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Comparative analysis of the polyphenolic profile and antioxidant activity of different plant parts of knotweed (*Polygonum aviculare* L.)

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Abstract

Polygonum aviculare L. *(Polygonaceae), commonly known as knotweed, is a widely distributed annual plant with a history of ethnopharmacological use. Despite its traditional applications and reported bioactivities, comprehensive analyses comparing the chemical composition and antioxidant potential of its individual plant parts are lacking. In this study, ethanol extracts were prepared from the aerial parts, leaves, stems, and roots of P. aviculare collected in northern Serbia. Targeted HPLC-MS/MS analysis quantified 31 polyphenols, while qualitative HPLC-DAD-MS analysis enabled the identification of dominant phenolic compounds based on their spectral (UV and MS) characteristics, without confirmation using reference standards. Catechin was most abundant in root and stem extracts, while the leaf extract exhibited the highest concentrations of gallic and chlorogenic acids, as well as flavonol-3-O-glucuronides. Antioxidant activity was assessed using a cell-based assay in U937 cells exposed to AAPH-induced oxidative stress. All extracts demonstrated significant antioxidant capacity, with the leaf extract showing the highest activity (252.8 ± 22.5 mg TE/g dry extract). Principal component analysis (PCA) revealed distinct polyphenolic profiles among the extracts, especially between roots and aerial parts. These findings highlight the differential distribution of bioactive compounds in P. aviculare and support the leaf extract as the most promising antioxidant source, warranting further investigation for therapeutic and nutraceutical applications.*

Keywords*: knotweed; flavonol glucuronides; polyphenolic profile; cell-based assay in U937 cells; AAPH-induced oxidative stress.*

INTRODUCTION

Polygonum aviculare L. (family Polygonaceae), commonly referred to as knotweed, prostrate knotweed, doorweed, knotgrass, lowgrass, or wiregrass, is an annual summer weed related to buckwheat and dock. This species typically exhibits a prostrate, mat-forming growth habit, with stems ranging from 20 to 40 cm in length. The leaves are alternate and display considerable variability in size and shape, though they are generally ovate. The inflorescences are axillary cymes, each bearing 2 to 6 flowers. *P. aviculare* is widely distributed across various habitats, including agricultural fields and wetlands, at both low and high elevations globally, and is also present in the flora of the Republic of Serbia [1].

Although *P. aviculare* has been classified as an invasive alien species in northern Serbia [2], it possesses numerous beneficial properties that support its traditional and ethnopharmacological use. Herbal infusions prepared from *P. aviculare* have been traditionally employed for the treatment of upper respiratory tract disorders and for external application in managing various skin conditions [3]. In traditional Chinese medicine, the plant is particularly valued for its diuretic, antidotal, anti-inflammatory, antipyretic, antiparasitic, and antidiarrheal activities [4]. The young leaves and aerial parts of *P. aviculare* can be consumed either raw or cooked [5]. Moreover, the seeds are edible and may be consumed whole or ground into flour, which can be used alone or blended with wheat flour in the preparation of baked products such as cookies and pancakes

[6]. In addition to its culinary applications, the fresh flowering stems of *P. aviculare* have been reported to serve as a natural dye for textile materials [5].

Previous studies have demonstrated that *P. aviculare* extracts from various geographical regions exhibit a broad spectrum of biological activities in both *in vitro* and *in vivo* models. For instance, *P. aviculare* collected in Egypt showed notable antimicrobial properties [7], while Swedish samples demonstrated anti-inflammatory effects by inhibiting prostaglandin biosynthesis and platelet-activating factor (PAF)-induced exocytosis *in vitro* [8]. The antioxidant potential of Taiwanese *P. aviculare* was evaluated by Hsu (2006), and Iranian extracts were shown to induce cytotoxicity in MCF-7 breast cancer cells and modulate apoptotic gene expression [9,10]. Ethanol extracts of aerial parts of *P. aviculare* from Serbia displayed cytotoxic activity against HepG2 hepatocarcinoma cells, with evidence of modulation of Keap1-Nrf2 gene expression [11]. Furthermore, ethanol extracts from *P. aviculare* were found to exert anti-obesity effects in high-fat diet-induced obese mice, attributed to the suppression of lipogenesis in adipose tissue and enhancement of antioxidant defenses [12]. In a clinical study conducted in Mexico, a *P. aviculare*-based extract (referred to as Mexican Sanguinaria) significantly reduced gingival inflammation, indicating its potential application as a supportive oral rinse in the management of gingivitis [13].

