

# MEDICINAL FLORA OF THE VIDLIČ MOUNTAIN IN SERBIA

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## ABSTRACT

**A study of medicinal flora of the Vidlič mountain situated in southeastern Serbia was conducted. The presence of 264 plant species, that are considered official or used in folk medicine is recorded. An overview of medicinal plants is given in a systematic order. For each herb species, main medicinal substances which enter in its chemical composition are listed. An overview of plant parts which are curative and which families contain the highest numbers of medicinal species, are presented. A special review of species that contain toxic substances, as well as species that have become so rare in their natural habitats by irrational exploitation in nature that they have been declared protected and strictly protected taxa in the Republic of Serbia is given.**

**Keywords:** Mt. Vidlič, Medicinal plants, Active ingredients, Protected species.

## INTRODUCTION

Vidlič mountain, which is situated in the Pirot's county, according with its position, exerts characteristics of the central Balkan area (Ćirić, 1971).

Within our homeland, Vidlič is peripheral mountain, crossed by Serbian-Bulgarian border. Its long and characteristic ridge, beginning above Pirot city, situated in NW-SE direction till the border with Bulgaria, but there doesn't end, continuing to the Bulgarian territory, all along Sofia (Martinović, 1979-1980).

The mountain Vidlič is a continuous belt of about 13 km long and of different widths from 250 to 1500 m (Marinkov, 1999). Its total length is 40 km according to Anđelković & Nikolić (1958).

The westernmost point of the study area on the river Temštica has coordinates: 43°12'2'' north geographical latitude and 22°33'4'' east geographical longitude, and the easternmost point close to the border with Bulgaria at village Vlkovija has coordinates: 43°5'5'' north geographical latitude and 22°55'1'' east geographical longitude (according to Greenwich).

Vidlič Mountain is a branch of Stara planina Mountains according to one group of authors (Mišić et al., 1978). Second group of authors (Vidanović, 1955; Martinović, 1979-1980) things that Vidlič has a separate orographic and tectonic whole, which is completely different from Stara Planina Mountains and Visok.

In geological term the mountain is almost completely built of limestone formations, with the best represented cretaceous and triassic layers.

The prevailing soil types are rendzina and calcomelanosol, which achieve different evolutionary forming phases (Antonović & Mrvić, 2008).

The climate is temperate continental, with hot summers and prominent drought periods, while the upper part of the mountain has features of a mountain climate (Ćirić, 1989).

Deciduous forest of hungarian and turkish oak (*Quercetum frainetto-cerris*) at low altitudes 500-600m, as one of the most widespread, considered to be climax in the region (Mišić et al., 1978). Different degradation stages of this community and its derivatives with oriental hornbeam (*Carpinus orientalis*) are well represented, in a larger extent on the mountain. Transitional belt between the oak (*Quercetum montanum*) and beech forests was noticed at upper altitudes 700-900m. The upper region of the mountain is covered by moesian beech forests (*Fagetum montanum moesiacum*), considered to be climate-regional community, over 1000m above sea level, to the highest altitude of the mountain, which is 1413 m (Marković et al., 2018). After the clear-cutting, and period of subsequent grazing, many types of meadows, xeric pastures and shrub-like vegetation of the rocky slopes were formed over the vast area of eroded slopes.

## THEORETICAL PART

The medicinal flora of the Vidlič Mountain has not been recorded and systematized yet.

The area of Pirot county was visited by our famous botanist Josif Pančić at the end of the XIX century. The first data of Vidlič flora originated since then and refer on the species which Pančić mentioned for Vidlič in the papers: "Flora Kneževine Srbije" and "Dodatak Flori Kneževine Srbije" (Marković, 2013). More intense study of plants of this region was performed by Lujo Adamović (Marković, 2013), in whose papers Vidlič is often mentioned.

Randelović et al. (1991) were studied the medicinal plants of Pirot county, and they were recorded the part of the medicinal plant from the Vidlič Mountain. In the monography „Lekovite biljke SR Srbije“ Sarić, ed. (1989) mentioned which plant species were found on Vidlič Mt.

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Aromatic flora of the Vidlič Mountain was especially systematized, where it was noticed 60 species with essential oil content (Marković, 2006; Marković et al., 2009). During the research of the resources of medicinal plants in the Pirot county, Marković et al. (2010a, 2010b) were noticed data of medicinal plants which are recorded on the Vidlič Mountain.

## EXPERIMENTAL

### Materials and methods

Field studies of medicinal flora of the Vidlič Mountain were carried out in the period 2002-2014. The list of medicinal flora was made according to the systematic order of the species according to Josifović (1970-1977). Only native representatives of the flora were included in the list of medicinal plants (Table1).

Some additional allochthonous (introduced, invasive and grown in the gardens) representatives of the flora were not included.

