

# TREATMENT OF HEART AND CIRCULATION DISORDERS USING AUTOCHTHONOUS MEDICINAL PLANTS OF LITHUANIA

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## Annotation

*In phytotherapical literature medicinal plants are divided to groups by their remedial features, effects and suitability for treatment of disorders and diseases. In literature sources (various publications of Lithuanian authors) 107 species of medicinal plants are recommended for treatment of these disorders. In separate publications the number of species for treatment of heart and circulation disorders is varied quite strong (4-54 species). 12 most frequent species of autochthonous medicinal plants of Lithuania (each of them was mentioned not less than in 7 publications) are recommended for treatment: Leonurus cardiaca, Convallaria majalis, Crataegus monogyna, Valeriana officinalis, Gnaphalium uliginosum, Fragaria vesca, Capsella bursa-pastoris, Hypericum perforatum, Viscum album, Polygonum aviculare, Berberis vulgaris, Viburnum opulus.*

**Key words:** autochthonous plants, medicinal plants, phytotherapy, heart disorders, circulation disorders.

## Introduction

In phytotherapeutic literature medicinal plants are divided to groups by their remedial features, effects and suitability for treatment of disorders and diseases. Medical plant group for treatment of heart and circulation disorders was analysed. In 14 literature sources 107 plant species were recommended for treatment of these disorders.

**Problem:** In these days heart and circulation disorders are one of most spread and many people suffer from these. Not only synthetic drugs, but drugs produced from plant raw are using for treatment too. On purpose to use most effective drugs, it is necessary to know medicinal plants most suitable for treatment of heart and circulation disorders.

**Object:** Autochthonous medicinal plant species of Lithuania.

**Goal:** On the basis of Lithuanian authors publications to draw up the list of autochthonous medicinal plant species of Lithuania using for treatment of heart and circulation disorders.

**Objectives:** To explore medicinal plant species using for treatment of heart and circulation disorders in such aspects: 1) active compounds; 2) remedial effects; 3) applying in official medicine and phytotherapy.

**Methods:** Analysis of scientific information sources, comparative analysis of Lithuanian authors phytotherapeutic data. The frequency of species recommended for treatment of disorders in scientific information sources is measured using *recommendation points* (the number of publications, where species are recommended for treatment of disorders of the same phytotherapeutic group). Phytotherapeutic group is the group of plant species, which by their remedial (therapeutic) features, effects or suitability are recommended for treatment of disorders of appropriate organ system. All Latin names of vascular plant species are cited by *Lietuvos induočių augalų sąvadas* (Gudžinskas, 1999) indexed regarding to requirements of International Botanic Nomenclature.

## 1. Phytotherapeutic classification of medicinal plants

The authors of 14 publications<sup>1</sup> on Lithuanian medicinal plants (Budnikas, Obelevičius, 2015; Dudėnas, Grinevičius et al., 1976; Grybauskas, 1927, 1946; Gudanavičius, 1960; Gudžinskas, Balvočiūtė, 2008; Jaskonis, 1996; Kalasauskienė, 2009; Kaunienė, Kaunas, 1991; Pipinys (ed.), 1973; Ragažinskienė, Rimkienė et al., 2005; Sasnauskas, 2002a, 2002b;

<sup>1</sup> On purpose to unify the data the publications of the same author published in several years were equated to one information source (e.g. Grybauskas, 1927, 1946; Sasnauskas, 2002a, 2002b; Vasiliauskas, 1991, 2015) and medicinal plants described thereat are presented in the single column (Table 1).

Stirbys, 2006; Šimkūnaitė, 1971; Vasiliauskas, 1991, 2015) were grouped medicinal plants according to their remedial (therapeutic) features, effects or suitability for treatment of appropriate organ systems. The number of separated groups in every publication differs and varies from 13 to 26. One of these is group of medicinal plants using for treatment of heart and circulating disorders. Medicinal plants for treatment of atherosclerosis and hypertension are included into this group too.

Systematised information about medicinal plants recommended for treatment of disorders of respiratory tracts is presented in other paper of authors (Motiekaitytė, Venckus, 2018).

