

international conference

ABSTRACT BOOK



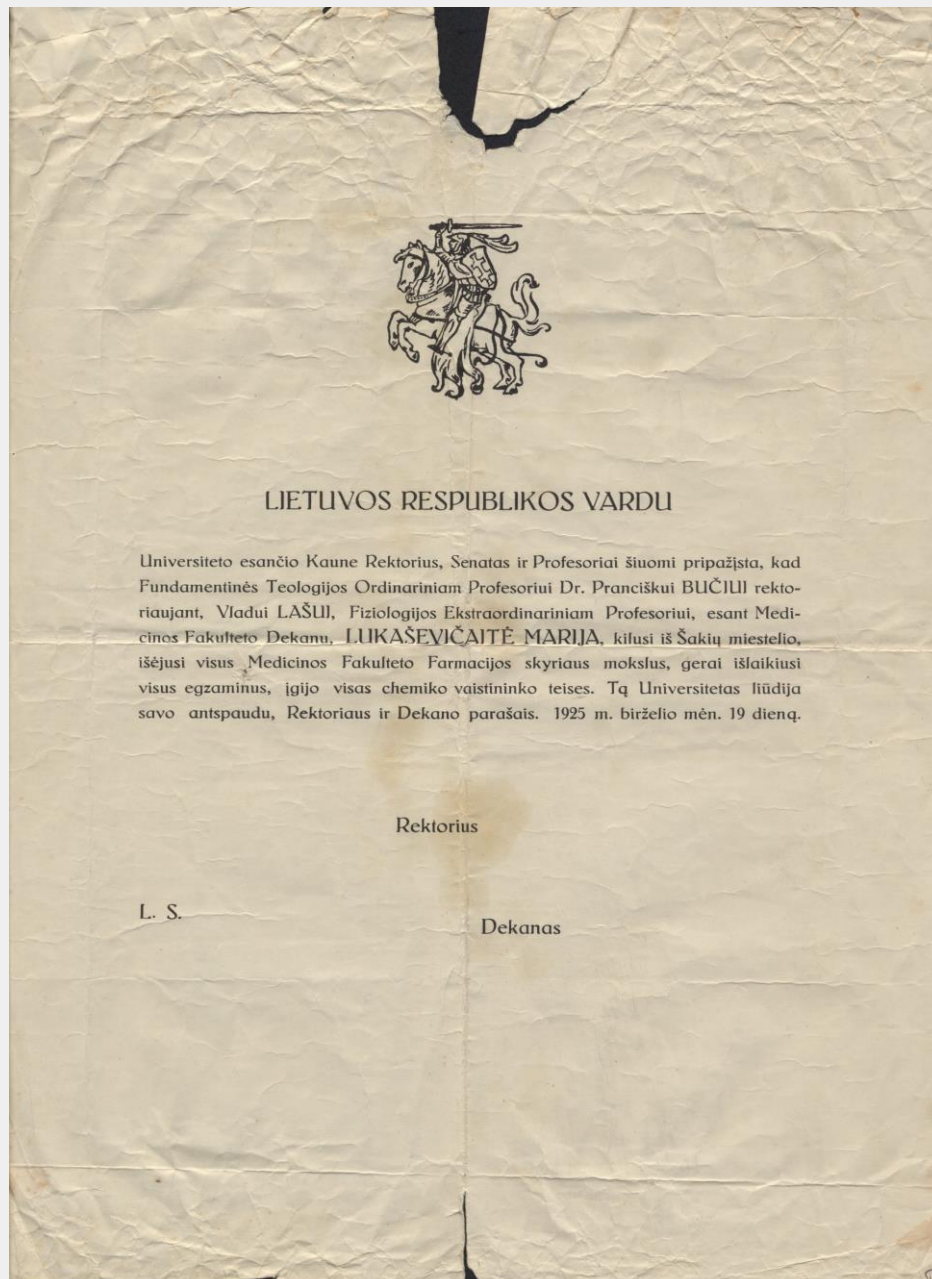
CONTEMPORARY PHARMACY: ISSUES, CHALLENGES AND EXPECTATIONS 2025

April 10
Lithuania, Kaunas

Conference dedicated to the Centennial of the First Lithuanian Pharmacy Diploma.

One hundred years ago, the first nine graduates of the University of Lithuania completed their higher pharmacy studies and were awarded the diploma of Chemist-Pharmacist. Over the past 100 years, approximately 5,600 individuals have completed higher pharmacy studies in Kaunas. These graduates are not only the creators of Lithuanian pharmacy history but also contributors to the broader history of our country.

As we mark this centennial milestone, it is a fitting moment to look back and reflect on the remarkable journey we have taken...



