	widespread	essential oil, resin, tannins
<i>Euphorbia amygdaloides</i> L. !	semen	VII-VIII	deciduous forests	widespread	bitter - hot substances
<i>Euphorbia cyparissias</i> L. !	semen, succus	VII-VIII	roadsides	widespread	bitter - hot substances
<i>Euphorbia helioscopia</i> L. !	semen, succus	IV-IX	ruderal places	widespread	bitter - hot substances
<i>Euphorbia lathyris</i> L. !	semen, succus	VII-VIII	cultivated grounds	subspontaneous	bitter - hot substances
<i>Euphorbia palustris</i> L. !	semen, succus	V-VI	wet places, meadows	surroundings of Pirot	bitter - hot substances
<i>Euphrasia minima</i> Jacq. ■	herba	VII-IX	mountain pastures and meadows	Stara Mt	glycosides, tannins, resin
<i>Euphrasia rostkoviana</i> Hayne ■	herba	V-IX	meadows and pastures	Stara Mt	glycosides, tannins, resin
<i>Euphrasia stricta</i> Host. ■	herba	V-IX	meadows	Stara Mt, Suva Mt, Vidlič	glycosides, tannins, resin
<i>Euonymus europaeus</i> L. !	cortex, stipes, folium, fructus	III-IV, V, VIII-X	brush-woods and thermophilous forests	widespread	alkaloids
<i>Fagus sylvatica</i> subsp. <i>moesiaca</i> (K.Maly) Czezc.	cortex	III, IX-XI	forests	widespread	phenolic derivatives, hydrocarbons, organic acids, resin
<i>Ranunculus ficaria</i> L.	tuber	XI-XII	forests and meadows	widespread	mucus, essential oil, saponins
<i>Filipendula hexapetala</i> Gilib.	herba, folium, rhizoma	V-VII, IX-X	meadows	widespread	essential oil, tannins,
<i>Filipendula ulmaria</i> (L.) Maxim.	herba, folium	VI-VIII	streamsides and springs of the mountain region	Stara Mt	essential oil, tannins, glycosides
<i>Foeniculum vulgare</i> Mill.	fructus	VIII-X	ruderal places, cultivated ground	subspontaneous	essential oil, fatty oil, flavonoids
<i>Fragaria vesca</i> L. ■	folium, fructus	VI-VII	forests and meadows	widespread	tannins, flavonoids
<i>Fraxinus excelsior</i> L.	cortex, folium, semen	III-IV, VI-X	forests	widespread	tannins, flavonoids, coumarins, resin
<i>Fraxinus ornus</i> L.	succus (manna)	VII-VIII	thermophilous forests	widespread	sugars (mannitol), mineral substances, resin
<i>Fumaria officinalis</i> L. !	herba	V-IX	ruderal places	widespread	alkaloids
<i>Galanthus nivalis</i> L. !	bulbus, folium, flos	III	forests	Vlaška Mt, Vidlič	choline, phytosterol
<i>Galega officinalis</i> L.	herba	VI-IX	meadows, riversides	widespread	alkaloids, flavonoids, tannins, saponins
<i>Galeopsis ladanum</i> L.	herba	VI-VIII	forests edges, brush-woods	widespread	bitter substance, tannins, glycosides
<i>Galeopsis pubescens</i> Bess.	herba	VII-IX	cultivated grounds	widespread	bitter substance, tannins, glycosides
<i>Galeopsis speciosa</i> Mill.	herba	VII-IX	cultivated grounds and bedrocks	widespread	tannins, saponins
<i>Galeopsis tetrahit</i> L.	herba	VII-VIII	forests, brush-woods	widespread	bitter substance, tannins, glycosides
<i>Galium verum</i> L. ■	herba	V-IX	meadows, roadsides	widespread	glycosides, tannins, saponins
<i>Genista tinctoria</i> L.	herba	VI-VIII	meadows, forests	widespread	alkaloids, flavonoids, essential oil
<i>Gentiana asclepiadea</i> L. ■	radix	X-XI	highmountain pastures	Stara Mt, Vlaška Mt	glycosides, tannins, pectin
<i>Gentiana cruciata</i> L. ■	herba	VII- IX	oak forests, pastures and meadows	Vidlič, Basara	bitter substance, tannins, glycosides
<i>Gentiana lutea</i> L. ♦	radix	X-XI	highmountain pastures	Stara Mt, Suva Mt	glycosides, phytosterols, pectins, sugars
<i>Geranium macrorrhizum</i> L.	rhizoma	III-IV, IX-X	forests and screes	widespread	essential oil, tannins, flavonoids, pectins, rubbers
<i>Geranium robertianum</i> L. ■	herba	V-VIII	forests and screes	widespread	tannins, flavonoids, resin, organic acids
<i>Geum urbanum</i> L.	rhizoma cum radicibus	IX-X	ruderal places and forests	widespread	tannins, flavonoids