A detailed investigation of the medicinal flora included the area of mountain Vidlič in southeastern Serbia, south of the river Visočica and north of the river Nišava, east of the river Temštica and west of the border with Bulgaria. The result of field research was the plant material that was collected, herbarized, labeled and deposited in the "Herbarium Moesiacum Niš", Faculty of Science and Mathematics, University of Niš (HMN).

Identification of the collected plant material was performed according to the "Flora of SR Serbia" (Josifović, 1970-1977). The nomenclature is adjusted according to the "Flora Europaea" (Tutin, 1964-1980; 1993). The belonging to the group of medicinal plants was determined according to Sarić, ed. (1989).

**Table 2.** The list of medicinal plants of the Vidlič Mountain.

Family	Taxon	Compounds	Herbal drug
Equisetaceae	<i>Equisetum arvense</i> L.	mineral substances, flavonoids	Herba
Aspidiaceae	<i>Dryopteris filix-mas</i> (L.) Schott !	floroglucyne derivatives, tannins, fatty oil	Rhizome
Polypodiaceae	<i>Polypodium vulgare</i> L.	tannins, resin, fatty oil, saponins, sugars	Rhizome
Pinaceae	<i>Abies alba</i> Miller	essential oil	acicula, strobuli, cortex
	<i>Pinus nigra</i> Arnold	turpentine	Turio
Cupressaceae	<i>Juniperus communis</i> L. *	essential oil, tannins, flavonoids	fructus, lignum
Aristolochiaceae	<i>Asarum europaeum</i> L. *!	essential oil, tannins, glycosides, alkaloids	herba cum radicibus
Ranunculaceae	<i>Helleborus odorus</i> Waldst. & Kit. !	cardiotonic heterosides, saponins	rhizoma et radix
	<i>Nigella arvensis</i> L.	essential oil, saponins, pfatty oil	Semen
	<i>Nigella damascena</i> L.	essential oil, saponins, fatty oil	Semen
	<i>Aquilegia vulgaris</i> L.	cyanogenetic heterosides, vitamin C	semen, folium, flos
	<i>Hepatica nobilis</i> Schreber *!	tannins, saponins	herba, folium
	<i>Pulsatilla montana</i> (Hoppe) Reichenb. subsp. <i>bulgarica</i> Rummelsp. **!	saponins, tannins, resin	herba recens
	<i>Clematis vitalba</i> L.	glycosides, saponins	Herba
	<i>Clematis recta</i> L.	glycosides, saponins	Herba
	<i>Ranunculus ficaria</i> L.	mucus, essential oil, saponins	Tuber
	<i>Ranunculus repens</i> L. !	anemone-camphor, saponins	Herba
	<i>Ranunculus acris</i> L. !	anemone-camphor, saponins	Herba
	<i>Ranunculus bulbosus</i> L. !	anemone-camphor, saponins	Herba
	<i>Adonis vernalis</i> L. **!	cardiotonic glycosides	Herba
Berberidaceae	<i>Berberis vulgaris</i> L.	alkaloids, tannins, vitamin C	cortex, radix, folium, fructus
Papaveraceae	<i>Papaver dubium</i> L. !	alkaloids	Flos
	<i>Papaver rhoeas</i> L. !	alkaloids, anthocyanins, mucus	Flos
	<i>Chelidonium majus</i> L.	alkaloids, flavonoids, saponins	radix, herba
	<i>Corydalis cava</i> (L.) Schweigger & Körte subsp. <i>marschalliana</i> (Willd.) Hayek !	alkaloids	Tuber
	<i>Corydalis solida</i> (L.) Clairv. !	alkaloids	Tuber
	<i>Fumaria officinalis</i> L. !	alkaloids	Herba
Ulmaceae	<i>Ulmus glabra</i> Hudson	tannins, mucus, bitter substance	Cortex

