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PROCEEDINGS

8TH INTERNATIONAL CONFERENCE ON

LIFE CYCLE ASSESSMENT IN THE AGRI-FOOD SECTOR



OCTOBER 1-4
2012
SAINT-MALO
FRANCE



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Welcome

*Soyez les bienvenus à LCA Food 2012 à Saint-Malo, France !
Welcome to LCA Food 2012 in Saint Malo, France!*

“Towards Sustainable Food Systems”

The LCA FOOD conference series is the world’s premier scientific and technical forum on Life Cycle Assessment in the agri-food sector. We hope that you will find the conference interesting and enjoyable and that you will “harvest” new ideas and contacts. Your input to the conference will contribute to its success.

The previous conferences in this series took place in Brussels (1996, 1998), Gothenburg (2001, 2007), Horsens (2003), Zürich (2008) and Bari (2010). This year, for the first time, the conference takes place in France. It has been organised by INRA, the French National Institute for Agricultural Research, with the support of ADEME, the French Environment and Energy Management Agency.

Objectives of the conference

The production, transformation, distribution and consumption of food and drink contribute strongly to human prosperity and health. However, the food and agriculture sector also contributes a large part of the environmental impacts caused by human activities. Because these impacts, in particular climate change and biodiversity loss, need to be reduced urgently, a shift towards sustainable food systems is essential.

Over the last two decades the Life Cycle Assessment (LCA) methodology has been developed and applied in the agriculture and food sectors to quantify environmental impacts and assist decision making. In recent years, LCA in the agri-food sector has developed rapidly, in particular for sustainability assessments of agricultural systems and their products, and for guiding consumers toward sustainable food-consumption patterns (e.g., via eco-labelling).

LCA Food 2012 will serve as a global forum in which to share recent developments in LCA methodology, databases and tools, as well as applications of LCA to food-production systems and food-consumption patterns. All of this will contribute, we hope, to achieving the 2012 conference motto: “Towards Sustainable Food Systems”.

From the 362 abstracts submitted, the conference is scheduled to have 121 oral presentations and 183 posters, and at the time of writing, we expect more than 420 participants from at least 42 countries. In addition to this book of abstracts, which contains 2-page abstracts for most oral presentations and posters, you will find 6-page papers for most oral presentations, along with the poster abstracts, in the conference proceedings, provided as a PDF file on the memory stick in your conference beach bag.

We want to thank the authors for their presentations and posters. We are very grateful to the 23 members of our scientific committee for their efforts in reviewing the abstracts and selecting the papers for oral presentations. We warmly thank our sponsors for supporting the conference. Last but not least, we want to thank our indefatigable INRA colleagues of the organising committee for their essential contribution to the success of the conference.

We hope you will appreciate the scientific and technical content of the conference, contacts with participants, the French and Breton cuisine during the lunches and Gala Dinner, and the city of Saint Malo and its seaside. We are delighted to welcome you to this beautiful region to join the rapidly growing LCA Food community and hope you will meet old friends and make new ones.

Michael Corson
LCA Food 2012 co-chair

Hayo van der Werf
LCA Food 2012 co-chair

86. Environmental impacts and resource use in feed production for Atlantic salmon aquaculture Erik Skontorp Hognes ^{1,*} , Friederike Ziegler ² , Veronica Sund ²	784
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88. Communication strategies for product sustainability messaging aimed at end consumers Thomas Redd ^{1,*} , Doug Harrison ² , Laura Riley ² , Greg Thoma ³	788
89. The good egg in the basket: improvements in egg production within the Pro Planet eco-labelling scheme Kewin Comptoi [*] , Martin Wildenberg, Tanja Altaparmakova, Dominik Frieling, Lydia Matiasch, Helmut Burtscher	790
90. Carbon labels worldwide- a review of approaches and indices Michael M. Blanke [*] , Florian Schaefer	791
91. Food waste amounts and avoidability in Switzerland Claudio Beretta ^{1,*} , Franziska Stoessel ¹ , Stefanie Hellweg ¹ , Urs Baier ²	793

