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LCA of local food chains: the compromise of environmental sustainability

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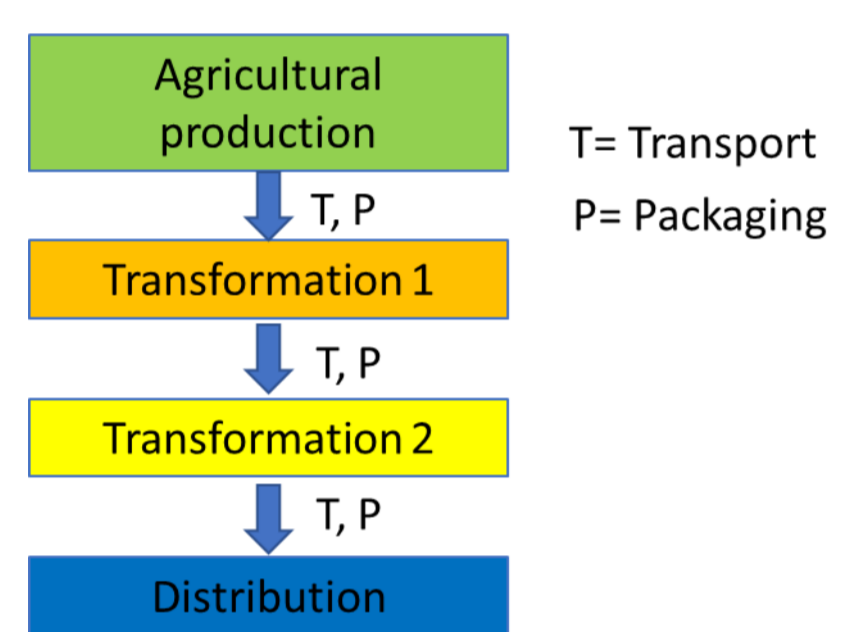
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Introduction

- Shortening value chains and giving territories back control over their food supplies is seen as a potential response to improving the sustainability of food systems and making them more resilient in many regions of the world. Indeed, local food chains are perceived as more sustainable than conventional ones. However, the environmental sustainability of food chains depends more on the strategies of the actors involved than on their degree of geographical proximity (Brunori and Galli, 2016).
- Territorialized agri-food chains (FAT) are emblematic of the process of re-territorialization of the food system in France (Darot et al., 2019). They consist of the structuring of agri-food value chains within a territorial (or local) perimeter, with a limited but reasonable number of intermediaries, enabling them to be sufficiently efficient.
- Objective** : to quantify the environmental sustainability of French FAT bread, and vegetables for catering, through the LCA of 5 case studies with the aim of identifying the technological and organizational determinants of the environmental sustainability of these sectors.

Methods

- Five case-studies, 2 sectors : French bread and vegetables for catering
- ALCA : Flow diagrams are drawn up on the basis of data collected from stakeholders through semi-directive interviews.
- Inventory Data
- Calculation method : RECIPE 2016, mid-point and end-point
- Prospective scenarios, reflecting variations in organizational and technological choices as well as different production scales, are modelled and analyzed.
- Value chain scenarios inspired by the case studies and varying criteria specific to each value chain:
 - Production scale
 - Technological/organizational choices:
 - Organic/conventional agricultural production
 - Kilometers traveled/logistics, storage
 - Packaging choice
- Bread: Scenario C (conventional), D, S, S1
- Vegetables : Scenario C (Conventional), A, B, B1, B2, B3



