éco-extraction transfrontalière

[www.eet-alcotra.eu]

Septembre 2011 - Octobre 2013

Eco Extraction du Végétal : du laboratoire au pilote industriel

GREEN Extraction Team
UMR408, INRA, Université d'Avignon

Dr Sandrine PERINO ; Pr. Farid CHEMAT

alcotra
Projet cofinancé par le programme Alcotra 2007-2013 / Fonds européen de développement régional
Accord cadre Etat Région ADEME 2007-2013
Région Provence-Alpes-Côte d'Azur
ADEME
REGIONE PIEMONTE

Microwave extraction

Reference Book in 2013 edited by Springer

Food Engineering Series
Series Editor: Gustavo V. Barbosa-Cánovas

Farid Chemat
Giancarlo Cravotto *Editors*

Microwave-assisted Extraction for Bioactive Compounds

Theory and Practice

Springer

Eco Extraction des Produits Naturels

Concept et Principles

Int. J. Mol. Sci. **2012**, *13*, 8615-8627; doi:10.3390/ijms13078615

OPEN ACCESS
International Journal of
Molecular Sciences
ISSN 1422-0067
www.mdpi.com/journal/ijms

Review

Green Extraction of Natural Products: Concept and Principles

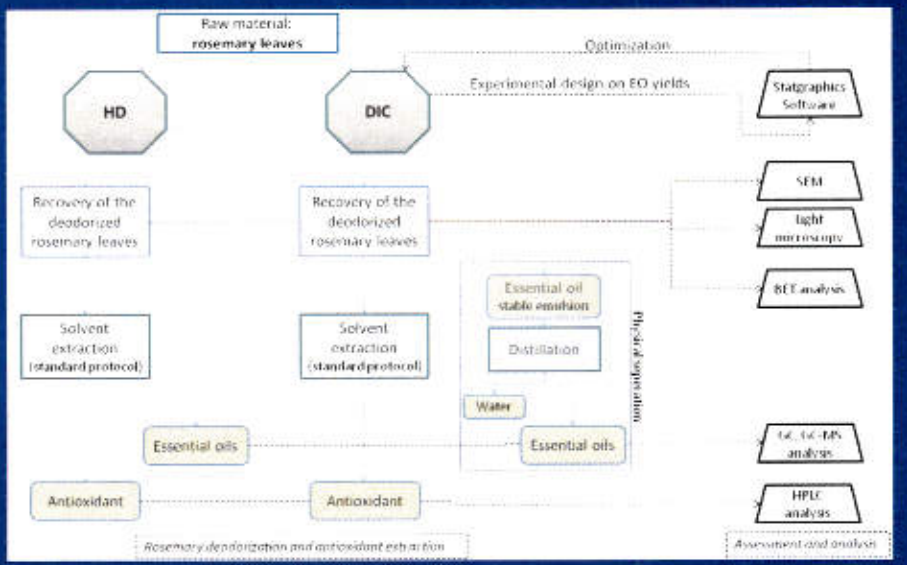
Farid Chemat [1,*], Maryline Abert Vian [1] and Giancarlo Cravotto [2]

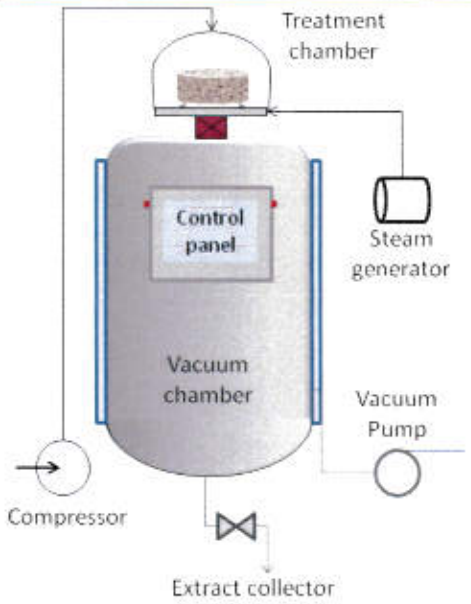
"Green Extraction is based on the discovery and design of extraction processes which will reduce energy consumption, allows use of alternative solvents and renewable natural products, and ensure a safe and high quality extract/ product".

Principle 1: Innovation by selection of varieties and use of renewable plant resources.
Principle 2: Use of alternative solvents and principally water or agro-solvents.
Principle 3: Reduce energy consumption by energy recovery and using innovative technologies.
Principle 4: Production of co-products instead of waste to include the bio- and agro-refining industry.
Principle 5: Reduce unit operations and favour safe, robust and controlled processes.
Principle 6: Aim for a non denatured and biodegradable extract without contaminants.

Deodorization by DIC of rosemary leaves prior to solvent extraction of antioxidants

Dr T. Allaf





LWT - Food Science and Technology 51 (2013) 111–119

Contents lists available at SciVerse ScienceDirect

LWT - Food Science and Technology

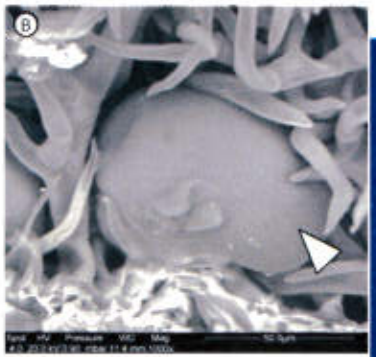
journal homepage: www.elsevier.com/locate/lwt

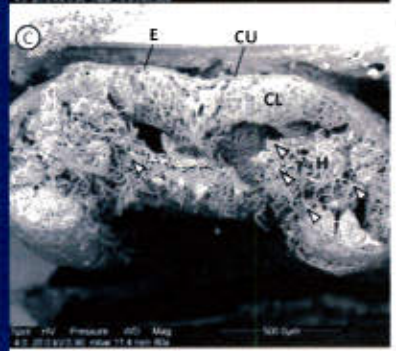
Deodorization by instant controlled pressure drop autovaporization of rosemary leaves prior to solvent extraction of antioxidants

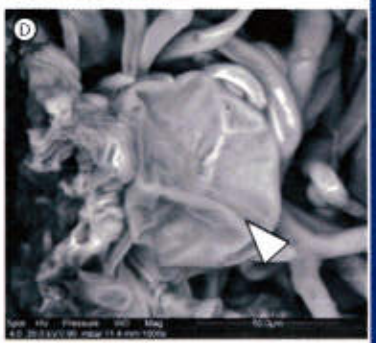
Tamara Allaf[a,b], Valérie Tomao[d], Karine Ruiz[d], Khaldoun Bachari[c], Mohamed ElMaataoui[d], Farid Chemat[a,*]

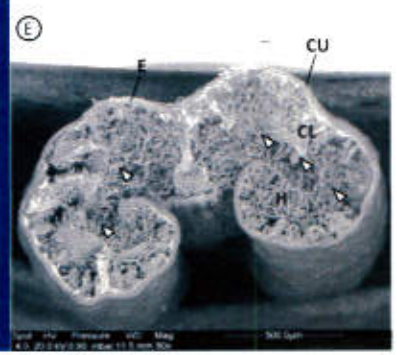
[a] Université d'Avignon et des Pays de Vaucluse, INRA, UMR408, F-84000 Avignon, France
[b] ABCAR-DIC Project, 17000 La Rochelle, France
[c] Centre de Recherche Scientifique et Technique en Analyses Physico-Chimiques (C.R.A.P.C), BP 248, Alger RP 16004, Alger, Algeria
[d] Université d'Avignon et des Pays de Vaucluse, INRA, UMR408, F-84000 Avignon, France

