

Water use in the life cycle of food products from Brazil

Leda Coltro

Packaging Technology Center – CETEA / Institute of Food Technology - ITAL Campinas – Brazil

> 7th Int. Conference on LCA in the Agri-Food Sector September 22 - 24, 2010 - Bari







INSTITUTE OF FOOD TECHNOLOGY



Research & Development Centers:



http://www.ital.sp.gov.br/



INTRODUCTION

Water is fundamental for life and its conservation through reduction of waste water generation, R&D to minimize the water use and waste water generation, treatment and reuse of water and source preservation are needs we must manage.

World water distribution

30% South America26% South and East Asia15% North America10% East Europe

World water consumption

6-7% North America6-7% Europe14-16% other regions

Water use 70% Agricultural activities 20% Industry 10% Domestic use



INTRODUCTION

Water use of different crops

broccoli, onion, tomato, potato, pepper, cabbage etc. FCOJ - the orange cropping step was the greatest contributor to the water use in the life cycle of the product

Water footprint

the evaporative water = green water use + blue water use
the non-evaporative water = polluted water resources
(Chapagain and Orr, 2002)

Objective

To consider the aspects of water use in two important Brazilian crops: coffee and orange. LCA was employed to assess the water use of these crops in the main Brazilian producer regions



Studied systems and system boundaries

1.Production of green coffee - up to Brazilian export harbor

Reference crops 2001/02 and 2002/03

56 properties located in 4 Brazilian coffee producer regions: MG - Cerrado Mineiro

South of Minas Gerais State

SP - Marília

Alta Mogiana

420,000 bags of coffee beans and 14,300 ha.



Studied systems and system boundaries

2.Production of orange for FCOJ up to processing plants

Reference crop 2002/2003

SP State - North

367,200 metric tons (9 million boxes) of oranges 4 million trees in commercial production

South

19.5% of the total area of orange production in the State of SP.



Data collection

Farm specific data along with agricultural production data Coffee and orange cultivation inventories Estimation of the impact of water use.

Functional unit

production of 1,000 kg of product

(cradle-to-gate basis)



Impact pathways

Only the impacts on ecosystem quality (from direct water use) were considered

Water flows quantified in LCI

Surface and groundwater evaporative uses: in-stream evaporation in reservoirs and power dams and off-stream evaporation of abstracted water through irrigation (Milà i Canals et al., 2009)

Characterization factor for LCIA

Water Use Per Resource (WUPR) indicator = 0.007 (BR) Water Stress Index (WSI) indicator = 0.034 (Parana basin) (Milà i Canals et al., 2009)







Water Use for GREEN COFFEE Crop



S - MG = 1–12; Cerrado MG = 13–16; Mogiana SP = 17-25; Alta Paulista SP = 26-28







Water Use for GREEN COFFEE Crop









Water Use for GREEN COFFEE Crop



FEI is approx. 0 (non-evaporative water)





Water Use for ORANGE Crop







Water Use for ORANGE Crop





RESULTS

Freshwater Ecosystem Impact for ORANGE Crop





CONCLUSIONS

The results showed that although the water use of the coffee crop is higher than the orange crop, the water used for coffee cropping has no environmental impact on the resources since the water is non-evaporative.

On the other hand the orange crop has some freshwater environmental impact due to the water used for irrigation of the orchards.

The FEI could be improved if the water quality available (level of pollution) along the river basin was also considered. In this way, water use could be differentiated depending on the regions of the same river basin.

The author is grateful to FINEP and FAPESP for the financial support.

Thank you for your attention! ledacolt@ital.sp.gov.br