Several phytochemical investigations of the whole *P. aviculare* plant have confirmed the presence of diverse bioactive constituents, including flavonoids, flavonoid glucuronides, lignans, tannins, saponins, phenolic acids, alkaloids, and sesquiterpenes [7,11,14,15]. However, to the best of our knowledge, comprehensive chemical profiling of the individual plant parts has not yet been conducted, and comparative analyses of their respective biological activities remain unexplored. In this study, ethanol extracts were prepared from the whole aerial part (herb), as well as separately from leaves, stems, and roots of *P. aviculare* collected in the northern region of the Republic of Serbia. The extracts were analyzed to assess differences in their polyphenolic composition using targeted, quantitative HPLC-MS/MS and LC-DAD-MS qualitative analyses, followed by evaluation of their antioxidant activity in a cell-based model system.

MATERIALS AND METHODS

Materials

Reference standards used for HPLC-MS/MS analysis were purchased from Sigma–Aldrich Chem (Steinheim, Germany), Roth/Carl Roth GmbH/Rotichrom® (Karlsruhe, Germany), Chromadex (Santa Ana, CA, USA), and from Fluka Chemie GmbH (Buchs, Switzerland), as detailed in Jovanović *et al.* (2021) [11]. Methanol (HPLC gradient-grade) was obtained from J.T. Baker (Deventer, The Netherlands), and formic acid (p.a.) was sourced from Merck (Darmstadt, Germany). Antibiotic/antimycotic solution (penicillin-streptomycin-amphotericin B suspension), 2,2′-azobis(2-methylpropionamidine) dihydrochloride (AAPH), 2′,7′-dichlorofluorescein diacetate (DCFH-DA), DMSO, fetal bovine serum (FBS), L-glutamine, RPMI-1640 medium with and without phenol red, trolox, trypan blue and human leukemic myelomonocytic cell line (U937) were supplied by Sigma–Aldrich Chem (Steinheim, Germany).

Plant material and extract preparation

P. aviculare plant material was collected in Novi Sad, Republic of Serbia. Plant material was identified, and the voucher specimens were deposited at the Herbarium of the Department of Biology and Ecology, Faculty of Natural Sciences, University of Novi Sad, Serbia (BUNS Herbarium; voucher number 2-1666).

Whole *P. aviculare* aerial parts, as well as separated leaves, stems, and roots, were air-dried and subsequently subjected to extraction. Dried, powdered plant material (10 g) was macerated with 80% ethanol (100 mL) for 72 hours under continuous stirring at room temperature. The resulting extracts were separated from the plant residue by filtration. Following vacuum concentration, the crude extracts were reconstituted in water and further purified via liquid–liquid extraction with petroleum ether to remove chlorophyll and other non-polar impurities. Recognizing the potential loss of target compounds during defatting, the petroleum ether phase was washed with methanol, and the methanolic fraction was combined with the aqueous layer. Final extract yields, after purification and vacuum drying at temperatures below 45 °C, were 1.17 g (12.3%), 0.58 g (15.2%), 0.62 g (7.3%) and 0.81 g (8.4%) for the whole aboveground plant - herb (PAH), leaf (PAL), stem (PAS) and root (PAR) extracts, respectively. The vacuum-dried and purified extracts were reconstituted in DMSO to achieve a final concentration of 100 mg/mL.

Chemical analysis –quantitative and qualitative analyses of polyphenols

HPLC-MS/MS technique was used for quantification of 44 selected phenolic compounds, while qualitative analysis of extracts was carried out using HPLC-DAD/MS technique, following the procedures described by Jovanović *et al.* (2021) [11].

Antioxidant assay

U937 cells (a human leukemic myelomonocytic cell line) were maintained under standard culture conditions as described by Beara *et al.* (2024) [16]. The cy-

totoxicity of the tested extracts was assessed prior to performing the antioxidant assay, following the methodology outlined in the same study.

