INOPTEP 2025 PTEP 2025

NINTH INTERNATIONAL CONFERENCE
SUSTAINABLE POSTHARVEST AND
FOOD TECHNOLOGIES
INOPTEP 2025
and
XXXVII NATIONAL CONFERENCE
PROCESSING AND ENERGY
IN AGRICULTURE
PTEP 2025
April 7th – 10th, 2025, ZLATIBOR, SERBIA

BOOK OF ABSTRACTS
ZBORNIK APSTRAKATA

DEVETA MEĐUNARODNA KONFERENCIJA
ODRŽIVE POSLEUBIRAJUĆE I
PREHRAMBENE TEHNOLOGIJE
INOPTEP 2025
i
XXXVII NACIONALNA KONFERENCIJA
PROCESNA TEHNIKA I ENERGETIKA
U POLJOPRIVREDI
PTEP 2025
7 – 10. april, 2025, ZLATIBOR, SRBIJA

Publisher / Izdavač

National Society of Processing and Energy in Agriculture, Novi Sad, Serbia
Nacionalno društvo za procesnu tehniku i energetiku u poljoprivredi, Novi Sad,
Trg Dositeja Obradovića 8

Co-publisher / Suizdavač

Faculty of Agriculture, Novi Sad, Serbia
Poljoprivredni fakultet, Novi Sad, Trg Dositeja Obradovića 8

Editor in Chief / Glavni i odgovorni urednik: Prof. Dr. Milivoj Radojčin

Editors / Urednici

Prof. Dr. Siniša Bikić
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For Publisher / Za izdavača: Mr. Miladin Kostić
Technical editor / Tehnički urednik: Prof. Dr. Siniša Bikić
Printed by / Štampa: Offsetprint, Novi Sad, Primorska 84

Edition / Tiraž: 150
ISBN: 978-86-7520-629-3
E-mail: ptep@ptep.org.rs
www.ptep.org.rs

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SUPPORTERS:

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Government of the Autonomus Provincial Secretariat for Higher Education and Scientific Research,
Secretariat for Agriculture, Water Management and Forestry

POKROVITELJI KONFERENCIJE:

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CONTENT

CHEMICAL CHARACTERIZATION OF CHOKEBERRY SEEDS AND THEIR DERIVED OIL: COMPOSITION AND POTENTIAL HEALTH BENEFITS

Jelena ŽIVKOVIĆ[1], Dejan PLJEVLJAKUŠIĆ[1], Dubravka BIGOVIĆ[1], Katarina ŠAVIKIN[1]
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Chokeberries are a rich source of bioactive compounds with potential health benefits for humans. The high concentrations of polyphenols, such as phenolic acids, flavonols, anthocyanins, flavanols, and proanthocyanidins, play a key role in their remarkable bioactivity. Chokeberry seeds, as well as oil obtained from them, can also be consumed as a food component, though it is less commonly found in typical diets. The aim of this research was to investigate the characteristics and nutrient composition of chokeberry seeds and the oil extracted from them. The oil was extracted using hexane as a solvent in a Soxhlet extractor for 6 hours at 60°C. Before analysis, fatty acids were converted into fatty acid methyl esters using a standard sulfuric acid procedure. Tocopherols and tocotrienols were analyzed using normal-phase HPLC with a fluorescence detector, while carotenoids were analyzed using normal-phase HPLC with a diode array detector. The seed oil demonstrated a high degree of unsaturation. Gas chromatography analysis revealed that the major unsaturated fatty acid was alpha-linolenic acid (80.0%), followed by oleic acid (10.4%). The main saturated fatty acid was palmitic acid (5.2%). Chokeberry seeds were also found to be rich in tocopherols, with α-tocopherol being the most prevalent (21.7 mg/100 g of seed), followed by β-tocopherol (3.3 mg/100 g). As for tocotrienols, only γ-tocotrienol was detected, with a content of 0.7 mg/100 g of seed. HPLC analysis also identified carotenoids, with (E)-β-carotene as the dominant compound (3.7 mg/100 g), followed by lutein (1.2 mg/100 g). The antioxidant capacity of chokeberry seeds was assessed using the hydrophilic trolox equivalent antioxidant capacity (H-TEAC) assay, while the lipophilic antioxidant capacity of the oil was measured using the α-TEAC assay. Chokeberry seeds exhibited a significant H-TEAC value of 20.5 ± 0.9 mmol TE/100 g dry weight (DW), and the oil demonstrated an antioxidant activity of 50.7 μmol α-TE/100 g. The nutrient composition and antioxidant properties of chokeberry seeds and their oil suggest they may offer health benefits to consumers. These findings highlight the potential of chokeberry seeds and oil as valuable sources for the development of new multi-purpose products in industries such as cosmetics, pharmaceuticals, and food.
***Key words**: seed oil, fatty acids, carotenoids, tocopherols*