## 2. Medicinal plants for treatment of heart and circulation disorders

In 14 publications 107 species of autochthonous medicinal plant species of Lithuania were recommended for treatment of mentioned disorders (Table 1). In separate publications the number of species varies strongly – from 4 (Budnikas, Obelevičius, 2015) to 54 (Kalasauskienė, 2009).

Table 1

Autochthonous medicinal plant species of Lithuania using for treatment of heart and circulation disorders

Serial Number	Species	References																The number of recommendation points
		Ph. Eur., 2016	Ph.Russ., 1990	Budnikas et al., 2015	Dudėnas et al., 1976	Grybauskas, 1927, 1946	Gudanavičius, 1960	Gudžinskas et al., 2008	Jaskonis, 1996	Kalasauskienė, 2009	Kaunienė et al., 1991	Ragažinskienė et al., 2005	Pipyns (ed.), 1973	Sasnauskas, 2002a, 2002b	Stirbys, 2006	Šimkūnaitė, 1971	Vasiliauskas, 1991, 2015	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	<i>Leonurus cardiaca</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	13
2.	<i>Convallaria majalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	12
3.	<i>Crataegus monogyna</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	12
4.	<i>Valeriana officinalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	11
5.	<i>Gnaphalium uliginosum</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
6.	<i>Fragaria vesca</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	9
7.	<i>Capsella bursa-pastoris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	8
8.	<i>Hypericum perforatum</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	8
9.	<i>Viscum album</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	8
10.	<i>Polygonum aviculare</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	8
11.	<i>Berberis vulgaris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	7
12.	<i>Viburnum opulus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	7
13.	<i>Cichorium intybus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
14.	<i>Mellilotus officinalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
15.	<i>Oxyccoccus palustris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
16.	<i>Ribes nigrum</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
17.	<i>Tanacetum vulgare</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
18.	<i>Vaccinium vitis-idaea</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
19.	<i>Taraxacum officinale</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	6
20.	<i>Equisetum arvense</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	5
21.	<i>Digitalis grandiflora</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	5
22.	<i>Lamium album</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	5
23.	<i>Urtica dioica</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	5
24.	<i>Achillea millefolium</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
25.	<i>Artemisia absintium</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
26.	<i>Astragalus glycyphyllos</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
27.	<i>Bidens tripartita</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
28.	<i>Calluna vulgaris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
29.	<i>Centaurium erythraea</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
30.	<i>Corylus avellana</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
31.	<i>Crataegus rhipidophylla</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
32.	<i>Erysimum cheiranthoides</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
33.	<i>Filipendula ulmaria</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
34.	<i>Ledum palustre</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
35.	<i>Plantago major</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
36.	<i>Rubus idaeus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
37.	<i>Sorbus aucuparia</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	4
38.	<i>Betula pubescens</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
39.	<i>Elytrigia repens</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
40.	<i>Galium verum</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
41.	<i>Humulus lupulus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
42.	<i>Malus sylvestris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
43.	<i>Parnassia palustris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
44.	<i>Rosa canina</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
45.	<i>Rosa majalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
46.	<i>Tilia cordata</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
47.	<i>Trifolium pratense</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
48.	<i>Viola tricolor</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	3
49.	<i>Alchemilla vulgaris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2
50.	<i>Angelica archangelica</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2
51.	<i>Arctostaphylos uva-ursi</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2
52.	<i>Centaurea cyanus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2
53.	<i>Chelidonium majus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2
54.	<i>Cicuta virosa</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2