The total antioxidant capacity of *P. aviculare* extracts was evaluated using a cell-based assay that measures the inhibition of intracellular oxidation of 2′,7′-dichlorofluorescein diacetate (DCFH-DA) by reactive oxygen species (ROS), which are generated by the addition of 2,2′-azobis(2-methylpropionamidine) dihydrochloride (AAPH), as described by Cordier *et al.* (2013) [17]. Briefly, U937 monocytes (1×10^6 cells/mL) were incubated with 5 µmol/L DCFH-DA for 1 hour at 37 °C in a humidified atmosphere with 5% CO_2. Following incubation, cells were centrifuged, washed, and resuspended in phenol red- and FBS-free medium. A volume of 10 µL of each extract (1.2 mg/mL) was added to 100 µL of the cell suspension, and ROS production was initiated by adding 10 µL of AAPH solution (240 mmol/L; final concentration 20 mmol/L). After 1 hour of incubation at 37 °C, fluorescence was measured at excitation/emission wavelengths of 485/538 nm. Trolox, in a concentration range of 0.019–2.4 mg/mL, was used to construct the calibration curve. Antioxidant activity was expressed as mg of Trolox equivalents per gram of dry extract weight (mg TE/g dw) or per gram of crude plant material (mg TE/g pm).

Statistical analysis

Experimental results are expressed as mean values ± standard deviation (SD) from three independent experiments. Variability in the polyphenolic profiles among samples was assessed using principal component analysis (PCA). Prior to PCA, all data were standardized to eliminate scale-related biases and to ensure equal contribution of all variables to the overall variance and component extraction. Statistical analyses were performed using STATISTICA software, version 14.0.015 (TIBCO Software Inc.).

RESULTS

Polyphenolic profile

LC-MS/MS analysis of the examined extracts resulted in the quantification of 31 polyphenols (**Figure 1a–c**), along with quinic acid, a key precursor of plant aromatic compounds, detected at concentrations of 2.846 ± 0.08, 3.762 ± 0.09, 1.850 ± 0.03, and 0.582 ± 0.01 mg/g dry weight in PAH, PAL, PAS, and PAR extracts, respectively. Several compounds were analyzed but not detected, i.e., their concentrations were below the limit of quantification. These included the phenolic acids 3,4-dimethoxycinnamic, cinnamic, and *o*-coumaric; the flavones baicalein and chrysoeriol; the isoflavones daidzein and genistein; the flavone glycosides apigenin-7-*O*-glucoside, apiin, and baicalin; the biflavonoid amentoflavone; and the lignans secoisolariciresinol and matairesinol.

