

Meeting report

International and interdisciplinary meeting
on non-target effects of biocontrolS

7–9 October, 2025 (Montpellier, France)

The international and interdisciplinary meetings on non-target effects of biocontrolS was held from October 7 to 9, 2025, in the Saint Charles lecture hall at Paul Valéry University of Montpellier. The event brought together over 70 participants from a wide range of disciplines, spanning from the humanities to biological sciences. These days of scientific presentations and discussions were structured into several thematic sessions to reflect the diversity of topics and approaches addressed:

- Pest adaptation and resistance
- Biodiversity, ecosystems and landscapes
- Risk assessment and regulation
- Changing human practices and organisation
- Ecotoxicology and human health

A detailed compilation of presentation summaries is available in the [abstract book](#).

To foster connections with a broader audience, a public conference (in French) was organized, highlighting how archaeology and archaeobotany can jointly contribute to understanding agro-food practices during the Iron Age.

In addition, the meetings welcomed students from the “Plant Protection and Environment” program of the Institut Agro Montpellier, further strengthening the link between research and education.

Finally, to ensure that this meeting produced concrete outcomes, participants were invited to contribute to:

- (1) Developing an overview of current and future research topics related to the [ENI-BC+ network](#).
- (2) A brainstorming session on the benefits and limitations of interdisciplinarity, as well as on the potential use of the matrix proposed by the [ENI-BC+ network](#).
- (3) A survey conducted by a team of linguists.

The following sections provides a summary of the results of these cross-disciplinary activities.

1 Matrix mapping pest control tools to their potential effect

By Anne-violette Lavoir

Within the ENI-BC+ network, a pressing need was identified to consolidate multidisciplinary knowledge on the non-target effects of pest control strategies. While the environmental and health impacts of synthetic pesticides are now well documented, their influence on surrounding socio-economic structures remains less understood. As for alternative control methods, some of their non-target effects have never been identified — let alone investigated. From this observation emerged the proposal to build a comprehensive matrix that maps all known pest control strategies against both documented and hypothetical non-target effects. This analytical matrix aims to systematically cross-reference control methods with their potential consequences.

The working group’s first step was to catalogue all known pest control tools and describe them in detail. At a fine scale, around fifty strategies were identified and grouped into six major categories: chemical/biological/autocidal/metabolic control, disruption techniques and agroecosystem management. A similar exercise was conducted for potential effects, encompassing both biological and sociological dimensions. While biological effects are often confirmed, sociological impacts remain largely hypothetical — highlighting a promising avenue for future research.

The next phase involves cross-referencing these effects with the control strategies. This meeting provides an opportunity to identify and bring together experts working on these critical questions. It was therefore proposed to the meeting participants that they position themselves within the matrix on a poster specifically designed for this purpose (Fig. 1). It can be observed that the experts are either specialists in a particular tool, in a specific effect, or, more precisely, in an effect crossed with a tool. It is also evident that certain topics have been the subject of extensive studies, whereas other questions remain at an early stage of investigation.

