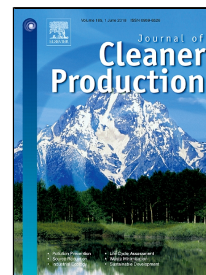


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Assessment of Technology Modification for Olive Oil Sector through Mass Balance: A Case Study for Turkey

Selda MURAT HOCAOGLU^{a,*}, Betül Hande GURSOY HAKSEVENLER^b, İrfan BASTURK^a, Pamir TALAZAN^a, Cihangir AYDÖNER^a

^aTUBITAK (Scientific and Technological Research Council of Turkey) Marmara Research Center, Environment and Cleaner Production Institute, 41470, Gebze, Kocaeli, Turkey.

^bFaculty of Political Science Department of Political Science and Public Administration, Marmara University, 34820, Beykoz, İstanbul, Turkey.

*Corresponding author: E-mail: selda.murat@tubitak.gov.tr, Telephone: 0 262 677 2941.

ABSTRACT

Olive oil production plays an important role in the economies of Mediterranean countries. However, the environmental impact of the sector is significant due to highly recalcitrant and polluted characteristics of its wastewater. In this study, mass balance equations were formulated to estimate water consumption, olive oil yield and wastewater and pomace generation. The mass balance equations indicated that a two-phase production process with 4,000 tons of olives revealed a water consumption by 1,360 m³ and a generation of wastewater by 1,120 m³ and of pomace by 3,280 tons; while a three-phase production process with 4,000 tons of olives revealed a water consumption by 3,760 m³ and a generation of wastewater by 4,776 m³ and of pomace by 2,036 tons. It is predicted that a switch from three-phase to two-phase processing technology in Turkey will result in a water usage decrease by 59%, a wastewater generation decrease by 70% and a COD load reduction by 98.7%, while increasing the pomace generation by 36%. The estimated total cost of the technology switch from a three-phase operation with a capacity of 4,000 tons of olives/season varies from €50,000 to €150,000 depending on the decanter technology used. The overall cost of moving to the two-phase technology for the entire sector in Turkey is estimated to range from 17 million Euros to 25 million Euros. The calculation method developed in this study may help olive oil producers to determine an optimal production process.

Key words: Two-phase production; three-phase production; olive oil sector; cleaner production; process modification; mass balance

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