

FLAVOUR SCIENCE

Proceedings of the

XV Weurman Flavour Research Symposium

18.-22. September 2017

Graz University of Technology

Austria

Edited by

Barbara SIEGMUND & Erich LEITNER

Graz University of Technology

Institute of Analytical Chemistry and Food Chemistry

Graz – Austria



Imprint

Flavour Science

Proceedings of the XV Weurman Flavour Research Symposium
18.-22. September 2017
Graz University of Technology
Austria

Edited by
Barbara Siegmund & Erich Leitner

First published 2018

© Verlag der Technischen Universität Graz
www.ub.tugraz.at/Verlag

Printed by Prime Rate
<https://www.primerate-druckerei.at/>

Print
ISBN 978-3-85125-593-5
ISSN 0269-5648

e-book
ISBN 978-3-85125-594-2
DOI 10.3217/978-3-85125-593-5



This work is licensed under a Creative Commons Attribution 4.0 International License.
<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Preface

The Weurman Flavour Research Symposium has been a unique platform and probably the most representative conference for flavour scientists to present and discuss recent trends and developments in the field of flavour research. The conference - named after the flavour pioneer Cornelius Weurman - took place in 1975 for its first time and was then held every three years in different European countries. In 2017, it took its turn to Graz, Austria. It was a great honour for us to be the organisers of the XV Weurman Flavour Research Symposium and to welcome 230 flavour scientists from 30 countries at the Old Campus of our university.

The symposium covered six major areas of flavour science: (i) Flavour Generation and Flavour Release, (ii) Flavour Perception and Psychophysics, (iii) Impact of Flavour Compounds on Humans, (iv) Flavour and Off-Flavour of Non-Food Products, (v) Industry-Related Flavour Issues and (vi) Recent Developments in Analytical Techniques. During the conference, we had the chance to follow the presentation of 38 lectures, 14 flash presentations and to discuss an impressive amount of topics and results in front of 130 posters. In the run-up to the event, 65 attendees took the opportunity to attend one of the two satellite symposia and to deepen their knowledge in real-time flavour release analysis or regarding flavour analysis by advanced chromatographic methods. The participation of attendees from industry and academia with different flavour perspectives launched lively discussions in the inspiring atmosphere of our university. We hope that the young colleagues could feel the 'Weurman spirit' and that they are encouraged to continue their work in flavour science.

The present edition of the book 'Flavour Science' follows the structure of the symposium. We are very pleased that many colleagues followed our invitation to publish their results as full contribution in this book. With 108 interesting contributions, we hope that this book will be useful for many flavour scientists, whether or not they attended the symposium. The opportunity to publish the contributions as open access papers will hopefully make flavour science accessible to a large audience.

The organisation of this symposium and the editing of the proceedings could only be achieved with the support and the help of a lot of people. We would like to acknowledge the members of our Scientific Committee for assessing abstracts, selecting contributions and helping us to set up the scientific programme, chairing sessions and reviewing full contributions to be published in this book. We would like to thank the members of the Local Organising Committee for organising this wonderful event at the campus of our university. Thanks to many master- and PhD students who assisted us during the symposium! We are grateful for the generous support by our sponsors. Thanks to their donations we were able to offer reduced student fees to 35 PhD students and, thus, to enable their participation. Finally, we would like to thank Larissa Kolb who worked hard on correcting and formatting of the manuscripts and Gabriele Gross from the Verlag der TU Graz for her general assistance with the book.

The XVI Weurman Flavour Research Symposium will be organised by Elisabeth Guichard and Jean-Luc Le Quéré and will take place in Dijon, France in 2020. We wish Elisabeth and Jean-Luc all success for the organisation and we are looking forward to attending the next Weurman Flavour Research Symposium!

