VII Postharvest Unlimited Congress

Abstract book

DAY 1 - 15 May	8.30 - 8.45	Opening		
	8.45- 9.15	Keynote Toine Timmermans		
	9.15 - 10.00	Keynote Ernst Woltering		
	10.00 - 10.30	Coffee & poster viewing		
	10.30 - 12.00	Plenary session: Thijs Defraeye, Rick van de Zedde, Bart Nicolai		
	12.00-13.30	Lunch & poster session 1		
		Podium	**Momentum 2-3**	**Momentum 1**
	13.30 - 15.00	PHU session 1a Invited: Pedreschi	PHU session 1b	PHO session 1 Invited: Çelikel
		Physiology 1	Postharvest Pathogens 1	
	15.00 - 15.45	Coffee & poster viewing		
	15.45 - 17.15	PHU session 2a Invited: Mishra	PHU session 2b	PHO session 2 Invited: Fanourakis
		Quality Measurements 1	Storage and technology 1	
DAY 2 - 16 May	9.00 - 10.15	PHU session 3a Invited Bovy	PHU session 3b	PHO session 3 Invited: Arens
		Preharvest conditions 1	Sensory & nutrition	
	10.15 - 11.00	Coffee & poster viewing		
	11.00 - 12.15	PHU session 4a Invited: Lukasse	PHU session 4b	PHO session 4
		Logistics and modelling	Pre-harvest treatments 1	
	12.15 - 14.00	Lunch & poster session 2 & business meeting Ornamentals (momentum 1)		
	14.00 - 15.30	PHU session 5a	PHU session 5b	PHO session 5 Invited: Verdonk
		Quality Measurements 2	Physiology 2	
	15.30 - 17.00	Excursion NPEC/Phenomea/Unifarm	Excursion NPEC/Phenomea/Unifarm	Excursion NPEC/Phenomea/Unifarm
	19.00 - 22.30	Conference dinner, WICC		
DAY 3 - 17 May	9.00 - 10.30	PHU session 6a Invited: Farneti	PHU session 6b	PHU session 6c
		Physiology 3	Preharvest conditions 2	Postharvest Pathogens 2
	10.30 - 11.00	Coffee & poster viewing		
	11.00 - 12.30	PHU session 7a	PHU session 7b	PHU session 7c
		Quality Measurements 3	Postharvest treatments 1	Chilling and disorders 1
	12.30 - 14.00	Lunch & poster session 3 & business meeting Unlimited (momentum 2-3)		
	14.00 - 15.00	PHU session 8a	PHU session 8b	PHU session 8c
		Chilling and disorders 2	Packaging and coating 1	Storage and technology 2
	15.00 - 15.30	Coffee & poster viewing		
	15.30 - 16.30	PHU session 9a	PHU session 9b	PHU session 9c
		Packaging and coating 2	Postharvest treatments 2	Storage and technology 3
	16.30 - 17.00	Closing ceremony		
	17.00 - 18.00	Farewell drinks, Restaurant Omnia		

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ISHS International Conference
14-18 May 2023 - Wageningen, NL

XII Postharvest Ornamentals
ISHS International Symposium
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Session: PHU7a-3

Direct injection volatilomics to improve the quality of tree nuts

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Abstract

Nuts are particularly valued for their sensory, nutritional, and health attributes. Considering their wide use both for fresh consumption and confectionery, the flavour of both raw and roasted kernels greatly influences their economic value. Since aroma involves the perception of a plethora of volatile organic compounds (VOCs), their assessment is crucial to guarantee the selection and marketability of high-quality tree nuts. Thus, high priority should be given to replace poor flavour cultivars or with off-flavours with favourable ones, exploiting the variability already available in nature by considering also kernel performances during postharvest and transformation. However, the aroma analysis of many samples which are necessary to overcome the significant biological and genetic variability among samples, may be laborious and time consuming. VOC phenotyping is currently a limiting step in breeding programs, due to high costs and complex analytical techniques. The interaction between fruit genetics, environmental effects, postharvest strategies, and product transformation is another limiting factor difficult to control. According to recent publications, direct injection mass spectrometry (DI-MS) techniques, like Proton Transfer Reaction -Time of Flight- Mass Spectrometry (PTR-ToF-MS), are powerful high-throughput phenotyping tool for both genetic and quality-related studies [1]. The rapidity and moderate cost of DI-MS analysis may allow to perform a detailed aroma characterization with a peculiar attention to fold changes in VOC profiles caused by ad hoc postharvest and transformation experiments. In this presentation we would like to report three case studies about the application of PTR-ToF-MS to monitor the quality of several type of tree nuts at different stages of the production chain: breeding, postharvest and transformation such as i) volatilome profiling of raw and roasted almond kernels for genetic characterization of an almond germoplasm [2]; ii) volatilome profiling of raw walnut kernels for valorisation of traditional Italian walnut [3] and iii) quality control of raw hazelnuts [4]. In the first case study a broad germplasm collection composed by 106 Italian and international elite almond cultivars was characterized. The roasting process of some cultivars was monitored online for observation of VOCs formation in real time. Almond VOC profile seemed to be mostly influenced by roasting, but still with significant interaction with genetic variability. According to the multivariate data analysis raw and roasted almond kernels were clustered into two separated clusters due to the roasting process and formation of products of Maillard reactions. A preliminary Genome Wide Association Studies (GWAS) enabled the identification of 63 mass peaks (related to fresh and/or roasted treatment) showing a significant phenotypengenotype association. The second case study dealt with VOC differences between walnut cultivars ("Blegette", "Bleggiana", and "Lara") related with exsiccation process, postharvest, and year of production. VOC analysis showed the presence of a reach aroma blend and the absence of typical markers of walnut oxidation. The third case study was focused on the possibility to predict sensory quality of raw hazelnuts by using volatilome analysis. For this reason, good and bad quality grain hazelnuts and their mixtures in known proportions were analysed by PTR-ToF-MS with different precursor ions (H 3 O + , NO + and O 2 +). The method was able to discriminate samples containing 20% of hazelnuts with unacceptable quality from good quality samples. Finally, unsupervised data clustering of VOCs fingerprints obtained with different precursor ions provided a correct classification rate higher than 90% for all ions. These case studies show that PTR-ToF-MS is suitable DI-MS technique for investigation of aroma profile of different type of tree nuts from various perspectives.