# Using customised agricultural LCA tools in research Using customised agricultural LCA tools in research. The case of cropping system modelling

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# Using customised agricultural LCA tools in research projects: reconciling ease of use and flexibility. The case of cropping system modelling

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## Introduction

### Customised agricultural LCA tools [1]

- Provide a user-friendly interface for collecting data
- Focus on the most significant life cycle phases for agricultural systems assessment

☺ **Simplification of LCA studies**

☺ A framework that helps not to forget any resource or substance flow

☺ Standardization is favoured, allowing better reproducibility of studies

☹ **Less flexibility than generic tools**

☹ Difficulties to tackle new research questions

### Challenge for customised tools

Low flexibility → multiplication of tools

"one question - one tool": high cost, risk for many tools to be little used

Adapt existing tools to other scientific questions and applications to improve their lifespan

***Under which conditions adapting LCA tools to new scientific questions or application fields?***

Case study: the adaptation of MEANS-InOut software for ACV bio project

## Materials and methods

**ACV Bio project:**[2]

- Aims: Assess environmental performance of organic cropping systems; create Life Cycle Inventories (LCI) of organic agricultural systems and products
- Use of MEANS-InOut to produce LCI of organic agricultural products

**MEANS-InOut:** a software permitting the study of individual crops [3]

Limits:

- Interactions among crops within the rotation are largely ignored
- The cropping system is the right scale for innovative design

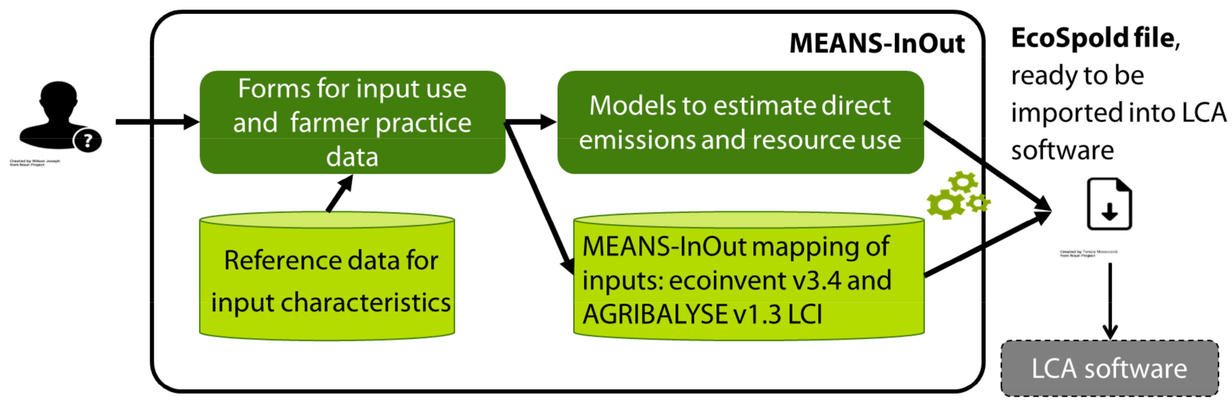
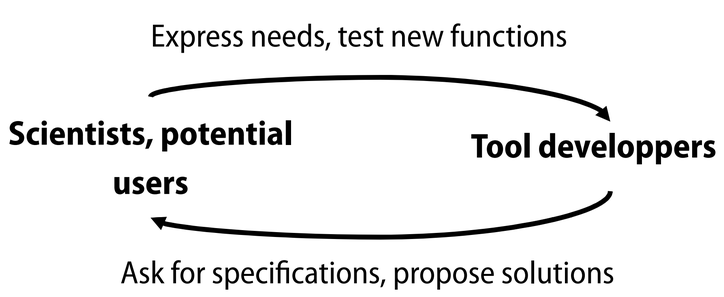



**Figure 1:** Main functions of the MEANS-InOut customised agricultural LCA tool

## Need for methodological and tool adaptations: 2 tasks of ACV Bio project

## Results and discussion

✓ **Close coordination between methodological work and software development:**




✓ **Adaptation of MEANS-InOut:**

- Forms for data collection
- Emission models: nitrate leaching, attribution to each crop of the rotation of impacts due to organic fertilization applied on one single crop
- Export function: generation of LCIs of each crop of the rotation and an LCI of the whole cropping system.

✓ **Simplification of data capture:**

- Soil and climate data collected at cropping system level, rather than per crop
- Consistency checks

→ Less risk of errors

## Conclusions

**Adaptation of a customised LCA tool is possible if:**

- The tool has been designed to be adaptable
- Users are involved in the new design to ensure that all factors key to the new question are considered

**Feedback from ACV Bio project:**

- The co-design of the tool by scientists, users and tool developers favours the delivery of a tool adapted to the need of users.
- Methodological developments were supported by the tool development.
- This approach is adapted to research projects, but is time consuming.

**Recommendations:**

Carefully budget time and resources for tool adaptations

**References:**

[1] Renouf MA, Renaud-Gentié C, Perrin A, van der Werf HMG, Kanyarushoki C, 2018. .Journal of Cleaner Production 179: 246-254.

[2] van der Werf HMG, Nitschelm L, Auberger J, Chambaut H, Colomb V, Dauguet S, Gac A, Lebas de Lacour J, Perrin A, Renaud-Gentié C, Roinsard A, Sautereau N, Tailleur A, 2018. In Munkung and Gheewalla (eds) LCA Food 2018. Conference proceedings of the 11th International Conference on Life Cycle Assessment of Food (LCA Food 2018), 16-20 October 2018, Bangkok, Thailand, p 121-124.

[3] Auberger J, Malnoë C, Biard Y, Colomb V, Grasselly D, Martin E, van der Werf HMG, Aubin, J, 2018. In Munkung and Gheewalla (eds) LCA Food 2018. Conference proceedings of the 11th International Conference on Life Cycle Assessment of Food (LCA Food 2018), 16-20 October 2018, Bangkok, Thailand, p. 317-320.

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