Barbara Siegmund and Erich Leitner

Local Organising Committee

Eveline Maier
 Erich Leitner
 Barbara Pöllinger-Zierler
 Barbara Siegmund
 Iris Tauber
 Iris Weiland
 Helmar Wiltsche
 Elisabeth Wrana

Scientific Committee

Klaus Dürrschmid	University of Natural Resources and Life Sciences, Vienna
Erich Leitner	Graz University of Technology
Christian Lindinger	Ionicon
Dietmar Krautwurst	Leibniz Institute for Food Systems Biology at Technical University of Munich
Ján Pe'tka	Austria Juice
Harald Pichler	Graz University of Technology
Barbara Siegmund	Graz University of Technology
Veronika Somoza	University of Vienna

Sponsors

AKRAS Flavours
 Altria Client Services
 Anton Paar
 aromaLAB
 ASAC Austrian Society of Analytical Chemistry
 Austria Juice
 Axxence
 Cambridge Isotope Laboratories, Inc.
 Flavologic
 Graz University of Technology
 Givaudan
 IONICON Analytik
 MARS Incorporated
 Nestlé Research
 PMI Science, Philip Morris International
 Rssl Reading Scientific Services Ltd.
 Shimadzu
 Springer
 Symrise
 The Flavour Centre
 Unilever
 Zotter Schokolade

Contents

Preface	iii
FLAVOUR GENERATION AND FLAVOUR RELEASE	1
Terpenoid biosynthesis in plants <i>Arman Beyraghdar Kashkooli, Alexander van der Krol, Harro J. Bouwmeester</i>	3
Production of esters and phenylpropenes are linked through <i>MdAAT1</i> in apple fruit <i>Ross G. Atkinson, Edwige J.F. Souleyre, Adam J. Matich, Ye Han, Xiuyin Chen, Mindy Y. Wang, Blue Plunkett, Nadeesha Ileperuma, Andrew P. Dare, Richard V. Espley, Sumathi Tomes, David Chagné, Yar-Khing Yauk</i>	13
Shedding light on the modulation of key Riesling wine aroma compounds in a changing climate <i>Josh Hixson, Yevgeniya Grebneva, Neele Glameyer, Kathrin Vollmer, Cory Black, Mark Krstic, Markus Herderich</i>	19
Changes in key aroma compounds during cocoa powder process <i>Ondrej Novotny, Isabel Pellon, Thierry Dufosse, Tomas Davidek, Sabine Belet</i>	25
Flavour release from wine glycosides during tasting <i>Mango Parker, Alice Barker, Wes Pearson, Yoji Hayasaka, Josh Hixson, Leigh Francis</i>	31
A saliva reactor to mimic in-vivo aroma release from flavoured ice-creams <i>Charfedinne Ayed, Sara I.F.S. Martins, Ann-Marie Williamson, Elisabeth Guichard</i>	37
Screening of yeast strains for flavour potential in meat products under reduced concentration of preservative nitrifying agents <i>Mónica Flores, Daniel Moncunill, José Javier López-Díez, Carmela Belloch</i>	43
Identification of odor-active trace compounds in Damask rose (<i>Rosa damascena</i>) <i>Teruhisa Ohashi, Yamato Miyazawa, Tetsuro Shibuya, Susumu Ishizaki, Yoshiko Kurobayashi, Tsukasa Saito</i>	47
Characterisation of aroma-active compounds in horseradish (<i>Armoracia rusticana</i>) <i>Eva-Maria Kroener, Andrea Buettner</i>	51
Effect of nitrate reduction on the development of oxidized aroma in dry fermented sausages during storage <i>Laura Perea, Carmela Belloch, Mónica Flores</i>	55
Shelf-life model: Useful tool to predict sensory and nutritional quality of infant formulas <i>Christine Kersch-Counet, Petra Vossenber, Rudy de Wit, Wim Timmermans, Hans Cruijsen, Jagannohan Rallapalli, Paul Deckers</i>	61
Milk fat globule membrane and its role in flavour development in cheese during ripening <i>Zahra Haddadian, Graham T. Eyres, Philip J. Bremer</i>	65
The effect of sugar type on VOC generation in a model baked system <i>Patrick Silcock, Julien Brecheteau, Loïc Toupin, Sam Heenan</i>	69
Understanding the impact of sodium on the structural properties of sweet biscuits <i>Charfedinne Ayed, Mui Lim, William Macnaughtan, Robert Linforth, Ian D. Fisk</i>	73
The impact of plant proteins on vanilla flavour perception <i>Lizeth Lopez Torrez, Lucian van Belzen, Mathieu Michalet, Odile Janinet, Solange Dalmas</i>	77
Decoding the unique peaty aroma of Islay scotch single malt whisky by means of the Sensomics concept <i>Veronika Mall, Peter Schieberle</i>	83

