LiveSeeding

Handbook

Rethinking Cultivar Evaluation for Organic

A Learning-by-Doing Perspective from the LiveSeeding Experience



Change Seed, Grow Difference!

LiveSeeding

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Abstract

This handbook draws on the experience of 18 pilot organic cultivar evaluation initiatives, which aimed to develop more cost-effective, adaptive and participatory approaches. We highlight how cultivar evaluation can generate value beyond formal experimental results, by strengthening relationships between actors, stimulating learning and creating opportunities for collaboration. We examine the critical stages of cultivar evaluation through the lens of a "research stance" balancing results-led and process-led perspectives on impact.

Rather than recommending a single best methodology, we propose a framework to help understand the diverse factors — organisational, institutional and contextual — that shape cultivar evaluation systems in practice. Ultimately, there is no single best way to organise cultivar evaluation: what matters is the capacity to have clear objectives and to develop coherent, adaptive approaches suited to one's objectives, actors and context — and to keep questioning and improving them over time. This handbook is intended as a companion for network coordinators, trial managers and other actors seeking to reflect on, adapt or strengthen their own cultivar evaluation systems.

Cultivar

In LiveSeeding, the term “cultivar” is used as a generic reference to varieties, breeding lines, landraces, populations and heterogeneous cultivars, including those falling under the category of Organic Heterogeneous Material.

PROJECT SUMMARY

LiveSeeding is a 4-year Innovation Action on organic seed and plant breeding to accelerate sustainable and diverse food systems in Europe, which started in October 2022. LiveSeeding provides science-based evidence and best practice solutions to help achieve 100 % organic seed. The project has a budget of 6.6 million Euro, funded by the European Union, the Swiss State Secretariat for Education, Research and Innovation (SERI) and UK Research and Innovation (UKRI). To deliver on such an ambitious goal, LiveSeeding brings together 37 organisations from a wide range of sectors operating in 16 European countries. LiveSeeding contributes to the transition towards environmentally friendly, climate-neutral, healthy and fair food systems through a PUSH-PULL-ENABLE strategy to

- Enhance the availability and adequacy of organic seeds of cultivars appropriate to organic farming (**PUSH**),
- Increase and stabilise the market demand for organic seeds of cultivars appropriate to organic farming (**PULL**),
- Foster an enabling policy and regulatory environment where both demand and supply can harmoniously and productively negotiate without irrelevant constraints due to legal restrictions and/or regulatory fragmentation (**ENABLE**).

LiveSeeding works with a **holistic, multi-actor**, **multi-stakeholder**, **participatory approach** involving stakeholders along the value chain in:

- **17 local Living Labs** (LLs), where innovation will be co-generated involving the whole value chain, from breeders to consumers and citizens.
- **3 established networks** of organic breeders (ECO-PB), seed savers (ECLLD), and Milan Urban Food Policy Pact (MUFPP).
- **15 focus crops** will be used **within Living Labs** in breeding, cultivar testing and seed production, namely: 4 cereals (wheat, rice, oat, maize) and 1 pseudo-cereal (buckwheat), 1 oilseed crop (sunflower), 4 grain legumes (broad bean, lupin, beans and soybean), 4 vegetables (pepper, carrot, tomato and brassica) and 1 fodder crop (alfalfa).

These activities take place in **16 European countries** covering different pedoclimatic zones and socio-economic contexts, including countries with a low level of development in organic seed and breeding in Eastern and Southern Europe.



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1 INTRODUCTION

Generating relevant information on cultivar performance, adaptation and suitability is an essential activity throughout the breeding, seed multiplication and cultivar deployment process. In organic farming, characterized by limited use of external inputs and by a diversity of socioeconomic settings, such information must be relevant to highly diverse environmental, technical and market conditions. Within this diversity, however, cultivar evaluation for organic farming and, broadly speaking, for the agroecological transition, faces three challenges.

1. The performance of cultivars is highly dependent[1] on the evaluation environment. It is therefore necessary to evaluate cultivars in organic farming conditions, instead of relying on cultivar evaluation in conventional environments.

