Against the Gram-negative strain: Acinetobacter baumannii ATCC 17978 only the extract obtained from Agrimonia eupatoria showed antibacterial activity (MIC-2.5 mg/ml; MBC-5 mg/ml), and both extracts studied showed no antibacterial activity against the Gram-negative strain Enscherichia coli ATCC 25922. Antifungal activity against Candida albicans ATCC 10231 was not shown by any extract.

Extracts from Agrimonia eupatoria and Cichorium imtybus showed bactericidal activity against Gram-positive strains (Staphylococcus aureus and Bacillus cereus), where the best antibacterial activity was demonstrated by Agrimony extract, which inhibited 2 Gram-positive strains and 1 Gram-negative strain and showed no antifungal activity against Candida albicans strain. The fact that the extracts studied in this work were active against Gram-positive bacteria is an important aspect, since many multidrug-resistant bacteria belong to this category, where new chemotherapeutic agents are needed to treat human diseases or to control microorganisms that cause food spoilage due to microbial resistance to some antimicrobial agents currently used in food preservation.

Conclusions. From this study we can conclude that the antimicrobial activity of extracts obtained from aerial parts of Agrimonia eupatoria and Cichorium intybus could be related to the content of secondary metabolites mostly phenolic compounds, as well as to their interaction with the susceptibility of the pathogenic microorganism evaluated.

HPLC ANALYSIS OF PHENOLIC COMPOUNDS IN JUNO BUCHARICA

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Introduction. Genus Juno Tratt. (or Iris subg. Scorpiris Spach) is a separate group of bulbous Irises, widespread in Central and Southwest Asia and the Caucasus with some representatives in the Mediterranean basin. This is a monophyletic group with remarkable morphological, biogeographical and molecular features, which is accepted here as a separate genus. Juno is one of the most disputable groups of the genus Iris s.l. (Iridaceae) and the largest part of its taxa are in need of typification. Recent phylogenetic studies have confirmed the monophyly of Juno irises, although their taxonomic rank in the Iris remains controversial (Matthew, 1990). Juno bucharica (Foster) Vved (synonym Iris bucharica Foster) is a bulbous perennial plant from the Iridaceae family, belonging to the subgenus Scorpiris. Bulb up to 2 cm tall. Roots are fusiform. The stem is from 15 to 30 cm tall, bears 4 – 5 flowers. The leaves are light green, crescent-shaped, narrowed towards the top, the lower ones are 1.5 – 3.5 cm wide. The flowers are light or dark yellow, 6 – 7 cm in diameter.

Iridaceae species have an immense medicinal importance and are used in the treatment of cancer, inflammation, bacterial and viral infections (Wang, Cui, Zhao, Mini Rev Med Chem., 2010) according to the high content of different phenolic compounds (isoflavones, flavones, hydroxycinnamic acids, xanthones). Phenolic compounds are one of the largest and most diverse groups of bioactive compounds in plants with different pharmacological effects. The chemical composition of the plant has not been studied. Previously, we only published a study on the amino acid composition of Juno bucharica leaves and corms (Mykhailenko et al., Sci. Pharm. 2020).

The aim of this study was to perform the HPLC analysis of the phenolic compounds in Juno bucharica leaves.

Materials and methods. The object of the study was the leaves of Juno bucharica (Foster) Vved (= Iris bucharica Foster) harvested in the Botanical Garden of Kharkiv National University name after V.N. Karazin (Kharkiv, Ukraine) in May 2021. The raw material was dried to an air-dry state. The extraction was performed in an ultrasonic bath for 30 minutes without additional heating. Chromatographic separation of the extracts was carried out in a Shimadzu Nexera X2 LC-30AD HPLC system using an ACE C18 column in a solvent system with 0.1% acetic acid in water under gradient increase elution of acetonitrile from 5 to 95%. The identification of the compounds was based on the UV/MS spectral data as well as co-chromatography with the control phenolic compounds. Detailed conditions for chromatographic analysis and validation characteristics of the method are presented in a previously published work (Mykhailenko et al., Phytochemical analysis, 2020). Studies of antioxidant activity were performed using the CUPRAC method on a Dynamica spectrophotometer, HALO DB-20. Statistical analysis was carried out in accordance with the requirements of the State Pharmacopoeia of Ukraine (2004) using software (Microsoft Office Excel 7.0).

