Utjecaj prirodnih dodataka na bazi maslinova lista tijekom prerade maslina na kvalitativna, nutritivna i senzorna svojstva proizvedenih ulja

Novoselić, Anja

Doctoral thesis / Disertacija

2022

Degree Grantor / Ustanova koja je dodijelila akademski / stručni stupanj: **University of Zagreb, Faculty of Food Technology and Biotechnology / Sveučilište u Zagrebu, Prehrambeno-biotehnološki fakultet**

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:159:441313

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Download date / Datum preuzimanja: **2025-04-02**

prehrambeno biotehnološki fakultet

Repository / Repozitorij:

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DIGITALNI AKADEMSKI ARHIVI I REPOZITORIJI

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Anja Novoselić

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DOKTORSKI RAD

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DOKTORSKI RAD

Mentor:
dr. sc. Karolina Brkić Bubola

Zagreb, 2022.

University of Zagreb

Faculty of Food Technology and Biotechnology

Anja Novoselić

INFLUENCE OF NATURAL ADDITIVES BASED ON OLIVE LEAVES DURING OLIVE PROCESSING ON QUALITY, NUTRITIONAL AND SENSORY PROPERTIES OF PRODUCED OIL

DOCTORAL DISSERTATION

Supervisor:
Karolina Brkić Bubola, PhD

Zagreb, 2022

Tema rada prihvaćena je na 7. redovitoj sjednici Fakultetskog vijeća Prehrambeno-biotehnološkog fakulteta Sveučilišta u Zagrebu akad. god. 2020./2021., održanoj 23. travnja 2021. godine, a Senat Sveučilišta u Zagrebu donio je odluku o odobravanju pokretanja postupka stjecanja doktorata znanosti na svojoj 11. sjednici u akad. god. 2020./2021., održanoj 8. lipnja 2021. godine.

Istraživanje je provedeno u okviru HRZZ projekta „Projekt razvoja karijera mladih istraživača - izobrazba novih doktora znanosti” (DOK-2018-01-469) sufinanciran sredstvima Europskog socijalnog fonda u okviru Operativnog programa Učinkoviti ljudski potencijali 2014.-2020., financijskom potporom Hrvatske zaklade za znanost. Istraživanje je financirano od strane projekta „Advanced solutions for assuring the overall authenticity and quality of olive oil – OLEUM“ (GA br. 635690) i Instituta za poljoprivredu i turizam.

Informacije o mentoru

Dr. sc. Karolina Brkić Bubola zaposlena je kao znanstvena suradnica na Institutu za poljoprivredu i turizam u Poreču. Od 2018. g. izabrana je u znanstveno zvanje znanstvena savjetnica. Diplomirala je 2004. g. na Prehrambeno-biotehnološkom fakultetu Sveučilišta u Zagrebu, gdje je 2011. g. obranila i doktorski rad te stekla akademski stupanj doktora znanosti u području biotehničkih znanosti, polju prehrambene tehnologije. Na Institutu je zaposlena od 2005. g., gdje je od 2005. g. zamjenica voditeljice Prehrambeno-biotehnološkog laboratorija, akreditiranog prema normi ISO/IEC 17025 za analizu kvalitete i autentičnosti maslinovih ulja, a od 2008. g. voditeljica je akreditiranog i službenog Panela za senzornu analizu djevičanskih maslinovih ulja, priznatog od strane Međunarodnog vijeća za maslinu (International Olive Council, IOC) i Ministarstva poljoprivrede RH. Područje njenog znanstvenog interesa su kemija i analitika te senzorna svojstva maslinovog ulja, s posebnim naglaskom na istraživanju odziva senzorni aktivnih kemijskih spojeva na tehnološke i druge izvore varijabilnosti, kao i njihovu povezanost sa senzornom kvalitetom proizvoda. Sudjelovala je u 12 znanstvenih projekata, većinom vezanih uz kvalitetu i tehnologiju maslinovih ulja te senzorna svojstva poljoprivredno-prehrambenih proizvoda. Bila je voditeljica VIP projekta “Primjena filtracije u svrhu poboljšanja kvalitete maslinovih ulja" financiranog od strane Ministarstva poljoprivrede RH, te voditeljica istraživačke skupine Instituta unutar HORIZON 2020 projekta “Advanced solutions for assuring the overall authenticity and quality of olive oil – OLEUM” financiranog od strane EU. Od 2018. g. voditeljica je dva Projekta razvoja karijera mladih istraživača, Hrvatske zaklade za znanost. Do danas je objavila 1 poglavlje u knjizi te više od 40 znanstvenih radova, od kojih je 31 rad zastupljen u CC i SCI Expanded bazama. Sudjelovala je na više od 40 međunarodnih konferencija, od čega je na 3 bila član organizacijskog odbora. Citirana je više od 350 puta uz h-indeks 13. Recenzirala je stotinjak znanstvenih članaka za 15 uglednih znanstvenih časopisa. 2008. g. dobila je stipendiju IOC-a za usavršavanje u senzornoj analizi maslinovih ulja na Sveučilištu u Jaenu, Španjolska, a dodatno se usavršavala u senzornoj analizi i poboljšanju kvalitete maslinovog ulja na edukacijama u Španjolskoj, Italiji, Tunisu i Hrvatskoj. U 2014. g. bila je dobitnica povelje „Vitezica hrvatskog maslinovog ulja“, priznanja za znanstveni i stručni rad na polju proizvodnje maslinovog ulja. Članica je stručnih društava: European Federation of the Science and Technology of Lipids, Hrvatskog kemijskog društva i Hrvatskog društva prehrambenih tehnologa, biotehnologa i nutricionista. Članica je međunarodnih ocjenjivačkih panela svjetskih natjecanja maslinovih ulja (NYIOOC, New Yorku, SAD; EVOOLEUM, Cordoba, Španjolska). Od 2014. g. članica je radne skupine stručnjaka za analizu maslinovih ulja u Europskoj komisiji, a od 2018. g.

