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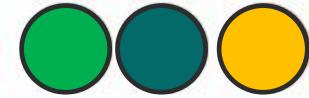


# Extraction of bioactive compounds from tobacco waste

M. Banožić\*, S. Jokić

<sup>1</sup>Josip Juraj Strossmayer University of Osijek, Faculty of Food Technology Osijek, Franje Kuhača 18, 31000 Osijek, Croatia

\*[mbanozic@ptfos.hr](mailto:mbanozic@ptfos.hr)



# On going research:

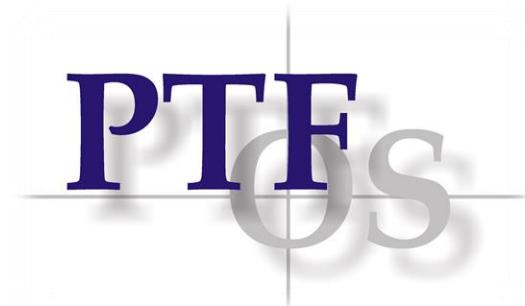
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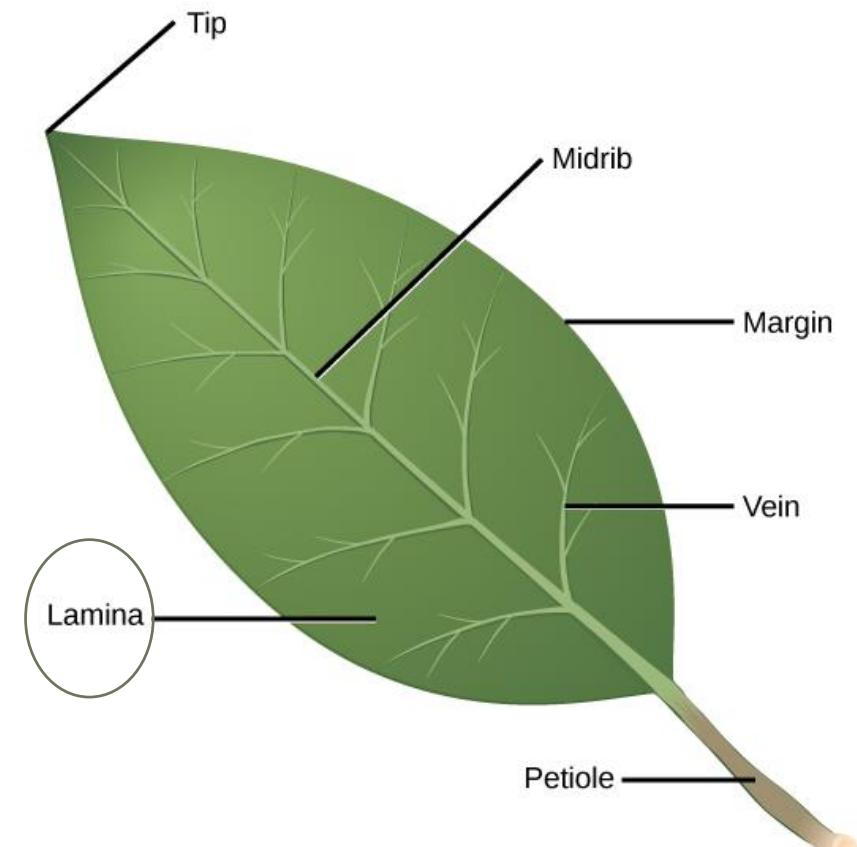
*„Application of innovative techniques of the extraction of bioactive components from by-products of plant origin“ (2018-2023)*