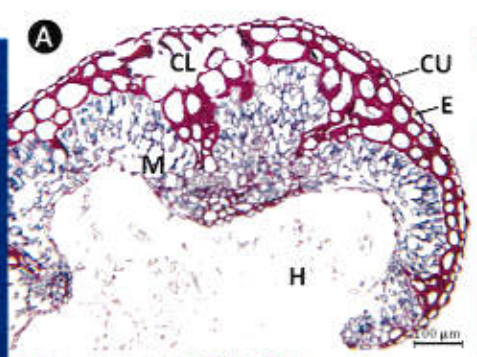
		Rosmarinic Acid (mg/g dm)	Carnosol (mg/g dm)	Dry extract (g/100g dm)
	RM	6.74±0.20	3.25±0.31	19.75 ± 1.01
Deodorized rosemary leaves	**HD**	1.92±0.29	1.38±0.08	15.89 ± 0.15
	DIC	12.76±0.22	2.91±0.07	26.32 ± 0.16

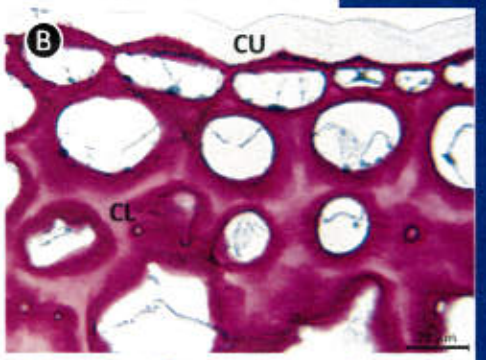


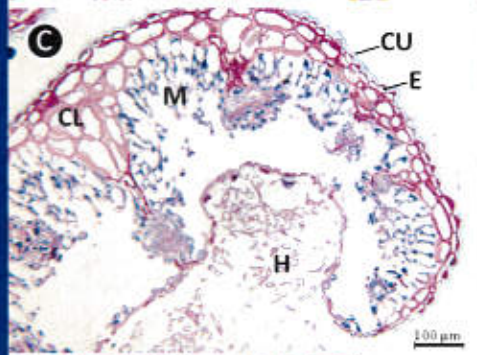


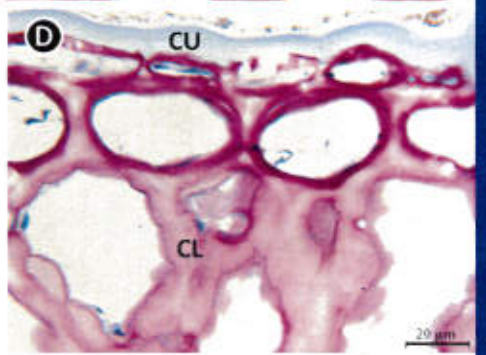


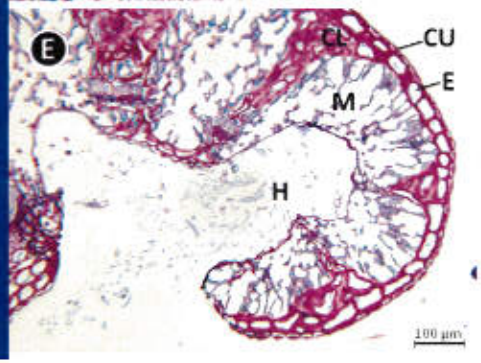


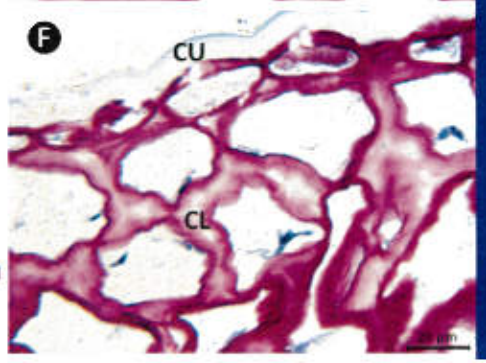


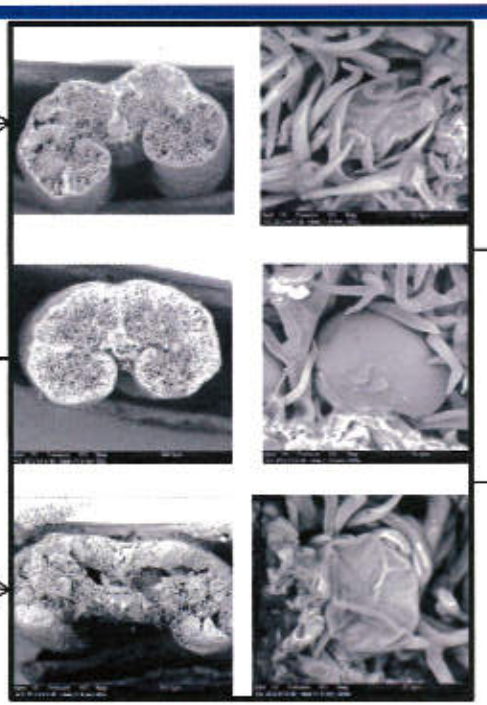












Conventional

DIC

Essential oil remaining in the leaves

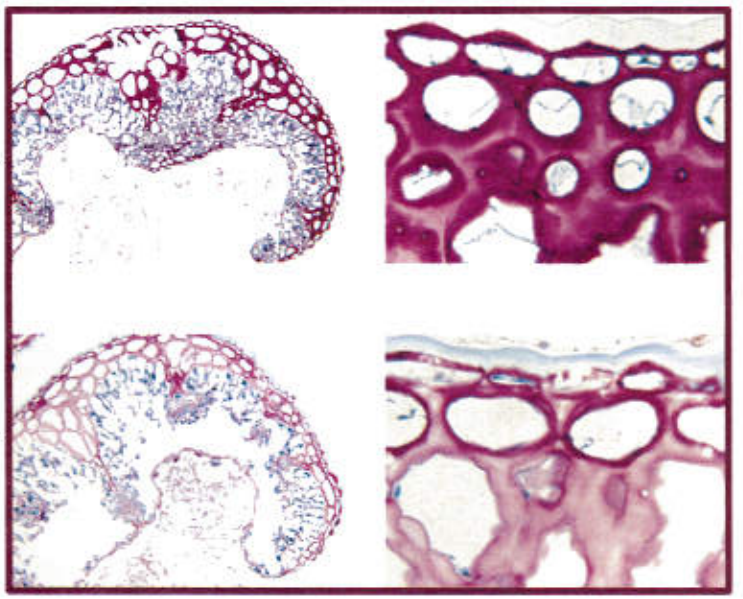
Extraction time

0.2 – 0.3 %

3 to 6 **hours**