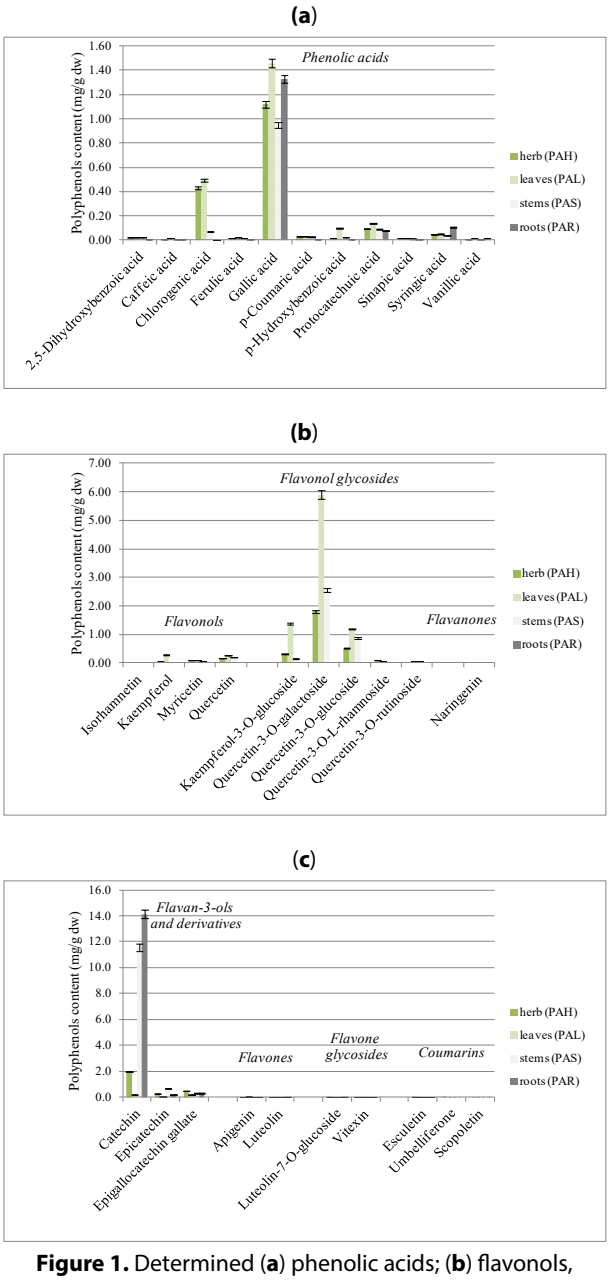

Figure 1. Determined (**a**) phenolic acids; (**b**) flavonols, flavonol glycosides and flavanones; (**c**) flavan-3-ols and derivatives, flavones, flavones glycosides and coumarins in extracts of *P. aviculare* aerial parts (PAH), leaves (PAL), stems (PAS) and roots (PAR).

To better understand the differences among the analyzed *P. aviculare* extracts, PCA was conducted based on the identified polyphenolic compounds (**Figure 2**). The first two principal components (F1, F2) together accounted for 80.25% of the total variance, with the F1 contributing 52.81% and the F2 contributing 27.45%.

Visual inspection of the HPLC-DAD-MS chromatograms revealed that many of the most prominent peaks—particularly in the herb (**Figure 3**) and leaf extracts—did not correspond to any of the compounds included in the targeted HPLC-MS/MS method. These

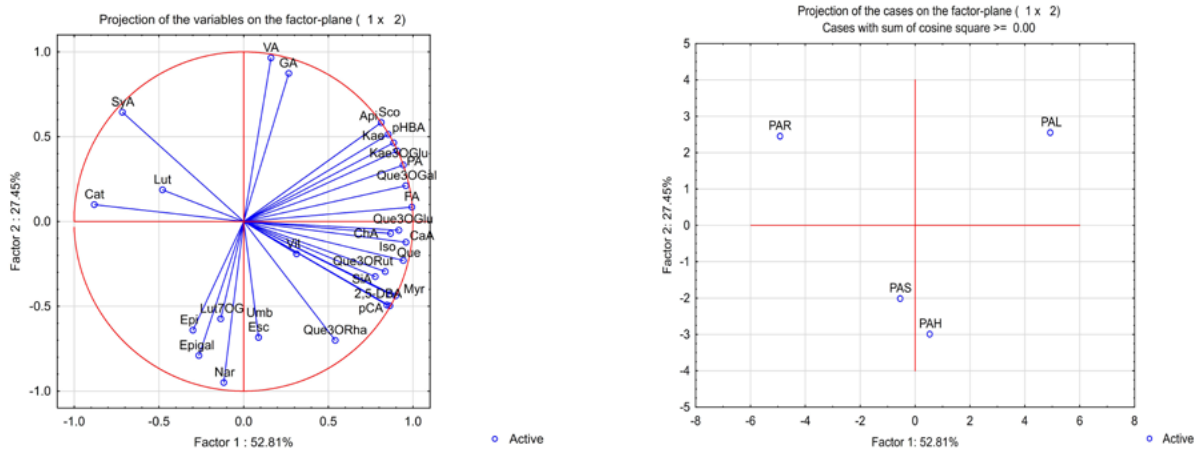

Figure 2. PCA of detected polyphenols in *P. aviculare* extracts (a) Distribution of variables on loadings plot; (b) distribution of *P. aviculare* aerial part (PAH), leaf (PAL), stem (PAS) and root (PAR) extracts on scores plot; Abbreviations: 2,5-DBA: 2,5-dihydroxybenzoic acid; Api: apigenin; CaA: caffeic acid; Cat: catechin; ChA: chlorogenic acid; Epi: epicatechin; Epigal: epigallocatechin gallate; Esc: esculetin; FA: ferulic acid; GA: gallic acid; Iso: isorhamnetin; Kae: kaempferol; Kae3OGlu: kaempferol-3-*O*-glucoside; Lut: luteolin; Lut7OG: luteolin-7-*O*-glucoside; Myr: myricetin; Nar: naringenin; PA: protocatechuic acid; pCA: *p*-coumaric acid; pHBA: *p*-hydroxybenzoic acid; Que: quercetin; Que3OGal: quercetin-3-*O*-galactoside; Que3OGlu: quercetin-3-*O*-glucoside; Que3ORha: quercetin-3-*O*-L-rhamnoside; Que3ORut: quercetin-3-*O*-rutinoside; Sco: scopoletin; SiA: sinapic acid; SyA: syringic acid; Umb: umbelliferone; VA: vanillic acid; Vit: vitexin.

