

Phakaporn Tanapisutti 2010: Life Cycle Assessment of Pineapple and Orange Juice in Thailand.
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Life cycle assessment of pineapple and orange juice in Thailand has been conducted to evaluate the environmental impacts throughout the supply chain. The scope of study covered agricultural system, juice processing (and aseptic carton production), distribution, sales, consumption and final disposal including related transport at all stages. The objective was to evaluate the environmental profiles for further improvement and to support the product environmental declaration for environmentally-conscious consumption. The functional unit was set as one liter of juice. The inputs and outputs associated with the system boundary were collected; primary data for 25 years of orange cultivation and a pineapple production in the processing plant in 2010, supplemented with the secondary data of pineapple farm and orange juice processing as well as other supporting data such as the production of electricity, chemicals and fertilizers. The results of inventory analysis showed that oranges require more water and higher application rate of fertilizer and pesticides but less land area compared to pineapples. Oranges require five times as much energy for transportation as pineapples. The energy consumption for orange juice production was 1.5 times that of pineapple juice. The potential impacts of orange juice were two to four times higher than pineapple juice, except for land use which for pineapple juice was four times that of orange juice. When the impact indicator values were normalized to the daily requirement of vitamin C (instead of the comparison on a volumetric basis), the results indicated that the environmental impacts of orange juice were 1.2-2.4 times that of pineapple juice for all the categories considered. The impacts from the 200-ml aseptic carton were twice that of the 1,000-ml carton, due mainly to the higher use of energy consumption for filling and packaging material production. For environmental improvement, the change of energy carriers for producing steam from fuel oil to natural gas could potentially reduce the impacts on the GWP by 15-93%. To reduce the impacts on the cultivation stage, organic fertilizer could be used to replace chemical fertilizer at an optimal quantity. The results of LCA could be used for Ecolabelling type III and the GWP result could be used for carbon footprint labelling. Based on the environmental information provided, it was suggested that pineapple juice should be preferred for environmentally-conscious consumers as well as climate conscious consumers.

Student's signature

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