Contemporary Pharmacy: Issues, Challenges and Expectations 2025

Programme

PLENARY SESSION Moderator: Prof. Ramunė Morkūnienė, Dean of Faculty of Pharmacy, Lithuanian University of Health Sciences, Prof. Victoriya Georgiyants, The National University of Pharmacy, Kharkiv, Ukraine	
8:30-9:00	Registration
9:00-9:20	Opening ceremony Prof. Kęstutis Petrikonis, Vice Rector for Studies, LSMU, Lithuania; Daniel Naumovas, Vice-Minister of Health of the Republic of Lithuania Dovilė Marcinkė, The head of State Medicines control agency of Lithuania; Prof. Ona Ragažinskienė, President of Lithuanian Pharmaceutical Association;
9:20-9:40	The Evolution of Pharmacy Diploma Awarding Traditions Assoc. prof. Vilma Gudienė, Faculty of Pharmacy, Lithuanian University of Health Sciences, Museum of the History of Lithuanian Medicine and Pharmacy, Lithuania, Assoc. prof. Rima Gerbutavičienė, Lithuanian University of Health Sciences, Lithuania,
9:40-10:00	Professionalism and Ethics in Pharmacy: The Relevance of the Apothecary Oaths Prof. Dušanka Krajnović, Vice-dean for postgraduate studies and continuing education, University of Belgrade - Faculty of Pharmacy
10:00-10:20	Medicine shortages- what EU can do? Jūratė Švarcaitė, Director General at the Association of the European Self-Medication Industry (AESPG), Belgium
10:20-10:30	The Story of Who We are: the Lithuanian Pharmaceutical Students' Association Student Edgar Aghasaryan, SFD President
10:30-10:40	Latvian Pharmacists from the Student Fraternity "Lettgallia": First Half of the 20th Century Assoc. Prof. Maija Pozemkovska, prof. Juris Salaks, Rīga Stradiņš University, Institute of the History of Medicine, Latvia
10:40-10:50	The Lithuanian students 1922-1940: the Student's Representation and Organizations PhD Audronė Veilentienė, Kaunas University of Technology, Lithuania
10:50-11:00	Informal Activities of Pharmacy Students in the Last Decade of the Soviet Era Assoc. prof. Tauras Mekas, Faculty of Pharmacy, Lithuanian University of Health Sciences, Lithuania, Museum of the History of Lithuanian Medicine and Pharmacy, Lithuania
11:00-11:30	Coffee break

Contemporary Pharmacy: Issues, Challenges and Expectations 2025

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HISTORY OF PHARMACY SESSION Moderators: Prof. Ramūnas Kondratas, Society for the History of Pharmacy, Lithuania Assoc. prof. Vilma Gudienė, Faculty of Pharmacy, Lithuanian University of Health Sciences, Museum of the History of Lithuanian Medicine and Pharmacy, Lithuania,	
11:30-11:40	Lithuanian Student in German-Speaking European Universities at the Turn of the 19th and 20th Centuries: The Case of Vytautas Civinskis Assoc. prof. Junona Almonaitienė, Lithuanian University of Health Sciences, Lithuania
11:40-11:50	Overview of the Diploma Theses of Pharmacy Candidates at Vytautas Magnus University prof. Liudas Ivanauskas, Lithuanian University of Health Sciences, Lithuania
11:50-12:00	The One Who Is Going to Save Thousands: Pharmacy Students Preparing for the Second World War in Vilnius and Kaunas PhD student Viktorija Šimkutė, assoc. prof. Aistis Žalnora, Lithuanian Institute of History, Vilnius University, Lithuania
12:00-12:10	Portrait of a Student at the Faculty of Medicine of Vytautas Magnus University in the Novel „Paradise of the Redwoods“ PhD Agnė Mazurkevičiūtė, Lithuanian University of Health Sciences, Lithuania
12:10-12:20	Academic Education of Latvian Pharmacists in the 19th–21st Centuries Indra Vilistere, Inta Vegnere, Inguna Cīrule, Pharmacy Museum, Latvia
12:20-12:30	Ukrainian Wartime Student Life: a New Reality and Opportunities Student Amira Awad, National University of Pharmacy, Ukraine
12:30-13:30	Round Table Discussion: Living History: A Pharmacist's Journey – Before and Beyond the Diploma" Moderators: Ramūnas Kondratas, Viktorija Butrimaitė Panel discussion members: Amira Awad (National University of Pharmacy, Ukraine) Dušanka Krajnović (University of Belgrade, Serbia) Faustas Malinauskas (Director of supplies at Dineras UAB, Lithuania) Olha Mykhailenko (National University of Pharmacy, Kharkiv, Ukraine) Viktorija Šimkutė (Vilnius University, Lithuania)
13:30-15:30	Lunch break
	Poster session

