Extreme simplification versus realistic controlled-environment facilities (Ecotrons)

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Introduction:

In this presentation, I will draw on multiple experimental studies conducted at the Montpellier European Ecotron (CNRS, France, www.ecotron.cnrs.fr), a cutting-edge facility for ecosystem research under controlled conditions.

Approach:

The focus will be on discussing key insights related to the experimental trade-offs in such environments, based on the findings of several published articles[1-3].

Main body of the abstract:

Specifically, I will cover: (i) the risks of oversimplifying model systems, (ii) the critical need for precise and realistic environmental control, (iii) the benefits of continuous response variable monitoring, and (iv) the advantages of using more complex and realistic model systems to enhance reproducibility and external validity.

Conclusions:

The presented examples will highlight the risks of using overly simplified model systems, which can produce results with low external validity, and underscore the advantages of more realistic model systems, such as those employed in the Ecotron facilities.

Learning objectives:

Attendees will gain a clearer understanding of how their choice of experimental systems can significantly influence the outcomes of their studies.

References:

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2. Ganault P, Nahmani J, Capowiez Y, Fromin N, Shihan A, Bertrand I, Buatois B, Milcu A. 2024. Earthworms and plants can decrease soil greenhouse gas emissions by modulating soil moisture fluctuations and soil macroporosity in a mesocosm experiment (F Hafeez, Ed.). *PLoS ONE* 19: e0289859.
3. Milcu A, Puga-Freitas R, Ellison AM, Blouin M, Scheu S, Freschet GT, Rose L, Barot S, Cesarz S, Eisenhauer N, *et al.* 2018. Genotypic variability enhances the reproducibility of an ecological study. *Nature Ecology & Evolution* 2: 279–287