*Principal Investigator: Stela Jokić*

*(Budget: 1.607.708,72 HRK)*





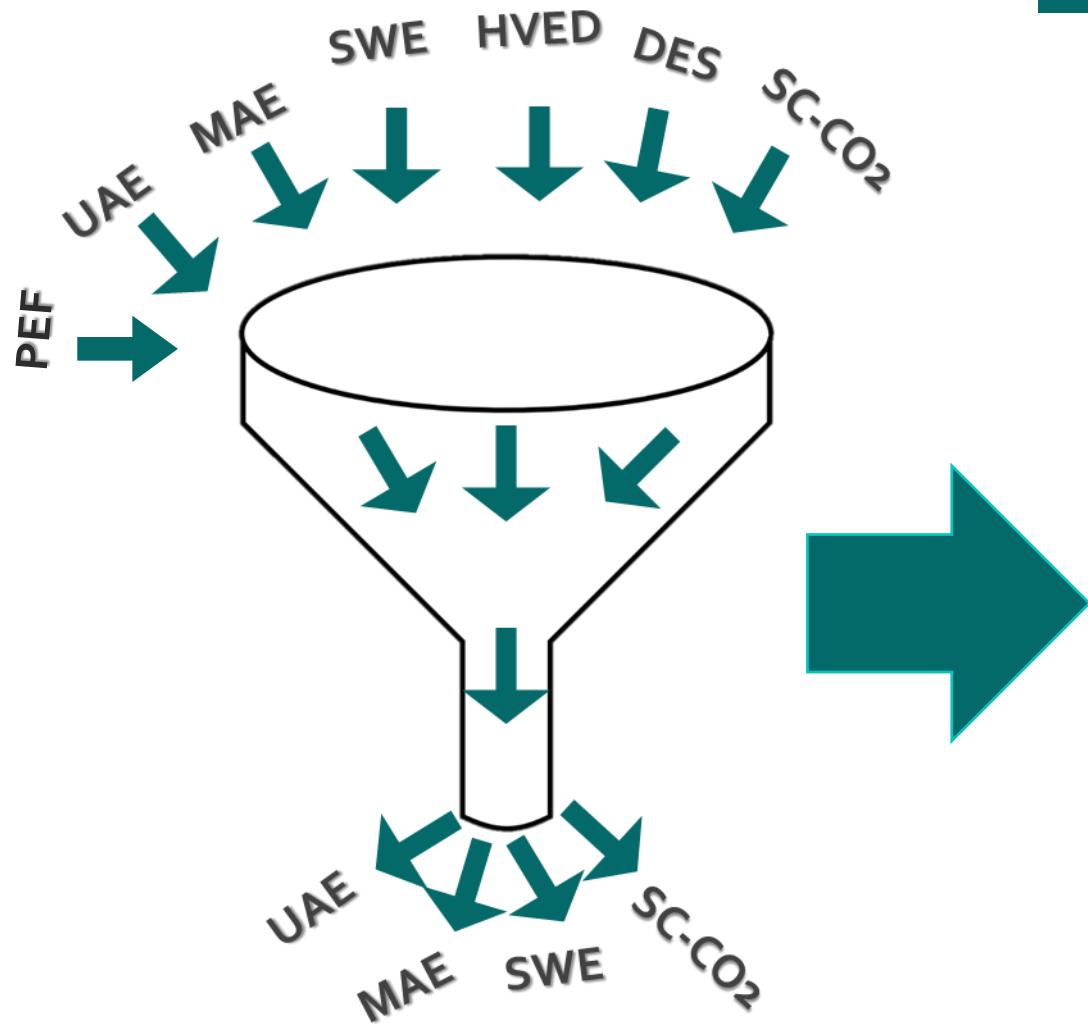




## TOBACCO PROCESSING AND MANUFACTURING



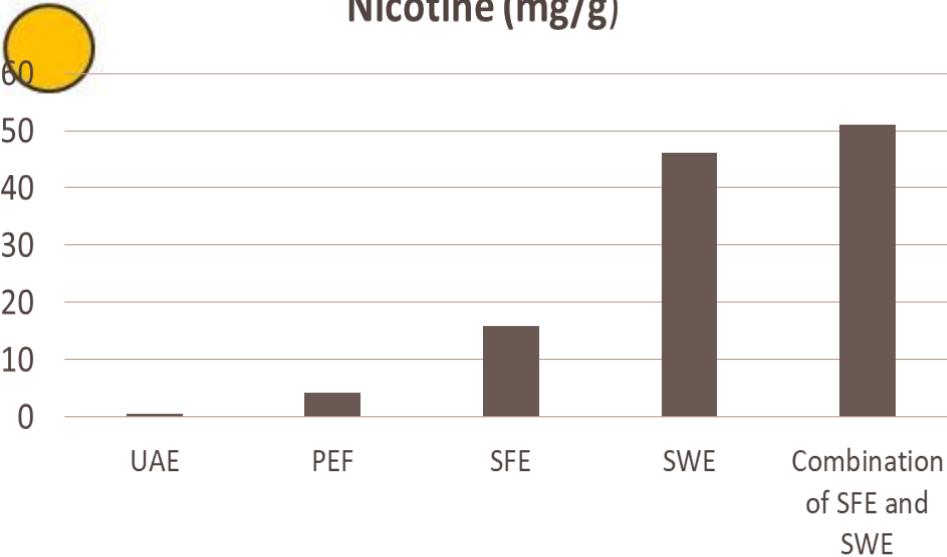
## EXTRACTION TECHNIQUES



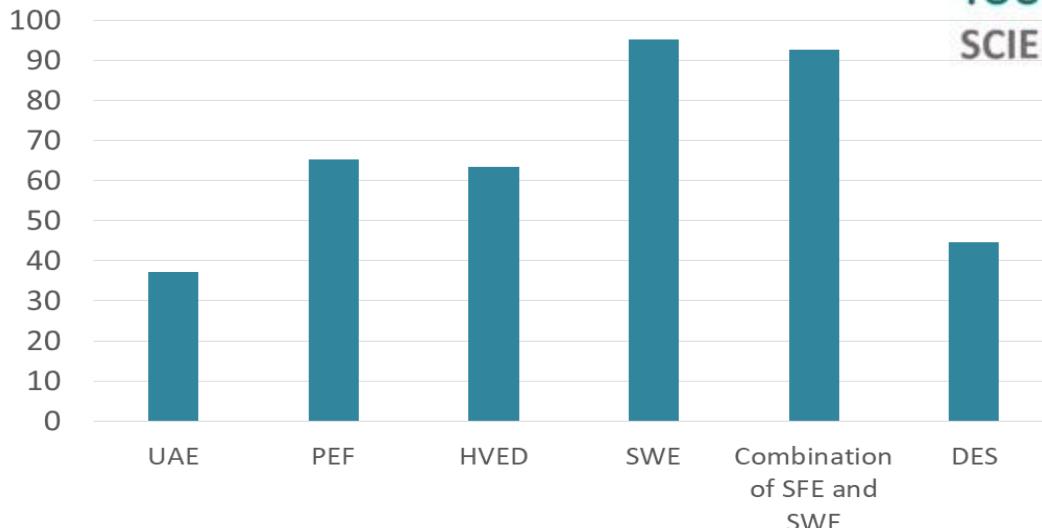
EXTRACTION TECHNIQUE	Process parameters	Extracted compounds		
	Temperature	Nicotine	Phenolic compounds	Volatile compounds
	Time			
	Solvent-solid ratio			
	Ethanol-water ratio			
	Temperature	Nicotine	Phenolic compounds	
	Time			
	Solvent-solid ratio			
	Temperature	Nicotine		Volatile compounds
	Pressure			
	Temperature	Nicotine	Phenolic compounds	
	Time			
	Solvent-solid ratio			