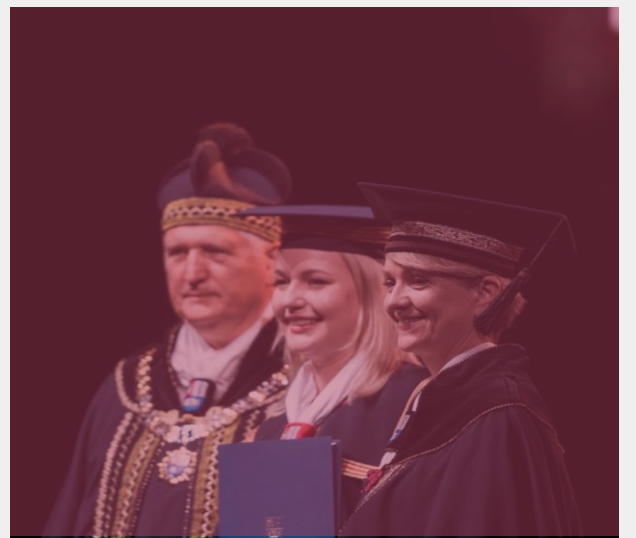
Contemporary Pharmacy: Issues, Challenges and Expectations 2025

Programme

SCIENTIFIC SESSION Moderators: Prof. Valdas Jakštas, Faculty of Pharmacy, Lithuanian University of Health Sciences, Lithuania; Prof. Lina Raudonė, Faculty of Pharmacy, Lithuanian University of Health Sciences, Lithuania	
15:30-15:40	Medicinal Plants 2025 - How to respond to the challenges of climate change and the needs of bio-economies Olha Mykhailenko, National University of Pharmacy, Ukraine; UCL School of Pharmacy, United Kingdom; Kiel University, Germany
15:40-15:50	Values of Total Hemispherical Reflectance and Emissivity of Blister with Chewable Tablets Containing Dihydroxy Aluminum Sodium Carbonate Depending on Storage Conditions assoc. prof. Beata Sarecka-Hujar, Faculty of Pharmaceutical Sciences in Sosnowiec, Medical University of Silesia in Katowice, Poland
15:50-16:00	Extrusion-Based 3D Printing of Plant-Origin Compounds and Extracts Using Aqueous Polyethylene Oxide Gel Inks Oleh Koshovyi, Jyrki Heinämäki, Ain Raal, Institute of Pharmacy, Faculty of Medicine, University of Tartu, The National University of Pharmacy, Estonia
16:00-16:10	"Green Chemistry" Approaches in Modern Pharmaceutical Science Prof. Victoriya Georgiyants, The National University of Pharmacy, Ukraine
16:10-16:20	Comparison of Total Flavonoid Content of Different <i>Levisticum officinale</i> w. D. J. Koch Parts Assoc. prof. Laura Rimkienė, Lithuanian University of Health Sciences, Lithuania
16:20-16:30	Antilipidemic Treatment in Patients with Familial Hypercholesterolemia PhD student Kristina Zubieliene, Lithuanian University of Health Sciences, Lithuania
16:30-16:40	Evaluation of Physicochemical Properties, and Stability on Storage of Cyano-Phycocyanin Loaded in Transferosomes PhD student Daiva Galinytė, Lithuanian University of Health Sciences, Lithuania
16:40-17:00	Poster session awards, Closing ceremony



POSTER SECTION



Terpenes and 3-octanone in *Lavandula angustifolia* Mill. Essential Oils: Quantity Differences Between Countries and Correlation Analysis

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Background: Lavender essential oil (EO) is one of the most widely used essential oils worldwide. The leading producers include Spain, France and Bulgaria [1], countries characterized by a Mediterranean climate with hot, dry summers and cold, rainy winters. However, climate change is causing summers and winters to become hotter and drier in other regions [2], which affects the quality of lavender plants, EO yield, and its chemical composition. This work analyses the main geographical and climate factors influencing the composition of lavender essential oils.

Aims: To analyze variations in the main lavender EO components across countries and identify factors influencing these differences.

Methods: Herb samples were collected in Ukraine (2022), Lithuania, France, and Bulgaria (2023) as well as essential oil samples were purchased from the UK (2024). Essential oils were extracted using hydrodistillation method and quantitative analysis was performed using GC–FID. Correlation analysis was conducted with PAST4.17 program.

Results: The sample from France had the highest 1,8-cineole content (63,4 mg/mL) and the highest camphor levels. The Bulgarian sample was notable for its high 3-octanone content, with linalool as the most abundant component. A statistically significant distribution was observed for camphor. Limonene content correlated significantly with the year of collection and country ($p = 0.02$), showing a strong negative correlation with average winter precipitation ($r_s = -0,65$). 1,8–cineole content positively correlated with altitude and longitude, and negatively with latitude. Camphor showed very strong positive correlations with both mean annual and summer temperatures.

Conclusion: The amounts of the main lavender EO components differ significantly between countries, influenced by collection year, location, winter precipitation, geographical data and temperature patterns.

