

# Starting from the field: Environmental impact of potato production in Cyprus through an LCA approach

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Agriculture output is by far the most significant source of anthropogenic non-CO<sub>2</sub> Greenhouse gasses (GHGs), accounting for approximately 54% of total GHG emissions globally (EPA 2012). According to Ritchie (2020), food waste accounts for 6% of the 26% of global GHGs due to food production. As food waste is disposed of in landfills and begins to degrade, methane, which has a 25 times larger Global Warming Potential (GWP) than carbon dioxide, is released into the environment.

Potatoes (*Solanum tuberosum* L.) are the most important non-grain food crop and the fourth-most important crop after rice, wheat, and maize, with around 462 million metric tons produced globally in 2018. (Statista 2022). China and India currently contribute for one-third of world output, with the Russian Federation ranking second. Germany, France, the Netherlands, and Poland have historically been the main European Union manufacturers. The plant's high fertilizer and chemical input requirements imperil potatoes' critical role in eliminating hunger and poverty and safeguarding water resources. A well-balanced nutrition supply can also influence a plant's resilience or tolerance to pests and diseases, resulting in less food loss. Excess fertilizer usage makes the water poisonous, eutrophic, and acidic, increasing greenhouse gas emissions (Kowalczyk, 2019).

The Sustainable Development Goals (SDGs) of the United Nations (2015), place a strong priority on environmental preservation, water security, and food security. The agriculture sector, which is accountable for 14% of GHGs emissions, faces a significant problem in supplying the need for food in an environment of continuously expanding population and diminishing agricultural land and natural resources. Farmers are already being impacted by climate change, and improving the agricultural process is necessary for adaptation (Stylianou *et al.*, 2023). Those slivers of proof emphasize how urgent it is to produce high-quality goods in adequate quantities while having little negative influence on the environment (Tsangas *et al.*, 2020). The goal of the current research was the analysis of the environmental impact of potato cultivation with the main objective of assessing the environmental impact of potato production in Cyprus. The potato production system was studied on its life cycle from soil preparation up to the transportation of the final product to the packing house through a 'cradle to farm gate' approach. The impact categories investigated are summed up in Table 1.

Table 1. Impact Categories investigated through the LCA

Impact Category	Unit
Global Warming Potential	Kg CO <sub>2</sub> eq.
Mineral Resource Scarcity	Kg Cu eq.
Freshwater Ecotoxicity	kg 1.4- DCB eq.
Freshwater Eutrophication	Kg P eq.
Terrestrial Acidification	Kg SO <sub>2</sub> eq.
Terrestrial Ecotoxicity	kg 1.4- DCB eq.

LCA results revealed that yield production has a significant contribution on environmental impact. Soil conservation and nutrient management can have a catalytic effect on crop yield while also lowering input requirements. Irrigation system planning and management utilizing existing models is regarded as a critical tool for preserving water resources while to achieve net-zero farming, good agricultural and production technologies must be present.

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