

EXTRACTION OF BIOACTIVE COMPONENTS FROM TOBACCO INDUSTRY WASTE



Marija Banožić, Martina Jakovljević, Maja Molnar, Mate Bilić, Stela Jokić

Josip Juraj Strossmayer University of Osijek, Faculty of Food Technology Osijek, Franje Kuhača 20, 31000 Osijek, Croatia

INTRODUCTION

Tobacco industry produce a huge amount of tobacco waste categorized as agro-industrial waste. Tobacco waste is a by-products produced in large quantities during processing of tobacco and usually underutilized or considered as waste, in spite of the fact that contain different classes of useful bioactive components. The aim of this work was to investigate the influence of different ultrasound extraction condition on content of phenolic components and solanesol in tobacco waste extracts.

PLANT MATERIAL

Tobacco Tobacco waste: fraction 1 (leaf waste and mid-rib) and fraction 2 (dust) were obtained from tobacco factory Hrvatski duhani, Virovitica. All samples were kept at ambient temperature at dark and dry place. Tobacco leaves and wastes were pulverized before extraction.

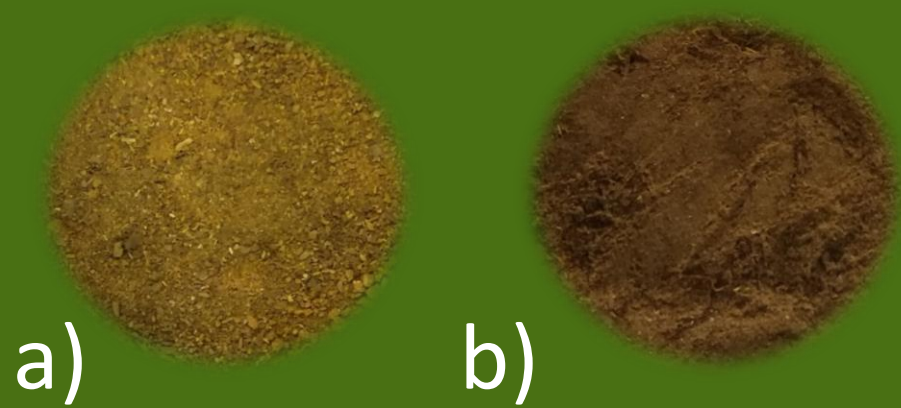


Fig.1 Tobacco waste material a) Fraction 1 and b) Fraction 2

HPLC DETERMINATION

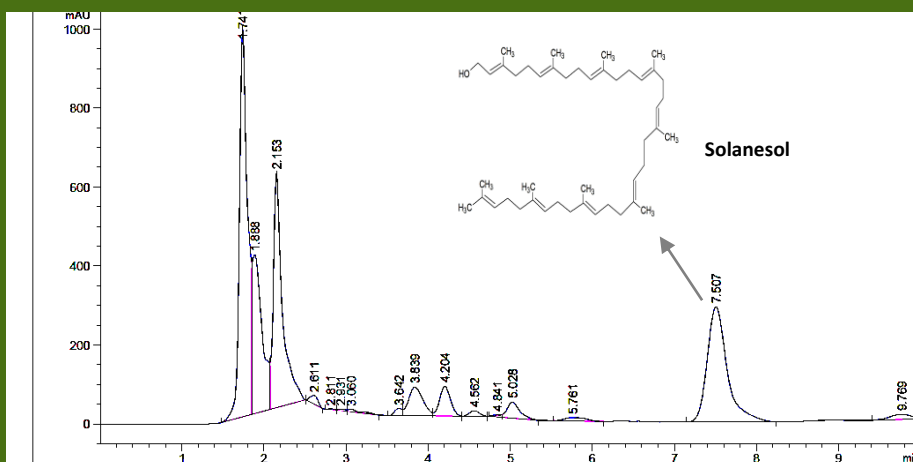


Fig.2 Chromatogram of detected solanesol (fraction 1, run 9)

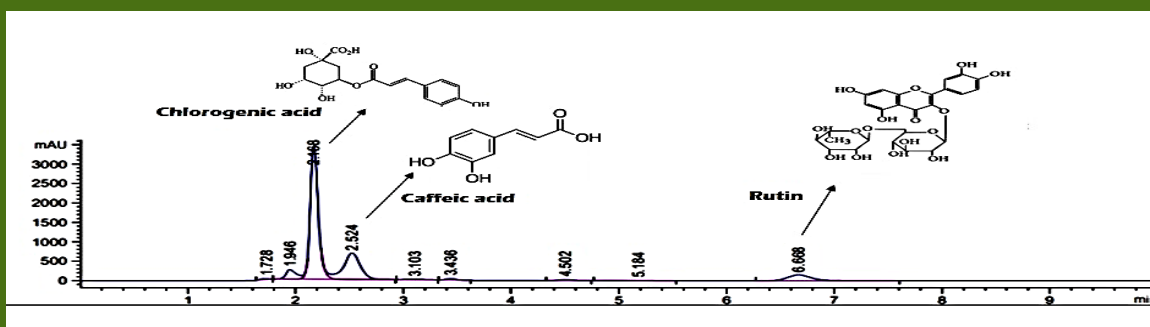


Fig.3 Chromatogram of detected phenolic components (fraction 1, run 13)

ULTRASOUND-ASSISTED EXTRACTION

Ultrasound-assisted extraction from tobacco waste was performed. The influence of extraction temperatures (30, 50, 70 °C), time (15, 30, 45 min), solvent ethanol: water ratio (40%, 60%, 80% v/v) and solvent-solid ratio (10, 30 and 50 mL/g) on the phenolic content in obtained extracts were determined.