OPTIMIZATION

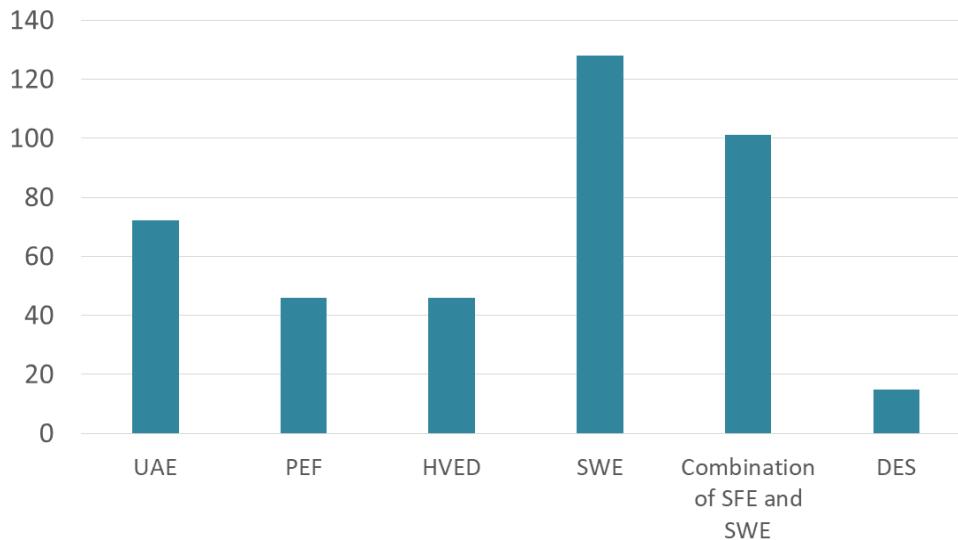
### Nicotine (mg/g)



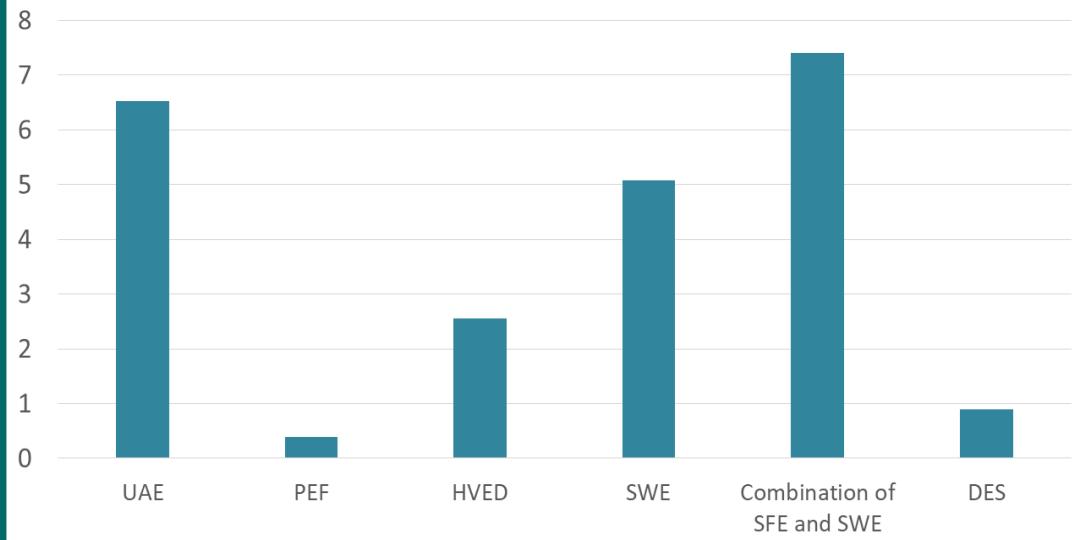
### DPPH (%)