Family	Taxon	Compounds	Herbal drug
Moraceae	<i>Morus alba</i> L.	vitamins, pectins, rubbers	folium, fructus recens
Cannabaceae	<i>Humulus lupulus</i> L.	resin, tannins, essential oil, flavonoids	Strobuli
Urticaceae	<i>Urtica dioica</i> L.	vitamins, tannins	folium, radix, semen
Fagaceae	<i>Fagus moesiaca</i> (K.Maly) Czech.	phenolic derivatives, hydrocarbons, organic acids, resin	cortex
	<i>Quercus cerris</i> L.	tannins, catechin, flavonoids	cortex
	<i>Quercus petraea</i> (Mattuschka) Liebl.	tannins, catechin, flavonoids	cortex
	<i>Quercus frainetto</i> Ten.	tannins, catechin, flavonoids	cortex
	<i>Quercus pubescens</i> Willd.	tannins, catechin, flavonoids	cortex
Betulaceae	<i>Betula pendula</i> Roth. *	flavonoids, tannins, resin, saponins, essential oil	gemmae, folium
Corylaceae	<i>Corylus colurna</i> L.*	tannins, flavonoids, fatty oil	cortex, folium, semen
	<i>Corylus avelana</i> L.	tannins, flavonoids, fatty oil	cortex, folium, semen
Juglandaceae	<i>Juglans regia</i> L.	tannins, nafttchynone derivatives, flavonoids, vitamin C, essential oil	folium, fructus
Caryophyllaceae	<i>Herniaria glabra</i> L. *	saponins, flavonoids, coumarins, tannins	herba
	<i>Herniaria hirsuta</i> L. *	saponins, flavonoids, coumarins, tannins	herba
	<i>Saponaria officinalis</i> L.	saponins, sugars	radix, herba
Polygonaceae	<i>Polygonum aviculare</i> L.	flavonoids, tannins, mucus	herba
	<i>Persicaria hydropiper</i> (L.) Delarbre	flavonoids, tannins, organic acids	herba
	<i>Rumex crispus</i> L.	calcium oxalate	radix, folium
	<i>Rumex sanguineus</i> L.	calcium oxalate	radix, folium,
	<i>Rumex acetosa</i> L.	calcium oxalate	radix, folium
Paeoniaceae	<i>Paeonia tenuifolia</i> L. **!	alkaloids, tannins	flos, radix
	<i>Paeonia peregrina</i> Miller **!	alkaloids, tannins	flos, radix
Hypericaceae	<i>Hypericum hirsutum</i> L.	flavonoids, tannins, essential oil	herba
	<i>Hypericum perforatum</i> L. *	flavonoids, tannins, essential oil	herba
	<i>Hypericum barbatum</i> Jacq. *	flavonoids, tannins, essential oil	herba
Vioaceae	<i>Viola odorata</i> L. *	saponins, bitter substance, mucus	folium, flos, radix
	<i>Viola tricolor</i> L.	mucus, tannins, flavonoids	herba
Brassicaceae	<i>Sisymbrium officinale</i> (L.) Scop.	sulfuric glycosides, vitamin C	herba recens, folium recens
	<i>Nasturtium officinale</i> R. Br.	sulfuric heterosides, vitamins	herba recens, folium recens
	<i>Cardamine pratensis</i> L.	sulfuric glycosides, vitamin C, carotene	folium
	<i>Cardamine impatiens</i> L.	sulfuric glycosides, vitamin C, carotene	stipes, folium
	<i>Cardamine flexuosa</i> With.	sulfuric glycosides, vitamin C, carotene	stipes, folium
	<i>Capsella bursa-pastoris</i> (L.) Medicus	flavonoids, tannins	herba
	<i>Sinapis arvensis</i> L.	fatty oil, sinapin	semen
Resedaceae	<i>Reseda luteola</i> L.	flavonoids, sulfuric glycosides	herba
	<i>Reseda lutea</i> L.	flavonoids, sulfuric glycosides	herba
Salicaceae	<i>Populus tremula</i> L.	flavonoids, salicin	cortex, gemmae
	<i>Populus nigra</i> L.	resin, flavonoids	cortex, gemmae
	<i>Salix alba</i> L.	glycosides, flavonoids, tannins	cortex
	<i>Salix cinerea</i> L.	glycosides, flavonoids, tannins	cortex
	<i>Salix caprea</i> L.	glycosides, flavonoids, tannins	cortex

