Session Cross-cutting: April 11th 15.45 hrs

5s2: The environmental and economic consequences of adoptig circularity at different spatial scales

LIFE CYCLE ASSESSMENT OF ORGANIC SWEET POTATO PRODUCTION USING LIDAR SENSOR MEASUREMENTS

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Greenhouse gas (GHG) emissions are inevitably linked to agricultural production and subsequently to climate change, and thus efforts to mitigate the associated environmental impacts are urgently required. Remote sensing and in particular the use of the innovative light detection and ranging (LiDAR) technology, offers a unique opportunity to measure and in turn quantify carbon emissions at farm level. In this context, a life cycle assessment (LCA) study regarding organic sweet potato cultivation in Crete, Greece, was performed using on-site LiDAR measurements (CO2 and N2O emissions) in order to determine environmental impacts and energy consumption. For that purpose, a detailed life cycle inventory was created, based on site-specific, field and survey-derived data, and used for a holistic cradle-to-farm-gate LCA analysis using the GaBi 6 software package and specific related databases (when required). The main impact categories assessed were global warming potential, acidification potential, eutrophication potential, photochemical ozone creation potential, ozone depletion potential and cumulative energy demand. In order to account for the uncertainty associated with the on-site LiDAR measurements, a comparison analysis with background level data as well as a Monte Carlo based sensitivity analysis to improve data reliability were performed. Based on the results of this study, irrigation and fertilization were identified as the main “hot-spots”, exhibiting the highest environmental impacts and energy consumption and thus measures to reduce those impacts are proposed. Uncertainty analysis revealed that the incorporation of on-site LiDAR measurements in the establishment of the life cycle inventory (LCI), exhibited slight to moderate differences compared to background data which mainly rely on commercially available databases. The overall results of this study indicate the promising application potential of the LiDAR technology to facilitate the development of a reliable LCI that could serve as reference in similar cultivations in Greece and other Mediterranean countries.

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