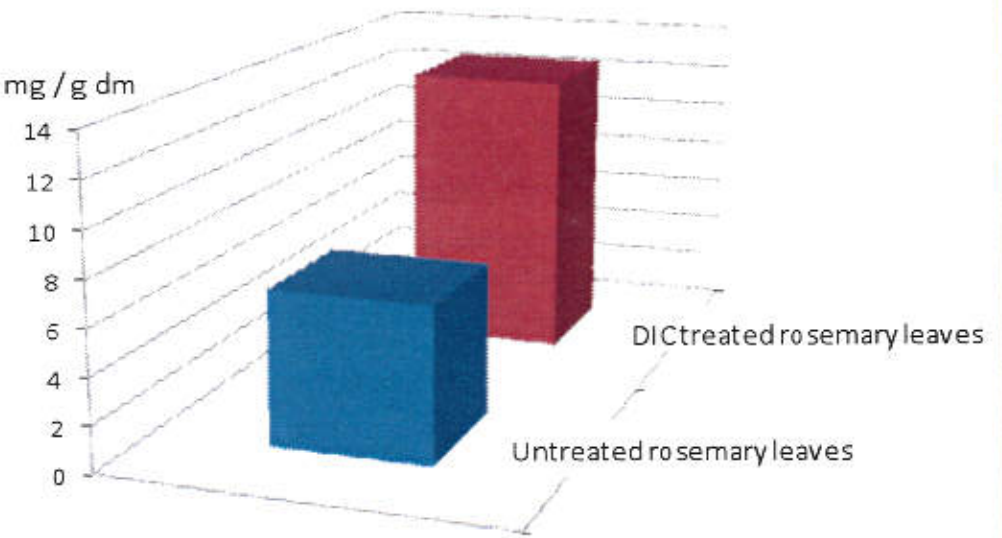
0.02 – 0.03 %

3 min



DIC

Rosmarinic acid



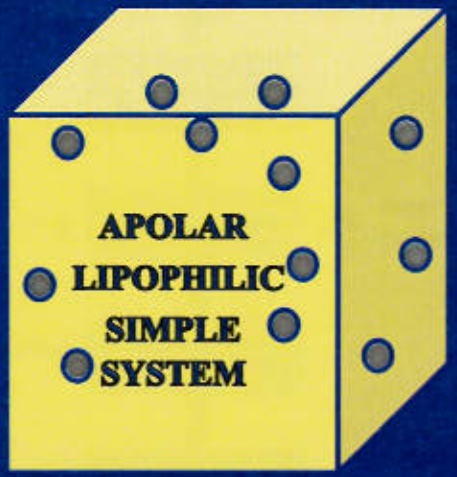
Vegetable oils as agro-solvents : Revisiting the Polar Paradox Theory

Ying Li

Terpènes

Polyphénols

Caroténoïdes



Ultrasonics Sonochemistry 20 (2013) 12–18

Contents lists available at SciVerse ScienceDirect

Ultrasonics Sonochemistry

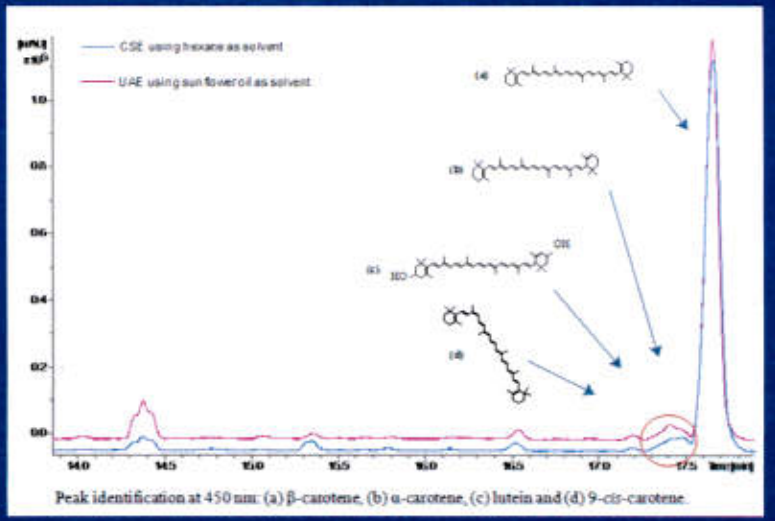
journal homepage: www.elsevier.com/locate/ultson

Short Communication

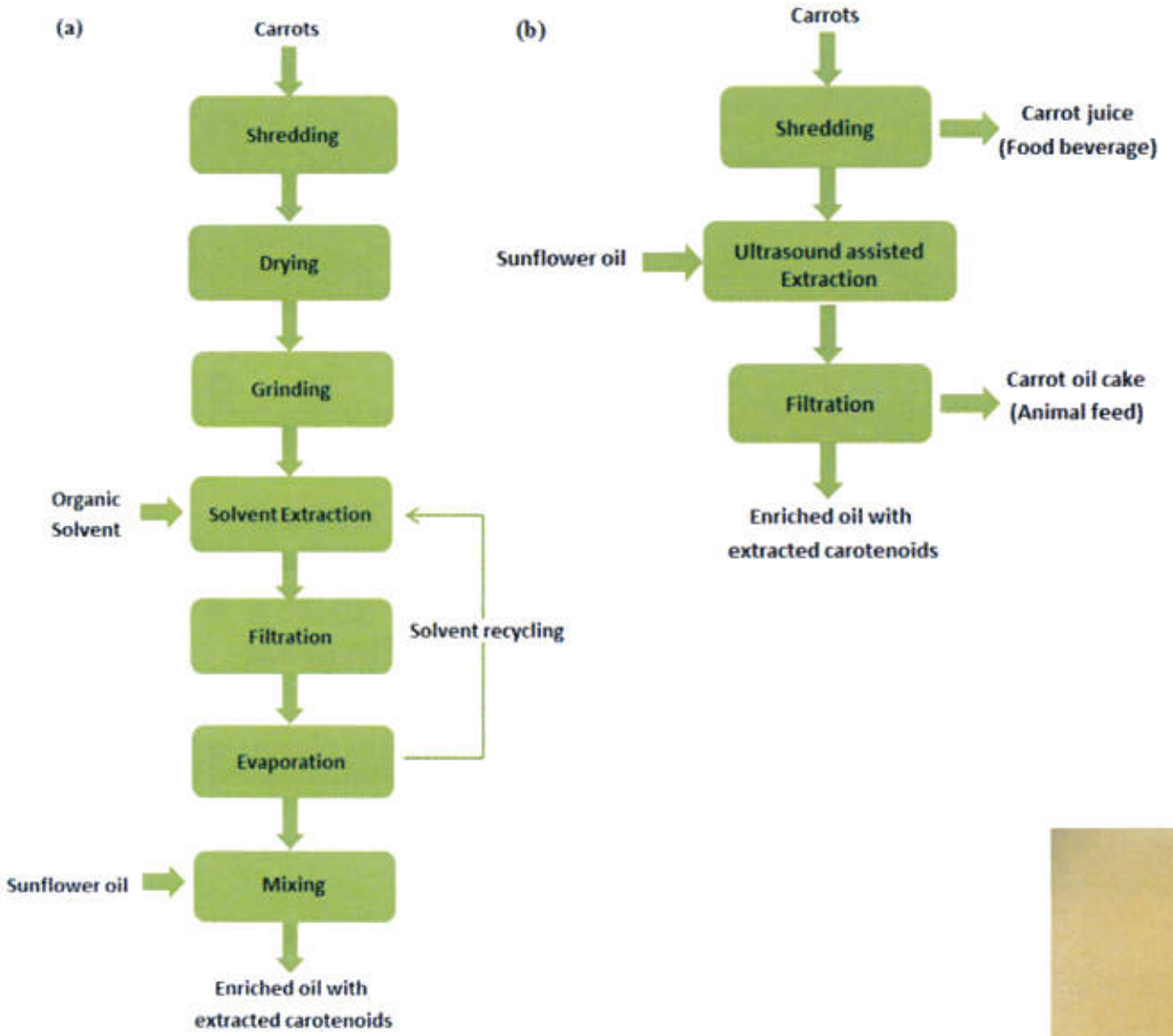
Green ultrasound-assisted extraction of carotenoids based on the bio-refinery concept using sunflower oil as an alternative solvent