Serial Number	Species	References																The number of recommendation points
		Ph. Eur., 2016	Ph. Russ., 1990	Budnikas et al., 2015	Dudėnas et al., 1976	Grybauskas, 1927, 1946	Gudanaivičius, 1960	Gudžinskas et al., 2008	Jaskonis, 1996	Kalasauskienė, 2009	Kaunienė et al., 1991	Ragažinskienė et al., 2005	Pipiny (ed.), 1973	Saanauskas, 2002a, 2002b	Štrėbys, 2006	Šimkūnaitė, 1971	Vasilėuskas, 1991, 2015	
55.	<i>Drosera rotundifolia</i>											+	+					2
56.	<i>Fumaria officinalis</i>												+					2
57.	<i>Helichrysum arenarium</i>														+			2
58.	<i>Juniperus communis</i>					+								+		+		2
59.	<i>Matricaria recutita</i>							+				+						2
60.	<i>Menyanthes trifoliata</i>														+		+	2
61.	<i>Ononis arvensis</i>																	2
62.	<i>Persicaria maculosa</i>											+						2
63.	<i>Pinus sylvestris</i>													+				2
64.	<i>Polygonatum odoratum</i>								+			+						2
65.	<i>Rubus caesius</i>													+				2
66.	<i>Salix caprea</i>				+									+				2
67.	<i>Saponaria officinalis</i>													+				2
68.	<i>Sedum acre</i>				+				+								+	2
69.	<i>Solanum nigrum</i>				+				+									2
70.	<i>Symphytum officinale</i>								+									2
71.	<i>Thalictrum aquilegifolium</i>				+								+					2
72.	<i>Thymus serpyllum</i>													+				2
73.	<i>Vaccinium uliginosum</i>																+	2
74.	<i>Acorus calamus</i>												+					1
75.	<i>Aegopodium podagraria</i>								+									1
76.	<i>Arctium lappa</i>														+			1
77.	<i>Chamaedaphne calyculata</i>														+			1
78.	<i>Empetrum nigrum</i>				+													1
79.	<i>Euonymus verrucosus</i>				+													1
80.	<i>Euphrasia officinalis</i>												+					1
81.	<i>Euphrasia rostkoviana</i>							+										1
82.	<i>Filipendula ulmaria</i>																+	1
83.	<i>Geranium pratense</i>								+									1
84.	<i>Geranium sylvaticum</i>				+													1
85.	<i>Herniaria glabra</i>																+	1
86.	<i>Inula britannica</i>														+			1
87.	<i>Linaria vulgaris</i>				+													1
88.	<i>Lycopus europaeus</i>				+													1
89.	<i>Melampyrum nemorosum</i>				+													1
90.	<i>Mentha aquatica</i>								+									1
91.	<i>Origanum vulgare</i>														+			1
92.	<i>Petasites hybridus</i>								+									1
93.	<i>Peucedanum palustre</i>									+								1
94.	<i>Plantago lanceolata</i>												+					1
95.	<i>Primula veris</i>												+					1
96.	<i>Pulmonaria obscura</i>												+					1
97.	<i>Prunella vulgaris</i>													+				1
98.	<i>Pulsatilla pratensis</i>													+				1
99.	<i>Rubus chamaemorus</i>									+								1
100.	<i>Rubus saxatilis</i>									+								1
101.	<i>Sanguisorba officinalis</i>												+					1
102.	<i>Securigera varia</i>				+													1
103.	<i>Solanum dulcamara</i>														+			1
104.	<i>Stachys officinalis</i>														+			1
105.	<i>Stachys silvatica</i>				+													1
106.	<i>Thlaspi arvense</i>												+					1
107.	<i>Vaccinium myrtillus</i>								+									1
	The number of species	3	9	4	27	9	7	22	21	54	13	31	32	49	33	8	38	

There were no medicinal plant species, which authors of all 14 publications indicated as suitable for treatment of heart and circulation disorders solidly. Authors mostly recommended for treatment medicinal plants belonging to 12 species (Table 1, serial number 1-12): *Leonurus cardiaca*, *Convallaria majalis*, *Crataegus monogyna*, *Valeriana officinalis*, *Gnaphalium uliginosum*, *Fragaria vesca*, *Capsella bursa-pastoris*, *Hypericum perforatum*, *Viscum album*, *Polygonum aviculare*, *Berberis vulgaris*, *Viburnum opulus* (species are enumerated in the direction of decrease of their number of recommendation points (from 12 to 7).

### 3. Medicinal plants for treatment of hypertension

In 13 publications 45 species of autochthonous medicinal plant of Lithuania were recommended for treatment of this disease (Table 2). In separate publications the number of such species varied strongly from 1 (Grybauskas, 1927, 1946) to 22 (Kalasauskienė, 2009).

