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Design and implementation of an automatically controlled malaxer pilot plant equipped with an in-line oxygen injection system into the olive paste

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Abstract

This paper summarises the implementation of an industrial pilot plant with a malaxer machine designed and developed using a system that allows the control and the monitoring of malaxing parameters (CMPS). To study the reliability of the pilot plant, different malaxation conditions were tested in an industrial environment: the free acidity, common quality indicators of olive oil (e.g., peroxide value, total phenols), volatile compounds and sensory evaluation of the olive oil extracted were investigated. The results were correlated with the detected oxygen concentration during the malaxation process. The pilot plant proved to be a highly robust device capable of performing fast in-line measurements of oxygen concentration, controlling in real-time the oxygenation of the olive paste, and allowing the identification of a correlation between the oxygen concentration and the olive oil quality. The experimental tests also demonstrated that a controlled oxygen supply promotes the production of volatile compounds responsible for a balanced oil, avoiding the excessive oxidation of the oil. This work is aimed at contributing to the development of monitoring and controlling systems for olive oil extraction equipment, and providing design parameters to define a new malaxer machine model.

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