The antioxidant properties of tobacco waste

Marija Banožić[1] , Ana-Marija Cikoš[1], Martina Jakovljević[1], Jelena Vladić[2]

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

[2]University of Novi Sad, Faculty of Technology, Bulevar Cara Lazara 1, 21000 Novi Sad, Serbia

INTRODUCTION

Tobacco contains significant concentration of phenolic compounds which are important naturally occurring antioxidants. Phenolic compounds are secondary metabolites in tobacco plant, and they have impact on quality of tobacco leaves due to their contribution to sensory properties-flavor, color, bitterness, and antioxidant properties.

The aim of this work was to investigate the influence of different ultrasound extraction condition on antioxidant activity of tobacco waste extracts.

Antioxidants from tobacco waste mainly come in the form of phenolic compounds such as chlorogenic acid, caffeic acid and rutin, as mayor phenolic compounds in tobacco.

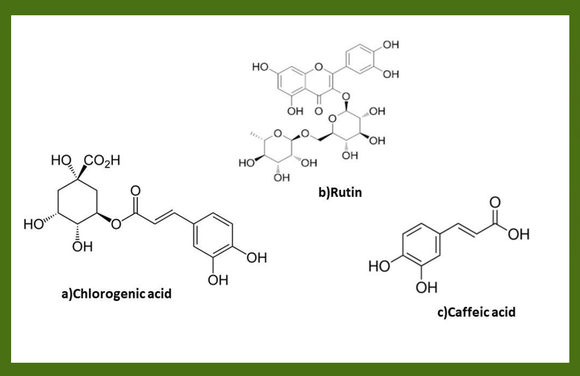

Fig.1 Mayor phenolic compounds in tobacco waste

PLANT MATERIAL

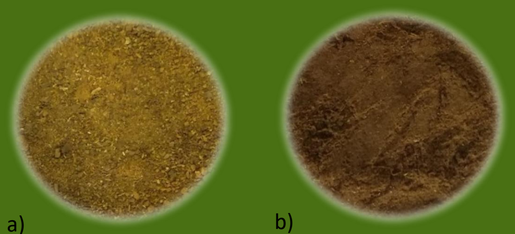

Fig.2 Tobacco waste material a)Fraction1 and b) Fraction 2

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.

UTRASOUND-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 antioxidan activity in obtained extracts were determined.

Fig.3 Ultrasound-assisted extraction of tobacco waste

DETERMINATION OF ANTIOXIDANT ACTIVITY

Antioxidant activity of obtained extracts was determined using DPPH method. Plant extracts were dissolved in methanol (250 µg/mL) and mixed with 0.3 mM DPPH radical solution.

The absorbance was measured at 517 nm and DPPH scavenging activity was determined using following equation:

$$\%\ DPPH\ activity = \frac{(A_{DPPH} + A_b) - A_s}{A_{DPPH}} * 100$$

Fig.4 Dillutions of tobacco waste extracts

RESULTS

RUN	UAE CONDITIONS				DPPH	
	Temperature (°C)	Time (min)	Solid: Solvent ratio(v.v)	Ethanol (%)	Fraction 1 (%)	Fraction 2 (%)
1	70	30	30	80	14.88	3.17
2	50	30	30	60	21.57	3.82
3	50	30	30	60	31.57	3.65
4	70	45	30	60	42.42	3.51
5	30	30	30	40	38.01	5.01
6	50	15	10	60	27.51	2.90
7	70	30	50	60	40.53	14.59
8	50	30	30	60	29.32	6.68
9	30	30	30	80	11.39	3.95
10	50	30	30	60	35.80	5.93
11	50	30	10	40	59.07	4.19
12	50	30	50	80	26.62	5.49
13	50	30	50	40	43.17	11.11
14	50	45	50	60	37.54	5.66
15	30	15	30	60	39.04	5.21
16	50	15	50	60	22.56	6.61
17	50	45	30	80	18.90	7.06
18	50	45	30	40	40.96	4.53
19	50	45	10	60	4.56	6.17
20	30	30	50	60	29.89	3.99
21	50	15	30	80	19.70	3.63
22	70	30	30	40	53.04	2.10
23	70	30	10	60	45.28	2.80
24	50	30	10	80	42.98	1.65
25	30	45	30	60	42.64	4.14
26	50	15	30	40	32.54	4.42
27	50	30	30	60	40.40	4.68
28	30	30	10	60	32.31	4.71
29	70	15	30	60	44.35	6.81

CONCLUSION

Ultrasound extraction conditions had statistically significant influence on antioxidant activity. Results showed that extracts with lower ethanol concentration possess better antioxidant activity. The strongest antioxidant activity showed fraction 1 extract obtained under following condition: temperature: 50 °C, time: 30 min, solvent/solid ratio: 10 mL/g and ethanol: water ratio 40% v/v.

ACKNOWLEDGEMENT

This work has been supported by Croatian Science Foundation under the project "Application of innovative techniques of the extraction of bioactive components from by-products of plant origin" (UIP-2017-05-9909)