Research results. In the present study the phenolic composition of Juno bucharica leaves is described. Taking into account the growing demand for natural components of medicines and the need to create "soft" herbal remedies, the search and study of new plants with phenolic compounds is an important direction.

Table. HPLC identification of the major constituents of J. bucharica leaves: chromatographic, UV data of identified compounds, and their content (mg/g)

Peak No	t_R (min)	UV λ_{max} (nm)	Mol. Formula	Mol. Weight, g/mol	Compound	Content, mg/g
1	9.411	217, 234, 325	$C_{16}H_{18}O_9$	354.31	Neochlorogenic acid	0.011 ± 0.01
2	11.883	280	$C_{15}H_{14}O_6$	290.27	Catechin	0.026 ± 0.01
3	14.003	219, 260, 293	$C_8H_8O_4$	168.15	Vanillic acid	0.555 ± 0.31
4	14.652	280	$C_{15}H_{14}O_6$	290.27	Epicatechin	0.051 ± 0.02
5	22.859	269, 215	$C_{21}H_{20}O_{10}$	432.4	Vitexin	0.018 ± 0.02
6	23.89	255, 353	$C_{21}H_{20}O_{12}$	464.4	Hyperoside	0.151 ± 0.10
7	30.534	266, 348	$C_{27}H_{30}O_{15}$	594.5	Kaempherol-3-rutinoside	0.351 ± 0.22
8	33.49	237, 266	$C_{21}H_{20}O_{10}$	432.4	Apigenin 7-glucoside	0.286 ± 0.05

Values of mean ± standard deviation are reported. Statistical comparisons were performed using ANOVA test ($p < 0.05$).

Eight phenolic compounds (neochlorogenic acid, catechin, vanillic acid, epicatechin, vitexin, hyperoside, kaempherol-3-rutinoside, apigenin 7-glucoside) were identified and quantified in the methanol extract of J. bucharica leaves for the first time. The leaves of Juno contain large amounts of vanillic acid and kaempherol-3-rutinoside. Flavonoids are the main class in the plant leaves. The study compared the antioxidant activity of Juno leaves methanolic extract with Trolox as a reference standard. The reducing power of the tested sample was measured three times by UV spectrophotometry and averaged. The value of antioxidant activity of Juno leaves was 22.88 mg/mL

($p<0,05$). The results show the presence of pronounced antioxidant activity due to the presence of phenolic compounds.

Conclusions. Characterization of phenolic compounds in Juno bucharica (Iridaceae) is an important result with regard to the biological properties (antioxidant and antiradical) of these metabolites for their possible applications in various industrial activities, such as food/feed, cosmetics, or phytomedicine.

TOTAL POLYPHENOLIC CONTENT OF LAVENDER WASTE EXTRACTS

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Introduction. Lavender (Lavandula angustifolia Mill.) is one of the most valuable plants due to its essential oil with unique fragrance and properties – antibacterial, anxiolytic, carminative, antioxidant, calming and analgesic. After steam distillation, the lavender residues still remain a rich source of biologically active substances – polyphenols, flavonoids, terpenoids.

The aim. The present study was designed to determine total polyphenolic content in ten fractionated extracts using lavender waste.

Materials and methods. The total polyphenolic content of ten fractionated was determined using Folin-Ciocalteu reagent and was calculated as gallic acid equivalent (% GAE).

Research results. The extracts were prepared by using ethanol 70% and 96% and mixed with organic solvents with different polarity at basic pH and acid pH. Thus, ten fractionated extracts were obtained. These extracts were investigated for total polyphenolic content and the most polyphenol-rich were the following: no.5 – 11,04% GAE, no.10 – 12,11% GAE, no.9 – 28,93% GAE.

Conclusions. A selective fractionation of lavender waste extracts demonstrates a promising alternative and rich source of polyphenols with application in pharmaceutical industry and cosmetics.