Environmental impacts of palm oil products: what can we learn from LCA?
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Abstract
Quantifying the environmental impact of production systems has become a milestone for agricultural commodity chains. Life Cycle Assessment (LCA) is a unique ISO standardized methodology for estimating the environmental impact of human activities along a commodity chain. In the last decade, LCA has become the worldwide standard for environmental product declarations and the baseline model behind various GHG calculators and certifications (e.g. EC, 2009; RSPO PalmGHG).

Various LCA on palm oil products have shown that the agricultural stage is a major contributor to most of the potential environmental impacts, including global warming, eutrophication and acidification for instance (Yusoff and Hansen 2005; Schmidt 2007; Chuchuoy et al. 2009; Choo et al. 2011). This large contribution is due to combined important nitrogen (N) input levels in the field and low input levels at the mill and refinery stages. The agricultural stage remains a critical contributor even when the system boundary is extended to palm-based biofuel production (Pleanjai et al. 2009; Achten et al. 2010; Papong et al. 2010; Arvidsson et al. 2011). Focusing on global warming impact, main contributors are N-related GHG emissions in the plantation and methane emissions from palm oil mill effluent (POME) treatment. The impact from the plantation becomes overwhelming when forests or peatland areas are converted to palm plantations (Wicke et al. 2008; Reijnders and Huijbregts 2008; Schmidt 2010). Meanwhile, impact from POME can be drastically reduced if the biogas is captured with electricity recovery.

While N-inputs are critical, LCA models still mostly rely on global emission factors (IPCC, 2006). A better modelling of the N balance including a better accounting for soil processes would allow for a more accurate diagnosis of environmental impacts and control levers in plantation management.

References