peaks were further analyzed, allowing for tentative identification based on retention times, UV-Vis absorption profiles, molecular ion data, and comparison with literature data [18]. Several of the dominant signals were consistent with flavonol glucuronides, including: myricetin-3-O-glucuronide (1), quercetin-3-O-glucuronide (2), methylated myricetin glucuronide (3), kaempferol-3-O-glucuronide (4), isorhamnetin-3-O-glucuronide (5), kaempferide-3-O-glucuronide (6), and quercetin-pentoside (avicularin, 7), and kaempferol-pentoside (juglanin, 8). Using the mAU values of

Visual inspection of the HPLC/DAD/MS chromatograms revealed that many of the most prominent peaks, particularly in the herba (**Figure 3**) and leaf extracts, did not match any of the compounds included in the targeted HPLC-MS/MS method. These peaks were further analyzed, allowing for tentative identification based on retention times, UV-Vis absorption profiles, and molecular ion data and comparison with literature data [18]. Several of the dominant signals were consistent with flavonol-glucuronides: 1) myricetin-3-*O*-glucuronide, 2) quercetin-3-*O*-glucuronide,

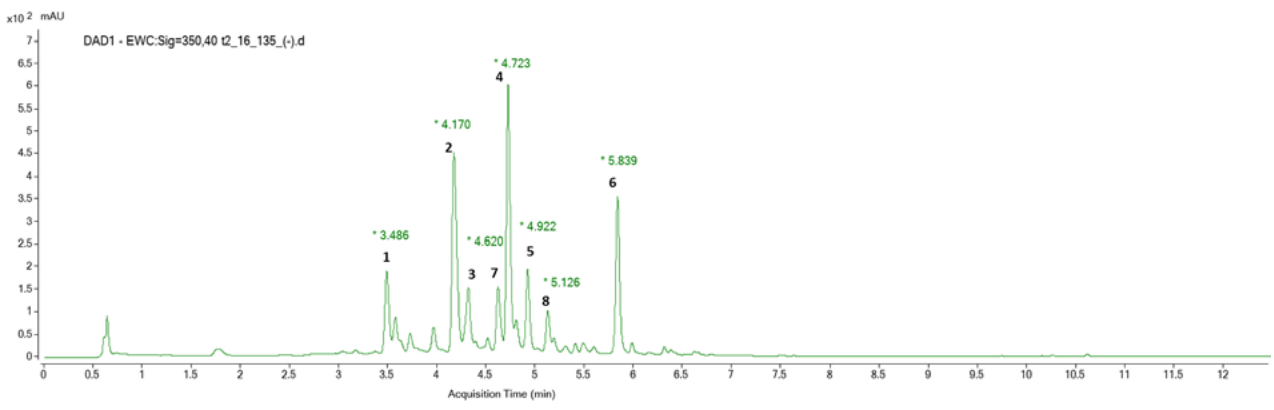

Figure 3. HPLC-DAD chromatograms (350 nm) of *Polygonum aviculare* ethanol herb extract with labelled dominant phenolics: 1) myricetin-3-*O*-glucuronide (493-, 3,486 min); 2) quercetin-3-O-glucuronide (477-, 4,170 min); 3) methylated myricetin glucuronide (507-, 4,317 min) 4) kaempferol-3-O-glucuronide (461-, 4,723 min); 5) isorhamnetin-3-O-glucuronide (491-, 4,922 min); 6) kaempferide-3-O-glucuronide (475-, 5,839 min); 7) quercetin-3-O-arabinofuranoside, avicularin (433-, 4,610 min); 8) kaempferol-3-O-pentoside (417-, 5,126 min)

selected peaks in the chromatograms at 350 nm, we compared their relative abundance across the three extracts (roots, stems, and leaves). The distribution of these tentatively identified compounds in different plant parts is presented in **Figure 4**.

3) metilated myricetin glucuronide, 4) kaempferol-3-*O*-glucuronide, 5) isorhamnetin-3-*O*-glucuronide, 6) kaempferide-3-*O*-glucuronide, and quercetin- and kaempferol- pentosides (7 and 8). Using the mAU values of selected peaks, in the chromatograms on 350

nm, we compared their relative abundance across the three extracts (roots, stems and leaves). The distribution of these tentatively identified compounds in different plant parts is presented in **Figure 4**.