Family	Taxon	Compounds	Herbal drug
	<i>Salix purpurea</i> L.	glycosides, flavonoids, tannins	cortex
Primulaceae	<i>Lysimachia nummularia</i> L.	bitter substance, tannins, saponins	herba
	<i>Lysimachia punctata</i> L.	tannins, saponins, flavonoids	herba
	<i>Lysimachia vulgaris</i> L.	tannins, saponins, flavonoids	herba
	<i>Anagallis arvensis</i> L. !	saponins, tannins	herba
	<i>Primula veris</i> L. *	saponins, glycosides, starch, tannins	flos, rhizoma cum radicibus
Tiliaceae	<i>Tilia tomentosa</i> Moench. *	mucus, tannins, mannitol	flos cum bracteis
Malvaceae	<i>Malva sylvestris</i> L.	mucus, tannins, anthocyanins	folium, flos
	<i>Malva neglecta</i> Wallr.	mucus, tannins, anthocyanins	folium, flos
Euphorbiaceae	<i>Euphorbia helioscopia</i> L. !	bitter - hot substances	semen, succus
	<i>Euphorbia cyparissias</i> L. !	bitter - hot substances	semen, succus
	<i>Euphorbia amygdaloides</i> L. !	bitter - hot substances	semen
Thymeleaceae	<i>Daphne mezereum</i> L. !	resin, flavonoids, glycosides, coumarins	cortex
Rosaceae	<i>Filipendula vulgaris</i> Moench	essential oil, tannins,	herba, folium, rhizoma
	<i>Filipendula ulmaria</i> (L.) Maxim.	essential oil, tannins, glycosides	folium
	<i>Rubus idaeus</i> L.	tannins, organic acids, flavonoids	folium, fructus recens
	<i>Rubus caesius</i> L.	tannins, organic acids, flavonoids	folium
	<i>Rosa canina</i> L. *	vitamins, pectins, tannins, glycosides, organic acids	fructus
	<i>Agrimonia eupatoria</i> Ledeb.	tannins, bitter substance	herba
	<i>Sanguisorba officinalis</i> L.	tannins, starch, saponins	rhizoma cum radicibus
	<i>Sanguisorba minor</i> Scop.	tannins, starch, saponins, sterols	rhizoma cum radicibus, herba
	<i>Geum urbanum</i> L.	tannins, flavonoids	rhizoma cum radicibus
	<i>Potentilla recta</i> L.	tannins, resin	rhizoma
	<i>Potentilla erecta</i> (L.) Rauschel *	tannins, saponins, resin, starch, flobaphens	rhizoma
	<i>Potentilla reptans</i> L.	tannins, resin	rhizoma
	<i>Fragaria vesca</i> L. *	tannins, flavonoids	folium, fructus
	<i>Alchemilla</i> sp. div. *	tannins, bitter substance	herba, folium
	<i>Cydonia oblonga</i> Miller	organic acids, vitamin C, tannins, mucu	folium, fructus, semen
	<i>Malus sylvestris</i> Miller	vitamins, iodine	fructus, semen
	<i>Sorbus aucuparia</i> L.	tannins, vitamins, organic acids	fructus
	<i>Sorbus torminalis</i> (L.) Crantz	tannins, vitamins, organic acids	fructus
	<i>Sorbus aria</i> (L.) Crantz	tannins, vitamins, rubbers	fructus
	<i>Crataegus monogyna</i> Jacq. *	flavonoids	flos, folium, fructus
	<i>Crataegus laevigata</i> (Poiret) DC. *	flavonoids	flos, folium, fructus
	<i>Prunus spinosa</i> L.	flavono ids, glycosides; tannins, anthocyanins, pectins	flos, fructus
	<i>Prunus avium</i> L.	glycosides	fructus, petiolus
Grossulariaceae	<i>Ribes uva-crispa</i> L. *	vitamins, carotenes	folium, fructus
Crassulaceae	<i>Hylotelephium telephium</i> (L.) Ohba	alkaloids, flavonoids, tannins, organic acids	herba recens
	<i>Sedum acre</i> L.	alkaloids, flavonoids, tannins, organic acids	herba recens
Fabaceae	<i>Ononis spinosa</i> L.	glycosides, triperpens, essential oil	radix