2. Organic cropping systems have limited access to external inputs and are thus exposed to higher environmental variability than conventional systems where these inputs can lead to greater uniformity in environmental conditions. It is therefore harder to make predictions on cultivar performance across multiple environments based on trial results.

3. Organic farming covers a relatively small proportion of agricultural surface and has therefore fewer financial resources than conventional farming. Thus, the above challenges cannot be just resolved by running more trials in organic environments than in conventional agriculture to cover wider environmental variation.

These challenges call for a deeper rethinking of the approaches adopted when generating information on cultivars, and to envisage alternative models that are **more cost-efficient, more adaptive, more participatory, and more impactful.**

This handbook results from work carried out under Task 2.3 of Work Package 2 (WP2) of the LiveSeeding project. This task aimed to support and monitor 18 pilot case studies (Figure 1) as they evolved their cultivar evaluation systems towards more cost-effective and participatory methods. It builds directly on the findings of Deliverable D2.5, "Synthesis of cultivar evaluation case-studies: recommendations and follow-up plans" (Costanzo et al., 2026). The objective was to test methodological guidelines1, published as part of the previous LIVESEED EU project (2017-2021), under real-world conditions, covering both arable and vegetable crops. Hence, the focus was not on comparing cultivar performance as such, but on analysing approaches and processes that multi-actor networks adopted to organise, adapt and strengthen participatory cultivar evaluation in organic farming.

[1]LIVESEED methodological guidelines were published in a report "Frugal, multi-actor and decentralised cultivar evaluation models for organic agriculture: methods, tools and guidelines" (D2.3, Rey *et al.*, 2021) and two practical booklets to support trial managers: "Guidelines for organic cultivar trials » (de Buck et al., 2021) and "Selecting the appropriate methodology for organic on-farm cultivar trials – a practical guide for researchers and facilitators" (Riviere et al., 2021).

Cultivar evaluation has been approached in a broad sense. Cultivar evaluation systems refer to **any organised activity aimed at generating information on the performance, adaptation or suitability of different genetic forms of cultivated species.**

Cultivars may include registered varieties, breeding lines, populations, organic heterogeneous material (OHM) or other plant genetic resources. Cultivar evaluation may support official post-registration recommendations, breeding programmes, participatory selection initiatives, local seed systems, value-chain development or farmer decision-making. It may take place at different stages of the breeding and cultivar deployment process and involve a wide range of actors, including farmers, breeders, advisors, researchers, seed companies, processors and consumers.

Building on the experience of the LiveSeeding project, **this handbook proposes a framework to support reflection on the evolution of cultivar evaluation systems**. Rather than prescribing a particular methodology, it aims to help actors better understand the factors that shape their programmes, identify opportunities and constraints, and explore possible pathways for adaptation and improvement.

The primary audience of this handbook is network coordinators and managers of cultivar evaluation systems. However, it may also be useful to trial managers, breeders, facilitators, advisors, researchers and, more broadly, to anyone involved in the design, coordination or evolution of cultivar evaluation systems.

2 A FRUGAL APPROACH FOR ORGANIC CULTIVAR EVALUATION

2.1 Objectives and hypothesis

The LIVESEED project produced practical guidance to **help actors select appropriate methodologies for cultivar evaluation according to their objectives and constraints** (Riviere et al., 2021). The main message from these guidelines was that there is no standard, universal methodology for cultivar evaluation. In fact, depending on the number of cultivars tested and on the number of experimental sites, different experimental designs and corresponding statistical analyses can be mobilised. With growing number of experimental sites, the experimental design on-site can become progressively simpler. In LiveSeeding, these guidelines were tested in real-life case-studies: 18 cultivar evaluation programmes seeking to rethink their methods.

The primary objective was to collectively progress towards more appropriate, participatory, cost-efficient and impactful methods for each case study, to ensure their success in supporting thriving organic seed sector development.

The secondary objective was to "learn-by-doing" about the conditions that determine the adoption of different methods, to generalise the lessons learned and guide others in designing appropriate cultivar evaluation systems in their own contexts.