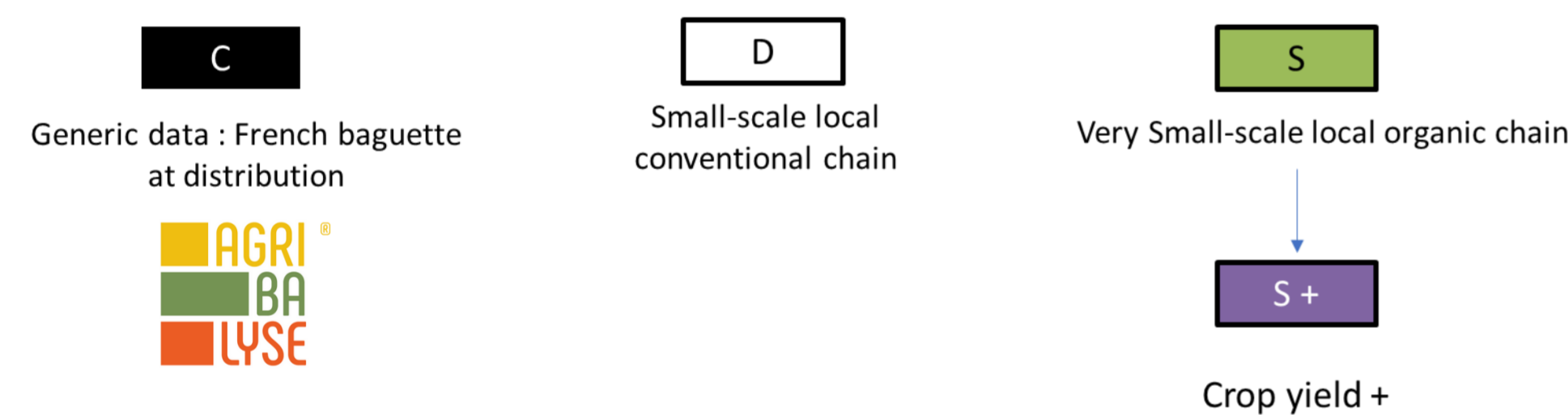
FU: 1 week-bread consumption for a family of 4 (2 adults and 2 children)