## Autochthonous medicinal plant species of Lithuania using for treatment of hypertension

Serial Number	Species	References													The number of recommendation points
		Dudėnas et al., 1976	Grybauskas, 1927, 1946	Jaskonis, 1996	Gudanavičius, 1960	Gudžinskas et al., 2008	Kalasauskienė, 2009	Kaunienė et al., 1991	Ragaziūnskienė et al., 2005	Pipinys (ed.), 1973	Sasnauskas, 2002a, 2002b	Stirbys, 2006	Šimkūnaitė, 1971	Vasiliauskas, 1991, 2015	
1.	<i>Leonurus cardiaca</i>	+		+	+	+	+	+	+	+	+	+	+	11	
2.	<i>Crataegus monogyna</i>	+		+		+	+	+	+	+	+	+	+	10	
3.	<i>Gnaphalium uliginosum</i>	+			+		+	+	+	+	+	+	+	10	
4.	<i>Viscum album</i>	+	+	+			+	+	+	+	+	+	+	8	
5.	<i>Capsella bursa-pastoris</i>			+		+	+	+	+	+	+	+	+	7	
6.	<i>Berberis vulgaris</i>				+		+	+	+	+	+	+	+	6	
7.	<i>Oxycoccus palustris</i>			+			+	+	+	+	+	+	+	6	
8.	<i>Fragaria vesca</i>						+	+	+	+	+	+	+	5	
9.	<i>Viburnum opulus</i>						+	+	+	+	+	+	+	5	
10.	<i>Polygonum aviculare</i>	+		+							+		+	4	
11.	<i>Astragalus glycyphyllos</i>	+					+		+					3	
12.	<i>Crataegus rhipidophylla</i>	+			+					+				3	
13.	<i>Ledum palustre</i>			+			+				+			3	
14.	<i>Ribes nigrum</i>						+				+		+	3	
15.	<i>Sorbus aucuparia</i>						+						+	3	
16.	<i>Vaccinium vitis-idaea</i>									+	+		+	3	
17.	<i>Valeriana officinalis</i>					+	+				+			3	
18.	<i>Filipendula ulmaria</i>						+		+					2	
19.	<i>Humulus lupulus</i>										+		+	2	
20.	<i>Melilotus officinalis</i>						+				+			2	
21.	<i>Rosa majalis</i>										+	+		2	
22.	<i>Thalictrum aquilegifolium</i>	+								+				2	
23.	<i>Tilia cordata</i>					+	+							2	
24.	<i>Acorus calamus</i>						+							1	
25.	<i>Aegopodium podagraria</i>					+								1	
26.	<i>Chamaedaphne calyculata</i>											+		1	
27.	<i>Centaurea cyanus</i>						+							1	
28.	<i>Cicuta virosa</i>			+										1	
29.	<i>Corylus avellana</i>						+							1	
30.	<i>Empetrum nigrum</i>	+												1	
31.	<i>Euonymus verrucosus</i>	+												1	
32.	<i>Fumaria officinalis</i>						+							1	
33.	<i>Geranium pratense</i>					+								1	
34.	<i>Helichrysum arenarium</i>												+	1	
35.	<i>Hypericum perforatum</i>												+	1	
36.	<i>Inonotus obliquus</i>												+	1	
37.	<i>Menyanthes trifoliata</i>												+	1	
38.	<i>Ononis arvensis</i>						+							1	
39.	<i>Parnasia palustris</i>	+												1	
40.	<i>Pinus sylvestris</i>												+	1	
41.	<i>Prunella vulgaris</i>								+					1	
42.	<i>Rubus caesius</i>										+			1	
43.	<i>Rubus idaeus</i>												+	1	
44.	<i>Solanum nigrum</i>	+												1	
45.	<i>Stachys silvatica</i>	+												1	
46.	<i>Taraxacum officinale</i>					+								1	
	Number of species	13	1	8	4	8	22	5	12	9	17	8	4	17	

The authors of 13 publications most often were recommended for treatment of hypertension medicinal plants belonging to 9 species (Table 2, serial number 1-9): *Leonurus cardiaca*, *Crataegus monogyna*, *Gnaphalium uliginosum*, *Viscum album*, *Capsella bursa-pastoris*, *Berberis vulgaris*, *Oxycoccus palustris*, *Fragaria vesca*, *Viburnum opulus* (species are enumerated in the direction of decrease of their number of recommendation points (from 11 to 5)).

