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Federal Department of Economic Affairs FDEA
Agroscope Reckenholz-Tänikon Research Station ART

New and updated data in the agri-food sector

Swiss Centre For Life Cycle Inventories

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Overview

- Introduction
- Updated datasets in the LCI biofuel project
  - N emissions
  - LUC
- New datasets in the LCI biofuel project
- New datasets in the catch crops for biogas project
- Fruit and vegetable data
- External data supply
- Outlook

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New and updated datasets for agriculture

- 178 updated crop inventories (N emissions, LUC)
- 5 new biofuel inventories Switzerland and Germany
- 6 new biofuel inventories overseas
- 33 datasets for fruit and vegetables
- 1 update soybean production, US (external data supplied)

Biofuel projects
Background and motivation

- Datasets from 2 projects presented here:
  1. Harmonisation of extension of biofuel life cycle inventories and LCAs
  2. Life cycle assessment of catch crop growing for biogas production
- The environmental impact of biofuels from agricultural biomass is dominated by the agricultural phase
- The emission of greenhouse gases is a key criterion for the evaluation of biofuels
- Dynamic context
  - New emission models and factors for nitrous oxide (N_2O), ammonia (NH_3) and nitrate (NO_3)
  - New methods and better data on land use change
  - Emerging sources of biomass like Jatropha, Miscanthus, Salix

→ An update, harmonisation and extension of the data for the assessment of biofuels is required

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Biofuel LCIs: Harmonised and updated nitrogen emission models

N compound	Applied	Emission model used
Ammonia (NH_3)	Global	AGRAMMON
Nitrate (NO_3)	Europe	SALCA-NO3
	Non-European countries	SQCB / de Willigen (2000)
Nitrous oxide (N_2O)	Global	IPCC 2006, Tier 1

Biofuel LCIs: N emissions: relative changes between ecoinvent V2 and V3

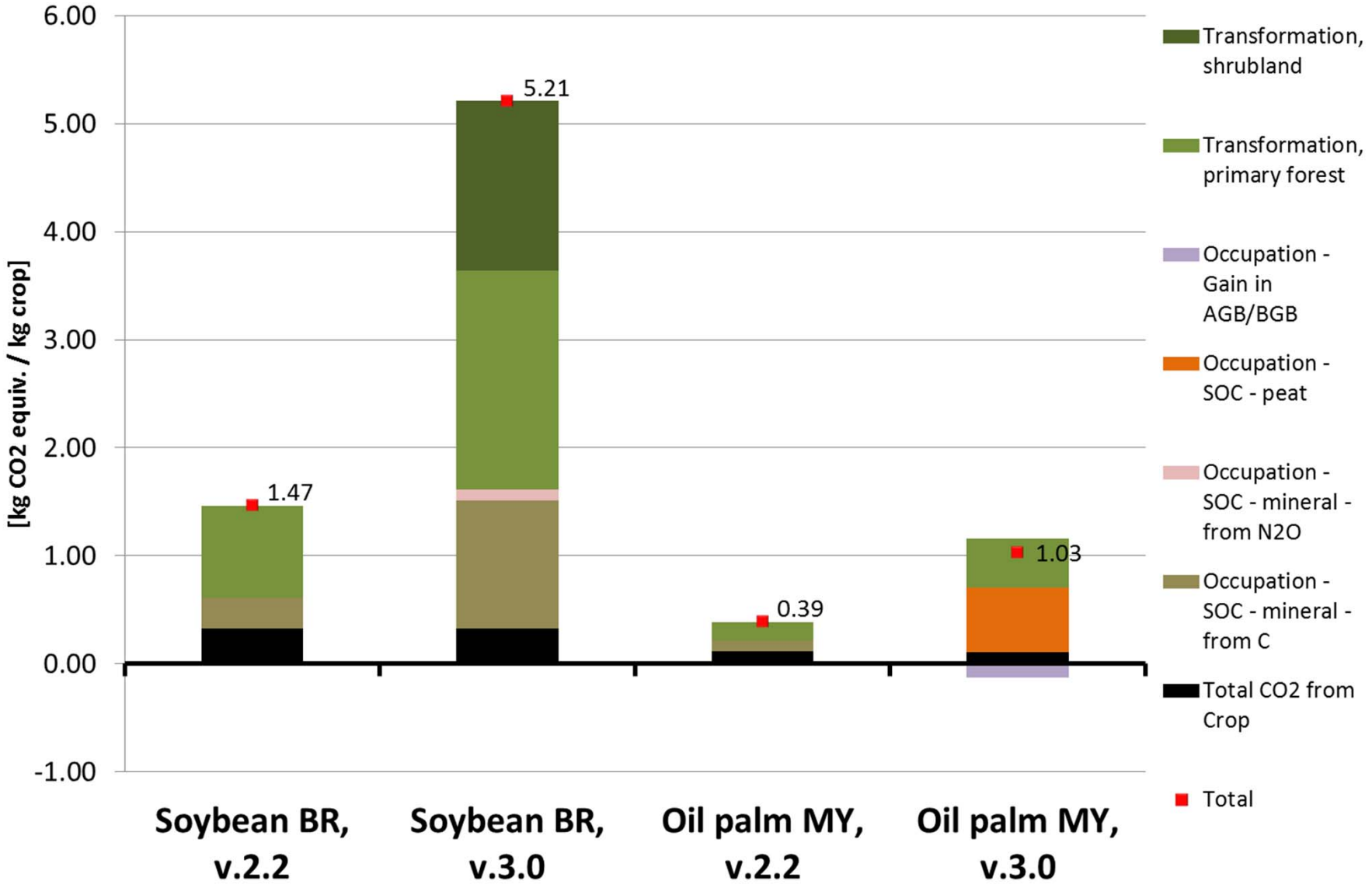
	kg NH3-N/ha	kg NO3-N/ha	kg N2O-N/ha
ecoinvent v2.1	13.69	40.28	1.38
ecoinvent v3	13.04	45.70	1.01
Relative change	**-4.8%**	**+13.4%**	**-26.4%**