<i>Glechoma hederacea</i> L. ■	herba	V-VI	roadsides, forests edges, meadows	widespread	tannins, bitter substance, essential oil
<i>Glechoma hirsuta</i> W. et K.	herba	IV	brush-woods and thermophilous forests	widespread	bitter substance, tannins, essential oil
<i>Gymnadenia conopsea</i> (L.) R.Br.	tuber	V-VIII	mountain pastures	widespread	mucus, starch
<i>Hedera helix</i> L. ■!	folium, stipes, cortex, fructus	III-IV, X-XI	forests	widespread	saponins
<i>Helleborus odoratus</i> W. et K. !	rhizoma et radix	III-IV, IX-X	forests	widespread	cardiotonic heterosides, saponins
<i>Hepatica nobilis</i> Mill. ■!	herba, folium	II-IV, V-VII	forests	widespread	tannins, saponins
<i>Heracleum sphondylium</i> L.	radix, folium, flos	II-IV, IX-XI	wet places, forests, ruderal places	widespread	essential oil, arginine
<i>Herniaria glabra</i> L. ■	herba	V-VIII	roadsides, bedrocks	widespread	saponins, flavonoids, coumarins, tannins
<i>Herniaria hirsuta</i> L. ■	herba	V-VIII	roadsides, bedrocks	widespread	saponins, flavonoids, coumarins, tannins
<i>Hieracium pilosella</i> L.	herba cum radicibus	V-VIII	arid slopes and meadows	widespread	tannins, flavonoids, coumarins, resin, mucus
<i>Humulus lupulus</i> L.	strobuli	IX	wet places	widespread	resin, tannins, essential oil, flavonoids
<i>Hyoscyamus niger</i> L. !	folium, semen	VI-VIII	weedy places, gardens, fields	widespread	alkaloids
<i>Hypericum barbatum</i> L. ■	herba	V-VII	thermophilous meadows, pastures	Stara Mt	flavonoids, tannins, essential oil
<i>Hypericum hirsutum</i> L.	herba	VI-VIII	forests	Stara Mt, Vidlič, Suva Mt	flavonoids, tannins, essential oil
<i>Hypericum perforatum</i> L. ■	herba	VI-VIII	meadows, cultivated ground, brush-woods	widespread	flavonoids, tannins, essential oil
<i>Hyssopus officinalis</i> L.	herba	VII-IX	bedrocks and rocks	Vidlič, Suva Mt, Jerma gorge, Basara, Belava	essential oil, flavonoids, tannins
<i>Inula helenium</i> L. ■	rhizoma cum radicibus	X-XI	meadows, grown in the gardens	Stara Mt	essential oil, bitter substance, inulin
<i>Isatis tinctoria</i> L.	folium	IV-VII	bedrocks, walls, vineyards	widespread	sulfuric heterosides
<i>Iris pseudacorus</i> L. ■	rhizoma	IX	along the rivers and wetlands	widespread	tannins, arginine, холин
<i>Juglans regia</i> L.	folium, fructus	VI-IX	forests and orchards	widespread	tannins, naftchynone derivatives, flavonoids, vitamin C, essential oil
<i>Juniperus communis</i> L. ■	fructus, lignum	IX-X	thermophilous forests and arid slopes	widespread	essential oil, tannins, flavonoids
<i>Lamium purpurum</i> L.	herba	IV-IX	ruderal places	widespread	saponins, mucus, flavonoids, essential oil
<i>Leonurus cardiaca</i> L. ■	herba	VI-IX	ruderal places	widespread	glycosides, alkaloids, tannins, saponins
<i>Ligustrum vulgare</i> L. !	cortex, folium, fructus	III, IV-V, VIII-IX	brush-woods and forests	widespread	tannins, essential oil
<i>Lilium martagon</i> L. ♦	folium, flos, bulb	VII-VIII	forests	widespread	mucus, essential oil
<i>Linaria vulgaris</i> Mill. !	herba	VI-IX	ruderal places, in the crops	widespread	alkaloids, glycosides
<i>Lycopus europaeus</i> L.	herba	VI-VIII	wet places, riversides	widespread	bitter substance, tannins
<i>Lysimachia nummularia</i> L.	herba	VI-VIII	meadows, riversides	widespread	bitter substance, tannins, saponins
<i>Lysimachia punctata</i> L.	herba	VI-VIII	mountain meadows, riversides	widespread	tannins, saponins, flavonoids
<i>Lysimachia vulgaris</i> L.	herba	VI-VIII	meadows, forests	widespread	tannins, saponins, flavonoids
<i>Lythrum salicaria</i> L.	herba	VI-IX	wet places, riversides	widespread	glycosides, tannins, flavonoids, mucus
<i>Malus sylvestris</i> (L.) Miller	fructus, коштице	VIII-XI	forest edges	widespread	vitamins, iodine
<i>Malva neglecta</i> Wallr.	folium, flos	IV, V-X	ruderal places	widespread	mucus, tannins, anthocyanins
<i>Malva pusilla</i> Sm.	folium, flos	VIII-IX	ruderal places	widespread	mucus, tannins
<i>Malva sylvestris</i> L.	folium, flos	IV, V-IX	ruderal places	widespread	mucus, tannins, anthocyanins
<i>Marrubium vulgare</i> L. ■	herba	VI-VIII	pastures, ruderal places	widespread	lactone marubin, essential oil, tannins