članica IOC radne skupine za senzornu analizu maslinovih ulja (predstavnica RH). Od 2021. g. članica je Matičnog odbora za biotehničke znanosti Agencije za znanost i visoko obrazovanje.

Na početku želim uputiti najveće zahvale mentorici dr. sc. Karolini Brkić Bubola na sveobuhvatnoj podršci, pomoći i suradnji koju mi je pružala u proteklih pet godina rada na Institutu. Bila mi je uzor i putokaz na mom putu proučavanja i upoznavanja maslinovog ulja. Na njezin poticaj nastala je ideja za ovaj doktorski rad.

Veliko hvala prof. dr. sc. Dubravki Škevin, dr. sc. Igoru Lukiću i izv. prof. dr. sc. Klari Kraljić koji su svojim sugestijama pomogli unapređenju moje doktorske disertacije.

Posebna zahvala ravnatelju dr. sc. Deanu Banu na svemu, posebno na financijskoj pomoći u realizaciji ovog istraživanja. Velike zahvale kolegicama Dori, Marini i Ivani koje su bile uvijek uz mene te nesebično dijelile svoja znanja koja su mi bila od velike pomoći u radu. Zahvale upućujem kolegama i dragim prijateljima s Instituta Sari R., Tini J.P.,Tini Š., Ani Č., Eni B., Živki K., Marici S., Danku C., Marinu K., Adrianu F., Elvinu Š., Bernardu P. i Marijanu B., te radnicima s imanja koji su mi bili podrška u realizaciji i provedbi istraživanja.

Hvala gosp. Kraljeviću, vlasniku uljare „Cuj" koji je omogućio preradu maslina i proizvodnju ulja u svom pogonu.

Zahvaljujem suradnicima sa sveučilišta u Bologni za pomoć pri analizi uzoraka za izradu doktorske disertacije.

Odajem veliku zahvalnost svojim roditeljima, bratu i prijateljima na poticaju i ljubavi koju su mi pružali tijekom ovog izazovnog životnog perioda.

TEMELJNA DOKUMENTACIJSKA KARTICA

Doktorski rad

Sveučilište u Zagrebu
Prehrambeno-biotehnološki fakultet
Sveučilišni poslijediplomski studij Biotehnologija i bioprocesno inženjerstvo, prehrambena tehnologija i nutricionizam
UDK: 547.56:633.852.73:665.327.3:665.7.035.7(043.3)
Znanstveno područje: Biotehničke znanosti
Znanstveno polje: Prehrambena tehnologija

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Anja Novoselić, mag. ing. agr.