The underlying hypothesis was that case studies could be interpreted as **Communities of Practice**: "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (**Lave and Wenger, 1991 and 1996**). Hence, experimenting with alternative approaches was considered as the best way to understand how organic cultivar evaluation could be improved.

2.2 Reflection on the case-studies experience

The case studies represented a wide diversity of situations reflecting the diversity of organic cultivar evaluation (Figure 1). They covered both arable and vegetable crops, and were active at either local or national scales. They included post-registration cultivar testing programmes aimed at producing recommendations for a broad audience, as well as participatory networks evaluating cultivars primarily to inform decisions within the network itself. In all case studies, cultivar evaluation was not conducted by isolated practitioners but involved multiple actors participating in either consultative or collaborative ways.

Overall, no case study linearly applied the methodological guidelines from the LIVESEED project, although the trial managers had access to a range of experimental approaches and awareness of possible alternatives. The experience gathered during LiveSeeding suggests that the challenge rarely lies in selecting a different experimental method, but rather in the **organisation of networks, the**

availability of resources, the expectations of stakeholders, institutional requirements, existing routines, or the practical realities of implementation.

Questions such as "How many cultivars should be tested?" or "How many sites are needed?" are not merely technical parameters. These choices are closely linked to broader questions concerning objectives, target users, available resources, governance arrangements, funding mechanisms, and the history of the evaluation programme itself. Within this work, cultivar evaluation programmes were considered within their "real-world context" rather than as case studies of best practice. This raised interesting questions for the task leaders in drawing conclusions and determining recommendations from the work.

Cultivar evaluation activities are rarely designed from a blank page: they are systems embedded within existing organisations, networks and institutional environments. They have evolved over time and reflect previous decisions, accumulated experience, available competencies, and established relationships among actors.
Such complexity requires a shift in perspective. Instead of focusing on which methodology should be chosen, it might be more useful to ask why certain methodologies are adopted, why others are not, and under which conditions change becomes possible. This consideration led us to move beyond a purely methodological perspective, towards considering cultivar evaluation as part of a broader sociotechnical system.