<i>Matricaria recutita</i> L.	flos	V-IX	ruderal places	widespread	essential oil, flavonoids, coumarins, mucus
<i>Medicago falcata</i> L.	folium	IV-V	thermophilous meadows	widespread	vitamins
<i>Medicago lupulina</i> L.	folium	IV-V	meadows, roadsides	widespread	vitamins
<i>Melilotus albus</i> Medic.	herba	VI	ruderal places	widespread	coumarins, flavonoids, tannins
<i>Melilotus altissimus</i> Thuill.	herba	VI-VII	ruderal places	widespread	coumarins, flavonoids, tannins
<i>Melilotus officinalis</i> (L.) Pallas ■	herba	VI	meadows, ruderal places	widespread	coumarins, flavonoids, tannins
<i>Melissa officinalis</i> L. ■	folium	V-VI	ruderal places	widespread	essential oil, flavonoids
<i>Melittis melissophyllum</i> L.	herba	V-VI	deciduous forests, brush-woods	widespread	essential oil, coumarins, flavonoids
<i>Mentha piperita</i> L.	folium	VII-IX	wet places, riversides	widespread	essential oil, tannins, flavonoids
<i>Mentha pulegium</i> L.	herba	VI-IX	wet places, cultivated ground and orchards	widespread	essential oil, tannins, bitter substance
<i>Menyanthes trifoliata</i> L. ♣	folium	VI-VII	peat bogs	Stara Mt (Kopren), surroundings of Pirot, Krupac	gorški heterosides, tannins
<i>Morus alba</i> L.	folium, fructus recens	VI-VIII	forests, along the rivers	in the settlements, subspontaneous	vitamins, pectins, rubbers
<i>Nasturtium officinale</i> R. Br.	herba recens, folium recens	IV-IX	around springs and streams	Krupac	sulfuric heterosides, vitamins
<i>Nepeta cataria</i> L.	herba	VII-IX	ruderal places	surroundings of Pirot	essential oil, tannins, saponins, glycosides
<i>Nepeta nuda</i> L.	herba	VI-VIII	meadows, bedrocks	Stara Mt, Suva Mt, Vidlič, Vlaška Mt	essential oil, tannins, saponins, glycosides
<i>Nigella arvensis</i> L.	semen	IX-X	cultivated ground, ruderal places	widespread	essential oil, saponins, pfatty oil
<i>Nigella damascena</i> L.	semen	VII-IX	cultivated ground, roadsides	in the settlements, subspontaneous	essential oil, saponins, fatty oil
<i>Ononis spinosa</i> L. ■	radix	III, IX-X	meadows	widespread	glycosides, triperpens, essential oil
<i>Orchis laxiflora</i> Lam. ♣	tuber	IV-VI	wet meadows	Stara Mt, Vidlič, Kopren	mucus
<i>Orchis militaris</i> L. ♣	tuber	V-VI	meadows	Stara Mt	mucus, starch
<i>Orchis morio</i> L.	tuber	IV-VII	meadows and brush-woods	widespread	mucus
<i>Orchis simia</i> Lam. ♦	tuber	V-VI	meadows, forests edges	Stara Mt, Jerma gorge	mucus, starch
<i>Origanum vulgare</i> L. ■	herba	VII-IX	meadows and forests	widespread	essential oil, tannins
<i>Oxalis acetosella</i> L. !	folium	IV	forests	widespread	flavone heterosides, oxalyc acid
<i>Paeonia peregrina</i> Miller ♣!	flos, radix	V, VIII-IX	oak forests, rocky slopes	Božurato, Blato, Kostur, Babušnica, Striževac, Kozarica	alkaloids, tannins
<i>Paeonia tenuifolia</i> L. ♣!	flos, radix	V, VIII-IX	oak forests, rocky slopes	Gulenovci, Visočki Odorovci	alkaloids, tannins
<i>Papaver dubium</i> L. !	flos	IV-VI	meadows and srop fields	widespread	alkaloids
<i>Papaver rhoeas</i> L. !	flos	V-VI	cultivated ground, roadsides	widespread	alkaloids, anthocyanins, mucus
<i>Pastinaca sativa</i> L. ssp. <i>urens</i> (Req. ex Godron) Čelak	fructus, radix	VIII-IX	meadows, roadsides	widespread	essential oil, fatty oil, coumarins, flavonoids
<i>Petasites hybridus</i> (L.) P. Gaertn., B. Mey. & Scherb. ■	radix, folium	III-V	riversides, wet places	widespread	essential oil, flavonoids, mucus, tannins
<i>Peucedanum longifolium</i> Waldst. & Kit.	herba, radix	VII-VIII, IX-X	rocky places and brush-woods	Vidlič, Jerma gorge, Gradašnica	bitter substance, essential oil
<i>Physalis alkekengi</i> L.	fructus	VIII-IX	forests and ruderal places	widespread	organic acids, glycosides, carotenoids
<i>Phytolacca americana</i> L.	fructus	VIII-IX	ruderal places	adventive	oxalyc acid
<i>Pimpinella saxifraga</i> L.	radix	III, IX-X	meadows, roadsides	widespread	essential oil, coumarins, saponins, tannins
<i>Pinus mugo</i> Turra ♣	turio	II-III	highmountain region forests	Stara Mt (Tri Čuke)	turpentine
<i>Pinus nigra</i> J. F. Arnold	turio	II-III	rocky places, forests	Stara Mt (Rsovci), Jerma gorge	turpentine
<i>Plantago arenaria</i> Waldst. & Kit.	semen	VIII-IX	ruderal places	widespread	mucus, fatty oil, proteins, glycosides