Ying Li [a], Anne Sylvie Fabiano-Tixier [a], Valérie Tomao [a], Giancarlo Cravotto [b], Farid Chemat [a,*]

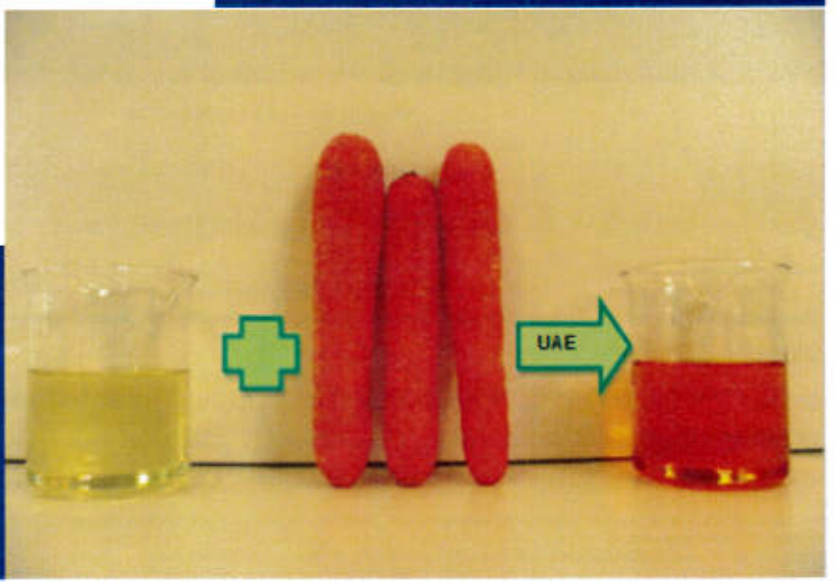
[a] Groupe de Recherche en Eco-Extraction de produits Naturels (GREEN), Université d'Avignon et des Pays de Vaucluse, INRA, UMR 408, Sécurité et Qualité des Produits d'Origine Végétale, F-84000 Avignon, France
[b] Dipartimento di Scienza e Tecnologia del Farmaco, Università di Torino, Via P. Giuria 9, 10125 Torino, Italy



Peak identification at 450 nm: (a) β-carotene, (b) α-carotene, (c) lutein and (d) 9-cis-carotene.


(a)
Carrots
Shredding
Drying
Grinding
Organic Solvent
Solvent Extraction
Filtration
Solvent recycling
Evaporation
Sunflower oil
Mixing
Enriched oil with extracted carotenoids
(b)
Carrots
Shredding
Carrot juice (Food beverage)
Sunflower oil
Ultrasound assisted Extraction
Filtration
Carrot oil cake (Animal feed)
Enriched oil with extracted carotenoids

