CHARACTERIZATION OF THE VOLATILE PROFILE AND IDENTIFICATION OF MICROBIAL GROWTH IN POMEGRANATE JUICE BY ION MOBILITY SPECTROMETRY

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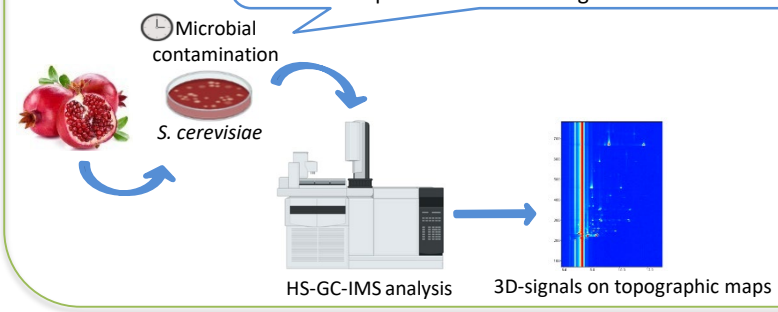
INTRODUCTION AND OBJECTIVE

Pomegranate (*Punica granatum* L.) is widely recognized for its health benefits in the human diet. Its antioxidant, antihepatotoxic, antitumoral and anti-inflammatory capacities have been attributed to its high levels of bioactive compounds such as phenolic acids, flavonoids and tannins. In juice form, pomegranate is prone to suffer spoilage resulting in CO_2 production, bad flavours and odours, and color degradation. Currently, microbial contamination is a serious concern for the food industry because of the significant economic and commercial loss it generates.

OBJECTIVE: Headspace-gas chromatography-ion mobility spectrometry (HS-GC-IMS) is proposed for the assessment of microbial contamination in pomegranate juice by means of microbial volatile organic compounds (MVOCs) monitoring produced by the most common yeast in foods, *Saccharomyces cerevisiae*.

METHODOLOGY

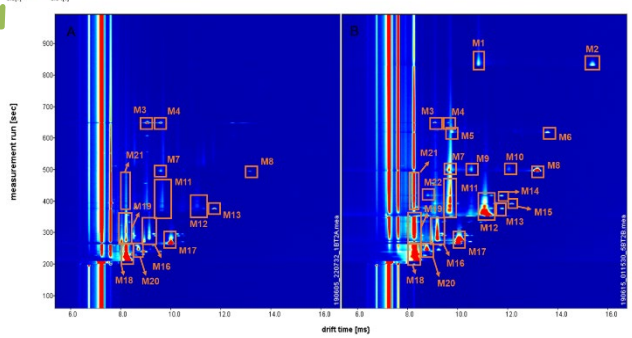
• MVOCs monitoring of pomegranate juice samples over two weeks
• Two types of preservatives: a sorbate/benzoate mixture and a natural preservative from vegetable material



HS-GC-IMS METHOD	
Injection volume	750 µL (HS), splitless mode
Incubation time	1 min
Incubation temperature	70 °C
Stirring rate	750 rpm
Capillary column	Non-polar HP-5MS-UI (30 m x 0.25 mm x 0.25 µm)
Carrier gas, N_2	1 mL min^{-1}
Oven programme	50 °C (3 min); 10 °C min^{-1}; 130 °C (6 min)
Ionization source	Tritium (^3H), positive polarity
Drift gas, N_2	150 mL min^{-1}
Drift tube temperature	80 °C
Drift tube voltage	500 V

RESULTS

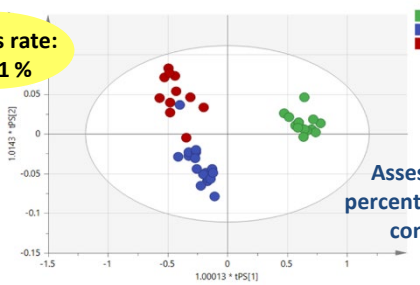
Topographic plots comparison and markers selection



Volatile composition of pomegranate juice

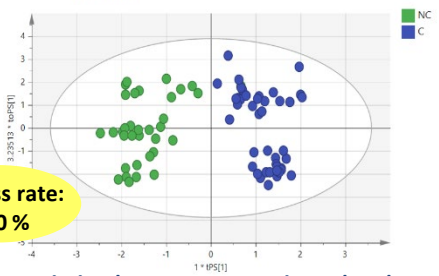
Compound	LOD (µg g^{-1})	LOQ (µg g^{-1})
Ethyl acetate	0.029	0.097
Ethyl butyrate	0.020	0.068
Limonene	0.024	0.080

Success rate: 90.91 %



Assessment of the percentage of microbial contamination

OPLS-DA models



Success rate: 100 %

Differentiation between contaminated and non-contaminated pomegranate juice samples

CONCLUSIONS

The proposed HS-GC-IMS method has proved to be an efficient tool to identify contaminated pomegranate juices as well as to classify the samples according to its contamination level. It provides an effective alternative to the traditional techniques as plate counting avoiding tedious sample treatments and time-consuming.

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