Flavour generation from microalgae in mixotrophic cultivation <i>Andriéli Borges Santos, Karem Rodrigues Vieira, Pricila Nass Pinheiro, Bruno Nicolau Paulino, Juliano Lemos Bicas, Eduardo Jacob-Lopes, Leila Queiroz Zepka</i>	87
Unraveling the complexity of a savory fermented product using a holistic sensory-analytical approach <i>Arne Glabasnia, Joséphine Charve</i>	91
Effects of drying methods on the composition of volatile compounds in fruits and vegetables <i>Azime Özkan-Karabacak, Gülşah Özcan-Sinir, Ömer Utku Çopur</i>	95
Characterization of aroma-active compounds in canned tuna by fractionation and GC/Olfactometry <i>Fei He, YanPing Qian, Christina Dewitt, Michael C. Qian</i>	99
Aroma compounds generation in brown and polished rice during extrusion <i>Fei He, YanPing Qian, Yan Zhang, MinWei Zhang, Michael C. Qian</i>	103
Aroma profile and proximate composition of Roselle seeds: Effects of different origins and different sample preparation methods <i>Nurul Hansiah Juhari, Mikael Agerlin Petersen</i>	107
Effects of sodium chloride, potassium chloride and calcium chloride on flavour formation during heating of a wheat flour-glucose model system <i>Tolgahan Kocadağlı, Dimitris P. Balagiannis, Vural Gökmen, Jane K. Parker</i>	111
An assessment of the effect of cinnamon spice on cocoa nibs (<i>Theobroma cacao</i> L.) - An approach to changing flavour in stored roasted cocoa nibs <i>Matthew Escalante, Gerrit Meerdink, Pathmanathan Umaharan</i>	115
Impact of water-soluble precursors leaching from green beans on aroma generation during coffee roasting <i>Chujiao Lui, Ni Yang, Robert Linforth, Ian D. Fisk</i>	119
Revisiting the role of glycosidic aroma precursors on wine aroma: Effects of microorganisms and of slow hydrolytical processes <i>Inês Oliveira, Vicente Ferreira</i>	123
Organoleptic properties of dark chocolates investigated by direct-injection mass spectrometry (PTR-ToF-MS) and GC-Olfactometry <i>Zoé Deuscher, Isabelle Andriot, Karine Gourrat, Etienne Sémon, Marie Repoux, Elisabeth Guichard, Sébastien Preys, Renaud Boulanger, Hélène Labouré, Jean-Luc Le Quééré</i>	127
Influence of salt reduction on flavour release in ready-to-eat meal <i>Cécile Rannou, Florence Texier, Philippe Courcoux, Véronique Cariou, Carole Prost</i>	131
Characterisation of the flavour of the old Austrian apple variety ‘Ilzer Rose’ <i>Iris Tauber, Georg Innerhofer, Erich Leitner, Barbara Siegmund</i>	135
<i>Aronia melanocarpa</i> – the Styrian ‘super berry’: A flavour characterisation of black chokeberry juice <i>Susanne Robert, Barbara Siegmund</i>	139
On-line coffee flavour formation analysis using PTR-ToF-MS during roasting under different atmospheres <i>Samo Smrke, Anja Rahn, Alexia N. Gloess, Chahan Yeretzian</i>	143
Characterization of key aroma compounds in two types of Keemun tea <i>Tetsuya Yoshida, Johanna Kreissl, Yoshiko Kurobayashi, Tsukasa Saito, Andreas Dunkel, Thomas Hofmann</i>	147
Age-related changes in oral and nasal physiology and their significance in aroma release and perception <i>Sophie Lester, Taylor M., Corbier C., Cornacchia L., Ian Fisk</i>	151