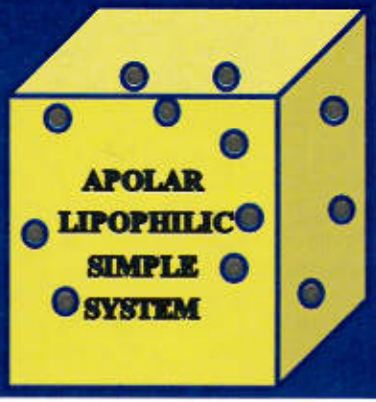

REUS
Ultrasound reactors
3 to 500 litres

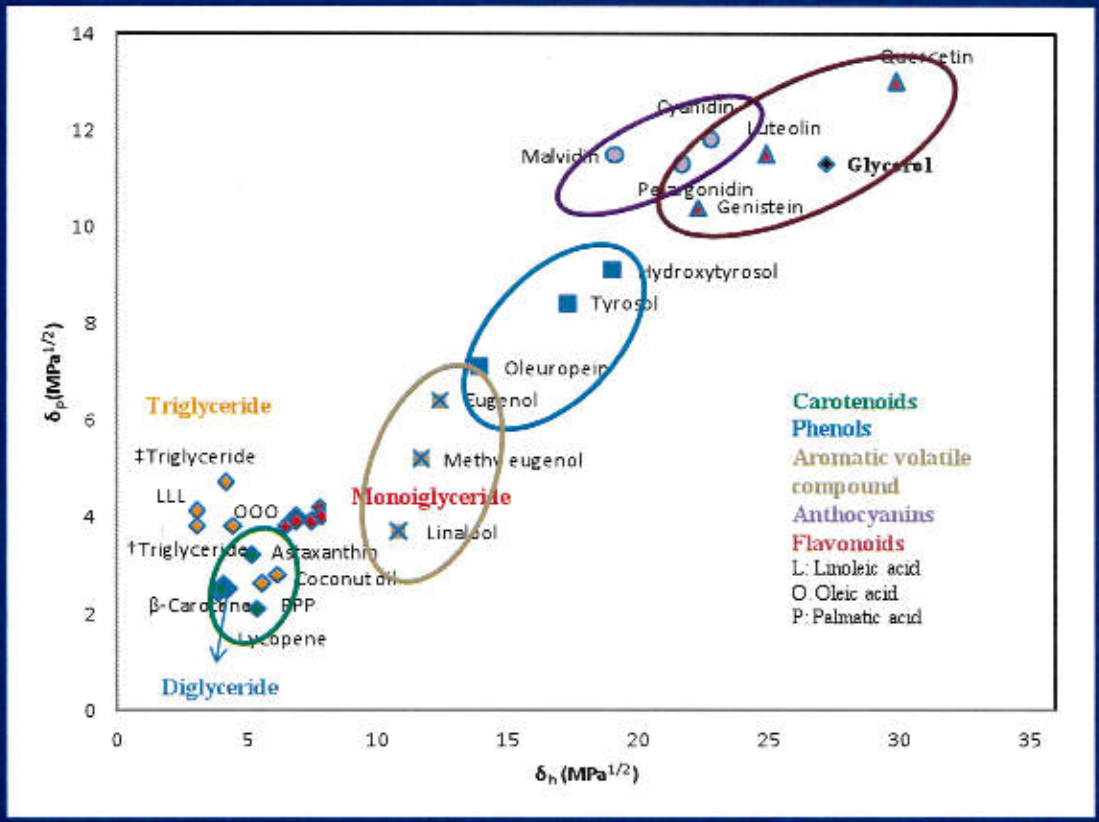

UAE

Terpènes

Polyphénols

Caroténoïdes

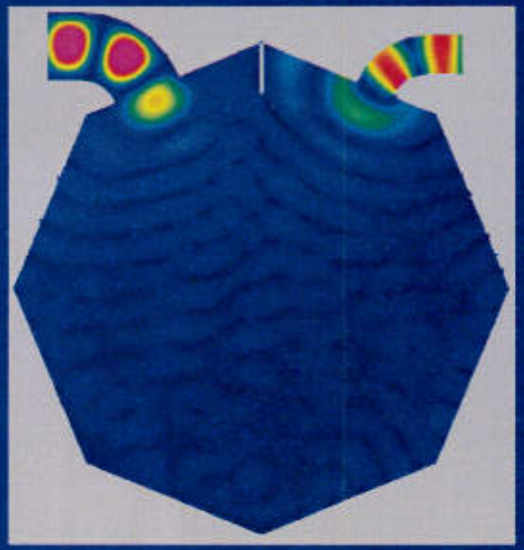




Vegetable oils as agro-solvents : Revisiting the Polar Paradox Theory

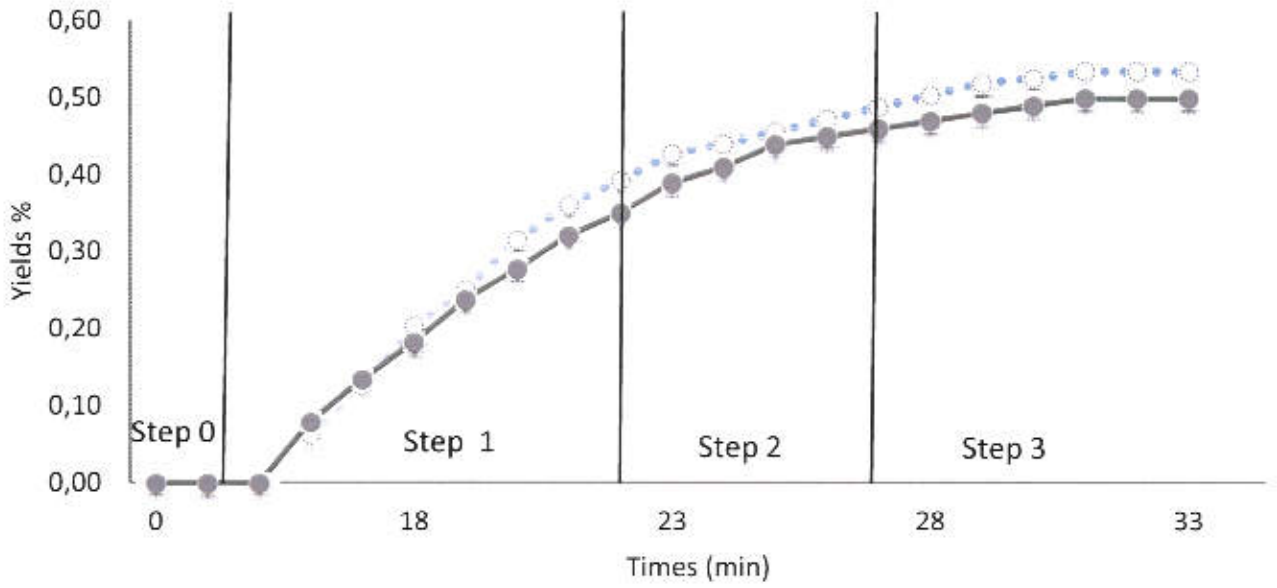
Solvent Free Microwave Extraction: From laboratory to pilot and Industrial Scale