References:

1. Bejar, E. Adulteration of English Lavender (*Lavandula angustifolia*) essential oil. Botanical Adulterants Prevention Bulletin. Austin, TX: ABC-AHP-NCNPR Botanical Adulterants Prevention Program; 2020, 1-12
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Determination of *Knautia arvensis* (L.) Coult. Physicochemical Parameters

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Background. The quality of raw materials depends on how well it meets the quality indicators. These indicators are established by the requirements of regulatory documentation. The pharmacognostic study of the non-official plant *Knautia arvensis* (L.) Coult. (Caprifoliaceae family) is relevant. *Knautia arvensis* herb accumulates biologically active substances such as vitamins, saponins, iridoids and phenolic compounds.

Aim. To determine the following physicochemical parameters of raw materials loss on dryness, total ash value and acid-insoluble ash value in order to assess the quality of *Knautia arvensis* herb.

Methods: the study material was *Knautia arvensis* herb, harvested during flowering in 2024. The determination of loss was carried out on 5 batches of raw materials according to the State Pharmacopoeia of Ukraine (SPhU) method, the SPhU Supplement 4, 2.2.32. The determination of total ash content on 5 batches of raw materials was carried out according to the SPhU method, 2.4.16. The determination of ash insoluble in hydrochloric acid was carried out on 5 batches of raw materials according to the SPhU method of 2.0, 2.8.1. The gravimetric method was used.

Results. The percentage of weight loss on drying or moisture content at 105 °C of *Knautia arvensis* herb was $12.09 \pm 0.19\%$. The total ash content was $7.48 \pm 0.21\%$, and the ash content insoluble in hydrochloric acid was $3.84 \pm 0.08\%$.

Conclusion. Physicochemical parameters as loss on dryness, total ash value and acid-insoluble ash value are signs of good quality of *Knautia arvensis* raw materials. The obtained data will be useful for further development of identification parameters and preparation of a monograph of this plant.

A Comprehensive Distribution of the Relevance of Using *Phacelia tanacetifolia*.

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Background: *Phacelia tanacetifolia* is a multifunctional crop with applications in agriculture, beekeeping, and industry. However, its potential for the pharmaceutical industry remains underexplored. Further research into its chemical composition and effects on the human body represents a promising direction for scientific investigation.

Aim: evaluation of the potential pharmacological significance of *Phacelia tanacetifolia* and its prospects for use in the pharmaceutical industry.

Methods: a review and analysis of literature sources have been conducted, highlighting the chemical composition of *Phacelia tanacetifolia* Benth. and its potential applications in medicine and pharmacy.

Results: *Phacelia tanacetifolia* Benth. exhibits significant value due to its combination of agricultural, melliferous, and industrial properties. The plant contains phenolic compounds, including rosmarinic acid, which is a taxonomic marker for the *Boraginaceae* family, as well as flavanones such as eriodictyol and hesperetin, along with fatty acids. This composition makes it a promising source for dietary supplements and pharmaceutical products. As a green manure crop, *Phacelia* enhances soil fertility, while its high nectar productivity makes it valuable for beekeeping. Its rich protein-vitamin composition supports its use as a fodder crop, positively impacting livestock production. Additionally, its fibrous stems are utilised in paper and textile manufacturing, contributing to a zero-waste approach. The presence of bioactive compounds in *Phacelia* sparks particular scientific interest, suggesting potential applications in pharmacology and biotechnology. These aspects highlight the broad prospects of this plant, necessitating further research. Due to its high adaptability to various growing conditions, *Phacelia tanacetifolia* can serve as an environmentally friendly raw material.

Conclusion: Thus, *Phacelia tanacetifolia* is a promising crop with significant yet underexplored pharmacological potential. The obtained results indicate the need for further chemical analyses. Research on this plant may open new opportunities for the pharmaceutical industry, contributing to the development of new medicinal products and biologically active supplements.

References:

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2. Порівняльний аналіз вмісту жирних кислот у траві та насінні фацелії пижмолистої / С. І. Степанова [та ін.] // Актуальні питання клінічної фармакології та клінічної фармації : матеріали наук.-практ. internet-конф., м. Харків, 22-23 жовт. 2019 р. – Харків : НФаУ, 2019. – С. 327-332.

Comparative Chemical Analysis of *Rhodiola rosea* Roots

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Background: *Rhodiola rosea* L. is a well-known medicinal plant valued for its adaptogenic, antifatigue, antidiabetic, and neuro-protective effects (1). The key bioactive marker compounds are salidroside, rosavin, rosin and rosarian (2). However, the growing demand and climate change factors for golden roots have led to over-harvesting of the raw material and its inclusion in CITES (3). As *Rhodiola* cultivation expands to new regions, assessing the quality of its bioactive compounds is becoming critical.

