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Using the volatilome as a measure of quality across a range of different fruit and vegetables

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Fresh cut ready-to-eat green salads and fruit salads have a short shelf-life and deteriorate quickly due to the nature of the produce and to stresses imposed by harvesting, minimal processing and subsequent cold storage and transport. In other produce such as garlic, shelf life is much longer, and cold storage is used to delay sprouting, but again quality declines with length of storage. In both cases the stresses impact adversely on quality of the produce as well as resulting in waste. Analyses of the volatilome, the overall profile of volatile organic compounds (VOCs) that make up the aroma of fresh produce, can provide an objective measure of the internal and external changes in quality. Here we report on the changes in the volatilome in a range of fresh produce (rocket salad, strawberries, melons, basil, coriander and garlic) in response to these post-harvest treatments. We assessed the volatilome using thermal desorption - gas chromatography - time of flight mass spectrometry (TD-GC-TOF-MS) to record VOC profiles of headspace over produce. TD sampling tubes provide a robust tool for collecting VOCs and TD-GC-TOF-MS a highly sensitive platform for analysing VOC composition. We assessed differences between entire VOC profiles using Permutational Multivariate Analysis of Variance (PerMANOVA) and Canonical Analysis of Principal coordinates (CAP). Further evaluation using network analysis was able to show that the volatilome, in this diverse set of produce with very different aroma profiles, can be correlated with other quality measures such as the content of nutritionally relevant compounds to derive potential VOC markers for produce quality.

Keywords: volatile organic compounds, post-harvest, fresh-cut salads, garlic.
