Fast tool based on electronic nose to predict olive fruit quality after harvest

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Abstract

Quality analyses of oil from olive fruit are performed according to regulated procedures and in accredited laboratories that are usually separated from the oil mill. These analytics include organoleptic features involving smelling by human experts. Therefore, oil features depend on the physicochemical conditions of the harvested fruit. An automatic and non-invasive system for monitoring and controlling the process in postharvest stages could optimize the quality of the processed oil. To validate this hypothesis we proposed a methodology based on an electronic nose sensor and pattern recognition algorithms to predict the quality of the oil to be processed from measurements on freshly harvested olive fruit. The pattern recognition algorithms applied were the Naïve Bayes (NB) classifier, the partial least squares discriminant analysis (PLSDA) and a multilayer perceptron (MLP) artificial neural network. Using the measurements performed on 82 samples of olives, the best result was obtained with the MLP network, with 90.2 % success obtained in the classification of the virgin and extra virgin olive oil quality by applying 10-fold cross-validation. Integration of this methodology to virgin olive oil production allows prediction of the quality of the final oil from the olive fruit received from the farmer.