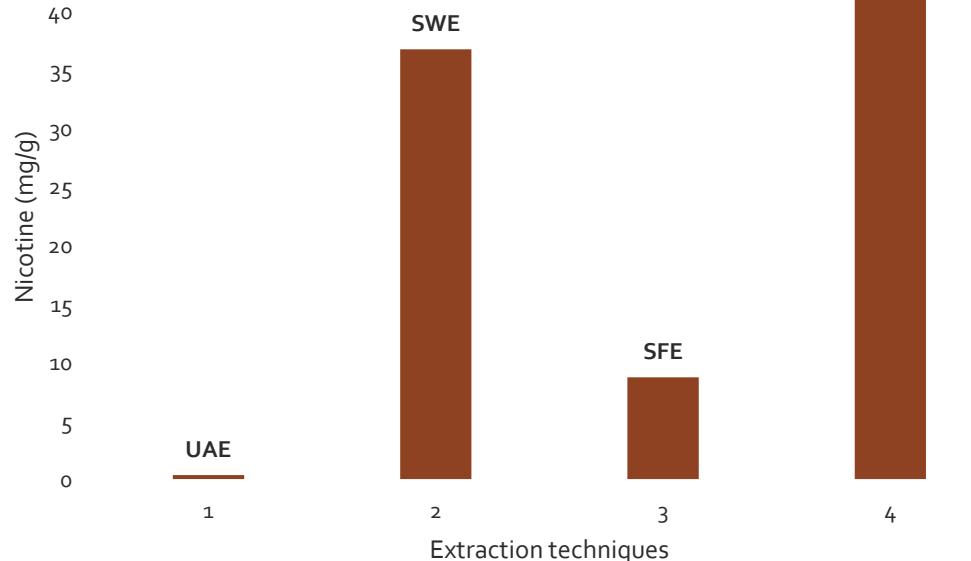


### Total phenols (mg/g)



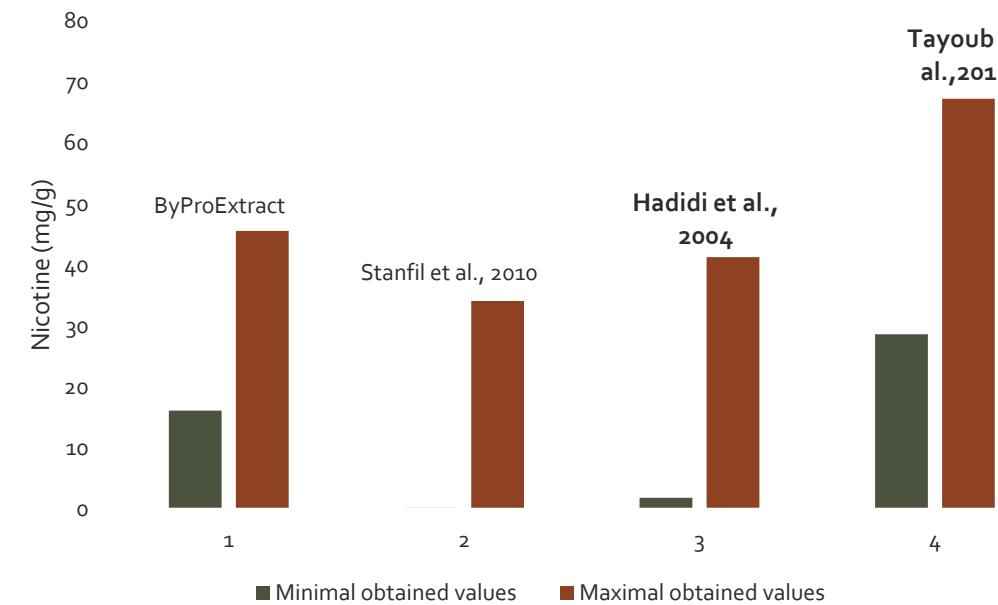
### Chlorogenic acid (mg/g)





**Figure A:** Comparison of different methods in extraction of nicotine from tobacco waste

- 11.6% higher nicotine yield
- Very high pH corresponded high with deprotonated nicotine