Family	Taxon	Compounds	Herbal drug
	<i>Medicago lupulina</i> L.	vitamins	folium
	<i>Medicago falcata</i> L.	vitamins	folium
	<i>Melilotus officinalis</i> (L.) Pallas	coumarins, flavonoids, tannins	herba
	<i>Anthyllis vulneraria</i> L. *	tannins, saponins, flavonoids	flos, herba
	<i>Genista tinctoria</i> L.	alkaloids, flavonoids, essential oil	herba
	<i>Coronilla varia</i> L. !	heterosides	herba
	<i>Coronilla scorpioides</i> (L.) Koch !	heterosides	herba
Lythraceae	<i>Lythrum salicaria</i> L.	glycosides, tannins, flavonoids, mucus	herba
Oenotheraceae	<i>Epilobium parviflorum</i> Schreber *	tannins, flavonoids, mucus	herba, folium
	<i>Epilobium angustifolium</i> L.	tannins, flavonoids, mucus	herba, folium
Anacardiaceae	<i>Cotinus coggygria</i> Scop. !	tannins, flavonoids	folium
Rutaceae	<i>Dictamnus albus</i> L.	essential oil, alkaloids, bitter substance	herba, radix
Aceraceae	<i>Acer tataricum</i> L.	tannins	cortex, folium
	<i>Acer platanoides</i> L.	glycosides	succus
Zygophyllaceae	<i>Tribulus terrestris</i> L.	saponins, flavonoids	herba, fructus
Oxalidaceae	<i>Oxalis acetosella</i> L. !	flavone heterosides, oxalyc acid	folium
Geraniaceae	<i>Geranium macrorrhizum</i> L. *	essential oil, tannins, flavonoids, pectins, rubbers	rhizoma
	<i>Geranium robertianum</i> L. *	tannins, flavonoids, resin, organic acids	herba
	<i>Erodium cicutarium</i> (L.) L'Hér.	tannins, flavonoids	herba
Polygalaceae	<i>Polygala amara</i> L.	saponins, bitter substance	herba
	<i>Polygala vulgaris</i> L.	saponins, bitter substance	herba
Cornaceae	<i>Cornus mas</i> L. *	tannins, pectins, organic acids	cortex, folium, fructus
	<i>Cornus sanguinea</i> L.	fatty oil	semen
Araliaceae	<i>Hedera helix</i> L. !	saponins	folium, stipes, cortex, fructus
Apiaceae	<i>Sanicula europaea</i> L.	bitter substance, tannins, saponins	radix, herba
	<i>Eryngium campestre</i> L.	saponins, tannins, essential oil	radix
	<i>Carum carvi</i> L.	essential oil, fatty oil, proteins, carbohydrates	fructus
	<i>Pimpinella saxifraga</i> L.	essential oil, coumarins, saponins, tannins	radix
	<i>Aegopodium podagraria</i> L.	essential oil, vitamin C	herba
	<i>Angelica sylvestris</i> L.	essential oil, resin, bitter substance	radix, fructus
	<i>Peucedanum longifolium</i> Waldst. & Kit.	bitter substance, essential oil	herba, radix
	<i>Pastinaca sativa</i> L. ssp. <i>urens</i> (Req. ex Godron) Čelak.	essential oil, fatty oil, coumarins, flavonoids	fructus, radix
	<i>Heracleum sphondylium</i> L.	essential oil, arginine	radix, folium, flos
	<i>Daucus carota</i> L.	carotenes, vitamins, pectins; essential oil, fatty oil	radix, fructus
	<i>Conium maculatum</i> L. !	alkaloids	folium, herba, fructus
Celastraceae	<i>Evonymus europaeus</i> L. !	alkaloids	cortex, stipes, folium, fructus
Rhamnaceae	<i>Rhamnus cathartica</i> L.	anthraquinones, flavonoids, pectins, glycosides, mucus	fructus
Apocynaceae	<i>Vinca minor</i> L.	alkaloids, flavonoids	folium, herba
	<i>Vinca herbacea</i> Waldst. & Kit. **	alkaloids, flavonoids	folium, herba
Asclepiadaceae	<i>Vincetoxicum hirundinaria</i> Medicus !	toxic compounds (vincetoxin), resin	rhizoma
Gentianaceae	<i>Centaurium erythraea</i> Rafin. *	glycosides, flavonoids	herba
	<i>Gentiana cruciata</i> L. *	bitter substance, tannins, glycosides	herba

Family	Taxon	Compounds	Herbal drug
Oleaceae	<i>Fraxinus ornus</i> L.	sugars (mannitol), mineral substances, resin	succus (manna)
	<i>Fraxinus excelsior</i> L.	tannins, flavonoids, coumarins, resin	cortex, folium, semen
	<i>Ligustrum vulgare</i> L. !	tannins, essential oil	cortex, folium, fructus
Menyanthaceae	<i>Menyanthes trifoliata</i> L.**	heterosides, tannins	folium
Rubiaceae	<i>Galium odoratum</i> (L.) Scop. *	coumarin heterosides, bitter substance, tannins	herba
	<i>Galium verum</i> L.	glycosides, tannins, saponins	herba
Caprifoliaceae	<i>Viburnum opulus</i> L.	saponins, resin, tannins, glycosides	cortex, fructus
	<i>Sambucus ebulus</i> L.	cyanogenetic heterosides, bitter substance	radix, folium, fructus
	<i>Sambucus nigra</i> L.	mucus, flavonoids, essential oil, tannins	flos, fructus
Valerianaceae	<i>Valeriana officinalis</i> L.	essential oil, tannins, starch	rhizoma cum radicibus
Convolvulaceae	<i>Cuscuta europaea</i> L.	not studied	herba
	<i>Cuscuta epithimum</i> (L.) L.	not studied	herba
Boraginaceae	<i>Cynoglossum officinale</i> L.	alkaloids, tannins	herba, radix
	<i>Symphytum officinale</i> L. *	mucus, tannins, starch	radix
	<i>Anchusa officinalis</i> L.	alkaloids, tannins, mucus	herba
	<i>Pulmonaria officinalis</i> L. *	mucus, mineral substances, tannins, flavonoids	herba
Solanaceae	<i>Atropa bella-donna</i> L. !	alkaloids	radix, folium
	<i>Hyoscyamus niger</i> L. !	alkaloids	folium, semen
	<i>Solanum dulcamara</i> L. !	alkaloids, glycosides, tannins	stipes
	<i>Solanum nigrum</i> L. !	alkaloids, tannins, saponins	herba, fructus
	<i>Datura stramonium</i> L. !	alkaloids	folium, semen
Scrophulariaceae	<i>Verbascum phlomoides</i> L.	flavonoids, saponins, mucus	flos
	<i>Verbascum phoeniceum</i> L.	flavonoids, saponins	flos
	<i>Linaria vulgaris</i> Miller !	alkaloids, glycosides	herba
	<i>Scrophularia nodosa</i> L. !	glycosides, tannins	herba
	<i>Veronica officinalis</i> L. *	flavonoids, glycosides, tannins, organic acids	herba
	<i>Veronica beccabunga</i> L.	flavonoids, glycosides	herba recens
	<i>Digitalis ferruginea</i> L. !	cardiotonic glycosides, saponins, flavonoids	folium
	<i>Digitalis lanata</i> Ehrh. !	cardiotonic glycosides, saponins, flavonoids	folium
	<i>Euphrasia rostkoviana</i> Hayne *	glycosides, tannins, resin	herba
	<i>Euphrasia stricta</i> D. Wolff ex J. F. Lehm. *	glycosides, tannins, resin	herba
Plantaginaceae	<i>Plantago major</i> L.	glycosides, tannins, mucus	folium
	<i>Plantago media</i> L.	glycosides, tannins, mucus	folium
	<i>Plantago lanceolata</i> L.	glycosides, tannins, mucus, flavonoids	folium
Verbenaceae	<i>Verbena officinalis</i> L.	glycosides, essential oil, mucus	herba
Lamiaceae	<i>Ajuga reptans</i> L.	tannins, phenolic acids	herba
	<i>Teucrium chamaedrys</i> L. *	essential oil, tannins, flavonoids	herba
	<i>Teucrium montanum</i> L. *	bitter substance, tannins, mineral substances, essential oil	herba
	<i>Teucrium polium</i> L.	essential oil, tannins	herba
	<i>Marrubium vulgare</i> L. *	lactone marubin, essential oil, tannins	herba
	<i>Nepeta cataria</i> L.	essential oil, tannins, saponins, glycosides	herba



