

GSB & LACAf August Meeting
August, 27-29, 2014
CENA – Piracicaba/SP – Brazil

Environmental Project Overview

Luiz A Martinelli

CENA / University of São Paulo - USP (Brazil)

Objectives of this workshop:

1. Better know the GSB-LACAf Fapesp initiative
2. Engage the scientific community to design a comprehensive project on the environmental aspects of GSB-LACAf (involving or not your direct participation in the project)

Overall objectives of environmental project:

Investigate the consequences of sugarcane cultivation and ethanol production on several environmental aspects, including: soil, water, biodiversity, and GHG balance.

Smeets E, Junginger M, Faaij A, Walter A, Dolzan P, Turkenburg W. The sustainability of Brazilian ethanol—An assessment of the possibilities of certified production. *Biomass and Bioenergy* 2008;32:781–813.

Corbière-Nicollier T, Blanc I, Erkman S. Towards a global criteria based framework for the sustainability assessment of bioethanol supply chains. *Ecol Indic* 2011;11:1447–5

Background information

Sugarcane expansion (2000-2009):

64% pasture (1.5 million ha)

34% crops (0.8 million ha)

< 1% forests (17.000 ha)

Adami M, Rudorff BFT, Freitas RM, Aguiar DA, Sugawara LM, Mello MP. Remote Sensing Time Series to Evaluate Direct Land Use Change of Recent Expanded Sugarcane Crop in Brazil. Sustainability 2012;4:574–85

Low input system
(pasture)



High input system
(sugarcane)

Landscape changes
Soil movement
Fertilizers
Soil amendments
Pesticides

Background information

Brazilian agriculture:

200 million ha of pasture

67 million ha of arable land

23 million of soy

14 million of corn

10 million of sugarcane

Pasture: 0.9 head ha⁻¹

Pasture intensification: increase stocking rates > 1 head ha⁻¹

Free arable land for biofuels or anyother crops.

(obviously this simple rationale only would work with a set of public policies, enviroinmental laws nd enforcement in place)

Low input system
(pasture)

High input system
(pasture)

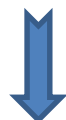


Landscape changes
Soil movement
Fertilizers
Soil amendments
Pesticides

Field experiments

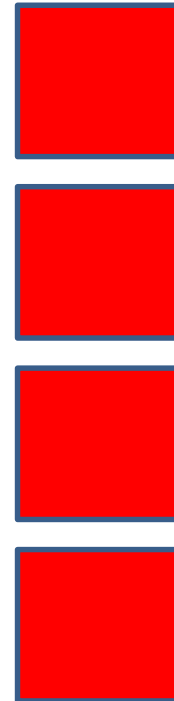


Soil Water



Biodiversity

Landscape



Soil (plot scale)

GHG emissions

Chemical changes (fertility)

N dynamics (mineralization, nitrification, denitrification)

Carbon dynamics

Physical changes

Erosion

Water (small watershed scale)

Physicol-chemical characteristics

N dynamics

Carbon dynamics

Suspended solids dynamics

Pesticide contamination

Heavy-metal contamination

Landscape (larger scale)

Landscape ecology in sugarcane areas

Biodiversity

Fragmentation

Land sharing x land sparing

Extinction debt

Considering that:

GSB – “Global” Sustainable Biofuels

LACAf – Latin America and Africa

and

The importance of modelling exercises in a global initiative on biofuels

and

Recognizing the importance of develop human resources in Brazil to work with biogeochemical model

A second scientific area would be the development or adaptation of already existing biogeochemical models to investigate changes caused by pasture replacement by sugarcane and pasture intensification