Aim: Determine qualitative and quantitative composition of wild and cultivated *Rhodiola* roots.

Methods: Samples were collected in the natural habitat (Altai, Mongolia) (sample-1) and cultivated in Botanical Garden, Vytautas Magnus University, Kaunas (sample-2) and Vilnius (sample-3), Lithuania. Chromatographic analysis was performed using the Waters e2695 Alliance HPLC system, on an ACE C₁₈ (250 mm × 4.6 mm, 5 µm) column with an acetonitrile (A) and phosphine buffer (pH 7.0 (B) as solvents. Detection was carried out at a wavelength of 251 nm (total rosavins (rosarin, rosavin, rosin, rosiridin) content) and 221 nm (salidroside).

Results: HPLC analysis showed good separation of peaks, which in terms of RT and UV spectra were consistent with standards. All roseroot individuals showed a very high deviation in their chemical content at each sampling time. Salidroside content varied between 0.95 and 1.41%, while the rosavin content varied from 0.12-1.85 %. The content of rosavin in sample-1 from natural habitats was the higher, while the rosavin in sample-2 was significantly lower. In sample-3, the marker compound was in trace amounts.

Conclusions: The analysis showed significant differences in bioactive compounds (rosarin, rosavin, rosin, rosiridin and salidroside) content between wild and cultivated golden roots. Given the variability of the chemical composition of plant materials depending on environmental factors, it is always important to assess the content of bioactive components.

References:

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2. Booker A, Jalil B, Frommenwiler D, Reich E, Zhai L, Kulic Z, et al. The authenticity and quality of *Rhodiola rosea* products. *Phytomedicine*. 2016;23(7):754-62.
3. Mykhailenko O, Jalil B, McGaw LJ, Echeverría J, Takubessi M, Heinrich M. Climate change and the sustainable use of medicinal plants: a call for “new” research strategies. *Frontiers in Pharmacology*. 2025;15.

Amino Acids Content in *Prunus armeniaca* 'Shalakh' Raw Material

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Background: *Prunus armeniaca* L. is widely valued for its rich nutritional content, including amino acids, polyphenolics, fatty acids (1), cyanogenic glucoside amygdalin and mineral compounds (2). While most studies focus on the fruit's nutritional profile, other plant organs, such as seeds, kernel shells, and leaves, are also rich in bioactive compounds, particularly amino acids. Amino acids may demonstrate antioxidant, antidiabetic, antimicrobial, and anticancer properties, particularly *in vitro* (3). Understanding the amino acid distribution in different parts of an apricot tree is essential for assessing their potential uses in food, medicine, and agriculture.

Aim: Comparative determination of the amino acids content in *Prunus armeniaca* 'Shalakh' raw material.

Materials and methods: *P. armeniaca* 'Shalakh' variety fruits, leaves, seeds, kernel shell have been harvested in the Tairov village, Armavir region (Armenia) in 2023. The analyses were carried out by GC-MS method on SHIMADZU GC-MS-QP2010 with preliminary derivatisation (4).

Results and discussions: All *P. armeniaca* 'Shalakh' raw material contains L-Ala, Gly, L-Val, L-Leu, Iso, L-Pro, L-Ser, L-Thr, L-Phe, L-Asp, L-Glu, L-Lys. The total amino acids content in *P. armeniaca* 'Shalakh' kernel shell is 143.38±0.85 mg/100 g, in the fruits is 208.70±1.24 mg/100 g, in the seeds is 317.12±1.58 mg/100g and leaves have the biggest content which is 1501.42±9.37 mg/100 g dry weight. For the integrated use of apricot by-products, the seeds, after oil extraction, can serve as a valuable source of amino acids, while the leaves can be used to obtain a complex of active compounds, including not only phenolic compounds and minerals but also a significant amount of amino acids

Conclusion: The leaves showed the highest content of amino acids, which, in combination with other classes of bioactive compounds, makes them a promising raw material for pharmaceutical development.

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1. Kutsanyan A, Georgiyants V, Zinchenko A. Study of the fatty acids composition of Apricot (*Armeniaca vulgaris* L.) fruit of the variety Shalakh. 9th International Electronic Conference on Medicinal Chemistry (ECMC 2023); 2023 Nov 1–30. Poster session: Natural Products and Biopharmaceuticals. Available from: <https://sciforum.net/paper/view/15582>.
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Bioactive Compounds of *Ruta graveolens* L. of Ukrainian Origin

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Background: *Ruta graveolens* L. is a medicinal plant that is little known in the modern world and rarely found in official medicine. However, in the past, it held an important place. The plant was used as a fresh herb, infusion, decoction, powder or oils (1). It was especially widespread in the region of its natural growth, the Mediterranean, where ruta was traditionally used for diseases of the heart, gastrointestinal tract, nervous system, dermatitis (2). Despite the decline in interest in the plant in modern practice, its pharmacological activities, attributed to its chemical composition, suggest the potential for its reintroduction into phytotherapy.