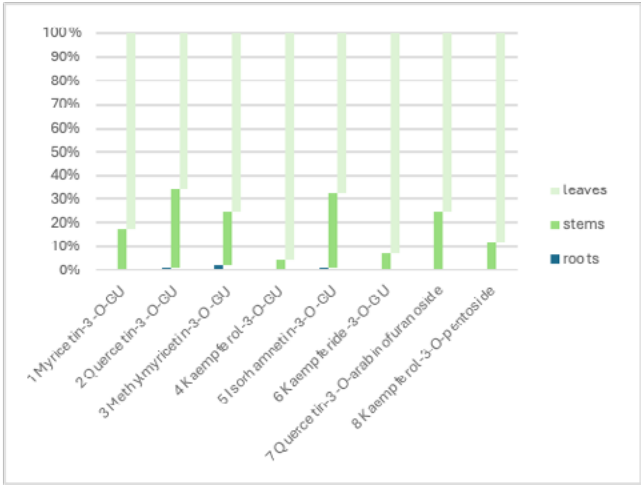

Figure 4. Relative distribution (%) of selected flavonoid glycosides in different organs (leaves, stems, and roots) of *Polygonum aviculare*. Compounds include myricetin-, quercetin-, and kaempferol-based 3-*O*-glucuronides, their methylated derivatives (methyl-myricetin; isorhamnetin (methyl-quercetin) and kaempferide (methyl-kaempferol)), and quercetin and kaempferol -pentosides. Flavonoid content is expressed as a percentage of the total peak area across tissues, based on HPLC-DAD/MS analysis.

In vitro antioxidant activity

Antioxidant activity was evaluated using a cell-based model system, and the results are presented in **Table 1**.

All extracts exhibited statistically significant differences in antioxidant activity, ranging from 110.8 to 252.8 mg trolox equivalents/g dry extract weight (mg TE/dw). However, when expressed as trolox equivalents per gram of crude plant material (mg TE/g pm), the antioxidant activity levels differed due to varying amounts of non-polar fractions removed during extraction, resulting in statistically similar antioxidant activity between stem and aerial part extracts.

DISCUSSION

LC-MS/MS analysis revealed that among the phenolic acids (**Figure 1a**), gallic acid (GA) and chlorogenic acid (ChA) were present in both herb (PAH) and root (PAR) extracts, with significantly different concentrations. Specifically, the highest levels of these acids were found in the leaf extract (PAL: 1.456 ± 0.008 and 0.495 ± 0.003 mg/g dw for GA and ChA, respectively), which likely contributed to their concentrations in the whole herb extract (PAH: 1.121 ± 0.010 and 0.429 ± 0.001 mg/g dw, for GA and ChA, respectively). In contrast, PAR contained a comparable amount of GA (1.328 ± 0.012 mg/g dw), but ChA was detected only in trace amounts (0.001 ± 0.000 mg/g dw). Other identified phenolic acids were found in similar concentrations across all examined samples.

An even more pronounced difference was observed for the most abundant compound, catechin (**Figure 1b**), which was present at markedly higher levels in stem (PAS) and root (PAR) extracts (11.546 ± 0.061 and 14.147 ± 0.072 mg/g dw, respectively), compared to the herb (PAH) and leaf (PAL) extracts (1.994 ± 0.009 and 0.215 ± 0.002 mg/g dw, respectively). Selected flavones, flavone glycosides, and coumarins were sporadically detected in trace amounts (**Figure 1b**). Moreover, quercetin-3-*O*-galactoside, the most abundant flavonol glycoside (**Figure 1c**), was present in all aboveground parts (PAL, PAS, and PAH), but only in minor amounts in the root extract (PAR).

These compositional differences are clearly illustrated in the PCA projection (**Figure 2**). The separation of PAR was likely driven by the high concentrations of catechin (Cat) and syringic acid (SyA), as well as the presence of luteolin (Lut). Despite overall differences, the profiles of PAS and PAH appeared most similar, likely due to the substantial mass contribution of stems to the whole plant. The distinct positioning of PAL was probably influenced by its high content of GA, protocatechuic acid (PA), and quercetin-3-*O*-galactoside (Que3OGal), along with its low Cat content.