Rad je izrađen na Institutu za poljoprivredu i turizam u Poreču
Mentor: dr. sc. Karolina Brkić Bubola, znanstvena savjetnica

Kratki sažetak
Cilj ovog rada je bio istražiti mogućnosti obogaćivanja djevičanskih maslinovih ulja fenolnim i hlapljivim tvarima primjenom prirodnih dodataka na bazi maslinova lista tijekom proizvodnje. U tu svrhu ispitani su utjecaji dodatka maslinova lista i vodenih ekstrakata maslinova lista tijekom proizvodnje maslinovih ulja na sastav fenolnih i hlapljivih tvari te na sastav masnih kiselina, pigmente, voskove, etilne estere masnih kiselina i senzorna svojstva proizvedenih ulja. U istraživanju su korišteni list i plod triju sorti maslina (Buža, Istarska bjelica, Leccino). Izučavano je može li primjena navedenih dodataka smanjiti negativan učinak proizvodnih čimbenika (kasniji stupanj zrelosti maslina, produljeno trajanje skladištenja maslina i skladištenja ulja) na sastav fenolnih i hlapljivih tvari u ulju. Utjecaj dodataka na bazi maslinova lista imao je različito djelovanje na parametre kvalitete u sortnim uljima ovisno o sortimentu prerađenih plodova te o količini dodanog lišća masline i vrsti dodanog vodenog ekstrakta maslinova lista. Primjena prirodnih dodatka na bazi maslinova lista nije negativno utjecala na senzorni profil istraženih sortnih ulja, odnosno u navedenim uljima nije utvrđeno postojanje mana. Utvrđene su interakcije između faktora 'dodatak maslinova lista/vodenog ekstrakta maslinova lista' i 'vremena skladištenja plodova' u njihovom utjecaju na ukupne identificirane fenolne spojeve i na ukupne identificirane hlapljive tvari. Dodatak maslinova lista utjecao je na povećanje indeksa ekstraktabilnosti tijesta maslina te na porast prinosa ulja u industrijskim uvjetima prerade maslina i proizvodnje ulja. Dobiveni rezultati značajno doprinose znanju o mogućnostima obogaćivanja ulja prirodnim antioksidansima, što može biti iskorišteno za proizvodnju maslinovih ulja boljih nutritivnih i senzornih svojstava te produljene trajnosti.

Broj stranica: 186
Broj slika: 29
Broj tablica: 29
Broj literaturnih navoda: 196
Broj priloga: 0
Jezik izvornika: hrvatski

Ključne riječi: maslinovo ulje, list masline, kontrola kvalitete, fenolni spojevi, hlapljive tvari, prinos ulja, oksidacijska stabilnost, senzorna svojstva

Datum obrane: 25. srpnja 2022.
Stručno povjerenstvo za obranu:

1. prof. dr. sc. Dubravka Škevin
2. izv. prof. dr. sc. Klara Kraljić
3. dr. sc. Igor Lukić, znanstveni savjetnik
4. doc. dr. sc. Ivona Elez Garofulić (zamjenski član)

Rad je pohranjen u: knjižnici Prehrambeno-biotehnološkog fakulteta u Zagrebu, Kačićeva 23; Nacionalnoj i sveučilišnoj knjižnici u Zagrebu, Hrvatske bratske zajednice 4; Sveučilištu u Zagrebu, Trg Republike Hrvatske 14.

BASIC DOCUMENTATION CARD

Doctoral dissertation

University of Zagreb
Faculty of Food Technology and Biotechnology
Postgraduate study in Biotechnology and Bioprocess Engineering, Food Technology and Nutrition
UDK: 547.56:633.852.73:665.327.3:665.7.035.7(043.3)
Scientific Area: Biotechnical Sciences
Scientific Field: Food Technology

INFLUENCE OF NATURAL ADDITIVES BASED ON OLIVE LEAVES DURING OLIVE PROCESSING ON QUALITY, NUTRITIONAL AND SENSORY PROPERTIES OF PRODUCED OIL

Anja Novoselić, mag. ing. agr.