Aim: to establish the link between traditional ethnopharmacological use of *Ruta graveolens* and modern applications using the principles of evidence-based pharmacy. Identification of main groups of bioactive substances and marker compounds in the plant raw material.

Materials and methods: *Ruta graveolens* was collected in the Ivan Franko Botanical Garden (Lviv, Ukraine) at different vegetative phases in 2023. The chemical composition was determined using qualitative reactions, HPLC, HPTLC and GC-MS methods.

Results: Analysis of ruta raw material allowed the identification of the following classes of compounds: alkaloids, hydroxycinnamic acids, coumarins, terpenoids, flavonoids and marker substances such as: rutin, chlorogenic acid, neochlorogenic acid, caffeic acid. Rutin was identified as the dominant compound. Considering the ethnopharmacological use of the raw material and properties of compounds, it can be assumed that it was rutin that caused its use in cardiovascular diseases in ancient times. Modern research confirms that this substance exhibits cardioprotective, antioxidant, antiapoptotic, and anti-inflammatory activity (3).

Conclusions: The high content of rutin ($>12,502 \pm 0,219$ mg/g) indicates the plant's potential in the treatment of cardiovascular diseases, as well as in the complex therapy of inflammatory pathologies. Further studies of the activity of other classes of substances from the rue will be carried out.

References

1. Colucci-D'Amato L, Cimaglia G. *Ruta graveolens* as a potential source of neuroactive compounds to promote and restore neural functions. *Journal of Traditional and Complementary Medicine*. 2020 Jun 4;10(3):309-314.
2. Coimbra AT, Ferreira S, Duarte AP. Genus *Ruta*: A natural source of high value products with biological and pharmacological properties. *Journal of Ethnopharmacology*. 2020 Oct 5;260:113076.
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HPTLC Standardisation of *Epilobium angustifolium* Polyphenols Dry Extracts

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Background. The standardisation of plant extracts is a critical step in ensuring the quality, efficacy, and safety of herbal preparations. Variability in plant composition due to environmental, genetic, and processing factors can significantly impact the bioactive profile of the final product (1). *Epilobium angustifolium* (2) is rich in polyphenols with anti-inflammatory and antimicrobial properties, holds great therapeutic potential. However, the lack of standardised extraction and analytical methods limits its use in phytopharmaceuticals.

Aim: to develop a reliable HPTLC method for *E. angustifolium* dry extract standardisation, ensuring consistency and potency for future applications.

Materials and methods: polyphenolics were studied using ethanol (70 v/v) and water *E. angustifolium* leaves dry extracts and chlorogenic acid, avicularin, guajaverin, isoquercitrin and hyperoside, gallic acid as reference standards. The analysis was carried out in HPTLC plates Si 60 F₂₅₄ (Merck) in ethyl acetate: formic acid: water (68:8:8) as mobile phase with further derivatisation by 2-aminoethyl-diphenylborinate 1% solution and 5% macrogol 400.

Results. The HPTLC analysis showed all compounds in *E. angustifolium* extracts but in different concentrations, e.g., yellow fluorescent zones ($R_f=0.4$; $R_f=0.38$; $R_f=0.85$; $R_f=0.52$) were in line with isoquercitrin, hyperoside, avicularin and guajaverin, and these compounds were dominant in both extracts, but their concentrations were higher in the ethanol dry extract. The light blue, fluorescent zone ($R_f=0.7$) was identified as gallic acid (Fig. 1).

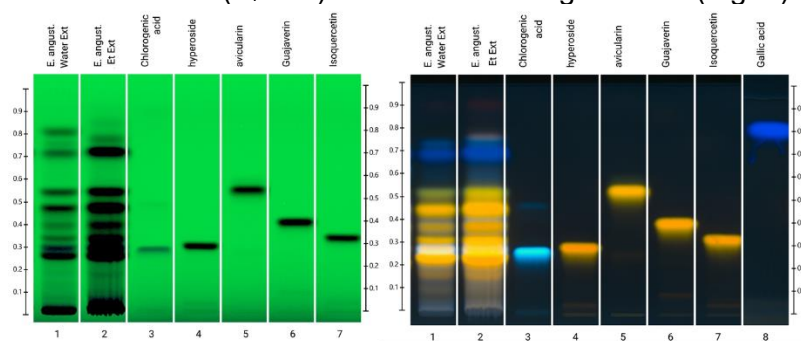


Fig. 1. HPTLC profile of *E. angustifolium* dry extracts under UV 254 nm (A) prior to derivatization and at UV 366 nm after derivatization

Conclusions. The presented method can be used for standardisation of *Epilobium* species.

