

## QUANTITATIVE DETERMINATION OF BIOLOGICALLY ACTIVE SUBSTANCES OF PLANTS OF *ROSACEAE*, *LABIATAE* AND *RUTACEAE* FAMILIES.

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**S u m m a r y.** It is investigated the content of basic groups of BAS of *Filipendula hexapetala* Gilib., *Nepeta cataria* L and *Ruta graveolens* L. It is determined the quantitative content of basic groups of BAS in underground organs of *Filipendula hexapetala*, in herb of *Nepeta cataria* and *Ruta graveolens*. The oscillation of BAS content in ontogenesis depending on the ecological terms of places of growing is determined. The received data are used during the development of projects of instruction about harvesting and drying of medicinal plants material of *Filipendula hexapetala*, *Nepeta cataria*, *Ruta graveolens*, and also methodology of raw materials quality control.  
**K e y w o r d s:** *Filipendula hexapetala* Gilib., *Nepeta cataria* L., *Ruta graveolens* L., biologically active substances.

cies of *Rosaceae* familiy, *Nepeta cataria* L. genus species of *Lamiaceae* (*Labiatae*) family, *Ruta* L. genus species of *Rutaceae* family.

### THE AIM OF THE STUDY

The aim of our work was to study the content of BAS of *Filipendula hexapetala* Gilib., *Nepeta cataria* L. and *Ruta graveolens* L.

### METHODS AND MATERIALS

BAS were extracted from plant raw materials by purified water, water, acidified with 0,1% hydrochloric acid and 70% by ethanol while heating on a water heater with reflux for 30 minutes. The obtained extracts were investigated for the presence of the main BAS groups according to methods described in the literature [1, 6, 8].

Quantitative determination of the amount of polyphenols and tannins was conducted by the methods

### INTRODUCTION

A medicinal plants material (MPM) is very important in modern medicine. Pharmacy urgent task is to find plants with the sufficient source of raw materials, the rational and complex use of raw materials, and also creation of new medicines on their basis. A valuable source of biologically active substances (BAS) are *Filipendula* Mill. genus spe-

of SPhU Appendix 2 [5]. Flavonoid content calculated on rutin was determined by spectrophotometric method [7]. Determination of oxidative polyphenols, free organic acids and ascorbic acid content was conducted by the pharmacopeia methods [2, 3, 4]. Determination of essential oils content in raw material of *Nepeta cataria* was conducted by their distillation with water steam [9].

## RESULTS AND DISCUSSION

As a result of phytochemical analysis of underground part of *Filipendula hexapetala*, herb *Nepeta cataria* and *Ruta graveolens* groups of biologically active substances of primary (polysaccharides, free sugars, amino acids) and secondary (flavonoids, coumarins, simple phenols, polyphenols – tannins, saponins, cardiosteroids, alkaloids) metabolism were identified.

The results of the quantitative determination of BAS in underground organs of *Filipendula hexapetala* depending on the growth place are shown in the table 1.

Table 1. Dependence of biologically active substances content in the underground organs of *Filipendula hexapetala* on the growth place.

Growth place	BAS content, %, $\bar{\delta} \pm \Delta \bar{\delta}$ , n = 9			
	Amount of polyphenols	Oxidative polyphenols	Ascorbic acid	Free organic acids
Ivano-Frankivsk region, Nadvirna district				
The edge of the v. Berezivka	5,67±0,18	4,28±0,11	0,09±0,03	0,58±0,03
The edge of the t. Yaremcha	5,51±0,35	3,88±0,20	0,08±0,03	0,56±0,02
Ternopil region, Monastyrsk district				
The edge of the t. Monastyrsk	5,31±0,06	4,30±0,03	0,09±0,03	0,55±0,06
Chernivtsi region, Kelmenetsk district				
The edge of the v. Novoselytsia	5,48±0,27	4,52±0,22	0,08±0,02	0,58±0,02
Khmelnyskyi region, Horodok district				
The edge of the t. Horodok	5,27±0,10	3,83±0,13	0,09±0,02	0,55±0,04

Research results (Table 1) showed that the amount of polyphenols content in underground organs of *Filipendula hexapetala* ranges from 5.27% to 5.67%. The content of oxidative polyphenols in

the underground organs of *Filipendula hexapetala* is in the range 3.83 - 4.52%.

The content of ascorbic acid in the underground organs of *Filipendula hexapetala* was observed in the range of 0.08% to 0.09%, organic acids from 0.55% to 0.58%.

Quantitative determination of bioactive substances in the herb of *Nepeta cataria* harvested during the mass flowering in Sniatyn-, Nadvirna-, Bohorodchany districts (Ivano-Frankivsk region), Mukachevo district (Zakarpattia region), Radekhiv district (Lviv region) was conducted.

The results of the quantitative determination of BAS in *Nepeta cataria* herb are shown in the Table 2.

Table 2. Dependence of biologically active substances' content in the herb of *Nepeta cataria* from the growth place.

