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ABSTRACT BOOK

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MTB-019: CHARACTERIZATION OF ITALIAN, RED-FLESHED APPLES: NMR INSIGHTS INTO VARIETAL, STORAGE, AND GEOGRAPHIC FACTORS.

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Introduction: Red-fleshed apples possess outstanding visual appeal, organoleptic properties, and a metabolite profile enriched in compounds that provide benefits for consumers' health, turning them into functional foods. Modified atmospheres during apple storage are used to control oxidative browning and to delay undesirable biological and biochemical changes. Widely targeted metabolomics is an approach that combines untargeted metabolomics and targeted metabolomics to achieve high-resolution, wide-coverage, and quantification. Aim: Study the influence of storage time, variety, and geographic origin in the quality of non-commercial red-fleshed apple varieties. Methods: The juice of different varieties (R204, R205) of Italian, red-fleshed apples from different geographic locations (Pietramurata, Cunevo, Nave San Rocco) stored in a low-oxygen atmosphere at 3 storage timepoints (0, 2, and 4 months) was extracted and analyzed by 1H NMR. 21 metabolites were identified and quantified in the samples. (O)PLS-DA models were performed with the 3 factors and variables selected by VIP score. Results: Classification accuracy of the test set was 100% for time and varietal factors, but decreased for the geographic classification, where less separation was observed between the classes in the scores plot. Among the selected discriminant variables for each factor, 2-hexenal was in higher concentration after 2 and 4 months of storage. Acetaldehyde, lactate, and ethanol showed an increase after 2 months, since they are part of the pyruvate metabolism cycle which is activated in low-oxygen conditions. Regarding the variety, R205 showed a profile enriched in choline, chlorogenic acid, and itaconic acid, while also in sugars. In terms of geographic origin, Pietramurata was clearly separated from the other locations. These apples had lower concentrations of malic acid and higher concentrations of sugars like xylose, arabinose, and sucrose. Conclusions: Variety R205 from Pietramurata showed an enriched profile of flavor, and functional compounds that provide benefits for health after 2 and 4 months.