<i>Plantago lanceolata</i> L.	folium	IV-IX	meadows	widespread	glycosides, tannins, mucus, flavonoids
<i>Plantago major</i> L.	folium	V-IX	meadows, ruderal places	widespread	glycosides, tannins, mucus
<i>Plantago media</i> L.	folium	V-IX	meadows	widespread	glycosides, tannins, mucus
<i>Platanthera bifolia</i> (L.) Rich. ♦	tuber	V-VII	forests	Suva Mt, Stara Mt	mucus, starch
<i>Platanthera chlorantha</i> (Custer) Rchb. ♣	tuber	V-VII	meadows, brush-woods	Vidlič, Stara Mt	mucus, starch
<i>Polygala amara</i> L.	herba	V-VI	meadows, pastures, bedrocks	Vidlič	saponins, bitter substance
<i>Polygala vulgaris</i> L.	herba	V-VIII	meadows	widespread	saponins, bitter substance
<i>Polygonum aviculare</i> L.	herba	VI-X	ruderal places	widespread	flavonoids, tannins, mucus
<i>Polygonum bistorta</i> L. ■	rhizoma	IX-X	mountain meadows	Stara Mt (Žarkova Čuka, Dojkinci, Kopren)	tannins, starch, organic acids
<i>Polygonum hydropiper</i> L.	herba	VI-IX	wet meadows, riversides	widespread	flavonoids, tannins, organic acids
<i>Polygonum persicaria</i> L.	herba	VI-IX	wet places, cultivated grounds	widespread	flavonoids, tannins, organic acids
<i>Polypodium vulgare</i> L.	rhizoma	III, IX-X	forests	widespread	tannins, resin, fatty oil, saponins, sugars
<i>Populus alba</i> L.	cortex, gemmae	II-III, IX-X	along the rivers	widespread	flavonoids, salicin
<i>Populus nigra</i> L.	cortex, gemmae	II-III, IX-X	forests, along the rivers	widespread	resin, flavonoids
<i>Populus tremula</i> L.	cortex, gemmae	II-III, IX-X	forests	widespread	flavonoids, salicin
<i>Potentilla erecta</i> (L.) Raeusch. ■	rhizoma	VI-IX	meadows of mountain region	widespread	tannins, saponins, resin, starch, flobaphens
<i>Potentilla recta</i> L.	rhizoma	VI-VIII	meadows and thermophilous forests	widespread	tannins, resin
<i>Potentilla reptans</i> L.	rhizoma	VI-VIII	meadows and ruderal places	widespread	tannins, resin
<i>Primula vulgaris</i> Huds. ■	rhizoma cum radicibus	III-IV	brush-woods, forests, meadows	widespread	saponins, glycosides
<i>Primula elatior</i> (L.) Hill ■	rhizoma cum radicibus	III-V	mountain pastures	Stara Mt	saponins, glycosides, starch, tannins
<i>Primula veris</i> Huds. ■	flos, rhizoma cum radicibus	IV-VII	mountain pastures	widespread	saponins, glycosides, starch, tannins
<i>Prunella vulgaris</i> L.	herba	VI-IX	forests and wet meadows	widespread	tannins, flavonoids, saponins
<i>Prunus avium</i> L.	fructus, petiolus	VI-VII	forests	widespread	glycosides
<i>Prunus spinosa</i> L. ■	flos, fructus	IV-V, VIII-IX	brush-woods, forests edges	widespread	flavonoids, glycosides; tannins, anthocyanins, pectins
<i>Pulmonaria officinalis</i> L. ■	herba	III-V	forests	widespread	mucus, mineral substances, tannins, flavonoids
<i>Pulsatilla montana</i> (Hoppe) Reichenb. ♣!	herba recens	III-IV	bedrocks and thermophilous pastures	Vidlič, Greben Mt, Vlaška Mt	saponins, tannins, resin
<i>Quercus cerris</i> L.	cortex	III-IV	forests	widespread	tannins, catechin, flavonoids
<i>Quercus frainetto</i> Ten.	cortex	III-IV	forests	widespread	tannins, catechin, flavonoids
<i>Quercus petraea</i> Liebl.	cortex	III-IV	forests	widespread	tannins, catechin, flavonoids
<i>Quercus pubescens</i> Willd.	cortex	III-IV	forests	widespread	tannins, catechin, flavonoids
<i>Quercus robur</i> L.	cortex	III, IV	forests, along the rivers	rare, surroundings of Pirot	tannins, catechin, flavonoids
<i>Ranunculus acris</i> L. !	herba	V-IX	wet meadows	widespread	anemone-camphor, saponins
<i>Ranunculus bulbosus</i> L. !	herba	IV-VI	meadows and pastures	widespread	anemone-camphor, saponins
<i>Ranunculus repens</i> L. !	herba	V-VII	wet meadows	widespread	anemone-camphor, saponins
<i>Ranunculus sceleratus</i> L. !	herba	VI-IX	wetlands	surroundings of Pirot	anemone-camphor, saponins
<i>Reseda lutea</i> L.	herba	VI-IX	ruderal places	widespread	flavonoids, sulfuric glycosides

