

An improvement in the efficiency of olive pomace oil extraction using an optimal pooling decision model

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Abstract-

When olives are harvested, local presses dispose of olive husk, the residue of the pressing process, transporting it to Olive Waste Management Centres (OWMC). Once there, the husk is emptied into pools to be classified, stored and then processed to obtain olive pomace oil and thermal and electric energy. Olive pomace oil extracted mechanically offers benefits over oil extracted chemically, both in terms of its culinary properties and in terms of its market price. This paper describes a decision model whose objective function seeks to maximise the quantity of olive pomace oil by improving the efficiency of mechanical extraction at OWMC. To improve this efficiency, a husk management decision model has been developed to cope with nonlinear husk pooling relationships over a multistage period. The convergence difficulties of mixed integer nonlinear optimisation in the decision model are dealt with by means of a novel multistage iterative linear formulation based on the first order Taylor approximation. The output accuracy and convergence of the proposed model is compared with that of a relaxed mixed integer nonlinear optimisation model. Finally, a real case study located in the south of Spain is described. In this study, by using the linear decision model the total amount of olive pomace oil was 10% greater than that obtained from the current procedure implemented at OWMC.

Index Terms-

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