FU: Producing 1 ton of ready-to-cook vegetables

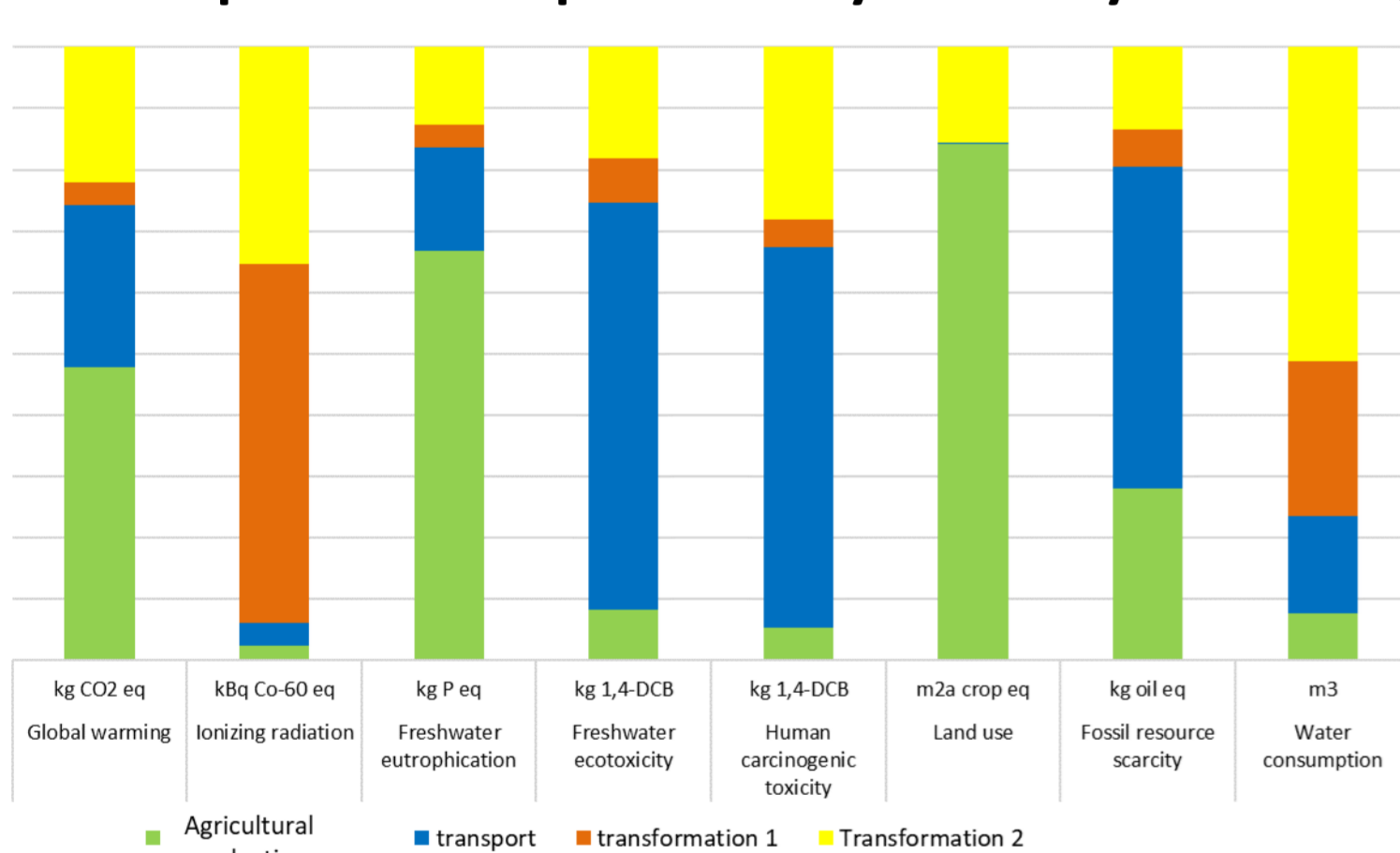


Results: Bread

- Data collected through field surveys → 3 flow scenarios