Thesis performed at the Institute of Agriculture and Tourism, Poreč
Supervisor: Scientific advisor, Karolina Brkić Bubola, PhD

Short abstract
The aim of this work was to investigate the possibilities of enrichment of virgin olive oil with phenolic and volatile compounds by applying natural additives based on olive leaf during production. For this purpose, it was investigated how the addition of olive leaf and its aqueous extracts during production affects the composition of phenolic and volatile compounds, as well as the composition of fatty acids, pigments, waxes, fatty acid ethyl esters, and sensory properties of produced oils. Olive leaves and fruits of three olive varieties were included in the research (Leccino, Istarska bjelica, Buža). It was be investigated if the application of these additives can reduce the negative effect of production factors (later stages of fruit ripening, prolonged duration of olive storage and oil storage) on the composition of phenolic and volatile compounds in the oil. The influence of olive leaf-based supplements had a different effect on quality parameters in varietal oils depending on the variety of processed fruits and on the amount of olive leaves added, as well as on the type of olive leaf aqueous extract added. The application of natural additives based on olive leaf did not adversely affect the sensory profile of the investigated varietal oils, that is the occurence of defects was not established. Interactions were found between the factors 'addition of olive leaf/olive leaf water extract' and 'storage time of fruits' in their influence on total phenolic compounds identified and on total volatile compounds identified. The addition of olive leaf caused an increase in olive paste extractability index and an increase in oil yield in industrial conditions of olive processing and oil production. The obtained results significantly contribute to the knowledge about the possibilities of improving oils with natural antioxidants, which could be used for the production of olive oils with better nutritional and sensory properties and extended shelf life.

Number of pages: 186
Number of figures: 29
Number of tables: 29
Number of references: 196
Number of supplements: 0
Original in: Croatian*

Key words: olive oil, olive leaf, quality control, phenolic compounds, volatile compounds, oil yield, oxidative stability, sensory attributes

Date of the thesis defense: 25th July 2022

Reviewers:

1. Full professor Dubravka Škevin, PhD
2. Associate professor Klara Kraljić, PhD
3. Scientific advisor Igor Lukić, PhD
4. doc.dr.sc. Ivona Elez Garofulić (substitute)

Thesis deposited in: Library of Faculty of Food Technology and Biotechnology, Kačićeva 23; National and University Library, Hrvatske bratske zajednice 4; University of Zagreb, Trg Republike Hrvatske 14.

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KLJUČNE RIJEČI: maslinovo ulje, list masline, kontrola kvalitete, fenolni spojevi, hlapljive tvari, prinos ulja, oksidacijska stabilnost, senzorna svojstva

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KEY WORDS: olive oil, olive leaf, quality control, phenolic compounds, volatile compounds, oil yield, oxidative stability, sensory attributes

SADRŽAJ

(Ostali dijelovi doktorata bit će dostupni nakon objave svih podataka)

(Other parts of the thesis will be available after the publication of all the research data.)

7. LITERATURA

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ŽIVOTOPIS

Anja Novoselić rođena je 23. veljače 1992. u Rijeci. Osnovnu školu i Opću gimnaziju završila je u Puli. Na Agronomskom fakultetu u Zagrebu 2013. stekla je zvanje prvostupnika hortikulture. Godine 2015. sudjelovala je u programu Erasmus u Ljubljani gdje je obavljala stručnu praksu na Biotehničkom fakultetu na Zavodu za prehranu u labaratoriju za hranu i vino. Na Agronomskom fakultetu u Zagrebu 2016. stekla je titulu magistra inžinjera hortikulture, usmjerenje Vinogradarstvo i vinarstvo. Zaposlena je na Institutu za poljoprivredu i turizam u Poreču od 2016. kao analitičar u Prehrambeno – biotehnološkom labaratoriju na kemijskim i senzornim analizama maslinovog ulja. Od 2018. radila je kao stručni suradnik na projektu Interreg Mediteran MITOMED + (Modeli integriranih oblika turizma na Mediteranu plus) na provedbi projektnih aktivnosti i u organizaciji međunarodnih konferencija. Godine 2018. počinje raditi kao asistent na projektu Hrvatske zaklade za znanost „Projekt razvoja karijera mladih istraživača – Izobrazba novih doktora znanosti“, te kao doktorand na radnom mjestu asistenta na projektu „Advanced solutions for assuring the overall authenticity and quality of olive oil – OLEUM“. Istovremeno na Prehrambeno – biotehnološkom fakultetu upisala je sveučilišni poslijediplomski studij Biotehnologija i bioprocesno inžinjerstvo, prehrambena tehnologija i nutricinizam, smjer Prehrambena tehnologija. Istraživanje za izradu doktorskog rada provela je u sklopu „Projekt razvoja karijera mladih istraživača – Izobrazba novih doktora znanosti“.

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