Influence of the brewing process and degree of milling on the taste characteristics of pigmented rice wine <i>Sanchai Yotmanee, Maria Jose Oruna-Concha, Jane K. Parker</i>	155
Characterisation of the aroma developed during fermentation and roasting of jackfruit seeds <i>Fernanda Papa Spada, Solange Guidolin Canniatti-Brazaca, Jane K. Parker</i>	159
Investigating the phytochemical, flavour and sensory attributes of mature and microgreen coriander (<i>Coriandrum sativum</i>). <i>Maria Jose Oruna-Concha, Stella Lignou, Emma L. Feeney, Karen Beegan, Owen Kenny, Niamh Harbourne</i>	163
HPLC-ESI(+)-MS/MS quantitation of the newly evidenced glutathione S-conjugates in two dual-purpose hop varieties: Citra and Sorachi Ace <i>Laura Decourriere, Cécile Chenot, Carlos Silva Ferreira, Sonia Collin</i>	167
Tracking of hop-derived compounds in beer during fermentation with PTR-ToF-MS <i>Tobias M. Richter, Alberto Algarra, Patrick Silcock, Graham T. Eyres, Phil J. Bremer, Vittorio Capozzi, Franco Biasioli</i>	171
Formation pathways of 2,3-pentanedione in model systems and real foods <i>Tomas Davidek, Ondrej Novotny, Thierry Dufossé, Luigi Poisson, Imre Blank</i>	175
Effect of several food processing methods on volatile composition of strawberry <i>Gülşah Özcan Sinir, Canan Ece Tamer, Ömer Utku Çopur</i>	179
FLAVOUR PERCEPTION AND PSYCHOPHYSICS	183
Influence of genetic variation on flavour perception and food choices <i>John E. Hayes</i>	185
Investigating perception and liking of non-nutritive sweeteners according to taste receptor genotypes <i>Lisa Methven, Gabriele Kavaliauskaite, Lauren Ellis, Karani S. Vimalaewaran</i>	193
Sugar reduction in flavoured beverages: The robustness of aroma-induced sweetness enhancement <i>Celine Brattinga, Petrus Maria Theresia De Kok, Johannes Hendrikus Franciscus Bult</i>	199
Perception of odour mixtures: The next challenge in flavour analysis <i>Thierry Thomas-Danguin, Charlotte Sinding, Sébastien Romagny, Maiken Thomsen, Elisabeth Guichard, Gérard Coureaud</i>	207
Structure-odour relation in homologous series of alkane-1,1-dithiols and dithio(hemi)acetals <i>Johanna Elisabeth Grimm, Jia-Xiao Li, Martin Steinhaus</i>	213
Effect of carbonation level on the perception of sourness in sparkling wine <i>John C. Castura, Kenneth M. McMahon, Carolyn F. Ross</i>	217
Explaining fat sensitivity in cottage cheeses by aroma release and oral physiology parameters <i>Elisabeth Guichard, Rachel Schoumacker, Sébastien Romagny, Hélène Labouré, Christophe Martin, Eric Neyraud, Jean-Luc Le Quééré, Thierry Thomas-Danguin</i>	221
Elucidating the mechanisms of individual variation in fat perception and preference <i>Xirui Zhou, Jane K. Parker, Orla B. Kennedy, Lisa Methven</i>	225
Molecular and cellular mechanisms of the pungent and tingling impression of black pepper (<i>Piper nigrum</i> L.) <i>Corinna Dawid, Leopoldo R. Beltrán, Andrea Henze, Oliver Frank, Madeline Beltrán, Janina Levermann, Sascha Titt, Sini Thomas, Viktoria Puerschel, Miriam Satalik, Günter Gisselmann, Hanns Hatt, Thomas Hofmann</i>	229

