Swiss LCA Forum

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Applying existing four biodiversity assessment methods to Agribalyse

Similarities and differences among methods

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Context and goal of the study

GIS Revalim is an inter-institute collaboration that **guides, steers and produces LCA data** for the agricultural sector in France (Agribalyse database).

Biodiversity is a **major challenge for agricultural areas** and LCA realm is currently tackling the issue

Land-use change is the major human influence on terrestrial ecosystems.

This study focuses on assessing the impact of food on biodiversity **at field level** specifically **addressing the "land use change" pressure associated with agriculture.**

Methodology

This study focuses exclusively on land occupation.

4 methods tested

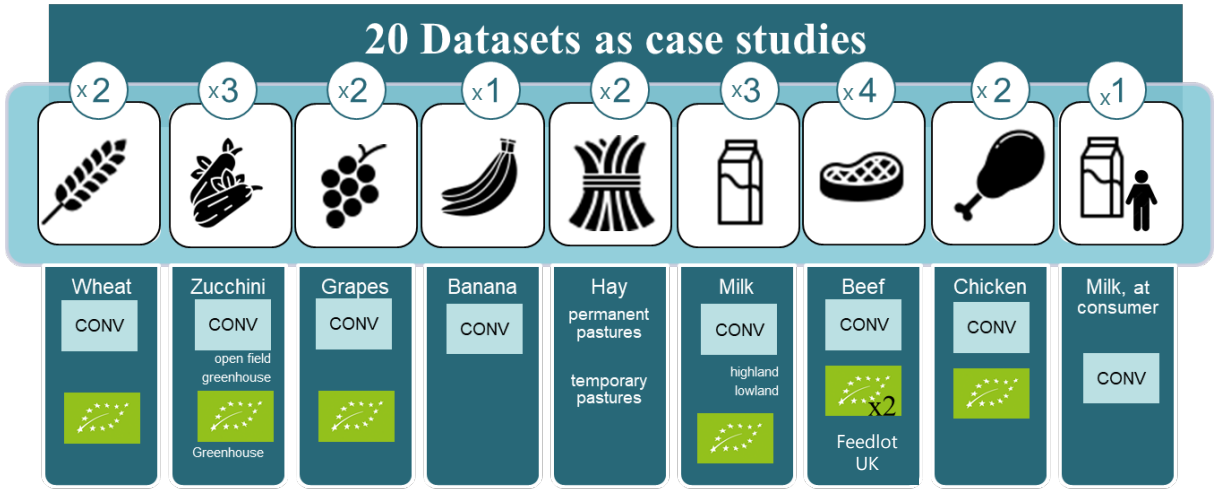
- Habitat conversion and fragmentation at global level (Kuipers et al. 2021)
- Land use intensity specific biodiversity footprint (Chaudhary & Brooks 2018)
- Biodiversity Value Increment (Lindner et al. 2019)
- BioSyScan : BSS (Dallaporta et al. 2023)

As these original two methods require data that was not available in Agribalyse, **they have been adapted.**

- Of the 14 parameters in Lindner et al. 2019, only 3 have been selected, according to previous work (Lindner et al 2022)
- In BIoSyScan, for field crops, 6 of the 12 parameters were determined using default values

