

Title Classification of apple fruits according to their maturity state by the pattern recognition analysis of their polyphenolic compositions

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Abstract

Polyphenolic profiles of cider apple cultivars were studied in order to differentiate fruits according to their maturity state (ripe or unripe). Thiolytic and direct solvent extracts of freeze-dried apple pulps and peels were analysed by HPLC-DAD. Univariate data treatment did not achieve the mentioned target; thus a multivariate approach was considered. For each apple tissue data set, several chemometric techniques were applied to the most discriminant variables. Cluster analysis allowed a preliminary study of the data structure. Then, supervised pattern recognition procedures, namely linear discriminant analysis, K-nearest neighbours, soft independent modelling of class analogy, and multilayer feed-forward artificial neural networks (MLF-ANN), were used to develop decision rules to classify samples in the established categories. Excellent results were afforded by MLF-ANN applied to the concentrations of total procyanidins and (+)-catechin and the average degree of polymerisation of procyanidins in apple pulp, with success in the prediction ability of 97% and 99% for unripe and ripe categories, respectively.