Politecnico di Torino, Italy - July 10 - 12, 2019

Under the Patronage

EFCE Working Party on Drying

EFCE

POLITECNICO DI TORINO

chimica fisica materiali DiSAT scienza e ingegneria

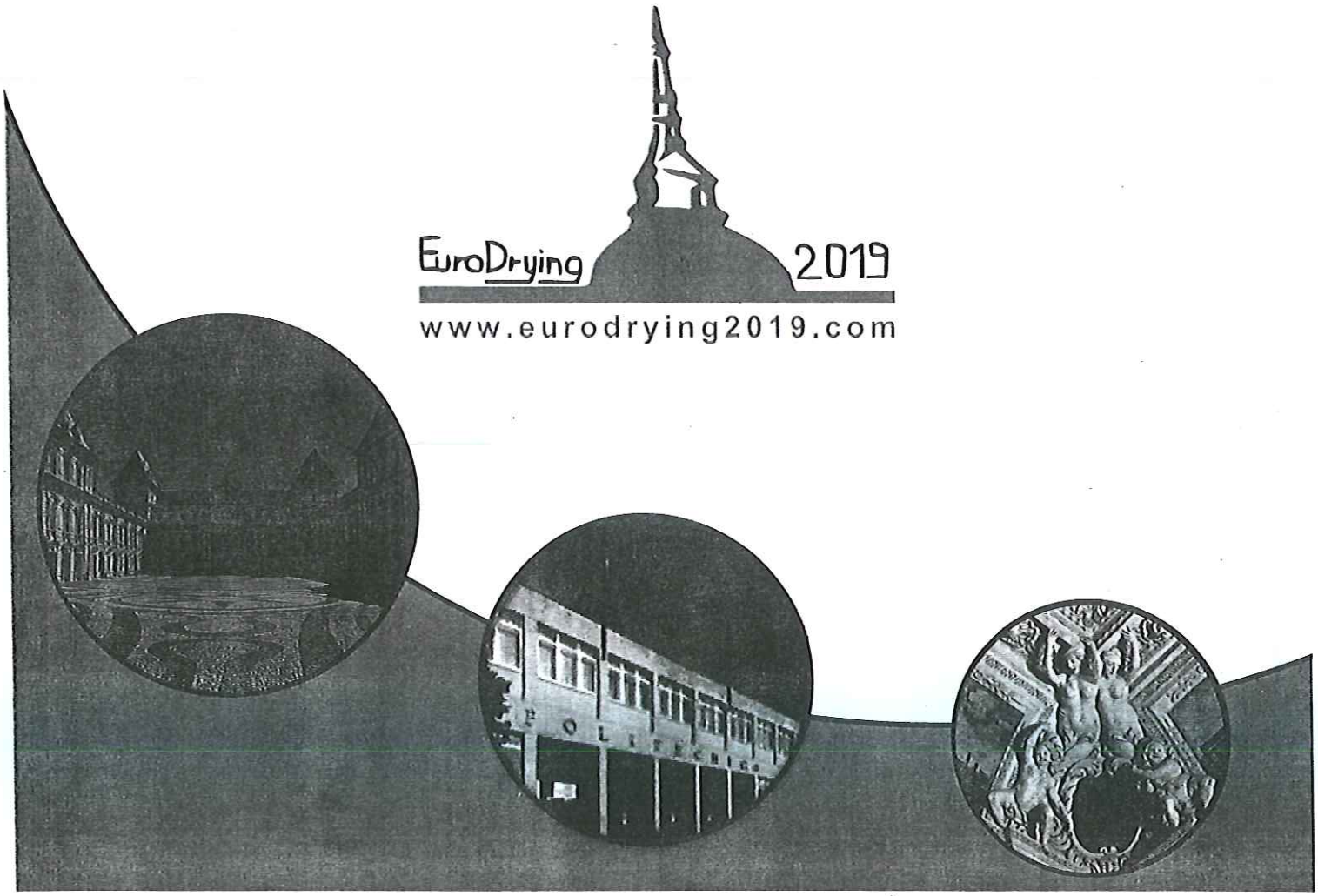
UPO UNIVERSITÀ DEL PIEMONTE ORIENTALE

7th European Drying Conference

Book of Abstracts

EuroDrying 2019

www.eurodrying2019.com



Exibitor Sponsors

BÜCHI

HOSOKAWA MICRON B.V.

PHARMATECH

MILLROCK TECHNOLOGY

PARALLEL ENERGY

Prize Sponsors

ALFATEST strumentazione scientifica

Crioforma

NUTRICIA RESEARCH

prodoc we cover recovery

Eurodrying'2019
Torino, Italy, July, 10-12 2019

EFFECT OF COLD DRYING ON CHEMICAL, MICROBIOLOGICAL AND SENSORY CHARACTERISTICS OF AROMATIC HERBS

Paola Dolci[1], Francesco Giovine[1], Lucia Zaquini[2], Chiara Roggero[1], Daniela Ghirardello[1], Elena Mangia[1], Elena Cerutti[2], Giuseppe Zeppa[1]

[1]Department of Agricultural, Forest and Food Sciences, University of Turin
Largo Paolo Braccini 2, 10095 Grugliasco, Italy
[2]Terre di Savoia, Piazza Carlo Alberto 6/A, 12035, Racconigi, Italy

Tel.: +39 0116708705 Email: giuseppe.zeppa@unito.it

Abstract

The aim of this research was to evaluate the impact of cold drying, compared to traditional drying, on the quality of four different aromatic herbs. Despite these preliminary data did not show significant differences on chemical, microbial and sensory characteristics of the herbs submitted to the two treatments, cold drying deserves attention for the advantages on the energy balance of the process and the possibility of recovering vegetation water usable in food and cosmetic preparations.