POSTER SESSION B - WEDNESDAY, 3 OCTOBER, 16.20-16.50

GROUP 4, SESSION B: CROP PRODUCTION SYSTEMS

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93. Salinalgue project: designing a sustainable production system of biofuel and by-products from microalgae Mélicha Cornélus ^{1,*} , Pierre Collet ¹ , Stéphane LePochat ³ , Roberto Bellino ³ , Jean-Philippe Steyer ¹ , Arnaud Hélias ^{1,2}	797
94. Using life cycle analysis to compare the environmental performance of organic and conventional apple orchards Aude Alaphilippe ^{1,*} , Sylvaine Simon ¹ , Laurent Brun ¹ , Frank Hayer ² , Gérard Gaillard ²	799
95. Assessing environmental sustainability of apple ancient varieties in Northern Italy Alessandro K. Cerutti ^{1,*} , Daniela Galizia ¹ , Sander Bruun ² , Dario Donno ¹ , Gabriele L. Beccaro ¹ , Giancarlo Bounous ¹	801
96. Life cycle GHG and energy balance of organic apples: a case study in Italy Maurizio Cellura ^{1,*} , Mario Fontana ¹ , Sonia Longo ¹ , Marina Mistretta ² , Flavio Paoletti ³	802
97. Life cycle assessment combined with eMergy for the evaluation of an organic apple production system Francesca Rossetti ^{1,*} , Benedetto Rugani ² , Elena Neri ¹ , Nicoletta Patrizi ¹ , Simone Bastianoni ¹	803
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99. The construction of a database for the evaluation of greenhouse gas emissions from cultivation of crops for biofuels in Poland Magdalena Borzecka-Walker [*] , Katarzyna Mizak, Antoni Faber, Alina Syp, Rafał Pudelko	805
100. Environmental implications of using biomass versus fossil fuels for energy production: the case of willow, an energy crop Thu Lan T. Nguyen [*] , John E. Hermansen	806
101. Influence of allocation methods in the quantification of the environmental impacts of compost application Julia Martínez-Blanco ^{1,*} , Joan Rieradevall ^{1,2} , Pere Muñoz ³ , Assumpció Antón ^{3,4}	807
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104. Using spatial data to define industry sub-sectors for Australian wheat Gonzalo Mata ^{1,*} , Sandra Eady ² , Tim Grant ³	810
105. Improving pesticide accounting in agricultural life cycle assessment: a review of existing LCA practice and available LCA and Ecological Risk Assessment models Mitchell Burns ^{1,*} , Philippe Roux ² , Carole Sinfort ³ , Claudine Basset-Mens ¹ , Eric Malezieux ¹	811
106. Comparison of assessment methods for the environmental impacts of pesticide production Kiyotada Hayashi ^{1,*} , Koichi Shobatake ² , Naoki Makino ²	812
107. Implementing decision making in irrigation management based on productive and environmental indicators Maria José Amores ^{1,*} , Francesc Ferrer ² , Orene Cabot ² , Assumpció Anton ^{1,3} , Albert Duaigües ² , Francesc Castells ¹ , Eskinder Demisse Gemechu ¹	814
108. LCAs for a large repertoire of Finnish outdoor plant products Merja Saarinen [*] , Yrjö Virtanen, Helena Hyvärinen	816
109. Life cycle assessment of long-lived perennial cropping systems: almond and pistachio production in California Elias Marvinney ^{1,*} , Alissa Kendall, Sonja Brodt, Theodore Dejong	818
110. Land use key parameters to be addressed in life cycle assessment study of soybean grains Anna Lúcia Mourad ^{1,*} , Lília Sichmann Heffig-del Aguila ²	819
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110. Land use key parameters to be addressed in life cycle assessment study of soybean grains

Anna Lúcia Mourad^{1,*}, Lília Sichmann Heiffig-del Aguila²

¹ CETEA – Packaging Technology Center / ITAL – Institute of Food Technology, Brazil, ² Brazilian Agricultural Research Corporation – EMBRAPA Temperate Agriculture, Brazil, * Corresponding author. E-mail: anna@ital.sp.gov.br

Brazil is considered as one of the largest exporters of agricultural products in the world. The growth of Brazilian agriculture in a continuous and solid way is extremely important to improve the quality of life of millions of Brazilians. A great part of this growth has come from the soy complex (grain, meal and oil) whose exports have more than quadrupled over the last 10 years, reaching the value of US\$ 23.8 billion in 2011. In 2011, Brazil produced 74.3 million tons of soy, being ranked as the second largest world producer of soy with 26% of the world crop, estimated at 263.7 million tons. The cultivation of soy occupies the largest area (35.7%) among the products of the annual and perennial crops of the country. Soy is planted-practically all over the country with the Center-west (49%) and South (34%) being two of largest areas. The recent expansion of the crop has taken place in areas of degraded pasturelands. Due to the importance of this crop to the country, the objective of this work is to select important parameters relative to the land use which can be considered in a life cycle assessment study of soy grains. The first selected parameter is the occupation of agricultural lands for this crop. The country has an area of 8.5 million of km² of which 37.3% is used for general agricultural and pasture purposes and 25.6% for cultivation of food products such as meat and vegetables. As the parameters for land use have not been established yet for LCA purposes in the country, 2.18 million of km² was considered as the reference area for normalisation of land for food production. The average land occupation for the soy crop 1.12 m²/yr per ton produced in 2010. Besides the territorial occupation itself the authors suggest that the total amount of fertilisers in relation to the nitrogen, phosphorus and potassium macronutrients as well as the total amount of pesticides (only actives) used per hectare could be indicative of the human interference on the land. These indicators are independent of the climate, temperature, relief, type of the soil or other factor that minimises the anthropogenic interference due to the capability of nature recovering. They are also independent of time, a key parameter in agricultural impacts. The impact of land use could be evaluated by soil organic matter content as this measure is considered as the one of the best stand-alone indicator of life support functions of land. Soil organic matter, consisting mostly of C, is the largest terrestrial pool in the C biogeochemical cycle. Soil organic matter, although occupying only 5% of the total soil volume, has an important influence in soil physical, chemical and biological properties, directly influencing the productivity of soybean. Management systems capable of maintaining and even increasing the soil organic carbon may stocks contribute to maintaining the productive capacity of soils and to mitigate the problem of increasing atmospheric CO₂.

References

- Milà i Canals L., Romanya J., Cowell S.J., 2007. Method for assessing impacts on life support functions (LSF) related to the use of 'fertile land' in Life Cycle Assessment (LCA). *J. Clean. Prod.*, 15, 1524-1440.
- Guinée JB et al., 2001. *Life Cycle Assessment – An operational Guide to the ISO Standards*, Leiden.
- Instituto Brasileiro de Geografia e Estatística - IBGE, 2012. *SIDRA- Banco de Dados Agregados. Produção agrícola municipal*.
- Associação Brasileira das Indústrias de Óleos Vegetais, 2012. *Dados estatísticos do complexo soja*.
- Brady NC, 1989. *Natureza e propriedade dos solos*. São Paulo, McGraw-Hill, 878p.
- Campos BC et al., 2011. Long-term C-CO₂ emissions and carbon crop residue mineralization in an oxisol under different tillage and crop rotation systems. *Rev. Bras. Ciênc. Solo*, 35, 819-832.