<i>Reseda luteola</i> L.	herba	VI-IX	ruderal places	widespread	flavonoids, sulfuric glycosides
<i>Rhamnus catharticus</i> L.	fructus	IX-X	oak forests and brush-woods	Suva Mt, Vidlič, Vlaška Mt	anthraquinones, flavonoids, pectins, glycosides, mucus
<i>Ribes uva-crispa</i> L.	folium, fructus	VI-VII, VIII-IX	brush-woods and rocky places	Stara Mt, Basara	vitamins, carotenes
<i>Robinia pseudoacacia</i> L.	flos	IV-V	acacia plantations and roadsides	subspontaneous, widespread	flavones heterosides
<i>Rosa canina</i> L. ■	fructus	VIII-X	brush-woods and thermophilous forests	widespread	vitamins, pectins, tannins, glycosides, organic acids
<i>Rubia tinctorum</i> L.	radix	III-IV, IX-X	ruderal places	Stara Mt, Temska	anthraquinone compounds, organic acids, pectins
<i>Rubus caesius</i> L.	folium	VI-VII	forests edges	widespread	tannins, organic acids, flavonoids
<i>Rubus idaeus</i> L. ■	folium, fructus recens	VI-VIII	forests of the mountain region	Stara Mt, Suva Mt, Vidlič, Vlaška Mt	tannins, organic acids, flavonoids
<i>Rumex acetosa</i> L.	radix, folium	III-V	wet meadows	widespread	calcium oxalate
<i>Rumex crispus</i> L.	radix, folium	V-VI	meadows	widespread	calcium oxalate
<i>Rumex obtusifolius</i> L.	radix, folium,	V-VI	forests and meadows	widespread	calcium oxalate
<i>Rumex sanguineus</i> L.	radix, folium,	V-VI	meadows and ruderal places	widespread	calcium oxalate
<i>Ruscus aculeatus</i> L. ■	rhizoma	IX-X	thermophilous forests	widespread	saponins, tannins, resin
<i>Ruta graveolens</i> L. ♣	folium	VI-VIII	bedrocks and brush-woods	widespread	flavonoids, alkaloids, coumarins, tannins, resin
<i>Salix alba</i> L.	cortex	III-IV	forests, riversides	widespread	glycosides, flavonoids, tannins
<i>Salix caprea</i> L.	cortex	III-IV	forests, streamsides	widespread	glycosides, flavonoids, tannins
<i>Salix cinerea</i> L.	cortex	III-IV	wetlands, mountain region	widespread	glycosides, flavonoids, tannins
<i>Salix purpurea</i> L.	cortex	III-IV	streamsides	widespread	glycosides, flavonoids, tannins
<i>Salvia glutinosa</i> L.	folium	VI-VIII	beech forests	widespread	essential oil, bitter substance
<i>Salvia nemorosa</i> L.	folium	V	roadsides, meadows	widespread	essential oil, bitter substance
<i>Salvia pratensis</i> L.	folium	V	meadows	widespread	essential oil, bitter substance
<i>Salvia sclarea</i> L.	folium	VI	thermophilous meadows and brush-woods	widespread	essential oil, bitter substance
<i>Sambucus ebulus</i> L.	radix, folium, fructus	III, VI-VII, IX-X	ruderal places	widespread	cyanogenetic heterosides, bitter substance
<i>Sambucus nigra</i> L. ■	flos, fructus	VI, VII-VIII	roadsides, forests	widespread	mucus, flavonoids, essential oil, tannins
<i>Sanguisorba minor</i> Scop.	rhizoma cum radicibus, herba	III-VI, IX-X	meadows	widespread	tannins, starch, saponins, sterols
<i>Sanguisorba officinalis</i> L.	rhizoma cum radicibus	III-IV, IX-X	wet meadows	widespread	tannins, starch, saponins
<i>Sanicula europaea</i> L.	radix, herba	III-IV, V-VII, IX-X	beech forests	widespread	bitter substance, tannins, saponins
<i>Saponaria officinalis</i> L.	radix, herba	III-IV, VI-X	ruderal places, riversides	widespread	saponins, sugars
<i>Satureja kitaibelii</i> Wierzb. ■	herba	VIII-X	calcareous pastures	Kopren, Vidlič, Belava, Basara, Suva Mt, Jerma gorge	essential oil
<i>Scrophularia nodosa</i> L. !	herba	VI-VII	forests, brush-woods, fire sites	widespread	glycosides, tannins
<i>Sedum acre</i> L.	herba recens	V-VIII	bedrocks	widespread	alkaloids, flavonoids, tannins, organic acids
<i>Sedum telephium</i> L.	herba recens	VI-IX	forests, rocky places	widespread	alkaloids, flavonoids, tannins, organic acids
<i>Sempervivum tectorum</i> L.	folium recens	V-IX	roofs, walls, rocks	subspontaneous, widespread	organic acids, tannins, resin, mucus
<i>Sinapis arvensis</i> L.	semen	IX-X	roadsides, cultivated ground	widespread	fatty oil, sinapin
<i>Sisymbrium officinale</i> (L.) Scop.	herba recens, folium recens	VI-VII	roadsides, ruderal places	widespread	sulfuric glycosides, vitaminC
<i>Solanum dulcamara</i> L. !	stipes	III-IV, IX-	wet places	widespread	alkaloids, glycosides,