Aurore Fily

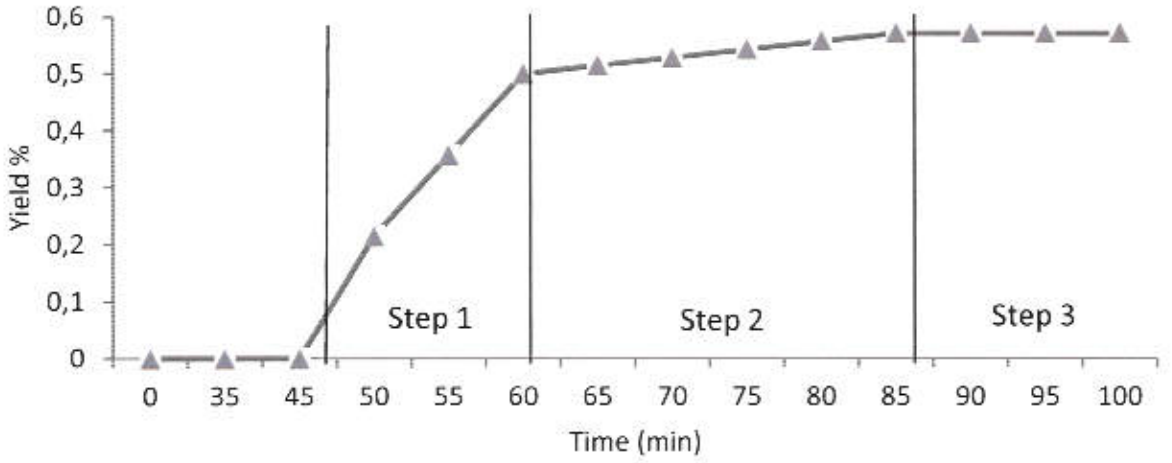


Article accepté dans Food Chemistry

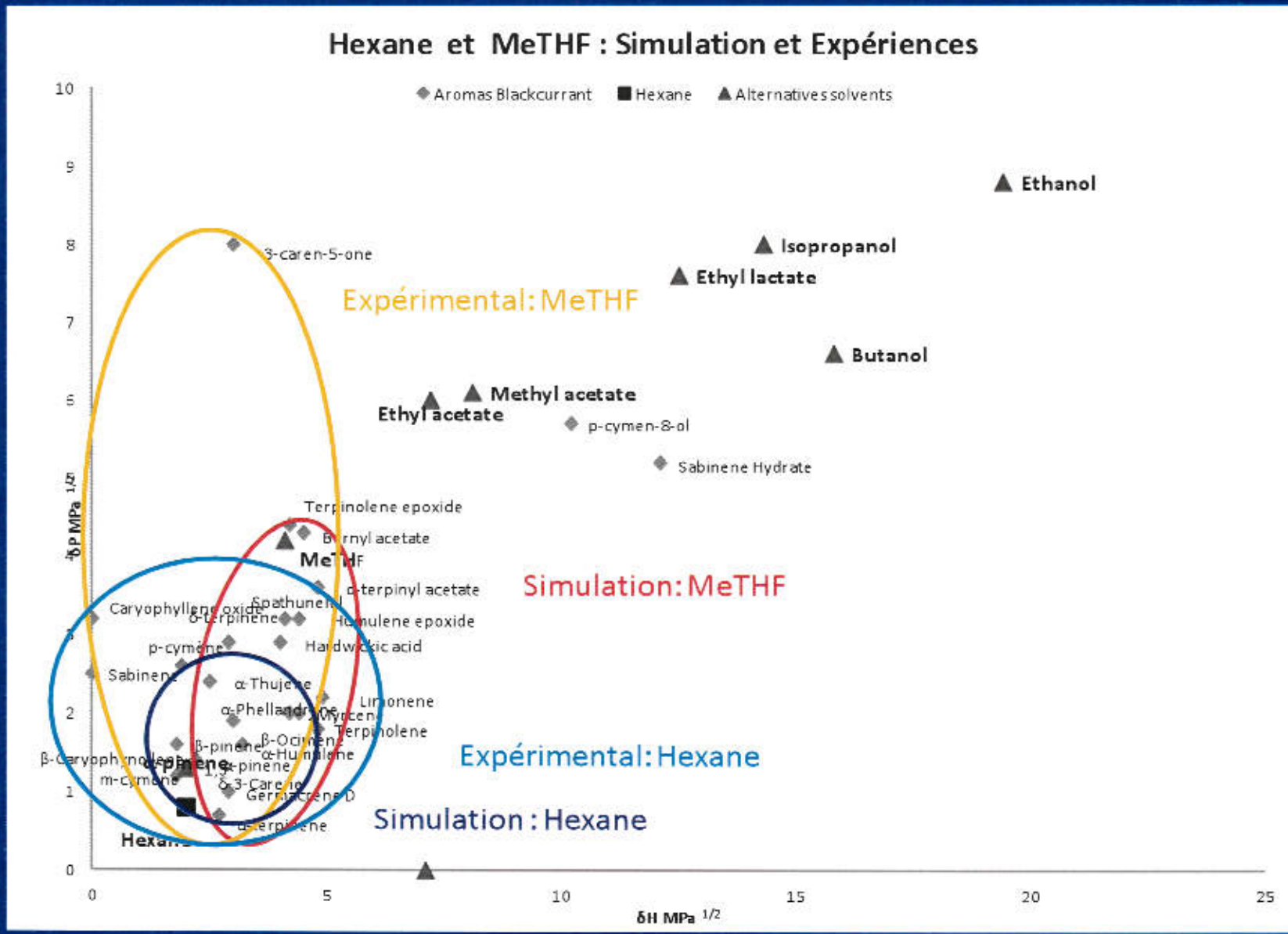
Yield profile as a function of time; microwave extraction



Yield profile as a function of time; conventional method

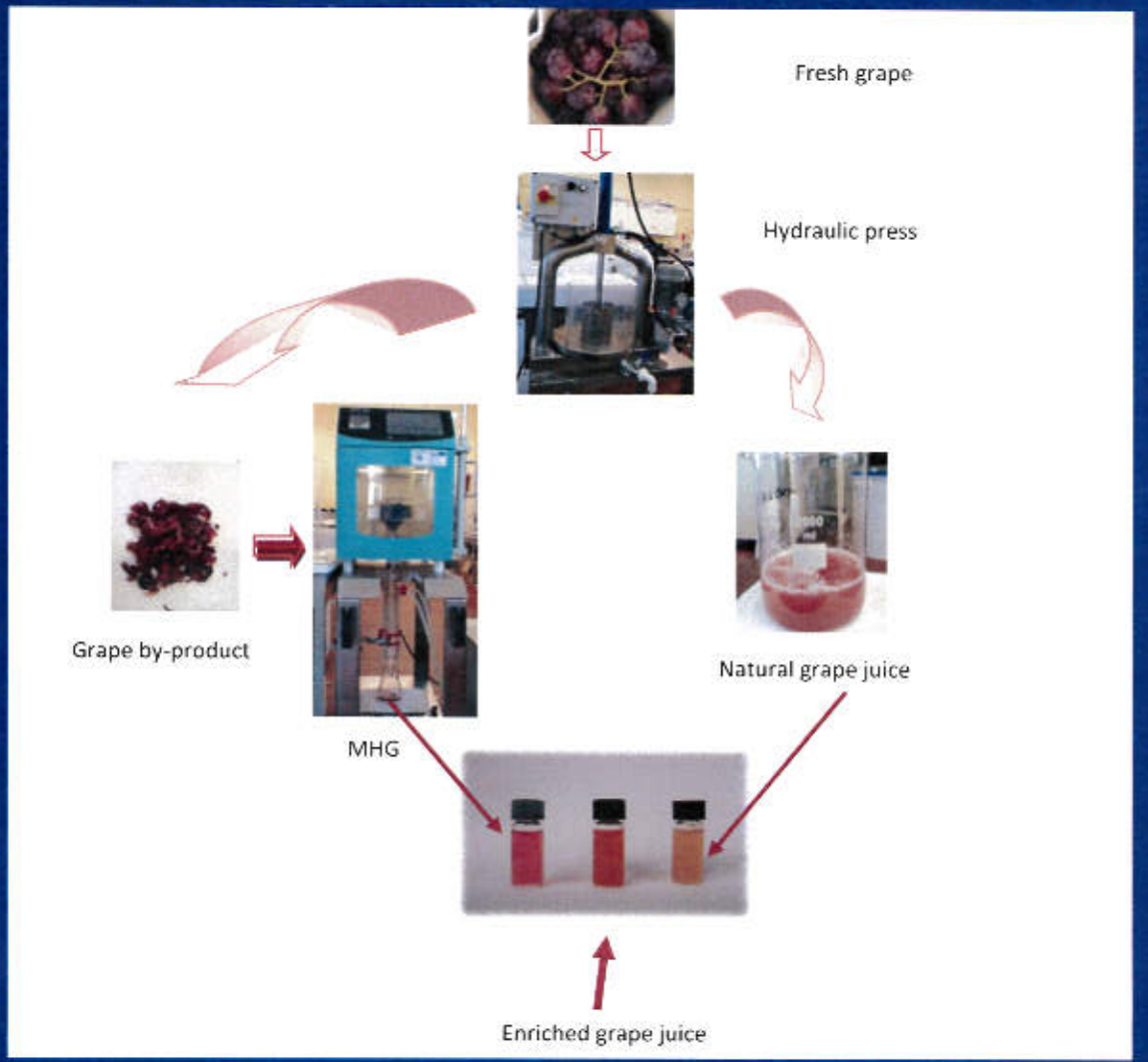


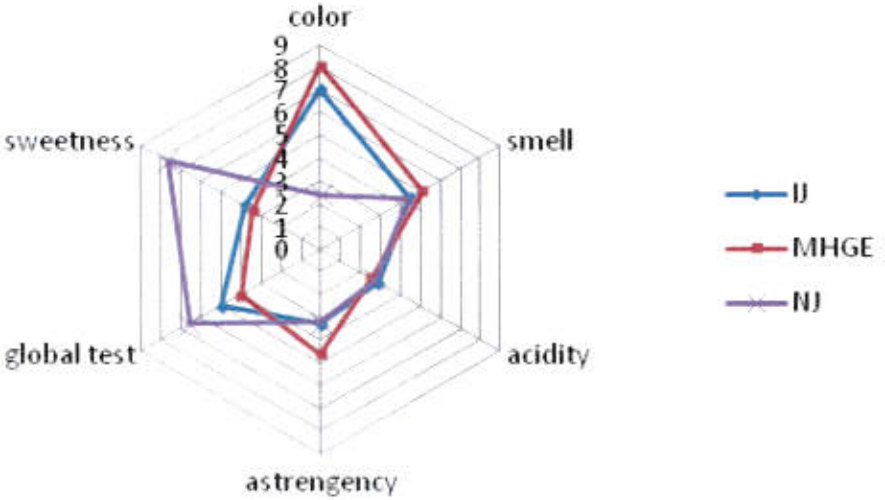
Solvants Alternatifs pour l'extraction des arômes
GREEN (UAPV) - ERINI (PASS) - UMR7272 UNSA