Temporal processing of odor mixtures in humans <i>Chloé Albietz, Terry E. Acree</i>	233
Real-time percept flavor balance derived from retronasal threshold and <i>in vivo</i> measurements of retronasal aroma release with PTR-MS <i>Shinichiro Ito, Ken Omori, Hideki Miyazaki, Toshihiro Takeda, Kunihide Hoshino</i>	237
Perceptive Interactions in Red Wines: How Physico-Chemical Pre-Sensorial Effects May Affect Red Wine Fruity Aromatic Expression? <i>Margaux Cameleyre, Georgia Lytra, Sophie Tempere, Jean-Christophe Barbe</i>	241
Why does this wine smell like apricots? <i>Tracey E. Siebert, Sheridan R. Barter, Alice Barker, Wes Pearson, Miguel A. de Barros Lopes, Philippe Darriet, Markus J. Herderich, I. Leigh Francis</i>	245
Structure-odor relationship study of C-6 unsaturated acyclic monoterpene alcohols: A comparative approach <i>Shaimaa Awadain Elsharif, Andrea Buettner</i>	249
IMPACT OF FLAVOUR COMPOUNDS ON HUMANS	253
Taste receptors in respiratory innate immunity <i>Alan D. Workman, Michael A. Kohanski, Noam A. Cohen</i>	255
Bitter taste: prediction, relation to toxicity, and effect on emotions <i>Ayana Dagan-Wiener, Ido Nissim, Nitzan Dubovski, Masha Y. Niv</i>	263
Can flavour enhancement modulate appetite and food intake in women? <i>Wenting Yin, Ian Fisk, Louise Hewson, Robert Linforth, Moira Taylor</i>	269
The TRP channel agonists nonivamide and cinnamaldehyde augment cold-induced mitochondrial biogenesis in white adipocytes <i>Barbara Lieder, Kerstin Schweiger, Veronika Somoza</i>	275
Biotransformation, transmission and excretion processes of garlic odorants in humans: impact on human milk, urine and exhaled breath <i>Laura Scheffler, Nina Sillner, Yvonne Saueremann, Constanze Sharapa, Jonathan Beauchamp, Andrea Buettner</i>	281
The novel umami peptides identified from <i>Takifugu Obscurus</i> and <i>Takifugu Rubripes</i> <i>Yuan Liu, Bei Li</i>	285
The role of the salivary proteome in salt sensitivity <i>Theresa Stolle, Freya Grondinger, Andreas Dunkel, Chen Meng, Guillaume Médard, Bernhard Kuster, Thomas Hofmann</i>	289
Comparison of the sensory properties of fragrant and non-fragrant rice: The role of the popcorn-like aroma compound 2-acetyl-1-pyrroline <i>Xuan Wei, Lisa Methven, J. Stephen Elmore</i>	293
INDUSTRY-RELATED FLAVOUR ISSUES	297
Safety assessment of flavourings in the European Union <i>Karl-Heinz Engel</i>	299
Impact of Nagoya protocol on flavour research <i>Robin Clery, Klaus Gassenmeier</i>	307
Acetals in food flavourings <i>Ján Pet'ka, Johann Leitner, Jose Maria Bueno, Peter Szolcsányi</i>	313
Novel Strategies of addressing increasing complexity in flavour research <i>Imre Blank, Tomas Davidek, Heiko Oertling</i>	319