Places and year of harvesting	BAS contents, %, $\bar{\delta} \pm \Delta \bar{\delta}$ , n = 9					
	The amount of polyphenols	Essential oil	Flavonoids	Ascorbic acid	Organic acids	Oxidative polyphenols
Zakarpattia region						
Mukachevo district, The edge of the t. Mukachevo	6,20 ± 0,07	1,00 ± 0,02	2,73 ± 0,02	0,10 ± 0,01	0,27 ± 0,03	3,30 ± 0,09
Ivano-Frankivsk region						
Bohorodchany district, The edge of the t. Bohorodchany	5,10 ± 0,03	1,00 ± 0,06	2,11 ± 0,01	0,09 ± 0,01	0,31 ± 0,02	3,13 ± 0,09
Sniatyn district, The edge of the v. Zabolotiv	6,7 ± 0,05	1,10 ± 0,07	2,12 ± 0,02	0,09 ± 0,02	0,22 ± 0,03	4,16 ± 0,09
Nadvirna district, The edge of the v. Pasichna	6,40 ± 0,07	1,00 ± 0,06	2,34 ± 0,02	0,10 ± 0,02	0,27 ± 0,03	3,18 ± 0,09
Lviv region						
Radekhiv district, The edge of the v. Latyn	5,90 ± 0,05	0,90 ± 0,07	2,49 ± 0,02	0,12 ± 0,01	0,23 ± 0,03	3,26 ± 0,09

The obtained results (Table 2) show that the highest content of polyphenols amount is accumulated in the raw materials harvested in Sniatyn district of Ivano-Frankivsk region, which exceeds the polyphenol content of the raw material from other areas of growth in 1.2 - 1.3 times. In the herb *Nepeta cataria* the content of essential oil is in the range of 0.9 - 1.1%. The highest content of essential oil is in the raw mate-

rials harvested in Sniatyn district of Ivano-Frankivsk region (1.1%). The highest content of flavonoids is found in herb of *Nepeta cataria* (2,73%) harvested in Mukachevo district Transcarpathian region. It is established that the content of ascorbic acid in the herb of *Nepeta cataria* is in the range of 0.09% - 0.12%, the total amount of organic acids - in the range of 0.22% - 0.31%. The content of oxidative polyphenols in the herb of *Nepeta cataria* range from 3.13% (Bohorodchany district) to 4.16% (Sniatyn district).

The received data indicate the prospects of using of *Nepeta cataria* herb for biologically active substances production. The quantitative content of biologically active substances in the herb of *Ruta graveolens* harvested in Ivano-Frankivsk, Chernivtsi, Kharkiv and Kyiv regions was determined. It allows to establish the dependence of biologically active substances content on the place plants of growing (Table 3).

Table 3. Dependence of biologically active substances content in the herb of *Ruta graveolens* on the growth place.

Places and year of harvesting	BAS, %, $\bar{\sigma} \pm \Delta \bar{\sigma}$ , n = 9				
	The amount of polyphenols	Flavonoids	Ascorbic acid	Organic acids	Oxidative polyphenols
State dendrology park named of the Z.Y. Pavlyk of the Vasyl Stefanyk Pre-carpathian National University, 2010.	2,5 ± 0,05	1,10 ± 0,07	0,020 ± 0,02	1,22 ± 0,03	2,56 ± 0,01
Botanical Garden of Yuriy Fedkovych Chernivtsi National University, 2011.	2,7 ± 0,05	1,3 ± 0,07	0,023 ± 0,02	1,32 ± 0,03	2,66 ± 0,01
Botanical Garden of V. N. Karazin Kharkiv National University, 2012 p.	2,9 ± 0,05	2,0 ± 0,07	0,029 ± 0,01	1,23 ± 0,03	2,78 ± 0,01
National Botanical Garden named after Mykola Hryshko of the National Academy of Sciences of Ukraine, 2010.	3,54 ± 0,07	1,7 ± 0,06	0,031 ± 0,02	1,27 ± 0,03	2,48 ± 0,01
Botanical Garden named after academician Oleksandr Fomin of Taras Shevchenko Kyiv National University, 2012.	3,5 ± 0,03	1,6 ± 0,06	0,030 ± 0,01	1,31 ± 0,02	2,43 ± 0,01

The content of groups of biologically active substances (Table. 3) in the herb of *Ruta graveolens* doesn't significantly depend on the place of growth. As a result of researches it was established that in herb of *Ruta graveolens* the content of polyphenols' amount is 2.5 - 3.5%, flavonoids - 1.10 - 2.0%, oxidative polyphenols - 2.43 - 2.78%. It was established that the content of ascorbic acid and organic acids in the herb of *Ruta graveolens* ranges within 0.020 - 0.031% and 1.22 - 1.32% respectively.

## CONCLUSIONS

The quantitative content of main groups of biologically active substances in underground organs of *Filipendula hexapetala* was determined, the dependences of fluctuations of biologically active substances content in ontogenesis on environmental conditions of growth places was found. The content of biologically active substances in *Filipendula hexapetala* raw material depending on the growth place doesn't differ significantly.

The quantitative content of oxidative polyphenols, amount of polyphenols, flavonoids, organic acids, including ascorbic, essential oil in herb of *Nepeta cataria* from different places of growth was determined.

The quantitative content of polyphenols amount, flavonoids, oxidative polyphenols, ascorbic and organic acids in herb of *Ruta graveolens* depending on the place of growth was determined.

The received data are used during the development of projects of instruction about harvesting and drying of medicinal plants material of *Filipendula hexapetala*, *Nepeta cataria*, *Ruta graveolens*, and also methodology of raw materials quality control.

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