Acknowledgment of funding: This work was supported by the Ministry of Science, Innovations and Technological Development of the Republic of Serbia for financial support, grant number 451-03-66/2024-03/200003.

HEMIJSKA KARAKTERIZACIJA SEMENA ARONIJE I ULJA DOBIJENOG IZ NJEGA: SASTAV I POTENCIJALNI ZDRAVSTVENI ASPEKTI

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Plod aronije predstavlja bogat izvor bioaktivnih jedinjenja. Visoke koncentracije polifenola, poput fenolnih kiselina, flavonola, antocijanina, flavanola i proantocijanidina, igraju ključnu ulogu u njihovoj bioaktivnosti. Seme aronije, kao i ulje dobijeno iz njega, takođe može biti konzumirano, iako se retko nalazi kao sastojak prehrambenih proizvoda. Cilj ovog istraživanja bio je da ispita karakteristike i sastav nutrijenata semena aronije i odgovarajućeg ulja. Ulje je ekstrahovano primenom heksana kao rastvarača u Soxhlet ekstraktoru tokom 6 sati na 60°C. Pre analize, masne kiseline su prevedene u metil-estere masnih kiselina korišćenjem standardne procedure sa sumpornom kiselinom. Tokoferoli i tokotrienoli su analizirani primenom normalno-fazne HPLC tehnike sa fluorescentnim detektorom, dok su karotenoidi analizirani primenom normalno-fazne HPLC tehnike sa detektorom sa diodnim nizom. Ulje semena je pokazalo visok stepen nezasićenosti. Analiza gasnom hromatografijom utvrdila je da je glavna nezasićena masna kiselina alfa-linolenska kiselina (80,0%), praćena oleinskom kiselinom (10,4%). Glavna zasićena masna kiselina bila je palmitinska kiselina (5,2%). Takođe, pokazano je da je seme aronije bogato tokoferolima, pri čemu je α-tokoferol najzastupljeniji (21,7 mg/100 g semena), a sledi β-tokoferol (3,3 mg/100 g semena). Što se tiče tokotrienola, detektovan je samo γ-tokotrienol, sa sadržajem od 0,7 mg/100 g semena. HPLC analiza je takođe identifikovala karotenoide, pri čemu je (E)-β-karoten dominantan među njima (3,7 mg/100 g), nakon čega sledi lutein (1,2 mg/100 g). Antioxidantni kapacitet semena aronije procenjen je korišćenjem testa hidrofilnog trolox ekvivalenta antioskidativnog kapaciteta (H-TEAC), dok je lipofilni antioskidativni kapacitet ulja meren α-TEAC testom. Seme aronije je pokazalo značajnu vrednost od 20,5 ± 0,9 mmol TE/100 g suve mase (DW), dok je ulje pokazalo antioksidativnu aktivnost od 50,7 µmol α-TE/100 g. Rezultati sastava nutrijenata i antioksidantnih svojstava semena aronije i njegovog ulja ukazuju na to da pomenute sirovine mogu ostvariti zdravstvenu korist za potrošače. Ovo istraživanje ističe njihov potencijal kao vrednog izvora za razvoj novih funkcionalnih proizvoda u industrijama poput kozmetičke, farmaceutske i industrije hrane.

Ključne reči: *ulje semena, masne kiseline, karotenoidi, tokoferoli*

Zahvalnica: Ovaj rad je podržalo Ministarstvo za nauku, inovacije i tehnološki razvoj Republike Srbije ugovor broj 451-03-66/2024-03/200003.