Effect of muscle, ageing and packaging on marker volatiles for beef flavour <i>Linda J. Farmer, Terence D.J. Hagan, David Sanderson, Alan W. Gordon, Rod J. Polkinghorne</i>	325
Discovering aroma patterns in food products using Latent Dirichlet Allocation and Jensen Shannon divergence <i>Michael Fitzke, Alicia Olivares</i>	331
Searching for naturally generated volatiles from <i>Tuber Melanosporum</i> as authenticity markers for black truffle infused vegetable oils <i>Consol Blanch, Carles Ibáñez, Montse Argelagués, Amparo Tàrrega, Míriam Torres</i>	335
Odour qualities and odour thresholds of halogenated, alkylated, alkenylated and methoxylated guaiacol-derived odorants <i>Katja Lorber, Maria Wagenstaller, Maria Schranz, Florian Juhlke, Katharina Klos, Julia Kerschbaumer, Andrea Buettner</i>	339
Characterisation of the key aroma compounds in alcohol- free beer base by gas chromatography-olfactometry <i>Jose A. Piornos, Dimitris P. Balagiannis, Elisabeth Koussissi, Eric Brouwer, Jane K. Parker</i>	343
Studies on off-flavours in lamb <i>Janeen S. Speers, Aurelie Aubry, Terence D.J. Hagan, Frank Monahan, W. Colin McRoberts, Alison White, Linda J. Farmer</i>	347
Key aroma compounds in meat bouillons: Comparison between industrial and traditional preparation processes <i>Johannes Polster, Maria Monteiro de Araújo Silva, Giuseppe Lubes, David Komarek, Imre Blank</i>	351
Malolactic fermentation of sea buckthorn (<i>Hippophaë rhamnoides</i> L.) berry juice with <i>Lactobacillus plantarum</i> : impact on sugars, sugars alcohols, and organic acids <i>Niko Markkinen, Sarianna Koivula, Oskar Laaksonen, Baoru Yang</i>	355
Impact of enzyme treatment on flavour of aronia juice <i>Mari Sandell, Anita Vanag, Oskar Laaksonen</i>	359
Validity of marker compounds for authenticity control case study: Methyl cinnamate <i>Michael Backes, Jekaterina Ongouta, Uwe Schäfer, Lars Meier, Birgit Nölting, Nadine Heinemeier, Margit Liebig, Gerhard E. Krammer</i>	363
Mapping on the origins of cajuput essential oil for its compatibility as <i>Cajuputs® Candy</i> functional flavour <i>Siska Septiana, Nancy D. Yuliana, Boy M. Bachtiar, C. Hanny Wijaya</i>	367
Influence of protective inert gas atmospheres on the aroma stability of orange juice with pulp <i>Jana Sádecká, Mária Kopuncová, Emil Kolek, Jaroslav Blaško, Martin Polovka, Pavel Farkaš, Ján Durec</i>	371
FLAVOUR & OFF-FLAVOUR OF NON-FOOD PRODUCTS	375
Odorants in non-food products – Is there more to them than just their smell? <i>Andrea Buettner, Jonathan Beauchamp, Philipp Denk, Miriam Strangl, Christoph Wiedmer</i>	377
The toilet malodor challenge <i>Christian Starkenmann, Charles Chappuis, Jana Pika</i>	383
Key odorants in the artificial leather of car interiors <i>Klaas Reglitz, Martin Steinhaus</i>	389
What does wood smell like? Characterization of odorants in wood <i>Linda Schreiner, Rahil Ghadiriasli, Patrick Bauer, Andrea Buettner</i>	395

Odour-active compounds in an inflatable PVC beach ball <i>Isabella Märkl, Klaas Reglitz, Martin Steinhaus</i>	399
Identification of malodorous emissions of wood pellets during storage <i>Barbara Pöllinger-Zierler, Irene Sedlmayer, Hermann Hofbauer, Elisabeth Wopienka, Barbara Siegmund</i>	403
Describing the smell of wet cat food using a common sensory language: Petscript® <i>Perrine Delime, Uwe Schaefer, Katja Tiitinen, Chloé Champion, Aurélie De Ratuld</i>	407
Comparison of different analytical methods for the quantification of odor-active haloanisoles in food contact materials <i>Brigitte Jaksá, Thomas Lehner, Dorothea Leis, Sigrid Hager, Erich Leitner</i>	411
Emissions of compost bedded pack barn for cattle <i>Alfred Pöllinger, Barbara Pöllinger-Zierler, Christian Kapp, Nina Haar, Larissa Kolb, Erich Leitner</i>	415
RECENT DEVELOPMENTS IN ANALYTICAL TECHNIQUES	419
PARADISE - a ground-breaking tool to treat complex GC-MS datasets <i>Mikael Agerlin Petersen, Rasmus Bro</i>	421
Exploring 2-acetyl-1-pyrroline loss by high resolution mass spectrometry and nuclear magnetic resonance <i>Bethany J. Hausch, Keith R. Cadwallader</i>	427
A sophisticated setup for rapid, sensitive and selective food and flavor analysis <i>Felix Piel, Klaus Winkler, Rene Gutmann, Stefan Haidacher, Jens Herbig, Gregor Mayramhof, Simone Jürschik, Alfons Jordan, Lukas Märk, Philipp Sulzer</i>	433
DOLC-NMR: Differential off-line LC-NMR analyses of nutrient-induced metabolome alterations in <i>S. cerevisiae</i> and their taste impact <i>Richard Hammerl, Oliver Frank, Thomas Hofmann</i>	439
Process control in flavour generation: NIR-MVA as a tool to monitor key odorants formation <i>Ana Rita Monforte, Sara I. F. S. Martins, A. C. Silva Ferreira</i>	445
Investigation of odour-active compounds in grapefruit (<i>Citrus paradisi</i>) <i>Akihiro Kawaraya, Shingo Chiba, Aki Kurabe, Yuichiro Yamazaki, Yumi Kusano, Kyoko Zaizen, Eri Hiraki, Yoshihiro Yaguchi, Yukihiro Kawakami</i>	451
Rapid aroma analysis and data interpretation using on-line mass spectrometry and visualisation software <i>Jun Hatakeyama, Andrew J. Taylor</i>	455
Rapid analysis of important taste active components in chocolate by ultra high performance liquid chromatography coupled with high resolution mass spectrometry (UHPLC-QToF-MS) <i>Katherine Filer, Daniel Festring</i>	459
Evaluation and optimization of sample preparation techniques towards the regional differentiation of Chinese green teas <i>Mark Bücking, T. T. Ho, Hongbo Yang, T. Albinus, M. Kotthoff</i>	463
On-line high-throughput analysis of the volatilome of microorganisms that have agroindustrial relevance <i>Iuliia Khomenko, Luca Cappellin, Michele Pedrotti, Patrick Silcock, Franco Biasioli</i>	467
Headspace solid phase microextraction (SPME) vs dynamic headspace extraction (DHS) to explore breast milk volatile fraction <i>Sara Le Roy, Angélique Villière, Catherine Fillonneau, Carole Prost</i>	471