**Figure B:** Comparison of results of nicotine extraction with literature reported results

#### LITERATURE:

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The Journal of Supercritical Fluids

journal homepage: [www.elsevier.com/locate/supflu](http://www.elsevier.com/locate/supflu)

Separation of active compounds from tobacco waste using subcritical water extraction

Stela Jokić<sup>a,\*</sup>, Tanja Gagić<sup>b</sup>, Željko Knež<sup>b,c</sup>, Marija Banožić<sup>a</sup>, Mojca Škerget<sup>b</sup>

<sup>a</sup>Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Franje Kuhača 20, HR-30000 Osijek, Croatia

<sup>b</sup>Faculty Chemistry and Chemical Engineering, University of Maribor, Smetanova 17, SI-2000 Maribor, Slovenia

<sup>c</sup>Faculty of Medicine, University of Maribor, Taborška ulica 8, SI-2000 Maribor, Slovenia



Article

## Optimization of Ultrasound-Assisted Extraction of Some Bioactive Compounds from Tobacco Waste

Marija Banožić, Ines Banjari, Martina Jakovljević, Drago Šubarić, Srećko Tomas, Jurica Babić, Željko Knež, Senka Vidović, Irena Vladić and Stela Jokić \*

Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Franje Kuhača 20, HR-30000 Osijek, Croatia; marija.banozic@ptfos.hr (M.B.); ines.banjari@ptfos.hr (I.B.); mjakovljevic@ptfos.hr (S.T.); dsubaric@ptfos.hr (D.Š.); srecko.tomas@ptfos.hr (S.T.); jbabic@ptfos.hr (J.B.)

\* Correspondence: stela.jokic@ptfos.hr; Tel.: +385-31-224-333

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## Volatile organic compounds of tobacco waste versus waste (scrap, dust, and midrib): extraction and optimization

Marija Banožić,<sup>a,\*</sup> Krunoslav Aladić,<sup>a</sup> Igor Jerković<sup>b</sup> and Stela Jokić<sup>a</sup>

Industrial Crops &amp; Products 144 (2020) 112009



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Recent advances in extraction of bioactive compounds from tobacco industrial waste-a review

Marija Banožić, Jurislav Babić, Stela Jokić\*

<sup>a</sup>Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Franje Kuhača 20, Osijek 31 000, Croatia



Article

## Optimization of MAE for the Separation of Nicotine and Phenolics from Tobacco Waste by Using the Response Surface Methodology Approach

Marija Banožić<sup>1</sup>, Ines Banjari<sup>1</sup>, Ivana Flanjak<sup>1</sup>, Mate Paštar<sup>2</sup>, Jelena Vladić<sup>3,\*</sup> and Stela Jokić<sup>1,\*</sup>

<sup>1</sup> Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Franje Kuhača 18, 31000 Osijek, Croatia; marija.banozic@ptfos.hr (M.B.); ines.banjari@ptfos.hr (I.B.); ivana.flanjak@ptfos.hr (I.F.)

<sup>2</sup> Public Institution RERA S.D. for Coordination and Development of Split-Dalmatia County, Domovinsko gata 2, 21000 Split, Croatia; mate.pastar@rera.hr

<sup>3</sup> Faculty of Technology, University of Novi Sad, Bulevar cara Lazara 1, 21000 Novi Sad, Serbia; Correspondence: vladic@uns.ac.rs (I.V.); stela.jokic@ptfos.hr (S.J.); Tel.: +385-31-224-333 (S.I.)

\* Correspondence: vladic@uns.ac.rs (I.V.); stela.jokic@ptfos.hr (S.J.); Tel.: +385-31-224-333 (S.I.)