“Density” of researchers per topic

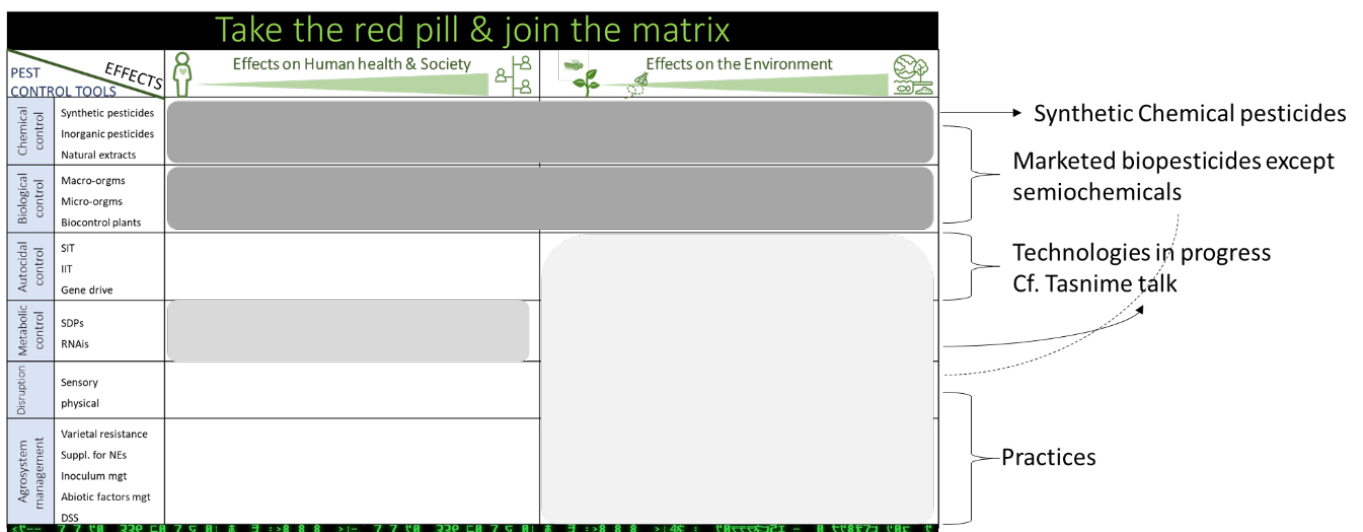
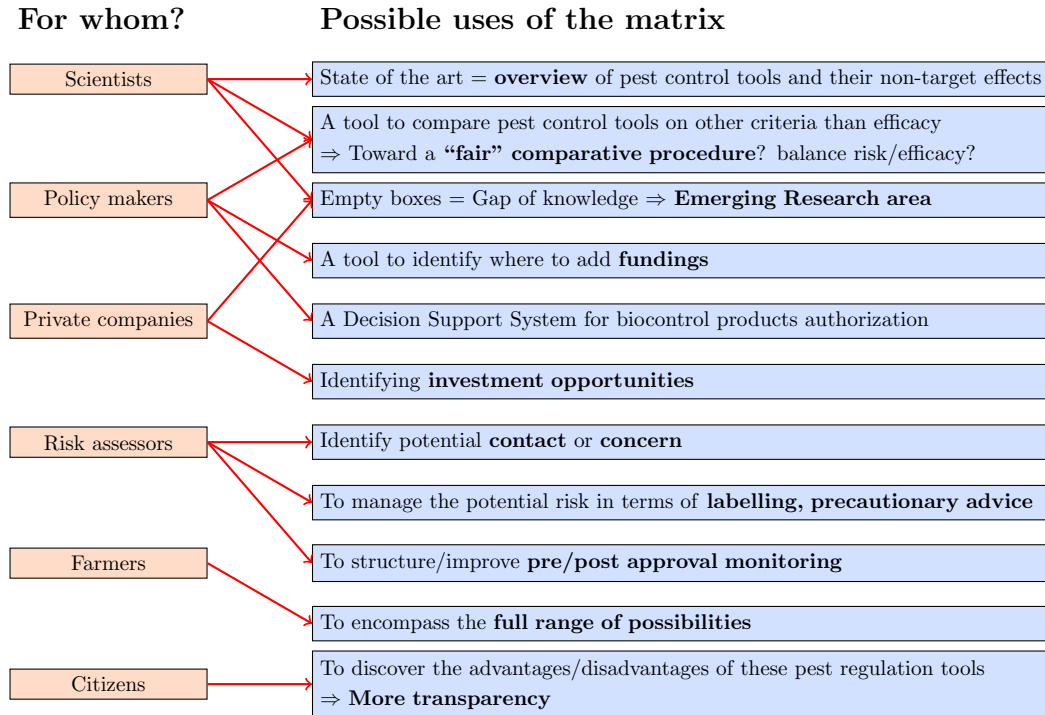


Figure 1 — Poster illustrating the matrix and the positioning of experts. The intensity of the grey shading reflects the number of experts per topic: the darker the shade, the greater the number of experts on that subject.

In addition, the meeting participants were asked what, in their opinion, could be the uses of the matrix and for whom. The participants mentioned:



2 Benefits and limitations of interdisciplinarity

By *Freddie-Jeanne Richard*

During the meeting, participants were invited to respond to the following question: “Provide 1–3 tangible examples of how interdisciplinary collaborations have helped, help, or may help further the study of the non-target effects of biocontrols. Please specify whether these examples are real or hypothetical.” The results were then presented to all participants in a discussion forum.

Analysis of the submissions revealed limited diversity in responses, with two examples of real success and seven suggestions. The real success stories reported were: (i) the organization of workshops involving individuals from multiple disciplines, resulting in scientific syntheses, and (ii) a scientific project in which interdisciplinarity mainly involved sub-disciplines of the life sciences, without including additional fields such as the humanities or social sciences.

These findings prompted an open discussion aimed at better understanding the results, focusing on the questions: *Why should we develop interdisciplinarity, and what are the locks?* Participants’ testimonies highlighted that the main challenges stem from the compartmentalized structure of scientific research across disciplines. These include difficulties in identifying and connecting with potential collaborators, as well as in understanding the concepts, terminology, methodologies, and constraints specific to other fields (e.g., fieldwork or laboratory practices). Disseminating results also presents a challenge, since most journals remain discipline-specific. Another challenge involves shifting the perspective on research, balancing depth within a discipline with breadth across disciplines, which can be a source of frustration. Nevertheless, participants emphasized that addressing current global challenges, such as sustainability in a complex world across multiple scales, requires adopting a holistic approach, which is inherently interdisciplinary, and potentially even transdisciplinary.