Continuous collection of volatiles produced by <i>Streptomyces</i> grown on oatmeal agar by headspace extraction and GC-MS <i>Raju Podduturi, Nina Clausen, Nanna Bender Petersen, Niels O. G. Jørgensen, Mikael Agerlin Petersen</i>	475
InnOscent chromatographic system: An innovative device to revisit aroma analysis and recombination perspectives <i>Angélique Villière, Sarah Le Roy, Catherine Fillonneau, Carole Prost</i>	479
Comparison of the volatile sulfur compounds in onion oil to those in fresh onion juice <i>Sytze Haasnoot, Gijs Koopmanschap, Hans Colstee, Cor Nideveld, Clint Wermes, Robert Cannon, Neil C. Da Costa</i>	483
The odour activity value of aroma-active esters - An appropriate means to assess the aroma quality of apple juices <i>Johanna Kreissl, Katharina Lehmann, Peter Schieberle</i>	487
WheelOscent: presentation of an innovative olfactometry-dedicated software using intuitive aroma wheel interface <i>Angélique Villière, Fabrice Guillet, Sarah Le Roy, Catherine Fillonneau, Carole Prost</i>	491
Scope for improvement in the sensomics approach <i>Lewis L. Jones, Richard Haydock, Kathleen Pinfold, James B. Addison, Neil Desforges</i>	495
Rapid ATR-FTIR method for monitoring the release of major components of clove essential oil encapsulated into a complex organic matrix <i>José Daniel Wicochea Rodriguez, Emanuelle Gastaldi, Thierry Ruiz, Peggy Rigou, Stéphane Peyron, Pascale Chalier</i>	499
The impact of pod storage on the formation of different alkylpyrazines from Ghanaian cocoa roasted at four roasting temperatures <i>Ann de Winne, Michael Hinneh, Julie Haeck, Davy Van de Walle, Jim Van Durme, Emmanuel Ohene Afoakwa, Koen Dewettinck, Luc De Cooman</i>	503
Method development for multiple partition coefficients determination to understand headspace aroma distribution of complex mixture. <i>Margaux Cameleyre, Georgia Lytra, Charlotte Herice, Jean-Christophe Barbe</i>	507
Characterisation of wines produced from fungus resistant grape varieties <i>Dorothea Leis, Wolfgang Renner, Erich Leitner</i>	511
AUTHOR INDEX	515
KEYWORD INDEX	519