#### 4. Medicinal plants for treatment and prophylaxis of atherosclerosis

In 11 publications 49 autochthonous medicinal plant species of Lithuania were recommended for treatment of this disorder (Table 3). In separate publications the number of such species varied strong from 1 species (Gudžinskas, Balvočiūtė, 2008; Gudanavičius, 1960; Kaunienė, Kaunas, 1991) to 29 (Stirbys, 2006).

Autochthonous medicinal plant species of Lithuania using for treatment and prophylaxis of atherosclerosis

Serial Number	References												The number of recommendation points
	Species	Grybauskas, 1927, 1946	Jaskonis, 1996	Gudžinskis et al, 2008	Gudanavičius, 1960	Kalasauskienė, 2009	Kaunienė et al., 1991	Pipynys (ed.), 1973	Ragažinskienė et al., 2005	Sasnauskas, 2002a, 2002b	Stirbys 2006	Vasiliauskas, 1991, 2015	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	<i>Viscum album</i>	+			+	+		+	+	+		+	7
2.	<i>Crataegus monogyna</i>			+		+			+	+	+	+	6
3.	<i>Fragaria vesca</i>		+			+			+	+	+	+	6
4.	<i>Leonurus cardiaca</i>					+		+	+	+	+	+	6
5.	<i>Taraxacum officinale</i>					+		+	+	+	+	+	5
6.	<i>Convallaria majalis</i>					+		+		+	+		4
7.	<i>Berberis vulgaris</i>		+							+	+	+	4
8.	<i>Plantago major</i>					+				+	+	+	4
9.	<i>Sorbus aucuparia</i>					+				+	+	+	4
10.	<i>Urtica dioica</i>					+			+		+	+	4
11.	<i>Alchemilla vulgaris</i>					+		+			+		3
12.	<i>Drosera rotundifolia</i>							+		+			3
13.	<i>Equisetum arvense</i>		+								+	+	3
14.	<i>Malus sylvestris</i>							+		+			3
15.	<i>Melilotus officinalis</i>					+					+	+	3
16.	<i>Ribes nigrum</i>					+			+			+	3
17.	<i>Rubus idaeus</i>								+		+	+	3
18.	<i>Trifolium pratense</i>					+			+	+			3
19.	<i>Viburnum opulus</i>					+				+		+	3
20.	<i>Calluna vulgaris</i>					+					+		2
21.	<i>Betula pubescens</i>									+	+		2
22.	<i>Elytrigia repens</i>									+	+		2
23.	<i>Erysimum cheiranthoides</i>								+	+			2
24.	<i>Oxycoccus palustris</i>								+			+	2
25.	<i>Rosa canina</i>								+	+			2
26.	<i>Saponaria officinalis</i>									+		+	2
27.	<i>Viola tricolor</i>								+		+		2
28.	<i>Achillea millefolium</i>										+		1
29.	<i>Bidens tripartita</i>										+		1
30.	<i>Chelidonium majus</i>										+		1
31.	<i>Conium maculatum</i>					+							1
32.	<i>Corylus avellana</i>					+							1
33.	<i>Euphrasia officinalis</i>							+					1
34.	<i>Gnaphalium uliginosum</i>					+							1
35.	<i>Helichrysum arenarium</i>										+		1
36.	<i>Herniaria glabra</i>											+	1
37.	<i>Hypericum perforatum</i>										+		1
38.	<i>Inula britannica</i>										+		1
39.	<i>Juniperus communis</i>	+											1
40.	<i>Menyanthes trifoliata</i>										+		1
41.	<i>Ononis arvensis</i>									+			1
42.	<i>Origanum vulgare</i>										+		1
43.	<i>Plantago lanceolata</i>							+					1
44.	<i>Rosa majalis</i>					+							1
45.	<i>Stachys officinalis</i>										+		1
46.	<i>Thlaspi arvense</i>					+							1
47.	<i>Thymus serpyllum</i>										+		1
48.	<i>Vaccinium vitis-idaea</i>										+		1
49.	<i>Valeriana officinalis</i>										+		1
	Number of species	2	3	1	1	21	1	7	14	19	29	17	