Family	Taxon	Compounds	Herbal drug
	<i>Nepeta nuda</i> L.	essential oil, tannins, saponins, glycosides	herba
	<i>Glechoma hederacea</i> L.	tannins, bitter substance, essential oil	herba
	<i>Glechoma hirsuta</i> Waldst. & Kit.	bitter substance, tannins, essential oil	herba
	<i>Prunella vulgaris</i> L.	tannins, flavonoids, saponins	herba
	<i>Melittis melissophyllum</i> L.	essential oil, coumarins, flavonoids	herba
	<i>Galeopsis pubescens</i> Besser	bitter substance, tannins, glycosides	herba
	<i>Galeopsis speciosa</i> Miller	tannins, saponins	herba
	<i>Lamium purpureum</i> L.	saponins, mucus, flavonoids, essential oil	herba
	<i>Leonurus cardiaca</i> L. *	glycosides, alkaloids, tannins, saponins	herba
	<i>Ballota nigra</i> L.	bitter substance, tannins, essential oil	herba
	<i>Stachys officinalis</i> (L.) Trevisan	tannins, glycosides, saponins	herba
	<i>Stachys sylvatica</i> L.	tannins, saponins	herba
	<i>Stachys recta</i> L.	tannins, saponins	herba
	<i>Salvia glutinosa</i> L.	essential oil, bitter substance	folium
	<i>Salvia sclarea</i> L.	essential oil, bitter substance	folium
	<i>Salvia pratensis</i> L.	essential oil, bitter substance	folium
	<i>Salvia nemorosa</i> L.	essential oil, bitter substance	folium
	<i>Melissa officinalis</i> L.	essential oil, flavonoids	folium
	<i>Saureja kitaibelii</i> Wierzb. *	essential oil	herba
	<i>Calamintha officinalis</i> Moench	tannins, bitter substance, essential oil	herba
	<i>Calamintha nepeta</i> (L.) Savi	essential oil	herba
	<i>Hyssopus officinalis</i> L.	essential oil, flavonoids, tannins	herba
	<i>Origanum vulgare</i> L. *	essential oil, tannins	herba
	<i>Thymus</i> sp. div.	essential oil, tannins, bitter substance, flavonoids	herba
	<i>Lycopus europaeus</i> L.	bitter substance, tannins	herba
	<i>Mentha piperita</i> L.	essential oil, tannins, flavonoids	folium
	<i>Mentha pulegium</i> L.	essential oil, tannins, bitter substance	herba
Campanulaceae	<i>Campanula glomerata</i> L.	not studied	herba
	<i>Campanula rapunculus</i> L.	inulin	herba, radix
	<i>Campanula trachelium</i> L.	not studied	herba
Asteraceae	<i>Eupatorium cannabinum</i> L.	essential oil, resin, tannins	radix, herba
	<i>Solidago virgaurea</i> L. * !	tannins, flavonoids, saponins, essential oil	herba
	<i>Bellis perennis</i> L.	bitter substance, tannins, saponins	herba, flos, folium
	<i>Telekia speciosa</i> (Schreber) Baumg.	essential oil, bitter compounds, inulin	radix
	<i>Achillea clypeolata</i> Sibth. & Sm. *	tannins	folium, flos
	<i>Achillea crithmifolia</i> Waldst. & Kit.	bitter substance, essential oil	herba, flos, folium
	<i>Achillea millefolium</i> L. *	bitter substance, essential oil	herba, flos, folium
	<i>Matricaria chamomilla</i> L.	essential oil, flavonoids, coumarins, mucus	flos
	<i>Tanacetum vulgare</i> L.	essential oil, flavonoids, tannins, bitter compounds	flos, herba
	<i>Artemisia vulgaris</i> L.	essential oil, bitter substance, tannins	herba
	<i>Artemisia pontica</i> L. *	essential oil, bitter substance	herba
	<i>Artemisia alba</i> Turra	essential oil, flavonoids, bitter substance	herba
	<i>Tussilago farfara</i> L.	mucus, inulin, tannins, flavonoids	flos, folium