References

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Parthenocissus quinquefolia: Chemical Composition and Pharmacological Activity

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Background: *Parthenocissus quinquefolia* (L.) Planch. (Vitaceae family) is a woody, deciduous liana native to North and Central America but has been naturalized in many parts of the world. [1] The plant is known for its many pharmacological effects. In Tunisian traditional medicine, the bark of this plant is used as an expectorant and tonic [2]. *P. quinquefolia* is considered invasive in Ukraine, where it is widespread across many regions, creating a large supply of raw material for both pharmaceutical and medicinal use.

Aim: To analyse the chemical composition of *P. quinquefolia* based on literature data and assess its potential for further pharmaceutical application.

Materials and methods: A literature search was conducted using the ScienceDirect database to gather information on the qualitative composition and pharmacological activity of *P. quinquefolia*.

Results: A study of literature data showed that the leaves, fruits, bark and stems of *P. Quinquefolia* contain sugars, anthraquinones, terpenoids, flavonoids, saponins, tannins, alkaloids, and cardiac glycosides. In particular, the total content of phenolic compounds was inserted, the content of which depends on the type of solvent and plant raw material. For example, 5 µg/mL was established in the hexane extract of fruits, while for the chloroform extract of bark – 468 µg/mL [3, 4]. Due to the presence of these compounds, antioxidant [3, 4], antitumor, antimicrobial [2], and anti-inflammatory [5] activity was inserted for the plant. In the studies, significant attention was paid to phenolic compounds, in particular flavonoids.

Conclusions: *Parthenocissus quinquefolia* is a promising medicinal plant, and studies indicate the possibility of using it in medicine, pharmacy and cosmetology. It is widespread, easy to cultivate, and contains a variety of phytochemical components, making it a possible source for the isolation of individual compounds.

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Pharmacological Potential of *Lespedeza bicolor* Due to Its Chemical Composition

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Background: *Lespedeza bicolor* Turcz. is a member of the Fabaceae family and is native to eastern Asia, Korea and Japan [1]. It has been introduced into Belarus, Uzbekistan and the south-eastern United States, where it is considered an invasive species. It is also cultivated in Ukraine. At present, its use in Ukraine is limited to the treatment of inflammatory diseases of the urinary system [2]. However, it is important to consider expanding the areas of plant application due to the wide range of active phytochemical compounds.

Aim: analysis of the chemical composition and pharmacological activity of *Lespedeza bicolor* to justify further research prospects.

Methods: literature review among major databases such as Web of Science, PubMed, Scopus and ScienceDirect.

Results: *L. bicolor* has been widely used in traditional medicine to treat kidney disease, conjunctivitis, rhinitis, otitis and herpes. Current research has shown that the main groups of active substances the aerial part of the *L. bicolor* are flavonoids (quercetin, kaempferol, lespedin, trifolin, etc.), isoflavonoids (daidzein), tannins (in young leaves) and alkaloids (bufotenin, lespedamine, etc), which may have psychedelic properties. Among the range of medicines in Ukraine, there are two *L. bicolor* products: Lespenefril® and Lespefril® [3]. *Lespedeza* extracts have antioxidant, diuretic, anti-inflammatory, hypo-azotemic and antimicrobial activity due to the present of those bioactive compounds. In addition, the literature suggests that the use of *L. bicolor* extract may have anticancer and neuroprotective properties [4]. In addition, *L. bicolor* extract can suppress renal inflammation, attenuate hyperglycaemia induced liver and skeletal muscle damage in type 2 diabetes mellitus [5].

Conclusion: Thus, *Lespedeza bicolor* has a high potential for use in a wide range of areas and requires further research into its possible use in the treatment of cancer, neurodegenerative disorders, such as Parkinson's disease and to prevent complications from type 2 diabetes.

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Medicinal Plants 2025 - How to respond to the challenges of climate change and the needs of bio-economies?

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Background. Medicinal plants play a vital role in healthcare, cosmetics, agriculture, and nutrition, but their biodiversity is declining due to climate change, habitat loss and unsustainable harvesting. Many species may disappear before their medical potential is fully explored. While demand for plant-derived pharmaceuticals grows, ecosystems face pressure that threaten species distribution, quality and availability. The bioeconomy offers a sustainable approach to balancing conservation and economic needs (1).

Aim: To assess the impact of climate change and bioeconomic demands on medicinal plants and discuss strategies for their conservation and use.

Methods: A resilience framework was applied to seven vulnerable medicinal plants, evaluating habitat loss, reproductive success, climate adaptability, and economic demand (2).