***Keywords**: cold drying, traditional drying, aromatic herb, antiradical activity.*

1. Introduction

In aromatic herb processing chain, cold drying represents an innovative technique that exploits the dehydrating action of cold and dry air with advantages on the energy balance of the process, and with the possibility of recovering vegetation water usable in food and cosmetic preparations (Orphanides *et al* 2016). The aim of this study was to evaluate the impact of cold drying, compared to traditional drying, on the quality of four different Italian aromatic herbs.
This experimentation is part of ESSICA project (Interreg V France-Italy, ALCOTRA 2014-2020), focused on process innovation in aromatic herb chain, in order to obtain high quality products and, thus, increase producer competitiveness. The partnership includes four members: TERRE di SAVOIA Association, DISAFA (Department of Agricultural, Forest and Food Sciences, University of Turin), FRANCEAGRIMER (Etablissement National des Produits de l'Agriculture et de la Mer), CRIEPPAM (Centre Régionalisé Interprofessionnel d'Expérimentation en Plantes à Parfum, Aromatiques et Médicinales).

2. Materials and methods

Four different herbs (savory, mint, lemon balm and mallow) produced in Italy (Piedmont region) were collected between July and October 2018 and submitted to both traditional drying and cold drying. The cold drier was provided by Northwest Technology (Boves, Cuneo, Italy). Time and temperature parameters used for traditional drying processes varied according to each specific herb: savory was dried at 40-42 °C for 24 h, lemon balm at 39 °C for 24 h, mallow at 45 °C for 36 h and mint at 38 °C for 24 h. Regarding cold drying, the temperature was set at 30 °C for all the four herbs, and the treatment was of 48 h, with the exception of mallow samples that needed 72 h to reach humidity values lower than 10%. The quality of the herbs, before and after drying treatments, was evaluated by chemical (Total Phenolic Content and Radical Scavenging Activity)(Barbosa-Pereira *et al* 2018), microbiological (Total Microbial Content, xerophilous moulds and yeasts, *Enterobacteriaceae*) and sensory analysis (Duo Trio test).

3. Results and discussion

Total Phenolic Content and Radical Scavenging Activity decreased in both traditional and cold dried herbs compared to fresh herbs (Table 1).
Not significant differences were detected between herbs submitted to cold and traditional drying with the exception of savory samples.

Table 1. Total Phenolic Content (TPC) and Radical Scavenging Activity (RSA) in fresh and dried aromatic herbs.

	TPC[1]			RSA[2]		
Sample	Mean		SD	Mean		SD
Mallow^{F}	30,07^{b}	±	6,29	249,61^{b}	±	20,07
Mallow^{TD}	11,46^{a}	±	1,11	53,38^{a}	±	6,25
Mallow^{CD}	12,92^{a}	±	0,93	62,52^{a}	±	3,71
Significance	***			***		
Lemon balm^{F}	144,17^{b}	±	9,96	804,24^{b}	±	75,58
Lemon balm^{TD}	111,60^{a}	±	5,34	629,23^{a}	±	24,75
Lemon balm^{CD}	99,72^{a}	±	10,11	568,29^{a}	±	47,56
Significance	***			***		
Mint^{F}	154,02^{b}	±	17,22	1014,93^{b}	±	49,32
Mint^{TD}	65,43^{a}	±	1,45	373,21^{a}	±	8,24
Mint^{CD}	73,47^{a}	±	3,31	424,05^{a}	±	22,31
Significance	***			***		
Savory^{F}	71,85^{b}	±	3,62	316,19^{b}	±	22,61
Savory^{TD}	67,19^{b}	±	2,30	322,76^{b}	±	10,36
Savor ^{CD}	54,78^{a}	±	4,96	258,00^{a}	±	19,64
Significance	***			***		

[1]Gallic Acid Equivalents mg/g dry weight – 2Trolox μM/g dry weight
F-fresh samples; TD-traditionally dried samples; CD-cold dried samples
Means followed by different letters are significantly different at $p<0.05$ – Significance: *** $p<0.001$
Data are expressed as mean value ± standard deviation (SD)

Microbial quality was comparable in fresh herbs and cold and traditional dried samples (data not shown). Despite drying cannot be considered a sanitization technique, occasionally, a moderate microbial reduction (10^1-10^2 cfu/g) was detected in cold dried samples compared to traditionally dried and fresh herbs. For example, xerophilous moulds and yeasts and *Enterobacteriaceae* loads were lower in cold dried savory samples, xerophilous yeasts in cold dried lemon balm samples and *Enterobacteriaceae* in cold dried mallow samples.
Similarly, sensory analysis did not show also differences between herb samples submitted to the two drying treatments. Thus, cold drying did not affect the overall quality of the herbs either negatively or positively compared to traditional drying.

4. Conclusions

On the basis of these results, cold drying did not lead to an improvement of the overall quality of the herbs analysed. Nevertheless, this technique deserves attention for the advantages on the energy balance of the process and the possibility of recovering of vegetation water containing a fair amount of aromas. These results will be further enriched with new analysis planned in summer-autumn 2019.

5. References

1. Orphanides A., Goulas V. and Gekas V., 2016 – Drying technologies: vehicle to high-quality herbs, Food Eng Rev, 8: 164-180.
2. Barbosa-Pereira L., Guglielmetti A. and Zeppa G., 2018 – Pulsed Electric Field Assisted Extraction of Bioactive Compounds from Cocoa Bean Shell and Coffee Silverskin. Food Bioprocess Tech, 11(4): 818-835.