

Streamlined life cycle assessment of residue utilization options in Tongkat Ali (*Eurycoma longifolia*) water extract manufacturing process

Abstract

Life cycle assessment (LCA) is often used to compare alternative process options in terms of their overall impact on the environment to easily identify the most environmentally friendly alternative. In this work, a streamlined LCA study was conducted to assess three different residue utilization schemes for Tongkat Ali (*Eurycoma longifolia*) extract production. The case study was firstly simulated using a batch process simulation software. The results of mass and energy balances obtained from the simulation software were then subjected to life cycle analysis. By evaluating the different schemes for using the fibrous residue from the extraction process, the potential for environmental process improvement was identified. Overall, use of the residue as process fuel was found to be the most environmentally friendly option. It produces the least emissions and reduces resource usage per unit of product than the other options evaluated. © 2007 Springer-Verlag.