Results. Climate change has significant impact on plant distribution, quality and yield. For example, rising temperatures and reduced precipitation have shifted the cultivation areas of *Crocus sativus* L. from southern to north-western Ukraine. Similarly, in Provence, France, increasing temperatures and water shortages have caused a threefold decline in *Lavandula angustifolia* Mill. yield and a northward shift in cultivation. While plants adapt through phenological shifts, extreme weather disrupts biosynthesis and lowers essential oil quality (3). Overharvesting and land-use changes further threaten endangered medicinal species like *Rhodiola rosea* L. and *Boswellia sacra* Flück.

Instead of expanding cultivation areas, optimising land use and applying adaptive strategies can promote sustainability. The bioeconomy supports economic growth in phytopharmacy by maximising plant-derived resources and decrease environmental impact. *Phacelia tanacetifolia* Benth. exemplifies sustainable use, enriching soil fertility, supporting pollinators, and providing bioactive compounds for pharmaceuticals and agrochemicals. Integrating medicinal plants into circular economic models expands their applications beyond traditional use while ensuring sustainability.

Conclusions. A bioeconomic approach maximises the potential of medicinal plants, ensuring sustainability, reducing waste, and preserving biodiversity for future generations.

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Hypochaeris & Leontodon are Sources of Sesquiterpene Lactones and Other Natural Products

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Background. *Hypochaeris* and *Leontodon* (Cichorieae tribe, Asteraceae family) are occurring throughout Europe, especially in temperate and subtropical climates. Members of these genera grow in a variety of habitats from grasslands to disturbed soils. Some well-known species include *H. radicata* L., *H. glabra* L., *L. hispidus* L., *L. saxatilis* Lam. etc. These plants have not yet found application in medicine and pharmacy, but they are used as food (1). Although these plants are not considered yet for the pharmaceutical industry, they might represent a unique source of new bioactive compounds.

Aim. To evaluate the literature data on chemical composition, with a focus on sesquiterpene lactones in *Hypochaeris* and *Leontodon* species, in order to identify the most promising samples.

Materials and methods: A systematic literature search on the chemical composition of the genera *Hypochaeris* and *Leontodon*.

Results. The selected species grow in temperate and Mediterranean climates, especially in grasslands and stony dry soils. *Hypochaeris* genus is particularly important for its rich content of sesquiterpene lactones, as well as flavonoids, lignans, phenolic acids and triterpenoids. In *H. radicata* roots have been found several representatives of the target class, namely hypochoeroside C, hypochoerosidic acid C, hypochoeroside D, hypochoerosidic acid D (2) as well as in *L. tenuiflorus* herb contains ixeriside D, sonchuside A, 11,13 β -dihydro-14-dihydroxyhypocretenolide, 11,13 β -dihydro-14-hydroxyhypocretenolide- β -D-glucopyranoside etc. (3). Due to the presence of these compounds, *Hypochaeris* (4) and *Leontodon* (5) species have anti-cancer and anti-inflammatory activity.

Conclusions. *Hypochaeris* and *Leontodon* genera represents a promising source of bioactive compounds with significant pharmacological potential. At this stage of the study, *Hypochaeris glabra* L. was selected for a comparative analysis of sesquiterpene lactones profile with known species.

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Modern Approaches for Assessing the Antioxidant Activity of Lipophilic Compounds

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Background: The assessment of antioxidant properties is very important for predicting the possible vector of pharmacological activity of bioactive compounds (1). For plant extracts, it is important to evaluate not only the total effect but also the activity of individual compounds. Such studies for phenolic compounds are widely conducted by LSMU scientists using the HPLC method with post-column derivatisation by appropriate chemical agents (2). Lipophilic antioxidants protect biological systems from oxidative stress by neutralising lipid peroxidation and scavenging lipid-soluble free radicals (3). The identification of the most active compounds in plant essential oils or lipophilic extracts is highly promising for optimising their research and further application. However, the use of the HPLC method for such purposes is not always feasible due to the nature of compounds and the limited use of reagents that may negatively affect the equipment.

Aim: This study assesses the feasibility of selecting methods for evaluating the antioxidant activity of individual lipophilic substances in plant objects.

Methods: A literature review was conducted to evaluate antioxidant assays used for lipophilic antioxidants.

Results: Few studies have focused on determining the antioxidant activity of individual lipophilic compounds, particularly in essential oils (4). Various methods, including GC and HPTLC, and assays such as ORAC, HORAC, TEAC, CUPRAC, and β -carotene linoleic acid have been applied. Among these, CUPRAC is particularly for assessing reducing capacity in lipid environments. Among *in vitro* methods, DPPH is the most commonly used due to its simplicity and cost-effectiveness, followed by hydroxyl radical scavenging, SOD, and β -carotene linoleic acid assays. The challenge of evaluating the antioxidant activity of individual lipophilic compounds can be effectively addressed using HPTLC, which offers extensive possibilities for the use of both mobile phases and derivatisation reagents.

Conclusion: HPTLC enables rapid, cost-effective detection of antioxidant activity, especially for lipophilic compounds in complex plant mixtures.

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