		X			tannins
<i>Solanum nigrum</i> L. !	herba, fructus	VI-VIII, IX-X	ruderal places	widespread	alkaloids, tannins, saponins
<i>Solidago virgaurea</i> L. ■!	herba	VII-IX	forests and rocky places	Stara Mt, Suva Mt, Vidlič	tannins, flavonoids, saponins, essential oil
<i>Sorbus aria</i> (L.) Crantz	fructus	IX-X	forests nad rocks	Vidlič, Vlaška Mt, Greben Mt	tannins, vitamins, rubbers
<i>Sorbus aucuparia</i> L.	fructus	IX-X	beech and beech and fir forests	Stara Mt	tannins, vitamins, organic acids
<i>Sorbus domestica</i> L.	fructus	IX-X	forests	Stara Mt, surroundings of Piro	tannins, vitamin C, organic acids
<i>Sorbus torminalis</i> (L.) Crantz.	fructus	IX-X	forests	widespread	tannins, vitamins, organic acids
<i>Stachys officinalis</i> (L.) Trevisan	herba	VII-VIII	meadows	widespread	tannins, glycosides, saponins
<i>Stachys palustris</i> L.	herba	VI-IX	wet meadows	widespread	tannins, saponins, glycosides
<i>Stachys recta</i> L.	herba	VI-VIII	meadows and bedrocks	widespread	tannins, saponins
<i>Stachys sylvatica</i> L.	herba	VI-VIII	forests	widespread	tannins, saponins
<i>Swertia punctata</i> Baumg. ♣	herba	VIII-X	forests and peat bogs	Stara Mt (Kopren, Tri Čuke, Vražja Glava, Arbinje)	glycosides
<i>Symphytum officinale</i> L. ■	radix	III, IX-X	forests, riversides	widespread	mucus, tannins, starch
<i>Tamus communis</i> L. !	rhizoma recens	III-IV, IX-X	thermophilous forests	widespread	alkaloids, starch, mucus, calcium oxalate, saponins
<i>Tanacetum vulgare</i> L.	flos, herba	VII-IX	ruderal places	widespread	essential oil, flavonoids, tannins, bitter compounds
<i>Taraxacum officinale</i> Weber	radix, herba	III-IV, IX-X	meadows and weedy places	widespread	glycosides, resin, mucus, inulin
<i>Telekia speciosa</i> (Schreb.) Baumg.	radix	III-IV, IX-X	forests	Suva Mt, Stara Mt, Vidlič	essential oil, bitter compounds, inulin
<i>Teucrium chamaedrys</i> L. ■	herba	VI-IX	forests and meadows	widespread	essential oil, tannins, flavonoids
<i>Teucrium montanum</i> L. ■	herba	VI-IX	bedrocks and termophilous pastures	widespread	bitter substance, tannins, mineral substances, essential oil
<i>Teucrium polium</i> L.	herba	VII-VIII	bedrocks and thermophilous pastures	widespread	essential oil, tannins
<i>Thymus sp. div.</i> ■	herba	V-IX	meadows and pastures	widespread	essential oil, tannins, bitter substance, flavonoids
<i>Tilia cordata</i> Miller ■	flos cum bracteis	VI-VIII	forests	widespread	mucus, tannins, mannitol
<i>Tilia platyphyllos</i> Scop.	flos cum bracteis	V	forests	widespread	flavonoids, tannins
<i>Tilia tomentosa</i> Moench. ■	flos cum bracteis	VI-VII	forests	widespread	mucus, tannins, mannitol
<i>Tribulus terrestris</i> L.	herba, fructus	IV-IX	ruderal places, roadsides, weedy places	widespread	saponins, flavonoids
<i>Tussilago farfara</i> L. ■	flos, folium	II-VI	roadsides, causeways, eroded places	widespread	mucus, inulin, tannins, flavonoids
<i>Ulmus glabra</i> Hudson	cortex	III-IV	forests	widespread	tannins, mucus, bitter substance
<i>Urtica dioica</i> L.	folium, radix, semen	III-IV, VII-X	ruderal places	widespread	vitamins, tannins
<i>Vaccinium myrtillus</i> L. ■	folium, fructus	V-VI, VII-IX	highmountain brush-woods	Stara Mt, Suva Mt	glycosides, tannins, anthocyanins, pectins
<i>Vaccinium uliginosum</i> L.	fructus	VIII-IX	highmountain brush-woods	Stara Mt	sugars, organic acids, vitamins, tannins, pectins
<i>Vaccinium vitis-idaea</i> L.	folium, fructus	III-IV, VII-IX	highmountain brush-woods	Stara Mt	glycosides, tannins, flavonoids, organic acids, vitamins
<i>Valeriana officinalis</i> L.	rhizoma cum radicibus	IX-XI	wet meadows, forests edges, streamsides	widespread	essential oil, tannins, starch
<i>Veratrum album</i> L.	rhizoma	VIII-X	pastures and meadows	widespread	alkaloids
<i>Veratrum nigrum</i> L. ■	rhizoma	VIII-X	forests, rocky places	Vidlič, Basara, Greben Mt, Vlaška Mt	alkaloids