An innovative grape juice enriched in polyphenols by microwave-assisted extraction

Dr Sandrine Perino





Contents lists available at SciVerse ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem

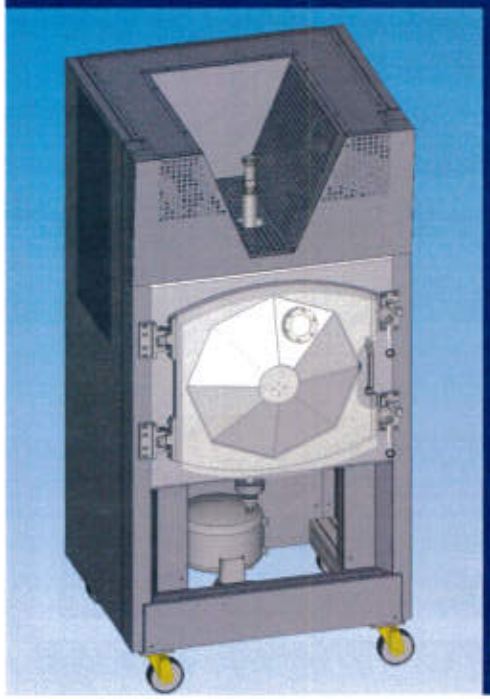
An innovative grape juice enriched in polyphenols by microwave-assisted extraction

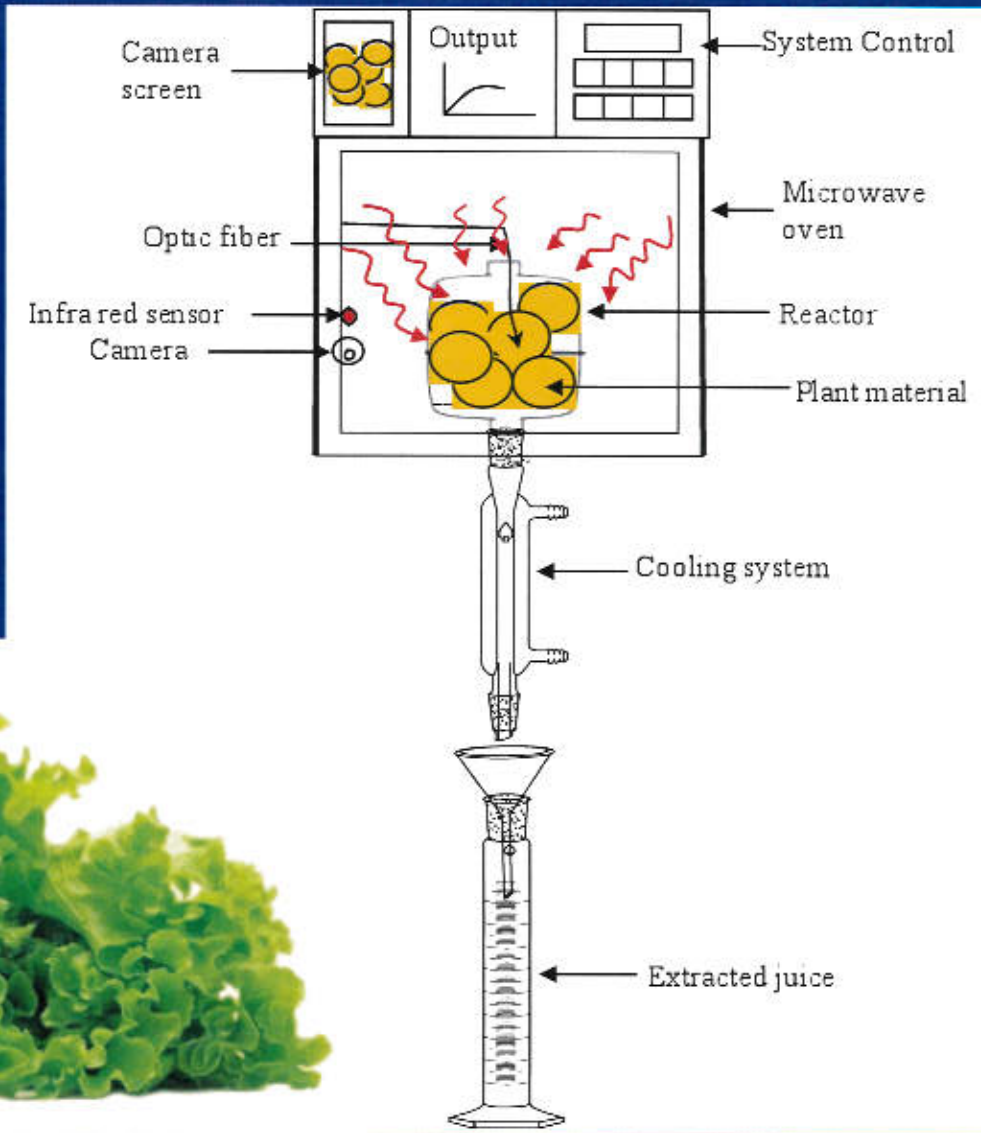
Sheiraz Al Bittar, Sandrine Périno-Issartier *, Olivier Dangles, Farid Chemat

Université d'Avignon et des Pays de Vaucluse, INRA, UMR408, 84000 Avignon, France