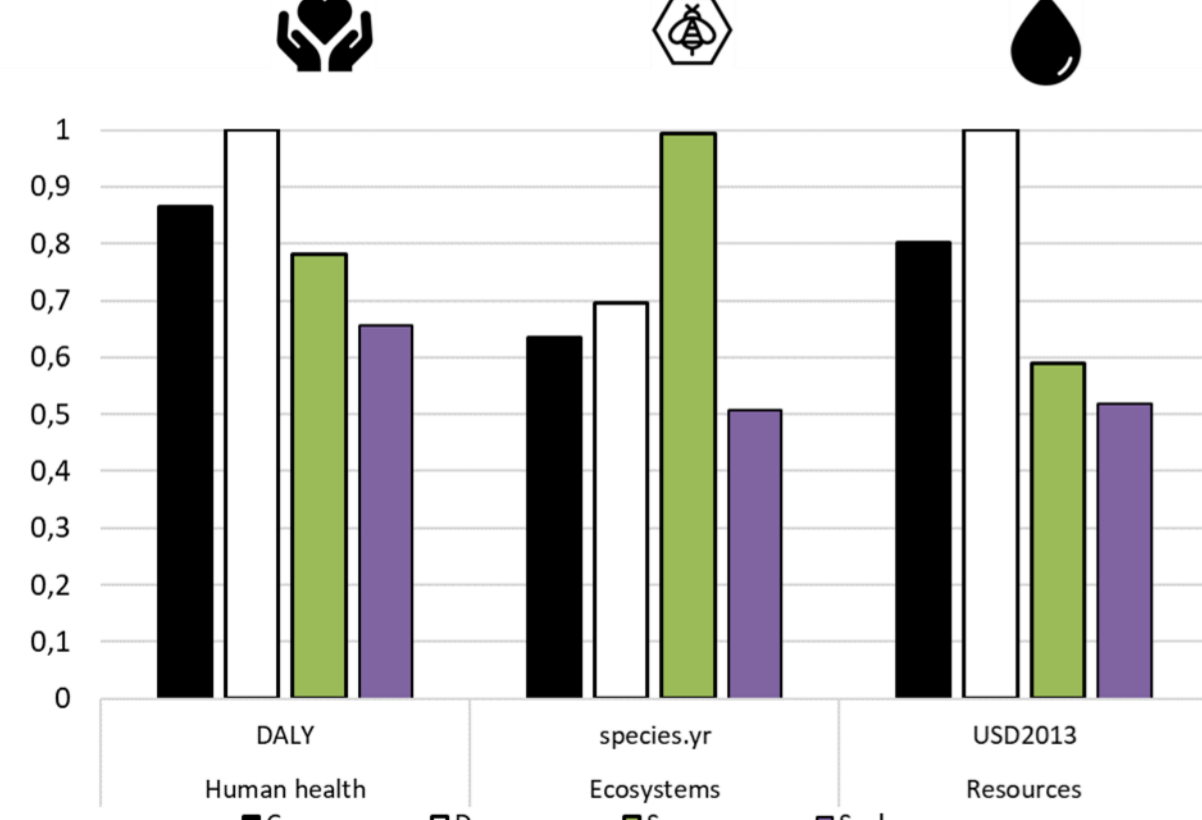


- Mid-point impacts by life cycle stage, scenario S



➤ High contribution of transport for the very small-scale chain due to bread-transport to distribution points

