



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

The Influence of Integrated Crop-Livestock Systems on Life Cycle Assessment (LCA) of Soybean-Based Biodiesel in Central-Brazil

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Abstract

Biodiesel in Brazil is mostly produced from soybeans. Even though it is an alternative for reducing greenhouse gas (GHG) emissions when replacing fossil fuels, biodiesel production from soybeans is put into question, especially in regards to competition with food production and the impacts from its farming process. On the other hand, a growing part of soybeans farmed in Central-Brazil is coupled with an interseasonal maize crop. Such systems mostly use no-till seeding, with its many environmental and economic benefits. Many times, these systems include grasses mixed with the maize crop, for short cattle grazing periods between maize harvest and soybeans seeding. These are the integrated crop-livestock systems. They are able to obtain three products in the same area in one single year. Such systems, though more capital and labour intensive, have been proving to be environmentally friendlier. They help to reduce emissions from the process through optimisation of resources usage, like infrastructure and machinery. Besides, they generate other products what positively accounts on LCAs. However, incorporating these integrated systems into an LCA poses many challenges, especially related to allocation of impacts among shared inputs and outputs, which may have different values according to the audience perception. Therefore, goal of this work is to propose an improved method for carrying out such analysis and suggesting allocation strategies for the different inputs and outputs of this complex system. Preliminary results show that, as a whole, integrated systems reduces the overall impact of biodiesel produced from soybeans cultivated under such systems, but when sharing enteric emissions from cattle with the crop systems, the approach adopted for input-output allocation is very important.

Keywords: Biodiesel, integrated systems, LCA