Parameters : soil tillage, fertilizer quantity, pesticides

20 datasets used for testing



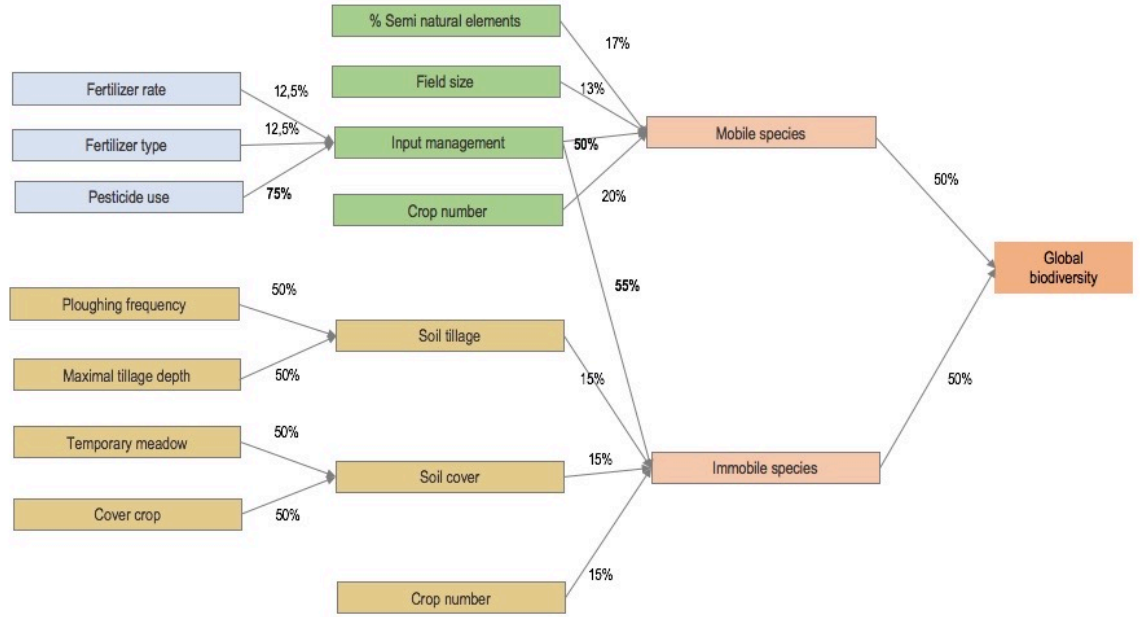
As Agribalyse existing occupation flows are more specific than those described in the methods, **mapping of flows was necessary.**

What is BioSyScan (2023) ?

- Non LCA method
- Developed by ITAB (French Organic technical institute) and INRAE
- Assessment of **status of biodiversity** of related surface depending on practices
- Input parameters ➔ status of biodiversity (**mobile and non mobile** species)
- Rating of biodiversity status from 0 to 100

- 3 models (for France) :
  - Cropland
  - Pasture
  - Permanent crops

Example of decision tree for cropland



Results (1/2)

Overall : geography + yield (apart from extensive pasture)

Kuipers et al. 2021

Overall : mostly geography
Brazil has very high CF
Effect of practices is low
Importance of yield effect

