

EFFECT OF DRYING METHODS ON THE CONTENT OF SOME NATURAL PIGMENTS IN THE *URTICA DIOICA* AND *MELISSA OFFICINALIS*

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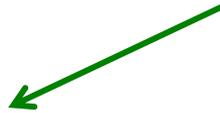
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**Latest Trends in Bioeconomy in Danube Region
Nitra
24th – 26th May, 2015**

Medicinal plants (herbs)

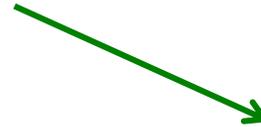
- source of biological active and health protective compounds



FRESH FORM



 short-term use
 high quality



DRIED FORM



 long-term use
 reduced quality

Chlorophylls and carotenoids



- ❖ *Primary metabolites of vegetables and fruit*
- ❖ *Antioxidant activity*
- ❖ *Anticarcinogenic potential*

Carotenoids and chlorophylls are susceptible to degradation during processing.

DRYING

- *the decreasing of plant moisture content aimed at preventing enzymatic and microbial activity, and consequently preserving the product for prolonged expiration time,*
- *may contribute to a regular supply and facilitate the marketing of plants,*
- *a critical factor for the post-harvest management.*

MATERIAL AND METHODS

Herbs

Lemon balm (*Melissa officinalis*)



Stinging nettle (*Urtica dioica*)



Drying methods

convection oven drying (CD)

25°C ± 1°C

65 hours

air drying with sun exposure (SUD)

65 hours

room temperature

microwave drying (MD)

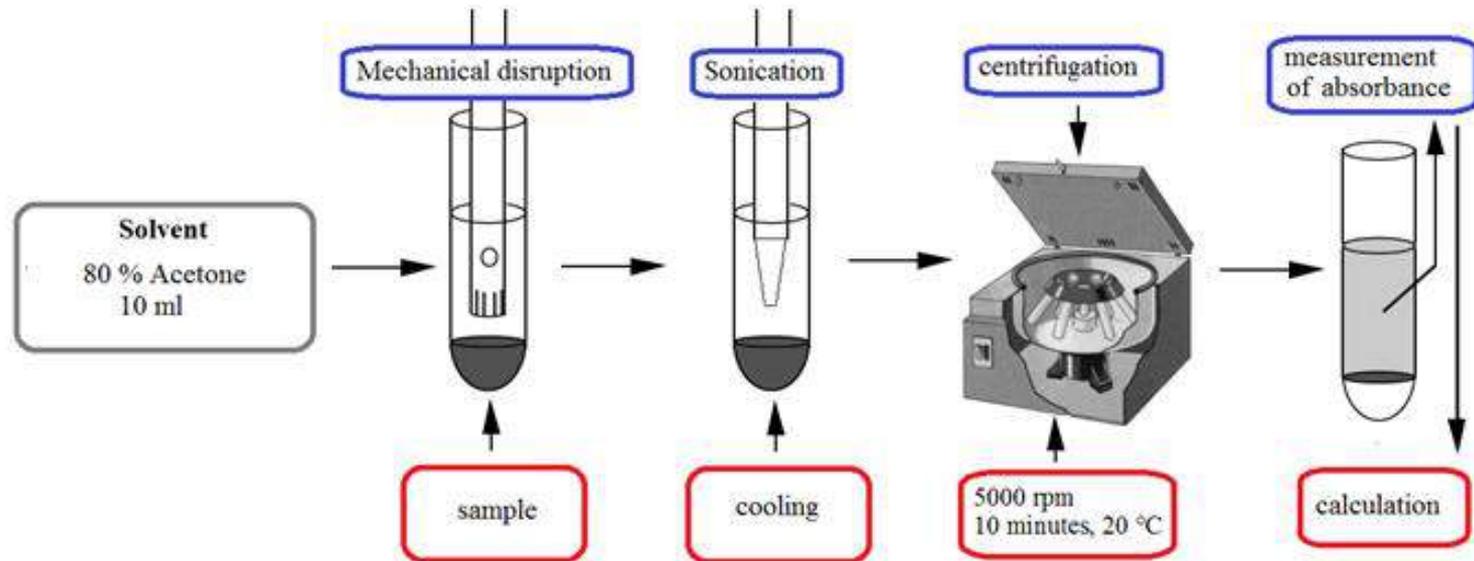
800 W

45 second in three 15 second periods with two 20 second pauses

Determination of Chlorophyll *a*, Chlorophyll *b* and Carotenoids

(Yang *et al.*, 1998)