Family	Taxon	Compounds	Herbal drug
	<i>Petasites hybridus</i> (L.) P. Gaertn., B. Mey. & Scherb. *	essential oil, flavonoids, mucus, tannins	radix, folium
	<i>Carlina acaulis</i> L. *	inulin, essential oil, tannins, resin	radix
	<i>Arctium tomentosum</i> Miller	inulin, mucus, essential oil, fatty oil, tannins	radix
	<i>Arctium lappa</i> L. *	inulin, mucus, essential oil, fatty oil, tannins	radix
	<i>Centaurea cyanus</i> L.	anthocyanins, glycosides, tannins	flos
	<i>Cichorium intybus</i> L.	inulin, glycosides, tannins, pectins	herba, radix
	<i>Taraxacum officinale</i> Weber	glycosides, resin, mucus, inulin	radix, herba
	<i>Hieracium pilosella</i> L.	tannins, flavonoids, coumarins, resin, mucus	herba cum radicibus
Liliaceae	<i>Veratrum album</i> L.	alkaloids	rhizoma
	<i>Veratrum nigrum</i> L. *	alkaloids	rhizoma
	<i>Colchicum autumnale</i> L. * !	alkaloids	semen, tuber
	<i>Lilium martagon</i> L. *	mucus, essential oil	folium, flos, bulbus
	<i>Allium ursinum</i> L. *	sulfuric essential oil, vitamins, mineral substances	herba recens, bulbus recens
	<i>Convallaria majalis</i> L. !	cardiotonic glycosides, saponins, flavonoids	herba, folium, flos
Amaryllidaceae	<i>Galanthus nivalis</i> L. * !	choline, phytosterol	bulbus, folium, flos
Asparagaceae	<i>Asparagus officinalis</i> L.	asparagine, saponins	rhizoma, radix
Iridaceae	<i>Crocus tommasinianus</i> Herbert !	alkaloids, carotenoids	stigma
	<i>Crocus adamii</i> Gay !	alkaloids, carotenoids	stigma
Dioscoreaceae	<i>Tamus communis</i> L. !	alkaloids, starch, mucus, calcium oxalate, saponins	rhizoma recens
Orchidaceae	<i>Orchis morio</i> L. *	mucus	tuber
	<i>Orchis simia</i> Lam. *	mucus, starch	tuber
	<i>Orchis militaris</i> L. **	mucus, starch	tuber
	<i>Orchis laxiflora</i> Lam. **	mucus	tuber
	<i>Anacamptis pyramidalis</i> (L.) L. C. M. Richard *	mucus, starch, proteins	tuber
	<i>Gymnadenia conopsea</i> (L.) R.Br. *	mucus, starch	tuber
	<i>Platanthera bifolia</i> (L.) L. C. M. Richard *	mucus, starch	tuber
	<i>Platanthera chlorantha</i> (Custer) Reichenb. **	mucus, starch	tuber
Poaceae	<i>Elymus repens</i> (L.) Gould	carbohydrates, mucus, sugar alcohols, saponins	rhizoma
Araceae	<i>Arum maculatum</i> L. !	starch	rhizoma

Legend:

\* - protected species (Prilog II) according to National legislative "Službeni glasnik Republike Srbije br. 5/2010, 47/2011, 32/2016, 98/2016 ; \*\* - strictly protected species (Prilog I) according to National legislative Službeni glasnik Republike Srbije br. 5/2010, 47/2011, 32/2016, 98/2016);

! – plant species with content of toxic substances.

## NUMERICAL RESULTS

We are noted 264 plants on Vidlič Mt. that are considered medicinal according to Sarić ed. (1989) in our country (tab. 1.). The group of medicinal plants in Serbia includes 420 species (Sarić, 1989). Complete taxonomic analysis of the medicinal flora at Svrliški Timok gorge in Eastern Serbia was

done by Zlatković & Bogosavljević (2014). They found that the flora of medicinal plant at Svrliški Timok gorge includes 190 taxa.