The authors of 11 publications most often were recommended for treatment and prophylaxis of atherosclerosis medicinal plants belonging to 10 species (Table 3, serial number 1-10): *Viscum album*, *Crataegus monogyna*, *Fragaria vesca*, *Leonurus cardiaca*, *Taraxacum officinale* *Convallaria majalis*, *Berberis vulgaris*, *Plantago major*, *Sorbus aucuparia*, *Urtica dioica* (species are enumerated in the direction of decrease of their number of recommendation points (from 7 to 4).

### 5. Phytotherapy of heart and circulation disorders

The phytotherapeutic preparations possibly could be used as additional remedies alongside modern pharmaceutical treatment. Extracts of hawthorn fruits, flowers and leaves could be used additionally or could replace temporarily preparations for treatment of ischemic heart disease. Therapeutically effect of hawthorn is determining by flavonoids, which this plant accumulate abundantly (Urbonavičiūtė, Jakštas et al., 2006). Flavonoids obtaining from hawthorn not only dilate coronary arteries but have insubstantial hypotensive and sedative effects too. The same hypotensive effect is characteristic to *Geranium sanguineum*, *Gnaphalium uliginosum*, *Viscum album*.

To date treatment of ischemic heart disease involves medications, containing cardiac glycosides. If ischemic heart disease is not complicated, doctor can prescribe herbal preparations containing cardiotonic glycosides, which are produced using flowers and leaves of *Convallaria majalis*. Insubstantial cardiotonic effect is characteristic to glucorhamnosides obtained from *Leonurus cardiaca*. *L. cardiaca* plants not so decreases blood pressure, as far as have sedative features that are important for many of cardiology patients. Curing ischemic heart disease, for which various oedemas are typical, herbal preparations stimulating diuresis (diuretics) are frequently prescribing.

Foreign phytotherapeutists for treatment of heart and circulation disorders recommend quite a few species, which are not autochthonous in Lithuania or are growing as cultivated plant. We will review only these species mentioned by foreign authors, which are autochthonous in Lithuania.

In official medicine for treatment of ischemic heart disease *Convallaria majalis*, which accumulates cardiotonic glycosides, is using (Petkov (ed.), 1988). Among plants, which contrary not accumulates cardiotonic glycosides, various species of *Crataegus* and *Leonurus cardiaca* are recommended. Complementary medicine is using these species: *Achillea millefolium*, *Hypericum perforatum*, *Valeriana officinalis*, *Viscum album* (Van Wyck, Wink, 2010).

Global phytotherapy (Petkov (red.), 1988) for treatment of hypertension is using *Gnaphalium uliginosum*, *Geranium robertianum*, *G. sanguineum* (Lithuanian authors these species of *Geranium* recommend rarely – they were classing by 2 recommendation points), *Sedum acre*, *Viscum album*, whereas official medicine is using *Convallaria majalis*. Complementary medicine is using these species: *Betula pendula*, *B. pubescens*, *Equisetum arvense*, *Humulus lupulus*, *Solidago virgaurea*, *Valeriana officinalis*, *Viscum album* (Van Wyck, Wink, 2010).

Phytotherapy for treatment and prophylaxis of atherosclerosis mostly is using cultivated species – onion (*Allium cepa*) and garlic (*Allium sativum*) (Petkov (red.), 1988; Van Wyck, Wink 2010).

## 6. Plant active compounds for treatment of heart and circulation disorders using in phytotherapy

Phytotherapy for treatment of ischemic heart disease and heart neuroses is using glycosides. Cardiotonic glycosides are strongly working compounds, therefore they are mostly using in official medicine, whereas in phytotherapy – very carefully, as is prescribed by doctor in herbal preparation recipe. Medicinal plants accumulating glycosides belongs to following autochthonous plant genera in Lithuania - *Digitalis*, *Convallaria*, *Crataegus*. Medicinal plants accumulating essential oils: *Humulus lupulus*, *Achillea millefolium*, *Valeriana officinalis*, *Matricaria recutita* are using for treatment too. Mentioned plants and their active compounds are recommended for treatment of atherosclerosis and hypertension (Petkov (red.), 1988).