Biofuel LCIs: Update LUC inventories

- Goal: update of the emission from direct LUC for all relevant crop activities:
  - Soybean, Brazil (BR)
  - Sugarcane, BR
  - Palm fruit bunches, Malaysia (MY)

- Consistent consideration of all carbon pools (IPCC 2006)
  - Above Ground Biomass (AGB)
  - Below Ground Biomass (BGB)
  - Dead Organic Matter (DOM)
  - Soil Organic Carbon (SOC)

Biofuel LCIs: Overview: LUC Results



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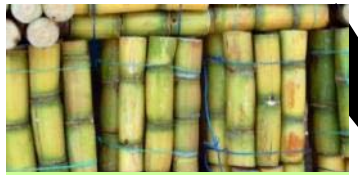
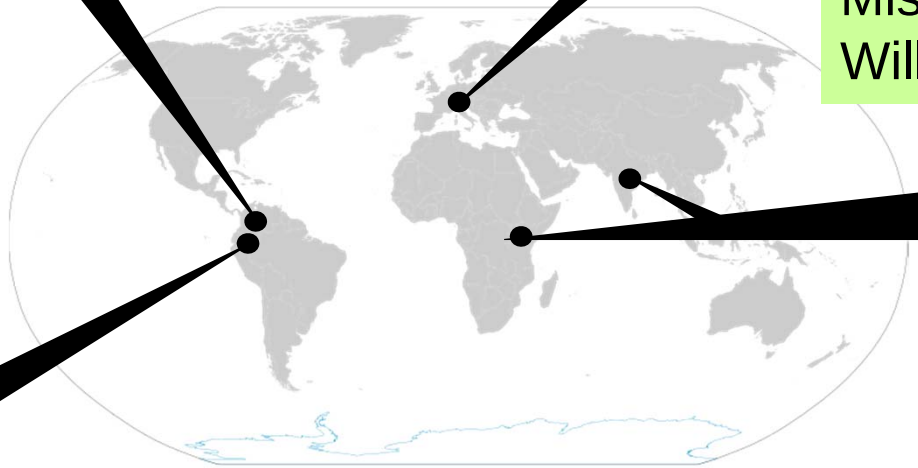
New biofuel crop inventories



