Sensory, GC-MS and PTR-ToF-MS profiling of strawberries varying in maturity at harvest with subsequent cold storage

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Abstract

Harvesting strawberry fruit before they are fully ripe and allowing them to further ripen during postharvest cold storage is a common practice. The effect of these storage conditions on consumer liking is not well understood. The first aim of this study is to investigate the effects of maturity at harvest and subsequent cold storage on consumer liking, expressed as sweetness and aroma attributes, and volatile composition. The second aim of this study is to investigate whether volatile organic compounds (VOCs) can be used to predict consumer liking. Strawberries (*Fragaria × ananassa* cv. Lusa) were harvested either at the ¾ red stage or full red stage and stored at 4 °C for one, five or nine days. Strawberries were subjected to sensory profiling, colour, firmness, GC–MS- and PTR-ToF-MS- measurements. The sensory profile of strawberries harvested at ¾ red stage showed lower sweetness and aroma than full red harvested strawberries. VOC analysis of these strawberries showed lower presence of volatile fatty acids, furanones and most esters even after nine days of cold storage, compared to full red strawberries. Strawberries harvested at full red stage showed the highest value for aroma attributes after one day of cold storage. Surprisingly, peak intensities of most esters (except for methyl butanoate and methyl hexanoate) and furanones were low on the first day, compared to ripe harvested fruit after longer storage. Ripe harvested fruit stored for nine days showed the highest peak intensities for most VOCs, but this did not correspond to the highest sensory aroma attributes. These fruits were judged with the lowest values for aroma attributes, perhaps related to the production of volatiles with off-flavours (acetaldehyde, ethyl acetate). PLS modelling showed that VOCs exist that are characteristic for both sweet and aromatic sensory attributes of 'Lusa' strawberries, based either on GC–MS (mainly volatile fatty acids) or PTR-ToF-MS analysis (mainly alcohol/ester fragments). This could lead to fast, non-destructive, selection of strawberries with high consumer liking using PTR-ToF-MS.