Sample preparation



$$\text{Chlorophyll } a \text{ } (\mu\text{g/ml}) = 12.25A_{663,6} - 2.25 A_{646,6}$$

$$\text{Chlorophyll } b \text{ } (\mu\text{g/ml}) = 20.31 A_{646,6} - 4.91A_{663,6}$$

$$\text{Carotenoids } (\mu\text{g/ml}) = 4.69 A_{440,5} - 0.267 (\text{Chl } a + \text{Chl } b)$$

Results were expressed as milligrams per gram dried weight of sample.

STATISTICAL ANALYSIS

- the results are expressed as mean values \pm standard deviation (SD),
- the data were statistically analysed for significance of the differences using a common procedure based on calculating Student's t criterion,

$$t = \frac{(\bar{x}_A - \bar{x}_B) \cdot \sqrt{n - 1}}{\sqrt{s_A^2 + s_B^2}}$$

- and comparing calculated t with critical $t_{crit. (n=4)} = 3.182$,
- \bar{x}_A and \bar{x}_B are arithmetic averages of the two sets under consideration,
- s_A and s_B are relating standard deviations,
- n is number of parallel experiments.

RESULTS

Content of chlorophylls and carotenoids (mg/g dry weight) in leaves of *Melissa officinalis* and *Urtica dioica* dried using different drying methods The results are expressed as mean \pm SD (n = 4).

Melissa officinalis

	Chlorophylle a	Chlorophylle b	Carotenoids
CD	5.77 \pm 0.19	2.15 \pm 0.17	1.20 \pm 0.24
MD	5.81 \pm 0.26	2.99 \pm 0.19	1.39 \pm 0.09
SUD	5.67 \pm 0.09	2.02 \pm 0.02	1.36 \pm 0.21

Urtica dioica

	Chlorophylle a	Chlorophylle b	Carotenoids
CD	7.04 \pm 0.09	2.71 \pm 0.12	1.53 \pm 0.07
MD	6.65 \pm 0.51	2.26 \pm 0.15	1.68 \pm 0.07
SUD	8.15 \pm 0.38	3.04 \pm 0.13	1.83 \pm 0.10

CD – convection oven drying,

MD - microwave drying ,

SUD – air drying with the sun exposure

Statistical testing of conformity of different drying method effect on the content of pigments in *Melissa officinalis* and *Urtica dioica* (Student's criterion t calculated; $t_{\text{crit (n=4)}} = 3.182, \alpha=0.05$)

Herbs	Calculated t-criterion for pair compared								
	Chlorophyll <i>a</i>			Chlorophyll <i>b</i>			Carotenoids		
	CD-MD	CD-SUD	MD-SUD	CD-MD	CD-SUD	MD-SUD	CD-MD	CD-SUD	MD-SUD
<i>Melissa officinalis</i>	0.26	1.60	0.88	5.71*	1.32	8.80*	1.38	0.87	0.23
<i>Urtica dioica</i>	1.30	4.93*	4.08*	4.06*	3.23*	6.82*	2.62	7.42*	3.36*

CD – convection oven drying,

MD - microwave drying ,

SUD – air drying with the sun exposure

* statistically significant difference ($t > t_{\text{krit. n=4}}$)

CONCLUSION

DRYING PROCEDURES THAT PRESERVE CONTENT OF PIGMENTS

→ **microwave drying** - Lemon balm

→ **air drying with sun exposure** - Stinging nettle

Acknowledgments:

This work was supported by Scientific Grant Agency (VEGA Project #1/0765/14), Research and Development Support Agency (APVV Project #0202-10), Grant Agency of Constantine Philosopher University in Nitra (UGA Project #VII/6/2014), and European Community under project #26220220180: Building Research Centre „AgroBioTech". The authors thank Michael Lawson for spelling and grammar corrections.

Thank you for your attention