Sugar cane
Colombia

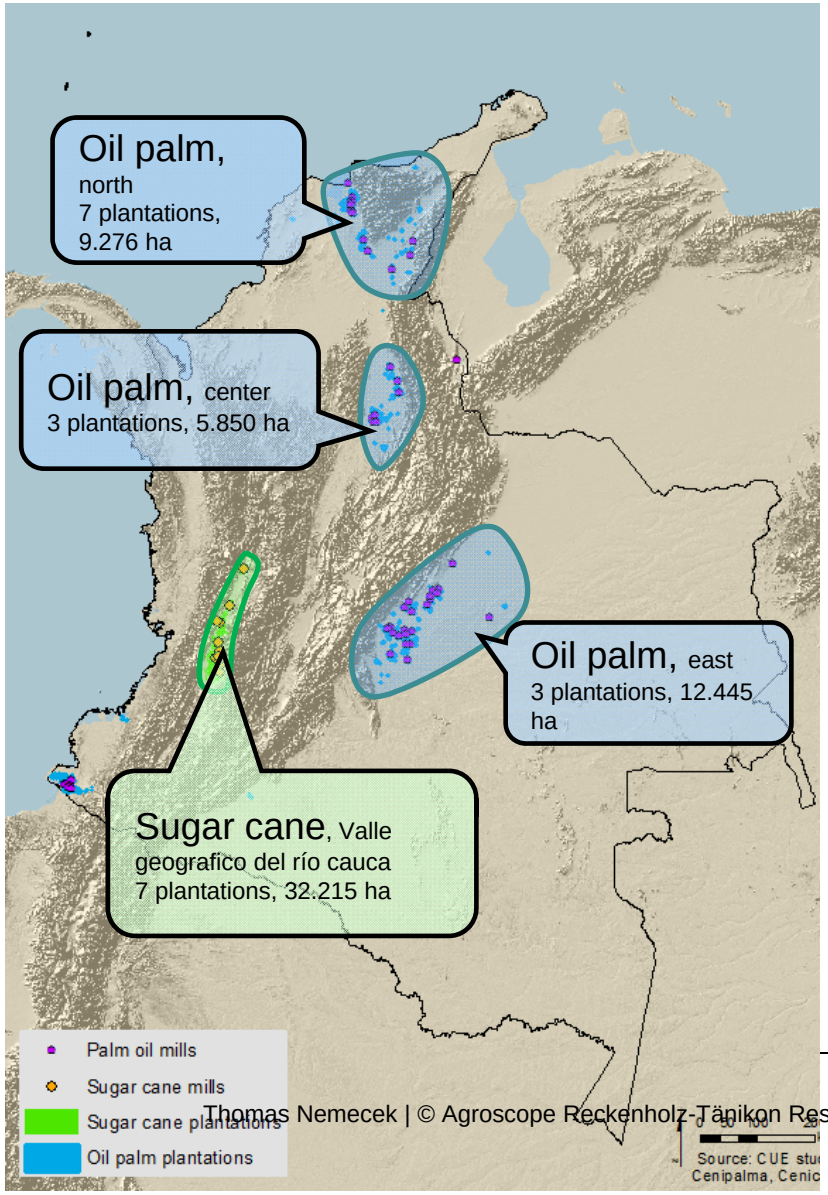
Alfalfa-grass mixture, CH
Miscanthus, DE
Willow, DE



Jatropha
India
East-Africa

Oil palm
Colombia

New biofuel inventory - Colombia



Sugar cane cultivation

National average data from field visits (20% of total SC area) validated and completed with literature data / expert interviews

Oil palm cultivation

National average data from field visits (26% of total palm area) validated and completed with literature data / expert interviews

New biofuel inventory - Jatropha

Hedge/fence (East Africa):

- Grown since more than 60 years
- Protection of crops/livestock, soil conservation
- Average data from 9 Sites in Et, Ke, Tz
- No crop management

Small-scale plantation (East Africa):

- Since a few years
- Additional income source, risk distribution
- Average data from 9 Sites in Et, Ke, Tz
- Little crop management