Families that contain the largest number of plants on Vidlič Mt. are: Lamiaceae (33), Rosaceae (23), Asteraceae (21), Ranunculaceae (13), Apiaceae (11), Scrophulariaceae (10). Similar results about number of medicinal taxa per



families were found Zlatković & Bogosavljević (2014) in the flora of Svrljiški Timok, where the families with the greatest number of medicinal representatives were Lamiaceae (32 taxa), Asteraceae (20 taxa) and Rosaceae (14 taxa). In the flora of Serbia families that contain the largest number of taxa are also Lamiaceae (16,2%), Asteraceae (12%) and Rosaceae (9%) (Sarić, 1989). The results about utilization of medicinal plants from different families were found by Zlatković et al. (2014) at Mt. Rtanj in Eastern Serbia. According to their results the plants from families Lamiaceae (22%), Rosaceae (20%) and Asteraceae (30%) are most commonly used in traditional medicine.

Aerial herbose part (herba) is most commonly used for medicinal purposes (112 plants). Leave (folium) is used from 70 plants, root (radix) from 33 plants, flower or inflorescence (flos) from 29 plants, fruit (fructus) from 28 plants. Review of plant parts that are medicinal with the number of taxa is given in the table 2.

The largest number of medicinal plants contains tannins as active medicinal substances (118 plants), followed by plants with content of flavonoids (80 plants), essential oils (67 plants), saponins (49 plants), glycosides (38 plants), mucus (37 plants), alkaloids (32 plants), bitter substances (32 plants) vitamins (19 plants) (Graph. 1).

Table 2. Review of herbal drugs with the number of taxa recorded on Vidlič Mt.

Medicinal parts of plants	Number of plants
herba - aerial herbose part	112
folium – leave	70
radix – root	33
flos – flower or inflorescence	29
fructus – fruit	28
cortex – bark	24
rhizoma – rhizome	20
semen – seed	17
tuber – tuber	11
succus – sap	4
stipes – stem	4
gemma, turio – bud	2
bulbus – bulb	2
stigma – stigma	2
petiolus – stalks	2

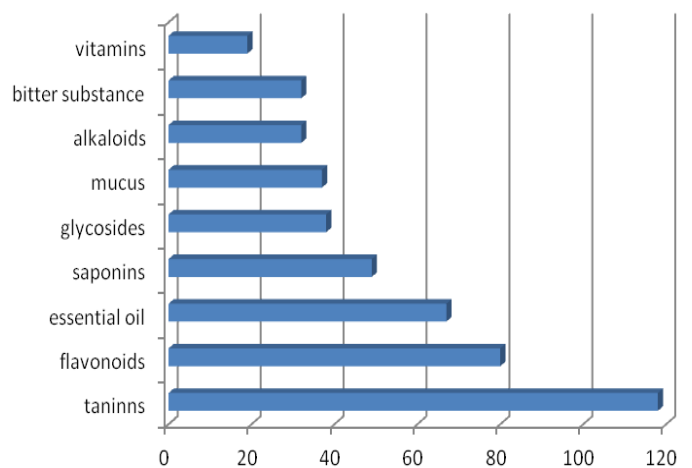


Figure 1. Review of dominant active substances with the number of medicinal plants of the Vidlič Mountain.

Particular attention was given to the plants with content of toxic substances, as well as rare and protected species.

42 plant species (15,91% of the total number of species) contain very toxic substances, so caution is advised in their use.

55 plant species (20,83%) are protected, and 9 species (3,41%) have become so rare with irrational exploitation, and they are strictly protected, with regulation named „Pravilnik o proglašenju i zaštiti strogo zaštićenih i zaštićenih divljih vrsta biljaka, životinja i gljiva“ (Službeni glasnik Republike Srbije br. 5/2010, 47/2011, 32/2016, 98/2016) Strictly protected species recorded on the Vidlič Mt. (*Pulsatilla montana* subsp. *bulgarica*, *Adonis vernalis*, *Paeonia tenuifolia*, *Paeonia peregrina*, *Vinca herbacea*, *Menyanthes trifoliata*, *Orchis militaris*, *Orchis laxiflora* and *Platanthera chlorantha*) are considered as threatened taxons of flora in Serbia, and almost exclusively, cannot be collected and used any purpose (Stevanović ed, 1999).

## CONCLUSION

In comparison with several well done, published studies on medicinal flora in surrounding limestone areas of southeastern Serbia, medicinal flora on Vidlič Mt. is very rich and diverse, that includes 264 medicinal plant species. Family Lamiaceae is the richest with medicinal plants. Aerial herbose parts of plants in bloom are produced mostly. The largest number of medicinal plant species of the Vidlič Mt. as a core group of active ingredients containing tannins.

Toxic substances in higher concentrations are registred in 15,91% of analyzed species. Some representatives of the medicinal plants of Vidlič Mt. are strictly protected (3,41%), and 20,83% species are protected.

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