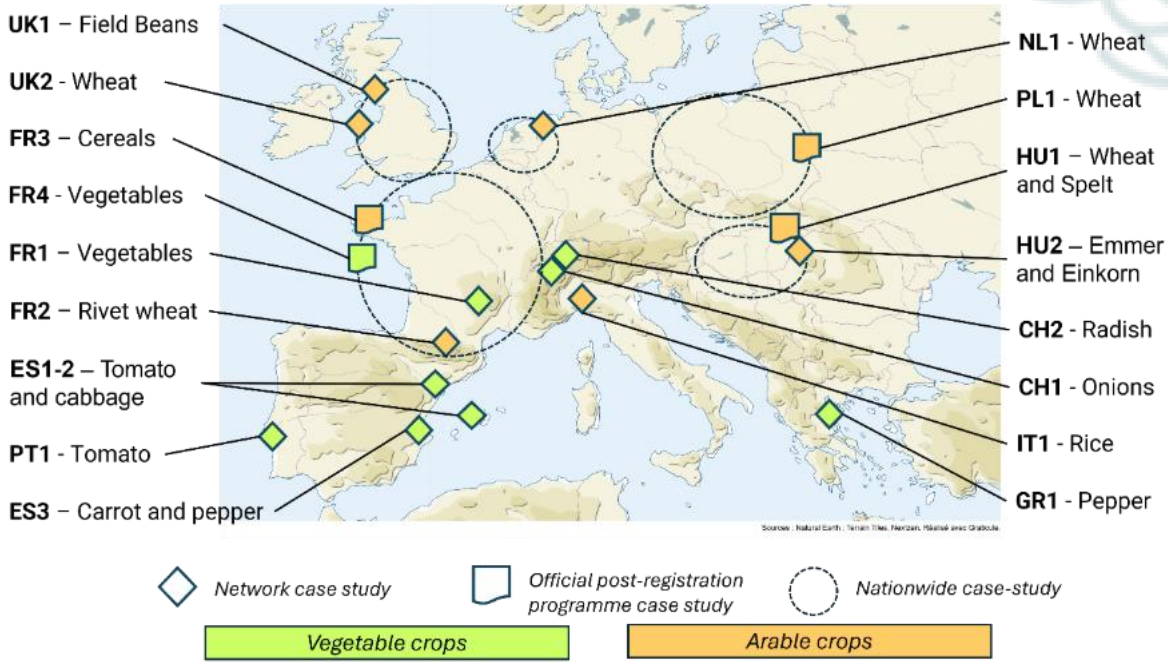


Figure 1: Location and characteristics of the 18 participatory cultivar evaluation case-studies in the framework of the LiveSeeding project.

2.3 A heuristic framework to help rethink cultivar evaluation systems

To embrace and reflect on the complexity that emerged from the LiveSeeding experience, it was necessary to think more deeply about cultivar evaluation, and to address this activity as an example of a knowledge production process in an indeterminate situation.

Hazard et al. (2020) developed a heuristic framework outlining some rules of thumb (Figure 2), to analyse research processes supporting sustainability transitions. Rather than focusing exclusively on experimentation, this framework considers the entire process through which (1) an issue is identified and isolated from an initial, evolving real-life situation, (2) translated into an operational objective, (3) addressed through specific methods to produce results that are, ultimately, (4) used to influence the initial situation. According to this framework, as adapted to the LiveSeeding work on organic cultivar evaluation (Costanzo et al. 2026), the real-life, indeterminate situation does not interact with the research process merely by providing a "problem" at the start and receiving "results" at the end.

The real-life context influences decisions and practices at every stage of the process: (1) it influences the way a technical-scientific problem is isolated, (2) the way it is translated into an addressable objective, (3) the interplay between constraints and methods that allows results to be generated, and ultimately (4) the way these results can be adopted in the real world. Conversely, each stage of the research process can have an impact on the real world by, e.g. raising awareness on a particular problem, enabling collective learning, or creating a fertile ground for serendipity or previously unforeseen initiatives.

In the following section, we explore what the LiveSeeding experience tells us about how to think strategically at each step of the knowledge production process in organic cultivar evaluation.