Large-scale plantation (India):

- Since a few years
- Data from field trials in Hyderabad, India
- Extensive management (little organic fertilizer / rain fed)
- Intensive management (min. fertilizer / pesticides / irrigation)

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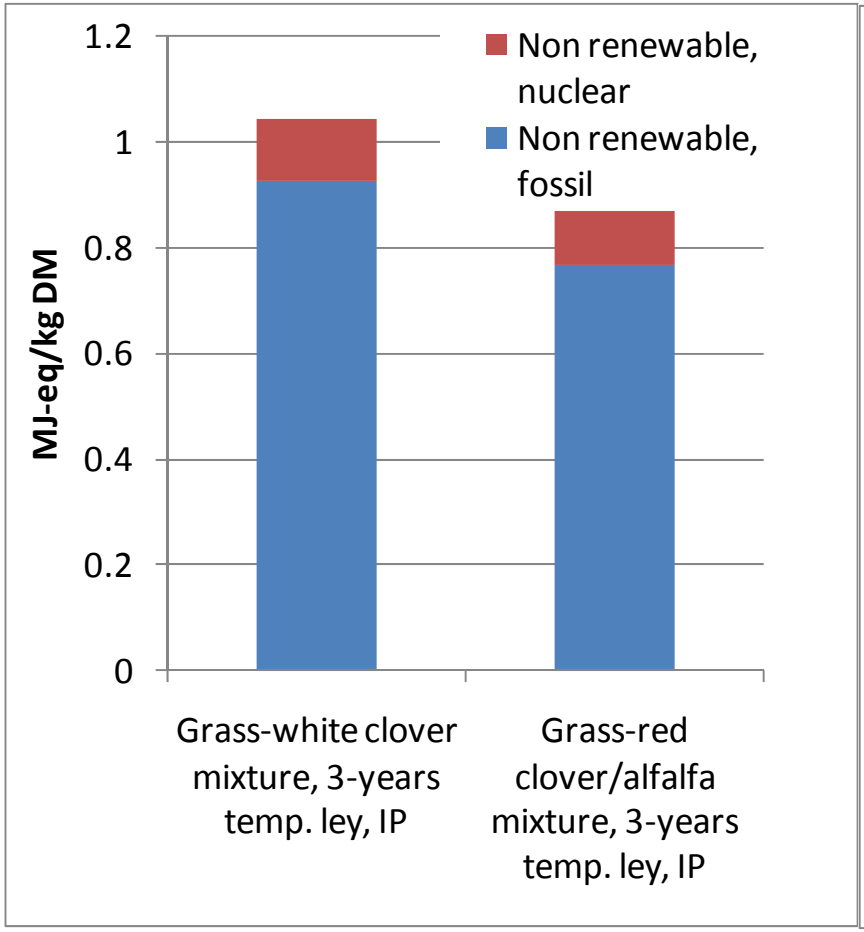
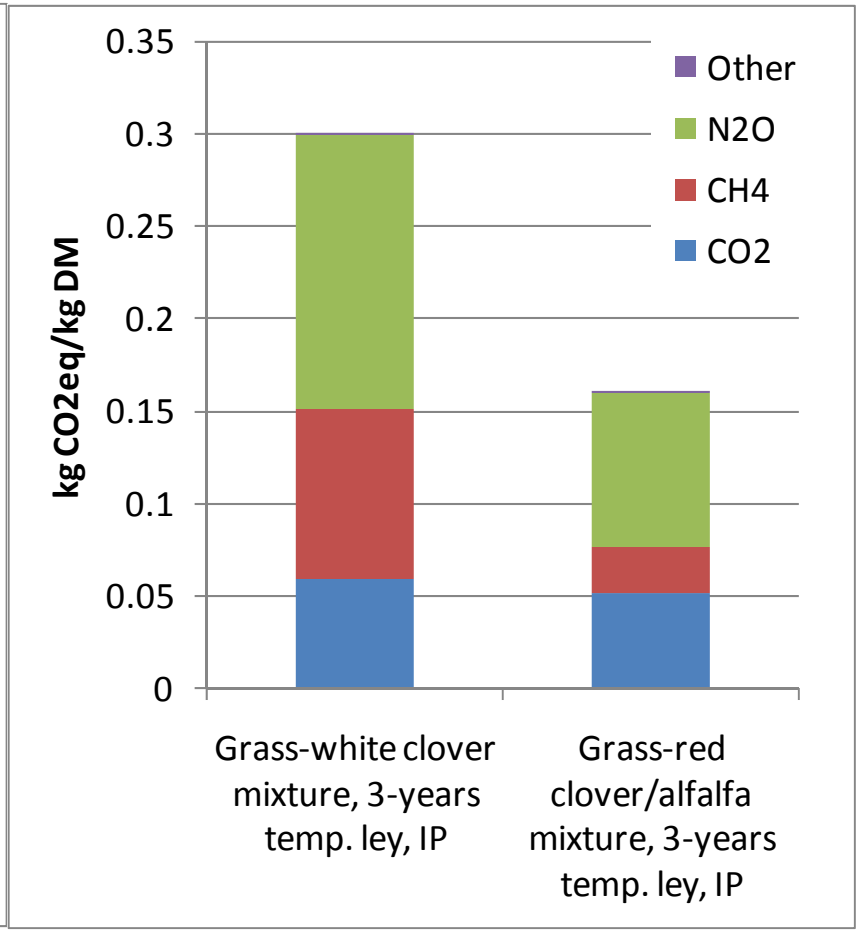
Alfalfa/Red clover-grass mixture
Reduced energy and GHG emissions





