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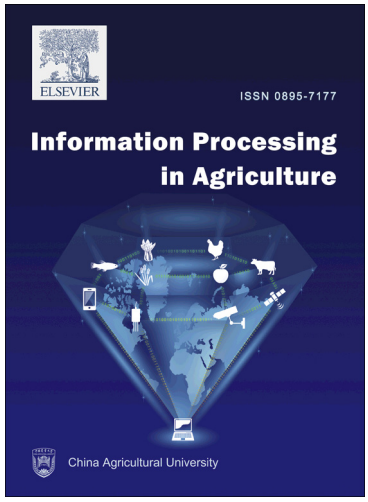

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Comparative life cycle assessment of pistachio, almond and apple production

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ABSTRACT

A comparative life cycle assessment (LCA), with the use of GaBi 6 software and specific related databases, of three water intensive tree cultivation systems was conducted in order to evaluate environmental impacts and energy consumption. The tree crops are traditionally cultivated in two representative areas in Greece, namely Aegina island, Attica region, for pistachios and Agia, East Thessaly region, central Greece, for apples and almonds. The impact categories considered include global warming potential (GWP), eutrophication potential (EP), acidification potential (AP) and cumulative energy demand (CED). Based upon the results obtained, it is deduced that pistachios and almonds show minor differences for all impact categories considered, while apples exhibit the best environmental profile. The phases of fertilizers production, irrigation system and field management were identified as the main "hot-spots" for all crops, exhibiting the highest environmental impacts and energy consumption. A sensitivity analysis was performed to explore actions that can be considered at farm scale, such as water desalination for irrigation purposes, transition to organic production and use of renewable energy, in order to reduce water requirements and promote energy conservation, especially in semi-arid and arid Mediterranean regions which suffer from water shortage and are prone to salinization. Finally, the