Fig.4 Ultrasound-assisted extraction

RESULTS

Table 1. Phenolic content in obtained extracts at different UAE parameters

R U N	UAE CONDITIONS				Fraction 1			Fraction 2		
	Temperature (°C)	Time (min)	Ethanol (%)	Solid: Solvent ratio (v/v)	Chlorogenic acid (ng/μl)	Caffeic acid (ng/μl)	Rutin (ng/μl)	Chlorogenic acid (ng/μl)	Caffeic acid (ng/μl)	Rutin (ng/μl)
1	70	30	30	80	17.12	3.33	22.29	3.35	-	8.55
2	50	30	30	60	24.62	2.67	15.31	4.87	-	5.30
3	50	30	30	60	26.89	3	20.16	3.46	-	7.90
4	70	45	30	60	26.9	2.77	15.32	3.53	-	6.24
5	30	30	30	40	26.48	2.1	11.27	7.66	-	2.67
6	50	15	10	60	64.18	1.46	4.28	6.37	-	3.76
7	70	30	50	60	16.76	3.68	31.28	2.67	-	9.39
8	50	30	30	60	27.27	3.14	20.45	5.80	-	7.04
9	30	30	30	80	17.63	2.48	17.78	3.03	-	6.74
10	50	30	30	60	26.42	2.95	17.09	3.52	-	7.68
11	50	30	10	40	72.74	1.38	5.93	7.03	-	2.23
12	50	30	50	80	8.63	3.24	27.73	2.58	1.19	18.83
13	50	30	50	40	20.91	2.43	19.02	5.36	-	12.92
14	50	45	50	60	15.46	2.83	27.35	2.54	-	11.34
15	30	15	30	60	25.97	2.88	14.63	5.69	-	5.38
16	50	15	50	60	14.14	1.72	25.54	2.63	-	12.16
17	50	45	30	80	23.88	2.06	16.75	8.68	-	6.20
18	50	45	30	40	24.8	2.41	11.42	3.20	-	7.02
19	50	45	10	60	62.79	1.64	7.02	7.03	-	4.37
20	30	30	50	60	14.88	2.44	26.95	2.50	-	9.66
21	50	15	30	80	11.16	1.1	9.5	3.08	-	6.94
22	70	30	30	40	28.76	2.53	13.75	8.48	-	5.19
23	70	30	10	60	73.83	2.02	10.74	7.29	-	0.00
24	50	30	10	80	80.12	2.45	13.05	3.66	-	2.40
25	30	45	30	60	26.59	2.28	16.73	4.71	-	3.68
26	50	15	30	40	23.37	1.53	6.08	6.51	-	3.93
27	50	30	30	60	26.22	2.57	14.65	5.38	-	6.34
28	30	30	10	60	79.86	2.12	10.96	2.81	-	0.00
29	70	15	30	60	26.29	2.47	12.45	5.50	-	7.50

RESULTS

Extraction of solanesol was improved by adding NaOH into the extraction solvent in concentration of 0.05M, under conditions of temperatures (33.78, 40, 55, 70, 76.2 °C) and time (8.78, 15, 30, 45, 51.21 min).

Table 2. Solanesol content in obtained extracts at different UAE parameters

RUN		1	2	3	4	5	6	7	8	9	10	11	12	13
UAE CONDITION	Temperature (°C)	70	55	55	55	55	76	55	33	70	40	40	55	55
	Time (min)	45	52	30	30	30	30	9	30	15	15	45	30	30
SOLANESOL (ng/μg)	Fraction 1	7.26	6.17	4.46	5.19	5.92	8.5	5.84	4.62	5.88	4.86	5.34	4.56	6.32
	Fraction 2	1.45	1.25	1.20	1.19	1.18	1.24	1.07	1.14	1.15	1.10	1.24	1.16	1.08

CONCLUSION

Phenolic components and solanesol were successfully extracted from tobacco waste fractions using ultrasound-assisted extraction. Ultrasound extraction conditions had statistically significant influence on content of bioactive components. Extracts of tobacco waste obtained from fractions 1 were characterized by high levels of chlorogenic acid and rutin with low level of caffeic acid and solanesol. In extracts obtained from fractions 2 low levels of chlorogenic acid, rutin and solanesol were determined.

ACKNOWLEDGEMENT

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