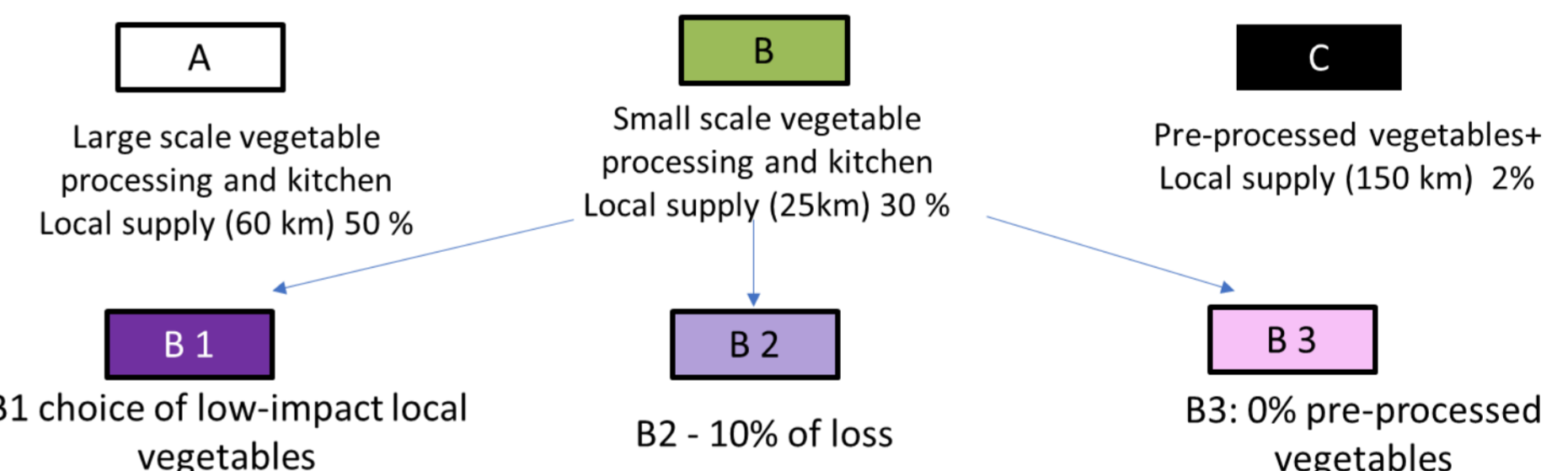
- End-point impacts by scenarios



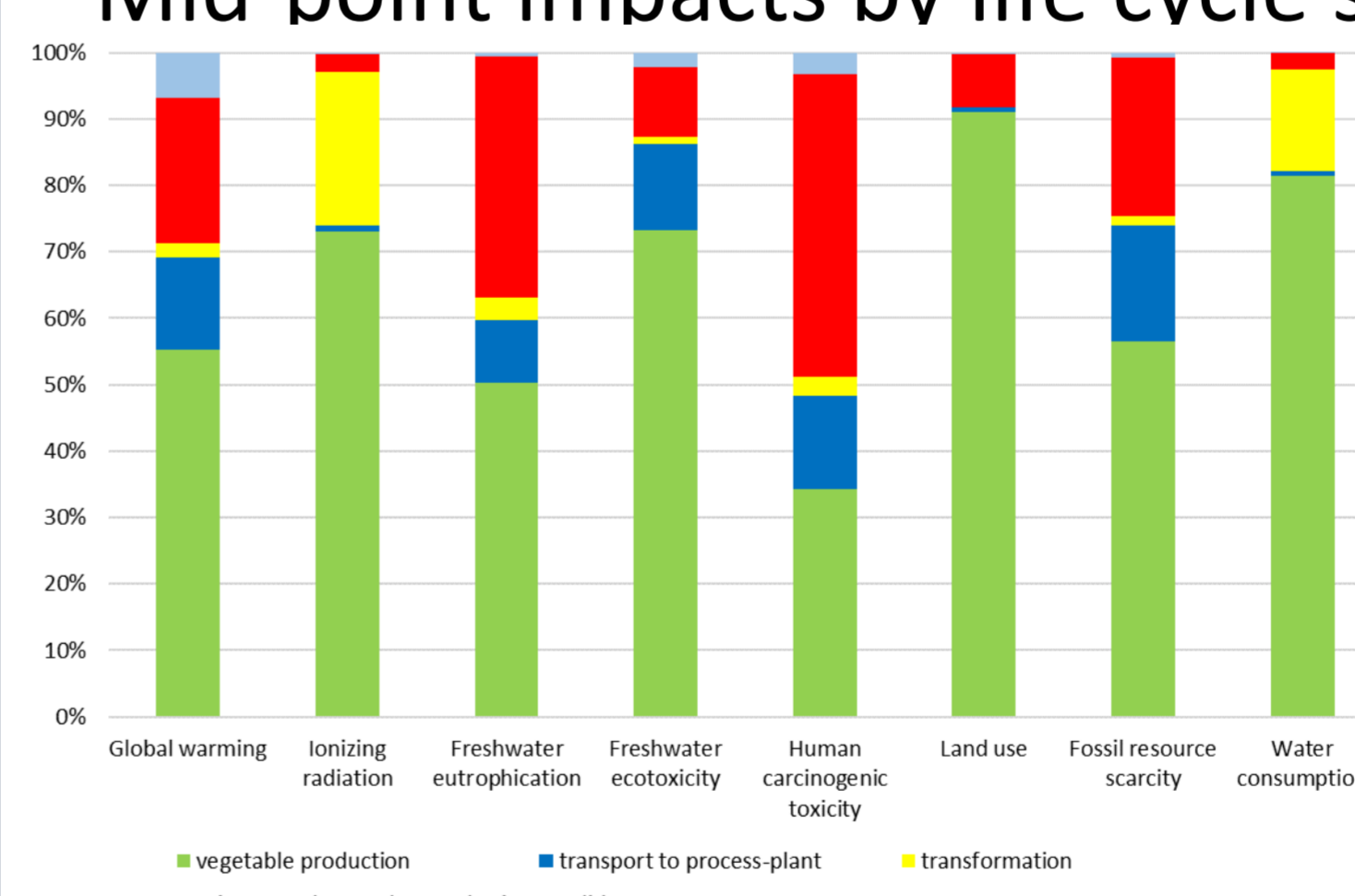
➤ No simple correlation between production-scale and environmental performance
 ➤ Scenario S has more impact on ecosystems due to land use related to low crop yield