3 Synthesis on terminological issues

By H el ene Ledouble and Boris Monachon

1. Terms listed as complex, be it for their definition or the potential synonymy between them:

- Agro ecologie
- Biocontrol
- Biocontr ole
- Bioprotection
- Classical biological control (CBC)
- Importation biological control
- Biosolutions
- Biopesticides
- Natural Pesticides
- Biorational pesticides
- Bio-insecticides
- Reduced-risk pesticides

2. Focus on 2 terms:

a) Biocontrol/biocontr ole : meaning? definition?

If we compare it with ‘biocide’ = “which kills living organisms”, biocontrol should mean ‘which controls living organisms’. But the other possible interpretation is ‘which controls *via* living organisms’.

In the 1st case, this does not exclude synthetic products that can control living organisms.

In the 2nd case, this excludes metals and minerals and non-living organic molecules (e.g. essential oils) that cannot be used to control living organisms.

Other subjects are being mentioned :

- the success of this ‘control’ which depends on the actors, adding: ‘this extends to the notion of “good” biocontrol and synergistic or antagonistic interactions’.
- the link between terms and regulations. Need for clear definitions and categories to define/understand which regulations are applicable. This is all the more important as there are not necessarily equivalences between French and European regulations.

b) Classical biological control (and its acronym CBC) *versus* Importation biological control

“Classical BC”: double issue :

- o ‘Classical’ does not refer to the method, so it is semantically unclear.
- o Its acronym CBC is the same as Conservation Biological Control.

A new term is emerging: *Importation Biological Control* and *Establishment BC*. ‘Importation BC’ was identified in a publication (Heimpel and Mills 2017: Biological Control: Ecology and Applications) and is also used by some colleagues in ISA (Sophia Antipolis).

3. Focus on two other semantically complex terms: service plants (and service animals).

Terms defining ‘service plants’ (and a long list of equivalents with their specific characteristics), but also ‘service animals’ (insects, but also chickens, rabbits, cattle, sheep, ducks, etc.). A more positive term than the warlike connotation of biocontrol. Equivalents: *biocontrol agents*, *pollinators*, ‘*plot cleaners*’. A SumCrop Metaprogramme project has just been launched on these questions.

Other terms heard or discussed during the seminar and potentially complex in terms of terminology: *Eco-smart*, *Silver-bullet method*, *PIP*, *biomarker*, *sociomarker* (*biosocialmarker?*), *Creole garden*, *Repellent*, etc. Distinction between ‘*alternative pesticides*’ and ‘*alternatives to pesticides*’, etc.

4 Statistics

During the registration process, participants were asked to provide several pieces of information. First, they were invited to estimate the carbon footprint of their travel. However, since not all participants reported their footprint, the total value would not have been representative. Therefore, this analysis is not presented here.

Second, participants were asked to indicate their gender. We analyzed the percentage of women among participants, speakers, and individuals who asked questions after the presentations. The results are shown on the side (Fig. 2). No significant differences were found ($\chi^2(2) = 3.74$, $p = 0.15$).

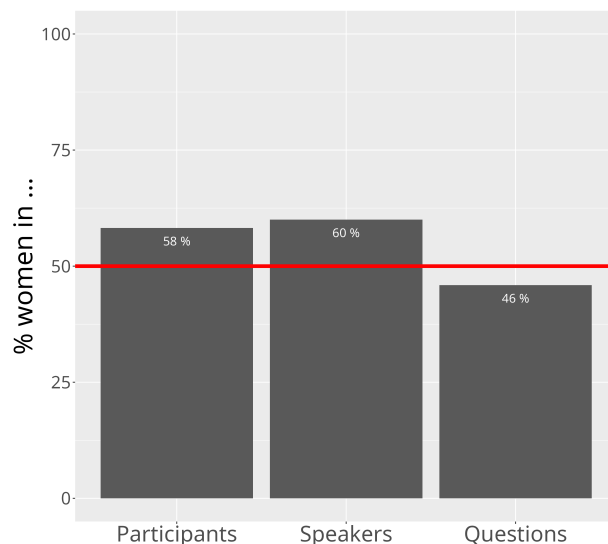


Figure 2 — Gender-balance during the conference.

5 Participants

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Figure 3 — International and interdisciplinary meeting on non-target effects of biocontrolS. 7-9 October 2025. Montpellier, France.

6 Organizing Committee

This conference was financially supported by the [ENI-BC+ network](#), with the support of the SuMCrop metaprogram (INRAE). The organizing committee, part of the ENI-BC+ network, involved:

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