## 7. Comparative analysis of autochthonous medicinal plants of Lithuania using for treatment of heart and circulating disorders

Lithuanian authors mostly recommended for treatment of these disorders 12 species (Table 1, Serial numbers 1-12). These species are included or not included in:

- 1) European Pharmacopoeia (2016) (Table 1, column 3);
- 2) Russian Pharmacopoeia (The State Pharmacopoeia of the USSR, 1990) (Table 1, column 4).

In these Pharmacopoeias are described medicinal plant species and plant raw, which are permitted to use in pharmacy and official medicine, coincide only partly. From 85 species of plants described in Russian Pharmacopoeia (RPh) even 35 species are not included in European Pharmacopoeia (EPH) (Shikov et al., 2014).

After to having a view of species mostly recommended by Lithuanian authors for treatment of heart and circulating disorders, there were stated, that plant raw (PR) of only 3 species are using in pharmacy for producing of cardiovascular preparations, which are permitting for treatment in official medicine.

There are 5 species incorporated into EPH and RPh at the same time:

*Leonurus cardiaca*. PR: *Leonuri Herba*; Active compounds (AC): iridoid glycosides, alkaloids, diterpenes;

*Crataegus monogyna*. PR agreeably to EPH - *Crataegi folium cum flore*, *Crataegi fructus*; PR agreeably to RPh - *Fructus Crataegi* only, AC: oligomeric procyanidins, flavonoids, organic acids;

*Valeriana officinalis*. PR agreeably to EPH - *Valerianae radix*; PR agreeably to EPH - *Rhizomata cum Radicibus Valerianae*; AC: valepotriates (valtrate, acevaltrate), sesquiterpenoids.

*Leonurus cardiaca* and *Valeriana officinalis* have sedative effect, *Crataegus monogyna* – cardiovascular effect. All 3 recited species are involved into composition of over-the-counter drug *Heart drops* producing by Lithuanian pharmacy industry. This drug is one of mostly taking by Lithuanian population.

*Hypericum perforatum*. PR - *Hyperici herba*. Plant has antidepressant, styptic and antiseptic effects. Herbal infusion *St John's wort Herb* is dealing at pharmacies of Lithuania as preparation against depression. However high degree of undesirable interacting between plant and synthetic drugs is stated and this plant must be taking carefully.

*Polygonum aviculare*. PR - *Polygoni avicularis herba*. Plant has diuretic effect. Herbal infusion *Common knotgrass Herb* is dealing at pharmacies of Lithuania. Mostly it is recommending as diuretic preparation, but is not recommending as preparation for treatment of hypertension (Kažemėkaitis, Mekienė, 2004).

There were no stated the species included in EPh only and there were stated 4 species included into RPh only. 3 first species enumerated bellow are using for treatment of heart and circulation disorders. Remaining 3 species enumerated bellow is using for other purposes:

*Convallaria majalis*. PR - *Herba Convallariae, Folia Convallariae, Flores Convallariae*. Plant has cardiogenic effect, AC – convallatoxin and other cardiac glycosides; *Convallaria majalis* is included into composition of plant preparation *Cardiol C* (drops) that is producing by Herbapol Wrocław. Drops are using for treatment of heart diseases (Kažemėkaitis, Mekienė, 2004).

*Gnaphalium uliginosum*. PR - *Herba Gnaphalii uliginosi*. Plant has hypotensive effect. AC – volatile oil, taninns;

*Capsella bursa-pastoris*. PR - *Herba bursae pastoris*. Plant has hemostatic effect.

*Viburnum opulus*. PR - *Cortex Viburni*. This PR has diuretic effect; PR - *Fructus Viburnum*. This PR has diaphoretic and inflammatory effects.