Valorisation of of food by products (lettuce) using microwave energy

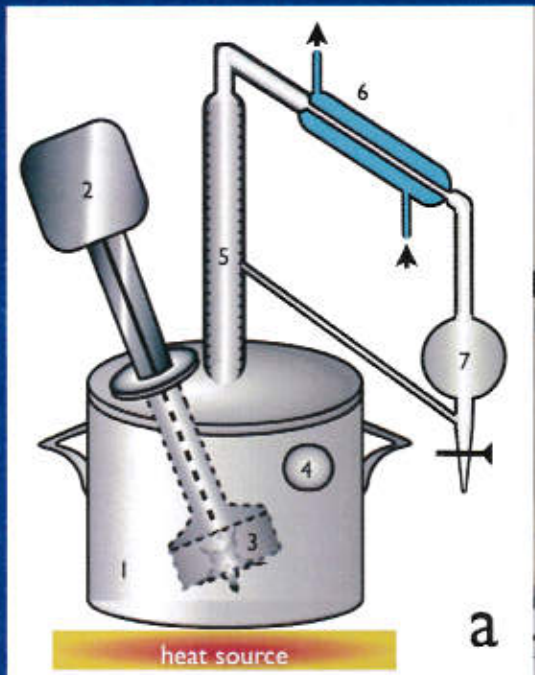
Dr Jean-Thomas Pierson





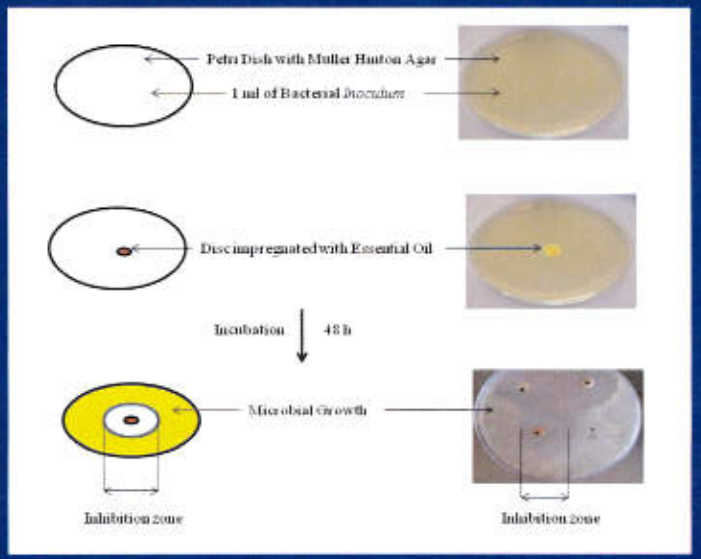
Green extraction of essential oil using Turbo-Distillation

Dr Sandrine Perino



Extraction, chemical composition, antimicrobial and antioxidant activities of six essentials oils from the Alliaceae family: Garlic, Onion, Leek, Chinese chive, Shallot and Chive

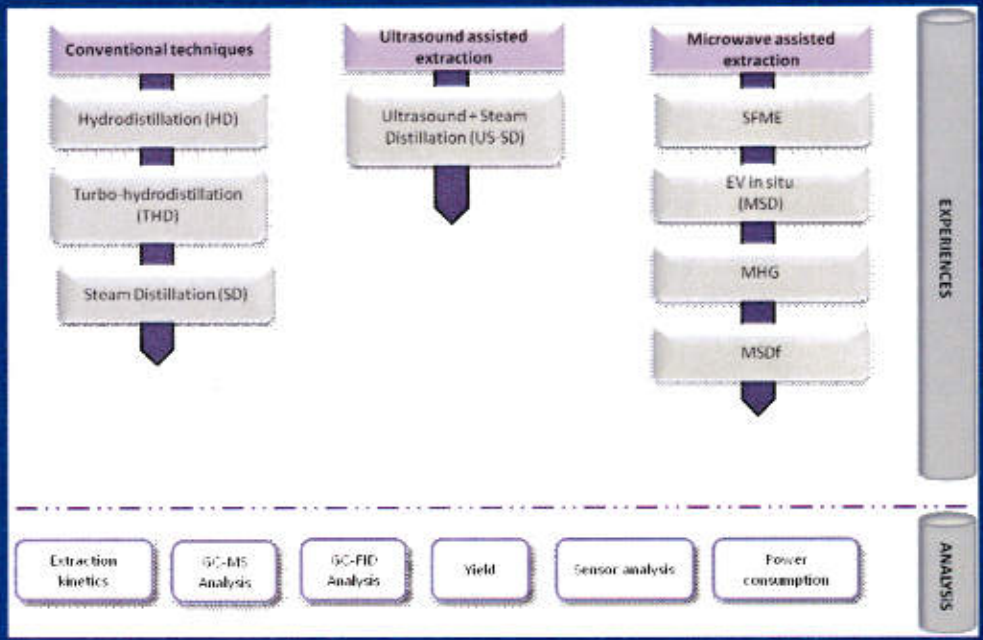
Dima Menayer



Article submitted to Food Chemistry

A comparison of essential oils obtained from lavandin via different extraction processes: Ultrasound, Microwave, Turbohydrodistillation, Steam and Hydrodistillation

Dr Sandrine Perino



Contents lists available at SciVerse ScienceDirect

Journal of Chromatography A

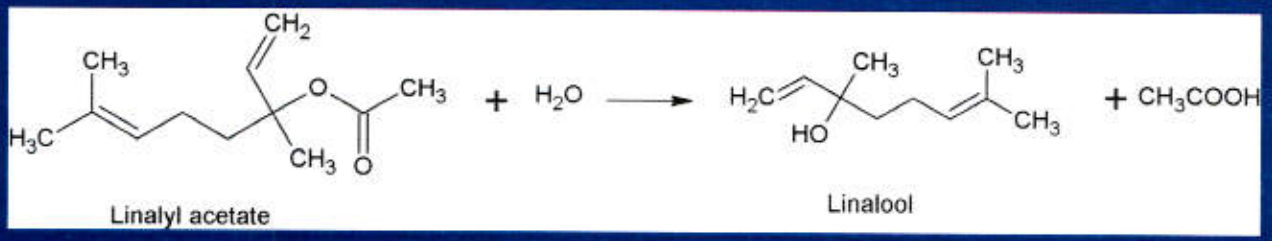
journal homepage: www.elsevier.com/locate/chroma

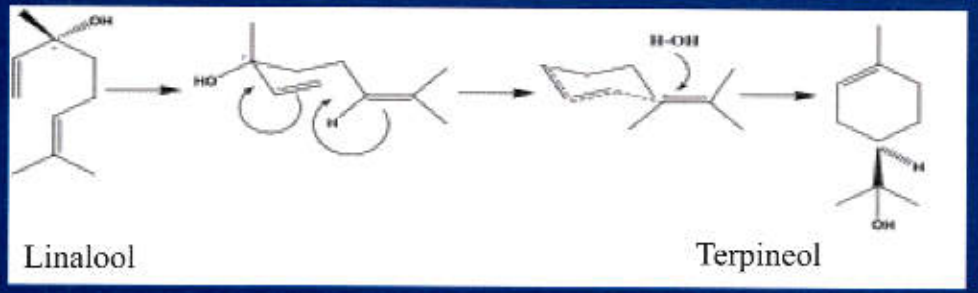
A comparison of essential oils obtained from lavandin via different extraction processes: Ultrasound, microwave, turbohydrodistillation, steam and hydrodistillation

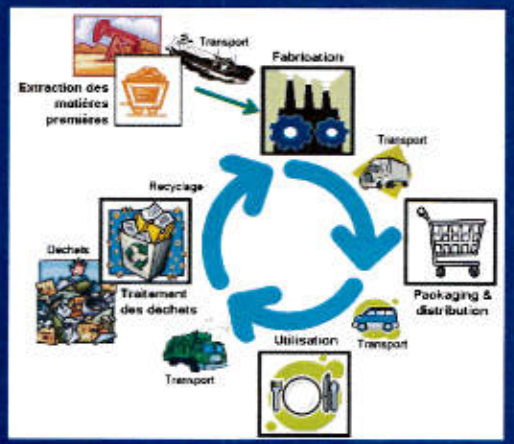
Sandrine Périno-Issartier[a,*], Christian Ginies[a], Giancarlo Cravotto[b], Farid Chemat[a]

[a] Université d'Avignon et des Pays de Vaucluse, INRA, UMR408, GREEN Extraction Team, 84000 Avignon, France
[b] Dipartimento di Scienze e Tecnologia del Farmaco, Università di Torino, 10125 Torino, Italy

Quality of EO// Impact of Processes







Etude technico-économique
150 Litres = 75 k Euros

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[www.eet-alcotra.eu]

Septembre 2011 - Octobre 2013

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