In comparison with published data on *P. aviculare* herb extracts from different localities, the qualitative profiles of dominant compounds appear to be gener-

Table 1. Antioxidant activity of examined extracts.

Sample (extract)	Inhibition of AAPH-induced ROS generation in U937 cells	
	(mg eq trolox / g of dry extract weight)	(mg eq trolox / g of crude plant material)
P. aviculare herb (PAH)	110.8 ± 6.9 ^{d}	11.89 ± 0.74 ^{c}
P. aviculare leaf (PAL)	252.8 ± 22.5 ^{a}	38.43 ± 3.43 ^{a}
P. aviculare stem (PAS)	151.6 ± 11.1 ^{c}	11.14 ± 0.82 ^{c}
P. aviculare root (PAR)	201.8 ± 18.2 ^{b}	17.00 ± 1.54 ^{b}

*Means within each row with different letters (a–d) differ significantly (p≤0.05).

ally similar. For instance, Jovanović *et al.* (2021) analyzed ethanol extracts of the aerial parts of *P. aviculare* collected from southern Serbia and reported comparable levels of chlorogenic acid (0.69 mg/g dw) and gallic acid (0.95 mg/g dw), lower catechin content (0.70 mg/g dw), and higher concentrations of quercetin-3-*O*-galactoside (3.00 mg/g dw) [11]. The primary difference is the reported presence of *o*-coumaric acid in their samples (0.0013 mg/g dw), which was not detected in the samples analyzed in the present study. A total of 25 compounds were identified in nine *P. aviculare* (Poland) herb extracts, with flavonol glucuronides representing a prominent group [18]. Notably, myricetin-3-*O*-glucuronide, quercetin-3-*O*-galactoside, quercetin-3-*O*-glucuronide, kaempferol-3-*O*-glucuronide, and kaempferide-3-O-glucuronide (designated as compounds 1, 3, 5, 9, and 17) were among the predominant constituents and were quantifiable in nearly all analyzed samples, with concentrations ranging from 0.50 to 4.57 mg/g. As presented in **Figures 3** and **4**, we also confirmed presence of flavonol-3-*O*-glucuronides (compounds 1-6) in examined samples. The highest relative concentration of flavonoid-glycosides was detected in leaf extract, followed by the stem extract, while their presence in root extract was minor (i.e., trace levels). Notably, the relative amounts of kaempferol-3-*O*-glucuronide and kaempferide-3-*O*-glucuronide (compounds 4 and 6, respectively) were up to 20-fold higher in the leaves compared to the stems.

Cai *et al.* (2020) reported comparable levels of gallic acid (1.029 mg/g dw) and quercetin (0.240 mg/g dw) in *P. aviculare* (China) leaf extract, along with lower concentrations of chlorogenic acid (0.162 mg/g dw), quercetin-3-*O*-galactoside (hyperoside, 2.083 mg/g dw), and kaempferol (0.063 mg/g dw) [19]. In contrast, they also dectected slightly higher amounts of syringic acid (0.176 mg/g dw) and quercetin-3-*O*-L-rhamnoside (quercitrin, 0.640 mg/g dw), as well as the presence of *o*-coumaric acid (0.104 mg/g dw).

In general, it can be concluded that the aboveground and underground parts of *P. aviculare* differ significantly in their phenolic composition, while the differences among the herb, stem, and leaf extracts are primarily quantitative. *P. aviculare* represents a valuable source of polyphenols, with different plant parts contributing specific compounds of interest. The leaves are particularly rich in flavonol glucuronides, gallic acid, and quercetin-3-*O*-galactoside, the stems serve as a notable source of catechin, and moderate levels of flavonol glucuronides, while the roots contain significant amounts of both gallic acid and catechin.