Remaining 3 species (*Fragaria vesca, Viscum album, Berberis vulgaris*) are not described neither to EPh, nor to RPh. *Viscum album* is included into composition of food supplement Česnakas® (Bional). It can help to maintain normal function of heart and circulation system (Kažemėkaitis, Mekienė, 2004).

Comparative analysis revealed, that in pending case (heart and circulation disorders) Lithuanian authors indicated 2 species (*Convallaria majalis, Gnaphalium uliginosum*) included into RPh only and 1 species (*Crataegus monogyna*) included into EPh and RPh.

As hypertension mostly is starting to treat with diuretics, it should be noted, that diuretic effect are characteristic to preparations produced from *Polygonum aviculare* herb (included into EPh and RPh) and from *Viburnum opulus* bark (included into RPh).

Often herbal preparations with *Valeriana officinalis, Leonurus cardiaca, Hypericum perforatum* (they are included into EPh and RPh) operating nerve system and mentality are prescribing to cardiology patients as additional medicines. Another species (*Capsella bursa-pastoris*) is included into RPh only. It is recommended as hemostatic preparation (to stop haemorrhoids bleeding too).

5 species (*Leonurus cardiaca, Crataegus monogyna, Valeriana officinalis, Hypericum perforatum, Polygonum aviculare*) mostly recommended by Lithuanian authors for treatment of heart and circulation disorders are included into EPh and RPh. Another 4 species (*Convallaria majalis, Gnaphalium uliginosum, Capsella bursa-pastoris, Viburnum opulus*) mostly recommended by Lithuanian authors are included into RPh only. Other 3 mostly recommended species - *Fragaria vesca, Viscum album, Berberis vulgaris* - are not included neither into EPh nor into RPh.

Remaining 94 species recommended by Lithuanian authors got recommendation points less than 7 (Table 1). But they could be significant reserve for seeking new drugs for treatment of heart and circulation disorders for same reasons:

1) Publications of Lithuanian authors summarized in the paper involve quite long period of medicinal plant using in Lithuania (1927-2015);

2) Authors of publications made use of local folk medicine experience about medicinal plants and Lithuania and adjacent countries information sources of one's time too.

### Conclusions

On base of data notified in 14 publications on medicinal plants of Lithuania the list, which is consist of 107 species of autochthonous medicinal plant species of Lithuania recommending for treatment of heart and circulation disorders was made.

Lithuanian authors mostly recommend for treatment of heart and circulation disorders medicinal plant belonging to 12 species: *Leonurus cardiaca, Convallaria majalis, Crataegus monogyna, Valeriana officinalis, Gnaphalium uliginosum, Fragaria vesca, Capsella bursa-*

*pastoris*, *Hypericum perforatum*, *Viscum album*, *Polygonum aviculare*, *Berberis vulgaris*, *Viburnum opulus*.

9 species of medicinal plants mostly recommended for treatment of hypertension are *Leonurus cardiaca*, *Crataegus monogyna*, *Gnaphalium uliginosum*, *Viscum album*, *Capsella bursa-pastoris*, *Berberis vulgaris*, *Oxycoccus palustris*, *Fragaria vesca*, *Viburnum opulus*.

10 species of medicinal plants mostly recommended for treatment and prophylaxis of atherosclerosis are *Viscum album*, *Crataegus monogyna*, *Fragaria vesca*, *Leonurus cardiaca*, *Taraxacum officinale*, *Convallaria majalis*, *Berberis vulgaris*, *Plantago major*, *Sorbus aucuparia*, *Urtica dioica*.

5 species (*Leonurus cardiaca*, *Crataegus monogyna*, *Valeriana officinalis*, *Hypericum perforatum*, *Polygonum aviculare*) mostly recommended by Lithuanian authors for treatment of heart and circulation disorders are included into EPh and RPh. Another 4 species (*Convallaria majalis*, *Gnaphalium uliginosum*, *Capsella bursa-pastoris*, *Viburnum opulus*) mostly recommended by Lithuanian authors are included into RPh only. Other 3 mostly recommended species - *Fragaria vesca*, *Viscum album*, *Berberis vulgaris* - are not included neither into EPh nor into RPh.

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