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## Duhanski otpad Bosne i Hercegovine – problem ili vrijedna sirovina



Review

## Carbohydrates—Key Players in Tobacco Aroma Formation and Quality Determination

Marija Banožić<sup>1</sup>, Stela Jokić<sup>1,\*</sup>, Đurđica Ačkar<sup>1</sup>, Marijana Blažić<sup>2</sup> and Drago Šubarić<sup>1</sup>

<sup>1</sup> Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Franje Kuhača 20, 31000 Osijek, Croatia; marija.banozic@ptfos.hr (M.B.); dackar@ptfos.hr (D.A.); dsubaric@ptfos.hr (D.S.)

<sup>2</sup> Karlovac University of Applied Sciences, Josip Juraj Strossmayer Square 9, 47000 Karlovac, Croatia; marijana.blazic@vuka.hr

\* Correspondence: stela.jokic@ptfos.hr; Tel.: +385-31-224-333

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### Poglavlje 13

#### NEKE MOGUĆNOSTI ISKORIŠTENJA NUSPROIZVODA DUHANSKE INDUSTRije

Marija Banožić<sup>1</sup>, Elma Nukić-Hrustovina<sup>2</sup>, Stela Jokić<sup>1,\*</sup>

<sup>1</sup>Sveučilište Josipa Jurja Strossmayera u Osijeku, Prehrambeno-tehnološki fakultet Osijek, Franje Kuhača 20, 31 000 Osijek, Hrvatska; \*jokic@ptfos.hr

<sup>2</sup>Fabrika duhana Sarajevo, Pofaliča 5, 71000 Sarajevo, Bosna i Hercegovina

polipropiridna, ali i ekonomski kultura koja se, za razliku od ostalih, ne već se uživa zbog svojih fizikalnih učinaka na sredstvi živani sustav i disanje dima koji se oslobađa izgaranjem istova ili, rjeđe, žvakanjem, duhan se uzgaja širom svijeta, a vodeći proizvod je Kina. S obzirom da je proizvodnja duhanska industrija generira i velike količine otpada, u duhanu, jedino se isti smatra komercijalno vrijednim te se koristi za prijenos, stabilizaciju, neodgovarajućim listovima (očišćeni ili bolesni), cvjeti i sjeme plija i smatraju se poloprovrednim otpadom, dok se tijekom prerade ista i frakcije manjih granulacija i duhanska prašina koje se smatraju komercijalno vrijednim. Dio duhanskog otpada je moguće iskoristiti u izradi duhanske folije, vrstici koju su surrogat pri proizvodnji cigareta, no to je zahtijevan i skup proces. Bi tri tisuće različitih kemikalijskih spojeva uključujući aldehidi, organske kiseline, estere, ketone i ugljikohidrate, a jošako tisuću njih nastaju izgaranjem plija. Polifenoli, tanini, kumarini i flavonoidi nastaju kao sekundarni

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Chapter 5

#### OVERVIEW ON THE APPLICATION OF SUPERCRITICAL CO<sub>2</sub> EXTRACTION OF ACTIVE COMPOUNDS FROM TOBACCO AND TOBACCO WASTE

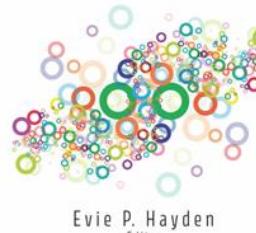
## Supercritical Carbon Dioxide Functions and Applications

Marija Banožić<sup>1</sup>, Senka Vidović<sup>2</sup>, Irena Vladić<sup>2</sup> and Stela Jokić<sup>1,\*</sup>  
<sup>1</sup>Faculty of Food Technology Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia  
<sup>2</sup>Faculty of Technology, University of Novi Sad, Faculty of Technology, Novi Sad, Serbia

### ABSTRACT

In few decades, Supercritical Fluid Extraction (SFE) using CO<sub>2</sub> has gained wide acceptance as an alternative technique for solvent extractions for separation of active compounds and materials including tobacco, as a most produced non-world. Tobacco contains more than 4000 compounds, tices and gases where a large part of them are delivered

E-mail: stela.jokic@ptfos.hr



Evie P. Hayden  
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