

IDENTIFICATION OF QTLs RELATED TO VOLATILE ORGANIC COMPOUNDS IN APPLE BASED ON PROTON TRANSFER REACTION MASS SPECTROSCOPY DATA

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Selection and breeding of high quality apple cultivars requires understanding of underlying genetics. The availability of genetic linkage maps enables the detection and analysis of QTLs contributing to quality traits of the genotype. Among the important quality parameters not yet completely investigated, apple volatile organic compounds (VOCS) play a most relevant role in flavour/aroma both because they are directly related to the sensory perceived quality and also because they provide a non invasive and fast tool to monitor in real time physiological processes induced, by ripening, storage, stress conditions, etc. Proton Transfer Reaction Mass Spectroscopy (PTR-MS) is a novel mass spectrometric technique that allows the detection of most of the VOCS that are relevant in agro-industrial applications. It is very fast (real time monitoring) and has a very high sensitivity down to the ppt range (single fruit measurements without concentration or pre-treatment). PTR-MS spectra can be used both as anonymous fingerprints for classification or calibration purposes and as valuable analytical tool to investigate the biochemistry related to volatile compounds. It has been successfully applied to many agro-industrial issues and, in particular, to the characterisation of strawberry cultivars.

In this study, we show that it is possible to find QTLs related to PTR-MS characterisation of the headspace composition of single whole apple fruit indicating an interesting link between molecular characterisation (linkage map 'Fiesta' x 'Discovery') and PTR-MS data. In this way, we show that chemical information is available and allows the identification of relevant metabolites and detection of the related QTLs in the genome.

We suggest that PTR-MS can play an important role in the investigation of fruit biochemistry and it is a starting point in determining optimal post-harvest quality and ensuring that the aromas required for consumer acceptability are produced and maintained.