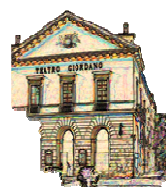# 4th MS-food Day

October, 07–09, 2015
Foggia - Italy

BOOK OF ABSTRACTS

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PROCEEDINGS OF THE 4th MS FOOD DAY

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OR13 - PREDICTION OF ANISE FLAVOUR IN APPLE FROM GC-MS AND PTR-MS VOLATILE PROFILING

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Flavour plays an important role in consumer preferences of apples. Descriptive sensory analysis provides qualitative and quantitative information of sensory perceptions in a comprehensive and rather objective way. However,time consumption and expensiveness of this method typically lead to both a limited number of apple cultivars and a limited set of their descriptors used for research. Since odour and flavour directly depend on volatile compound concentrations it is desirable to substitute long-term sensory analysis with fast mass spectrometric techniques which would be able to predict sensory characteristics of apples as well as trained panelists (Aprea et al. 2012).

24 and 56 apple cultivars harvested in orchards of Fondazione Edmund Mach (Trentino, Italy) in 2012 and 2013, respectively, were selected for sensory and mass spectrometric analysis. A sensory panel using the quantitative descriptive analysis method was performed for two successive years (2012 and 2013) by 16 trained judges (XX males and XY females, 2012) and 18 ones (XX males and XY females, 2013) (13 in common). An apple sensory profile contains sensory attributes for flesh appearance, texture, overall odour, taste, and overall flavour. The panel rated the intensity of each attribute on a linear scale, anchored to 0 (no presence) and 100 (maximum intensity), with graduation halfway (50). For the odour and flavour attributes, the judges were asked to rate only the attributes that they recognized. Here only the data set of flavour attributes was considered. Mean scores (panel average with 2 replicates) were used for further analysis.

Gas chromatography–mass spectrometry (GC-MS) and Proton Transfer Reaction – Time of Flight - Mass Spectrometry (PTR-ToF-MS) were selected as two mass spectrometric techniques to measure volatile organic compounds in order to compare apple flesh headspace volatile concentratios with sensory profiles. For GC-MS measurements apple flesh puree with antioxidant solution (deionized water, sodium chloride, ascorbic and citric acid) was prepared for each cultivar separately. Flesh cylinders (1.2 cm height; 1.8 cm diameter) were measured by a

commercial PTR-ToF-MS 8000 instrument (Ionicon Analytik GmbH, Innsbruck, Austria). Data processing of GC-MS data was performed according to a standard procedure with Nist MS Search v2.0 (Biomolecular Measurement Division, Gaithersburg, MD). Data processing of PTR-ToF-MS spectra consisted of dead time correction, external calibration and peak extraction (Cappellin et al. 2010).

Partial Least Square (PLS) models were estimated for each flavour separately on the basis of GC-MS and PTR-ToF-MS datasets. The models provided poor results. This is most likely due to the fact that flavour is an interaction between different volatile compounds, their common fragments, taste and texture perceived by a panelist. However, for both years anise flavor showed high correlation with anethol and p-allylanisole in the dataset of GC-MS measurements and with mass peaks 134.07, 148.09, 149.09, and 150.11 in the dataset of PTR-ToF-MS measurements. These mass peaks can be tentatively identified as the sum of anethol and p-allylanisole, their main fragments, and isotopes. Ambrosia showed the highest concentration of these compounds for both years and was recognized as an apple with highest anise flavour by almost all panelists.

In this work, for the first time, we showed the connection between anise flavour perception in apple and concentration of anethol and p-allylanisole measured by two different mass spectrometric techniques in apple flesh headspace.

References
[1] E. Aprea et al Food Research International, 49, 677-686 (2012).
[2] L. Cappellin et al International Journal of Mass Spectrometry, 290, 60-63, (2010).

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