<i>Verbascum blattaria</i> L.	flos	V-VII	roadsides, meadows and cultivated ground	widespread	flavonoids, saponins, mucus
<i>Verbascum densiflorum</i> Bertol.	flos	VII-VIII	meadows and pastures	widespread	flavonoids, saponins, mucus
<i>Verbascum phlomoides</i> L.	flos	VI-VIII	meadows and pastures	widespread	flavonoids, saponins, mucus
<i>Verbascum phoeniceum</i> L.	flos	V-VII	thermophilous forests and meadows	widespread	flavonoids, saponins
<i>Verbena officinalis</i> L.	herba	VI-VIII	ruderal places, in the crops	widespread	glycosides, essential oil, mucus
<i>Veronica beccabunga</i> L.	herba recens	V-VIII	streamsides and springs	widespread	flavonoids, glycosides
<i>Veronica officinalis</i> L. ■	herba	VI-VIII	forests	widespread	flavonoids, glycosides, tannins, organic acids
<i>Viburnum opulus</i> L.	cortex, fructus	III-IV, VII-IX	wet places in the forests	Stara Mt	saponins, resin, tannins, glycosides
<i>Vinca herbacea</i> Waldst. & Kit. ♣	folium, herba	III-V, IX	streamsides pastures and brush-woods	Belava, Basara, Vidlič, Smilovci, Kozarica	alkaloids, flavonoids
<i>Vinca minor</i> L.	folium, herba	III-IV, IX	brush-woods	spontaneous, grown in the gardens	alkaloids, flavonoids
<i>Viola odorata</i> L. ■	folium, flos, radix	III-IV, VIII	deciduous forests	widespread	saponins, bitter substance, mucus
<i>Viola tricolor</i> L.	herba	V-VIII	meadows and pastures	widespread	mucus, tannins, flavonoids

