

# Bio-diesel from *Jatropha*: life-cycle and environmental impact

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The pantropic oil-bearing woody plant *Jatropha curcas* L. (JCL) receives a lot of attention from project developers in the fields of biofuel production and Clean Development Mechanism. Recent plantations have been established in India, Indonesia, East Africa and Central America. As a pioneer species well adapted to semi-arid climates JCL is promising to simultaneously combat desertification, produce bio-diesel and enhance socio-economic development in degraded rural areas in the South. As such, bio-diesel production and use from JCL is believed to have a positive environmental and socio-economic impact, although no quantitative studies are available to confirm this. Life Cycle Assessment (LCA) can be considered the best instrument to investigate the environmental impact of such production system. LCA evaluates the positive and negative environmental effects throughout a product's life (i.e. cradle-to-grave) from raw material acquisition through production, use and disposal and compares that with the same functional unit (e.g. 100km driven with a 4-wheel drive on an average dirt road) for a reference system (e.g. fossil diesel or biodiesel from palm oil). All inputs and outputs from the complete JCL production process are inventoried. Relevant production scenarios for JCL are small-scale agroforestry plantations, medium-size community woodlots, and industrial plantations. Inventory data are then evaluated, assessed and accounted with respect to certain impact categories. For bio-diesel production the energy balance (how much energy is primary put into the process and how much comes out) and impact on global warming (the reduction of greenhouse gas emissions in tons CO<sub>2</sub> equivalents by the use of bio-diesel compared to fossil diesel) are relevant impact categories, together with the land use impact category. In land use impact assessment the impacts of the production process on soil, water, vegetation structure and biodiversity are evaluated. In order to make a LCA on the bio-diesel production from JCL (well-to-wheel) all inputs and outputs of all different steps in its life-cycle – including seed production, cultivation, harvesting, pressing, esterification, distribution – should be identified and quantified. This paper will give an overview of the main experiences and knowledge gaps related to the life-cycle of biodiesel from *Jatropha*.

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