Results: Vegetables

- Data collected through field surveys → 6 flow scenarios

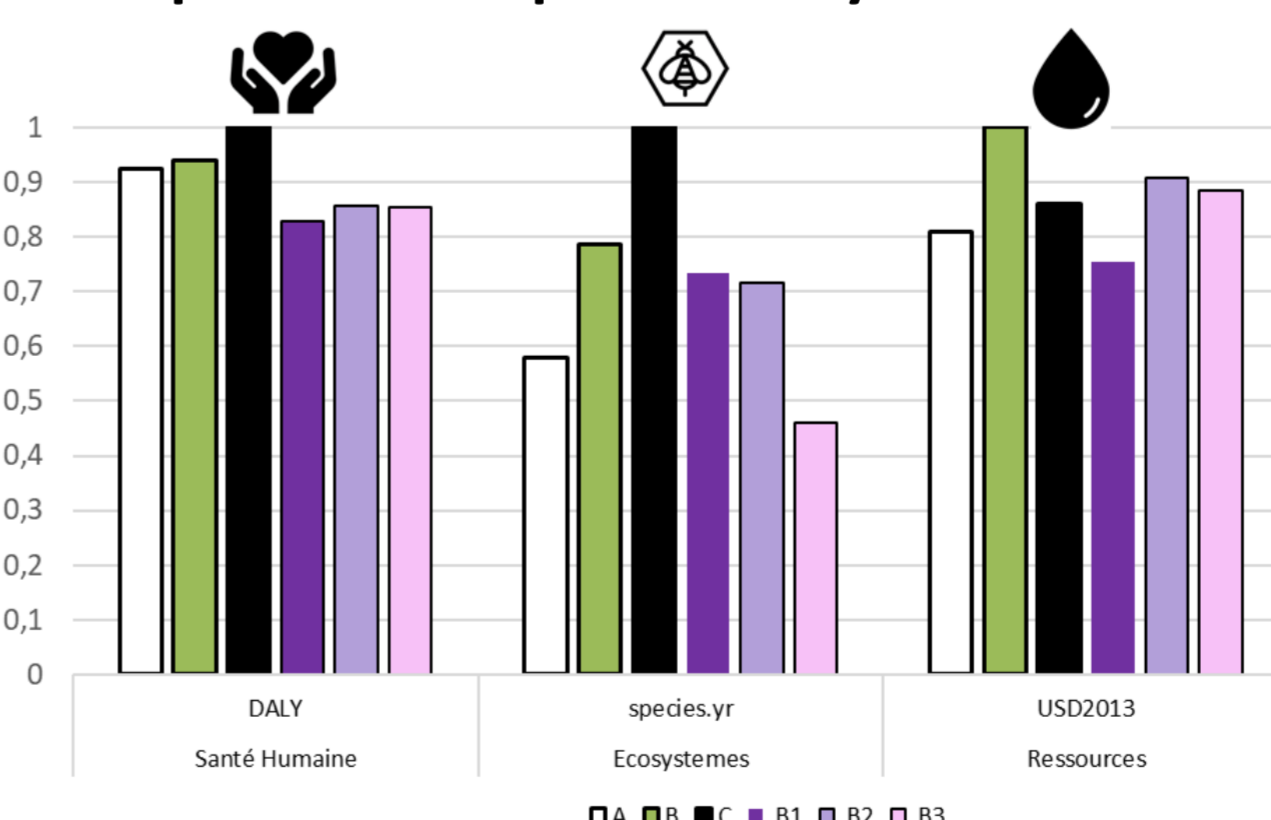


- Mid-point impacts by life cycle stage, scenario A



➤ High contribution of packaging of pre-processed vegetables used in meal preparation

- End-point impacts by scenarios



➤ Scenario A is the most virtuous, thanks to economies of scale and less use of pre-processed vegetables
 ➤ Scenario B can be improved by increasing the proportion of low-impact raw vegetable supplies.

Conclusion & Perspectives

Thanks to LCA modelling, it is possible to vary technological choices and production scales concomitantly in prospective FAT scenarios to better approach socio-economic realities. This method could make it possible to identify the best environmental compromise between different technological choices and production scales in FAT.

References and acknowledgements

- Brunori G., Galli F. (2016). Sustainability of local and global food chains: Introduction to the special issue. *Sustain.* 8, 765. 7 pp.
- Darrot C., Maréchal G., Bréger T. (2019). *Rapport sur les Projets Alimentaires Territoriaux (P.A.T.) en France : Etat des lieux et analyse.*
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