Catch crops for biogas

Green manure:

mustard (*Sinapis alba*)
phacelia (*Phacelia tanacetifolia)*

Autumnal catch crops

mustard, phacelia

sunflower

SM 101: oat-vetches-mixture

SM 106: grass-clover-mixture

Overwintering catch crops

SM 200, SM 210: grass-clover-mixtures

Italian Ryegrass

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Variants of catch crops

Yield variability for each crop according to sowing date, fertilisation intensity and harvest frequency, but no yield differences were assumed between different fertiliser types

- Fertilisation levels: (0), 20-80 kg N
- Fertiliser type: mineral fertiliser, cattle slurry
- Harvest: 1-3 times (grass-clover-mixtures)

33 new horticultural products in ecoinvent v3


foodsubs.com


alexawesome.com


majicatl.com


vincesmarket.com


photo-dictionary.com


bonapetit.com


crustpost.com


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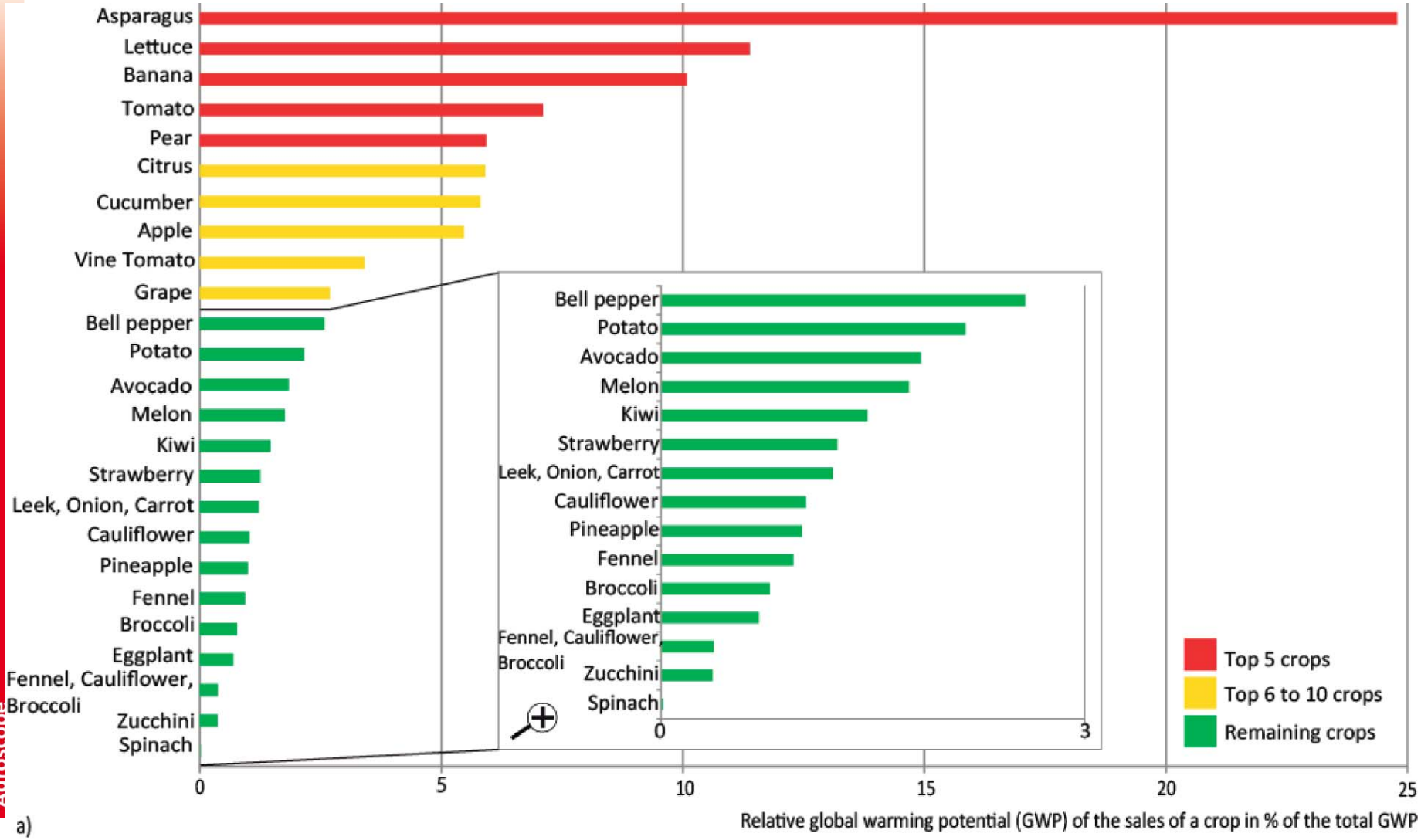
GHG of 83 % of fruits and vegetables sold at the retailer's stores



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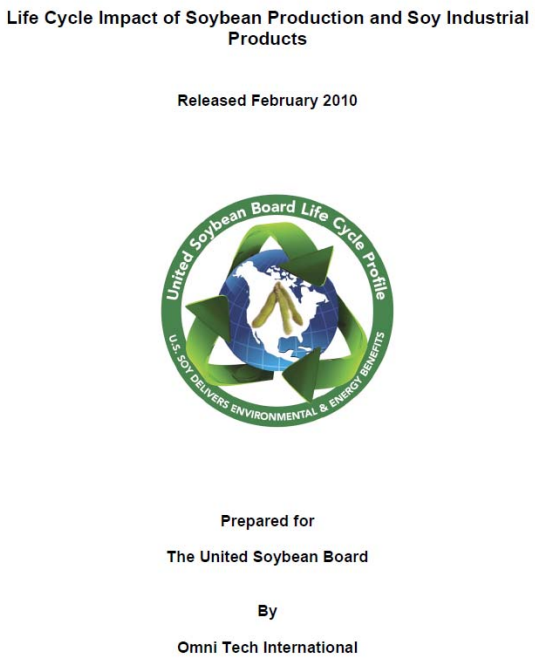
Datasets soybeans, US, 2007

- Author: Anne Creig, Four Elements Consulting, LLC
- Based on: Omni Tech International & Four Elements Consulting, 2010: Life Cycle Impact of Soybean Production and Soy Industrial (report for the United Soybean Board)



Life Cycle Impact of Soybean Production and Soy Industrial Products

Released February 2010

United Soybean Board Life Cycle Profile

U.S. SOY DELIVERS ENVIRONMENTAL & ENERGY BENEFITS

Prepared for

The United Soybean Board

By

Omni Tech International

Outlook

- Revision of fertiliser modelling
- Further parametrisation of emission models
- Animal products
- Food sector
- Larger geographical coverage
- More data suppliers