became very rare and endangered in their habitats. Their habitats are often additionally anthropogenically disturbed, and the survival of their populations in nature is at stake. As an example can be quoted *Gentiana lutea*, whose underground organs are used for obtaining of highly esteemed herbal drugs (*Gentianae radix*). Mentioned species has been observed at few sites in very poor and fragile populations of the Stara Mountain. Beside that herb, in the studied area was recorded presence of another 86 species whose underground parts (roots, rhizome, bulbs, tubers) are used for medicinal purposes, and whose populations are therefore extremely vulnerable. For their protection exploitation of lower intensity is recommended and also strict respect of procedures for collecting and harvesting species whose underground organs are used. Collection, use and market sales of certain number of medicinal species in the region are regulated by special legislation and can be considered as controlled. Strictly protected species recorded in the Pirot county are: *Adiantum capillus-veneris*, *Adonis vernalis*, *Cardamine amara*, *Drosera rotundifolia*, *Menyanthes trifoliata*, *Orchis laxiflora*, *Orchis militaris*, *Paeonia peregrina*, *Paeonia tenuifolia*, *Pinus mugo*, *Platanthera chlorantha*, *Pulsatilla montana* subsp. *bulgarica*, *Ruta graveolens*, *Swertia punctata*, *Vinca herbacea* ("Sluzbeni Glasnik Republike Srbije" 5 / 10). These plants are considered as threatened taxons of flora in Serbia, and almost exclusively, cannot be collected and used for any purpose. (Stevanović ed, 1999).

Medicinal plants that are under control of collection, use and trade in the market include a list of 66 species of Pirot County ("Sluzbeni glasnik Republike Srbije" 31/05, 45/05, 22/07, 38/08 9 / 10). On the basis of present study as well as official

records, special care in determining contingents for collection from nature is necessary for the following species: *Allium ursinum*, *Asarum europaeum*, *Achillea millefolium*, *Carlina acaulis*, *Inula helenium*, *Solidago virgaurea*, *Symphytum officinale*, *Gentiana asclepiadea*, *Gentiana cruciata*, *Hypericum barbatum*, *Hypericum perforatum*, *Iris pseudocorus*, *Origanum vulgare*, *Satureja kitaibelii*, *Ruscus aculeatus*, *Althaea officinalis*, *Polygonum bistorta*, *Primula elatior*, *Primula veris*, *Primula acaulis*, *Crataegus oxyacantha*, *Vaccinium myrtillus*.

Table 2. Summarized review of herbal drugs compared to the number of taxa recorded in Pirot County used as their biological source

Parts of plants containing medicinal substances	Number of plants
Aerial herbose part (Herba)	135
Leave (Folium)	92
Root (Radix)	44
Fruit (Fructus)	42
Flower or inflorescence (Flos)	39
Bark (Cortex)	29
Rhizome (Rhizoma)	27
Seed (Semen)	20
Tuber (Tuber)	13
Sap (Succus)	6
Bud (Gemma or Turio)	6
Stem (Stipes)	6
Bulb (Bulbus)	4
Stigma (Stigma)	3
Stalks (Petiolus)	1

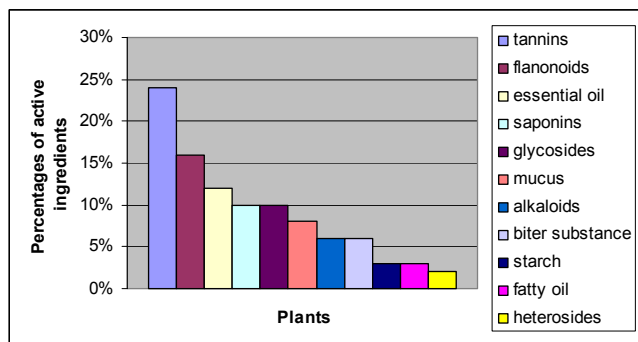


Fig. 1. Representation of the dominant active ingredients in medicinal plants in the Pirot County

Conclusion

On the basis of these findings, can be concluded that Pirot County medicinal flora is very rich and diverse, that includes 326 medicinal plant species. The largest part of the resource is available for rational exploitation during June. Among the species that were presented, 135 taxons in the region were recorded as a biological source for the herbal drugs. The most species as the main active ingredient contain compounds from the group of tannins (167). Toxic substances in higher concentrations are registered in 16,87% of general number of analyzed species.

Some representatives of the medical plants of the Pirot County are strictly protected by law (4,29%) or their collection, use and trade in the market is controlled (20,25%). Collection of protected species, species whose populations are rare and few in nature and species of which are used underground parts, should be considered in more rational way or recommend plantation grown.

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