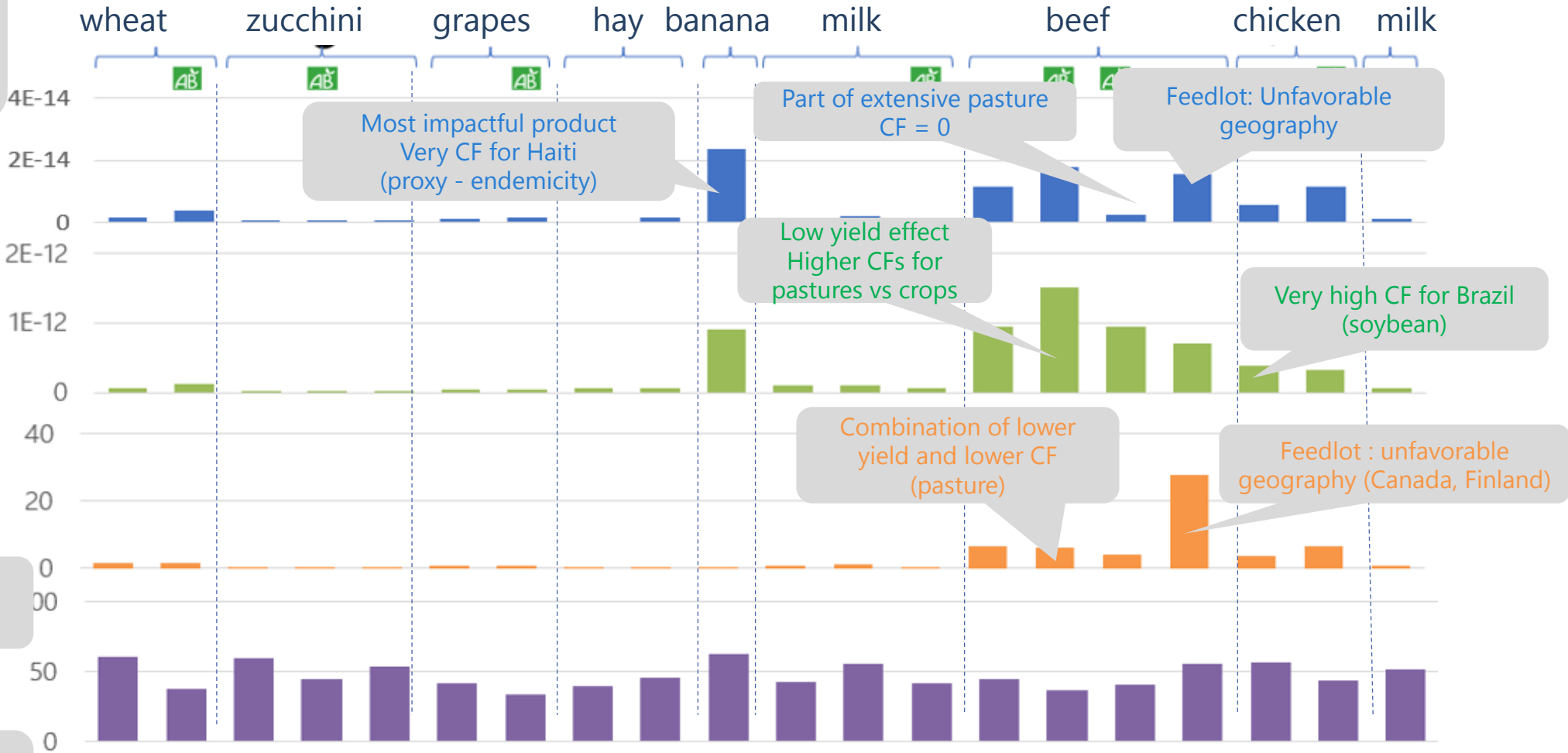
Chaudhary et al. 2018

Lindner et a.l (adapted) 202

Overall : mixture of practices and geography (CA, FI, ~~BR~~)

BioSyScan 2023

No accounting of surface per kg product
Organic = always better



Results (2/2)

Effet of practices

Sensitivity analyses:

Quantity of fertilizers,
Quantity of Plant protection products
Field size
Presence of Semi-Natural Habitats

(With addition indicator in Lindner adapted)

The most sensitive method to variations in practices (field size and SNH) is the Lindner (adapted) method.

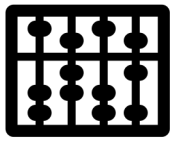
Extreme values

	Ferti -20%	Protection products -30%	Field size = min	Field size = max	SNH 40%	SNH 0%
Chaudhary	-4%	-2%	-4%	0%	-4%	0%
Lindner adapted	-5%	-2%	-23%	33%	-23%	33%
BioSyScan	-2%	-1%	-20%	4%	-3%	10%

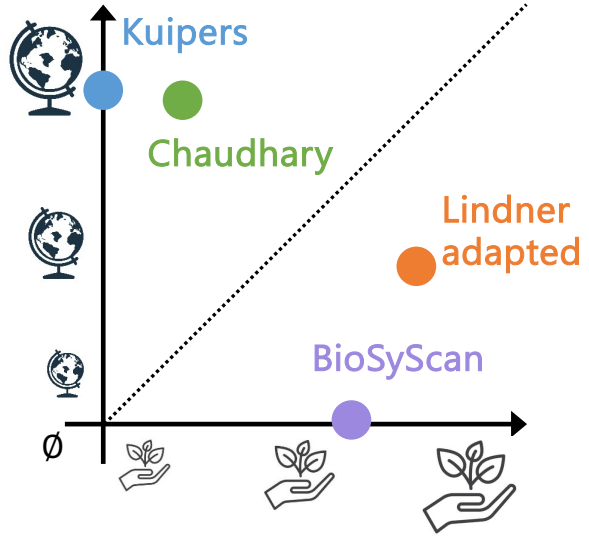
Kuipers method is not included in this test as there is no indicator relating to agricultural practices.

Discussion

This study :



Highlights contradictions in hierarchy of impacts from land occupation depending on method



Highlights the current lack of inventory data, especially at **landscape level** (e.g. SNH, field size)

Limitations :

Only land occupation

Land transformation : lack of consistent inventory data

Potential risk of double counting to keep in mind (a priori no – target is biodiversity on agricultural land)

Take home messages

This work has enabled REVALIM scientific group to highlight the criteria and choices for a future local biodiversity method:

- assessing field biodiversity with various methods : need for an **LCA-compliant method**
- **balancing geography and practices** : depending on the method the weight given to farming practices and geography varies
- **coordinating field biodiversity assessment with other pressures** covered by LCA requires careful thought.

Thank you!

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For further comments or questions: don’t hesitate to reach out!

References

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