ROS play essential roles in various cellular processes, including immune responses, tissue repair, regulation of circadian rhythms, cell growth, differentiation, apoptosis, neurotransmission, the metabolism and elimination of drugs and xenobiotics, etc. However, under pathological conditions, ROS production can exceed the capacity of antioxidant defense systems, resulting in oxidative stress. This state underlies the pathophysiology of numerous diseases, including diabetes mellitus, atherosclerosis, cancer, autoimmune disorders, and neurodegenerative conditions [20]. In this study, the antioxidant activity of *P. aviculare* extracts was evaluated based on their ability to inhibit AAPH-induced ROS generation in U937 cells. As shown in **Table 1**, antioxidant capacity varied across the samples (ranging from 110.8 to 252.8 mg Trolox equivalents / g dw), following the order: leaf > root > stem > whole herb. Notably, when the results were expressed relative to the crude plant material, no statistically significant difference was observed between the antioxidant activities of the stem and herb extracts. The determined antioxidant activity is consistent with previous findings, where the antioxidant potential of *P. aviculare* whole herb was demonstrated through various assays, including DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging, superoxide radical scavenging, lipid peroxidation inhibition, and DNA protection against hydroxyl radical-induced strand scission [9,21]. Furthermore, six compounds (two furan-type derivatives and four phenolic compounds), isolated from *P. aviculare*, exhibited significant antioxidant activity in both ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)) and DPPH assays [22].

In general, our findings suggest that the lower antioxidant capacity of stems, compared to leaves, contributes to the reduced overall activity of the whole herb extract. Therefore, it can be concluded that *P. aviculare* leaves represent the most valuable plant part in terms of antioxidant potential and may serve as the most promising source for the development of antioxidant-rich formulations or functional products.

CONCLUSION

The differences among the examined aboveground parts of *P. aviculare* are primarily quantitative, with all parts containing similar classes of polyphenols in varying amounts. In contrast, the phenolic composition of the roots differs significantly. Each plant part contributes specific compounds: the leaves are abundant in flavonol and methylflavonol glucuronides (particularly kaempferol-3-*O*-glucuronide and kaempferide-3-*O*-glucuronide), as well as gallic acid and quercetin-3-*O*-galactoside. The stems are rich in catechin and contain moderate levels of flavonol glucuronides, especially quercetin-3-*O*-glucuronides. The roots contain notable amounts of both gallic acid and catechin. Among all extracts, the leaf extract showed the highest antioxidant potential, identifying *P. aviculare* leaves as the most promising candidate for antioxidant-rich formulations or functional products. These findings under-

score the importance of selecting specific plant parts to optimize the chemical and bioactive properties of *P. aviculare* extracts.

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Uporedna analiza polifenolnog profila i antioksidantne aktivnosti različitih delova biljke troskot (*Polygonum aviculare* L.)

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Kratak sadržaj

Polygonum aviculare L. *(Polygonaceae), poznata kao troskot, je jednogodišnja biljka široko rasprostranjena u prirodi, koja ima i etnofarmakološki značaj. Uprkos tradicionalnoj upotrebi u narodnoj medicini i dokumentovanim biološkim aktivnostima, sveobuhvatne analize koje upoređuju hemijski sastav i antioksidantni potencijal pojedinačnih delova biljke i dalje su ograničene. U ovom radu, etanolni ekstrakti su pripremljeni iz herbe, listova, stabljika i korena P. aviculare prikupljene na severu Srbije. Kvantitativnom, HPLC-MS/MS analizom određen je sadržaj 31 jedinjenja iz klase polifenola, dok je kvalitativna HPLC-DAD-MS analiza omogućila identifikaciju dominantnih fenolnih jedinjenja na osnovu spektralnih (UV i MS) karakteristika, bez potvrde referentnim standardima. Katehin je najzastupljeniji u ispitivanim ekstraktima korena i stabljike, dok ekstrakt lista sadrži najviše galne i hlorogenske kiseline, kao i različitih flavonol-3-O-glukuronida. Antioksidativna aktivnost je ispitana na ćelijskoj liniji U937 nakon izazivanja oksidativnog stresa primenom AAPH agensa. Svi ekstrakti su pokazali značajan antioksidativni potencijal, pri čemu je ekstrakt lista pokazao najvišu aktivnost (252,8 ± 22,5 mg TE/g suvog ekstrakta). Analiza glavnih komponenti (PCA) otkrila je jasne razlike u polifenolnim profilima ekstrakata, posebno između korena i nadzemnih delova. Dobijeni rezultati ukazuju na različitu raspodelu bioaktivnih jedinjenja u biljci P. aviculare i ističu ekstrakt lista kao najperspektivniji izvor antioksidanasa, što opravdava dalja istraživanja njegove primene u terapijske svrhe ili kao funkcionalne hrane.*

Ključne reči: *troskot; flavonol-glukuronidi; fenolni profil; ćelijska linija U937; oksidativni stres.*