



Environmental life cycle assessment of Mediterranean tomato: case study of a Tunisian soilless geothermal multi-tunnel greenhouse

Mariem Maaoui^{1,2} · Rachid Boukchina^{1,2} · Nouredine Hajjaji¹

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Abstract

Despite the advantages that tomato production has on the economic balance of Tunisia, it may present an environmental pressure on the natural ecosystem. The main objective of this research is to determine the environmental impacts of soilless geothermal conventional multi-tunnel cherry tomato production located in Chenchou (South-West of Tunisia) using life cycle assessment methodology. The functional unit considered is one ton of soilless cherry tomato produced. The system boundaries included: (1) energy, (2) fertigation (3) pesticides (3) transport (4) crop maintenance (Pruning, harvesting, CO₂ injects) (5) greenhouse setting-up and (6) waste treatment. The inventory data were collected from the farm exploitation. Ten impact categories were computed using International Reference Life Cycle Data System impact assessment methodology. The results obtained showed that fertilizers and energy sub-systems are the most contributing in the majority of the impacts. The production of 1 ton of tomato emits about 954 kg CO₂-eq. Moreover, waste treatment sub-system engendered an avoided global warming, land use, water resources depletion and abiotic resources depletion potential impacts. Finally, the studied system presented a relatively low water footprint due to the use of geothermal water for irrigation. The sensitivity analysis showed that substituting electricity source from natural gas to renewable sources (biomass, photovoltaics and hydropower) could improve the environmental performance of the tomato production system.

Keywords Soilless greenhouse tomato · Life cycle assessment · Climate change · Carbon footprint · Water footprint

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✉ Mariem Maaoui
meriem.maaoui@gmail.com

¹ Laboratoire de Recherche Catalyse et Matériaux pour l'Environnement et les Procédés (LR19ES08), Ecole Nationale d'Ingénieurs de Gabès, Université de Gabès, Rue Omar Ibn Alkhattab, 6072 Gabès, Tunisie

² Institut supérieur des sciences et techniques des eaux de Gabes, 6072 Gabès, Tunisie