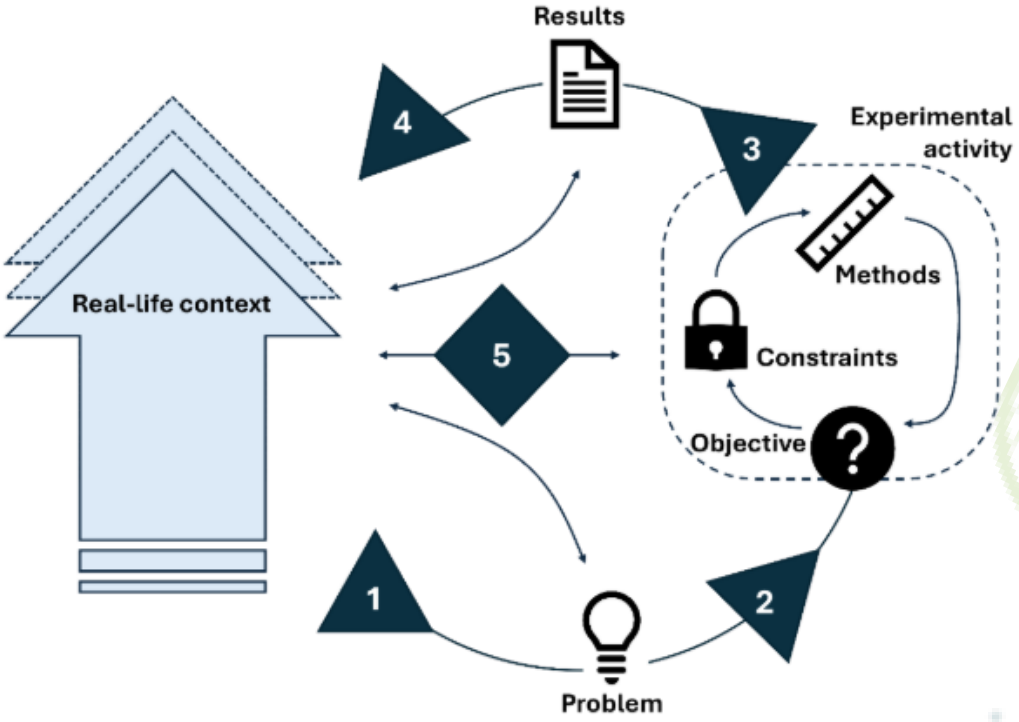


Figure 2: Heuristic scheme of the relationship between an indeterminate, real-life context and an R&D programme (such as cultivar evaluation) as adapted from Hazard et al. (2020). The cycle of knowledge production involves four subsequent choices: (1) the translation of real-life problems into a technical-scientific issue; (2) the design of the programme by the choice of appropriate methods for an addressable question; (3) programme implementation: production of formal results through the iterative interplay between addressable objective, constraints, and appropriate methods; (4) the use of results to change the real-world context. A further cross cutting dimension represents the feedback interactions between the knowledge production process and the real-life context (5).

3 THINKING STRATEGICALLY ABOUT THE CRITICAL STAGES OF CULTIVAR EVALUATION

3.1 Defining the problem as a commitment: *"what is the cultivar programme working to address?"*

Every knowledge production process starts with a problem, an opportunity, or a question, arising from a real-world situation that cannot be addressed with existing knowledge.

At first sight, when thinking of cultivar evaluation, this stage may appear straightforward: "helping farmers and growers to choose the most appropriate cultivar for them". However, even with this basic formulation, the problem is intrinsically multidimensional and must be explored at two different levels: (1) the balance between the biotechnical and socio-organisational dimensions, and (2) the effect on the "real-world" that is deemed desirable.

The experience of the LiveSeeding case-studies showed that the **starting problems of each cultivar evaluation activity are rarely purely technical**. In most situations, cultivar evaluation was expected not only to improve cultivar choice or generate technical information, but also to **support broader objectives** such as strengthening seed systems, developing value chains, increasing market opportunities, fostering farmer participation, or valorising local genetic resources.

As far as the intended effects are concerned, organic cultivar evaluation often addresses problems at the interface between the farm and the value chains pre-farm gate and post-farm gate. Organic cultivar evaluation might be seeking a "PUSH" effect towards the seed sector, identifying which (types of) cultivars are most appropriate and hence informing breeders or seed producers about what to prioritise. At the same time, organic cultivar evaluation intrinsically seeks a "PULL" effect towards the post-farm-gate value chain, to improve the supply of products to processors or to consumers by identifying cultivars that optimise particular desirable characteristics. In both cases, articulating the intended ambition helps clarify which relationships need to be established with which players.

The way a problem is defined shapes the entire evaluation process and its **ambition**. It is about building a representation of the world, of the way we think it needs to change, and of the way we think we can change it in a desirable direction. Problem definition is therefore not merely a preliminary step but an important intervention in its own right: a commitment that will lead to all subsequent decisions.

Box 1. From cultivar evaluation to rebuilding a local seed network

Participatory observation of vegetable cultivars (case-study FR1[2])

The initial goal was to provide a range of vegetable cultivar recommendations for organic farmers in the Massif Central region, a vast mountain area in the centre-south of France specialized in extensive animal production.

Through the discussions conducted during the project, participants realised that the underlying challenge was not just to provide recommendations on cultivar choice, but to address the lack of a sufficiently active network capable of generating and sharing locally relevant information.

Although the proposed experimental design, based on participatory observation and citizen-science approaches, was only partially implemented, the process of collectively discussing and formalising the problem increased awareness among local actors and created new opportunities for future collaboration.

Lesson learned: Defining a problem can already generate impact, even before methodological changes or formal results are produced.

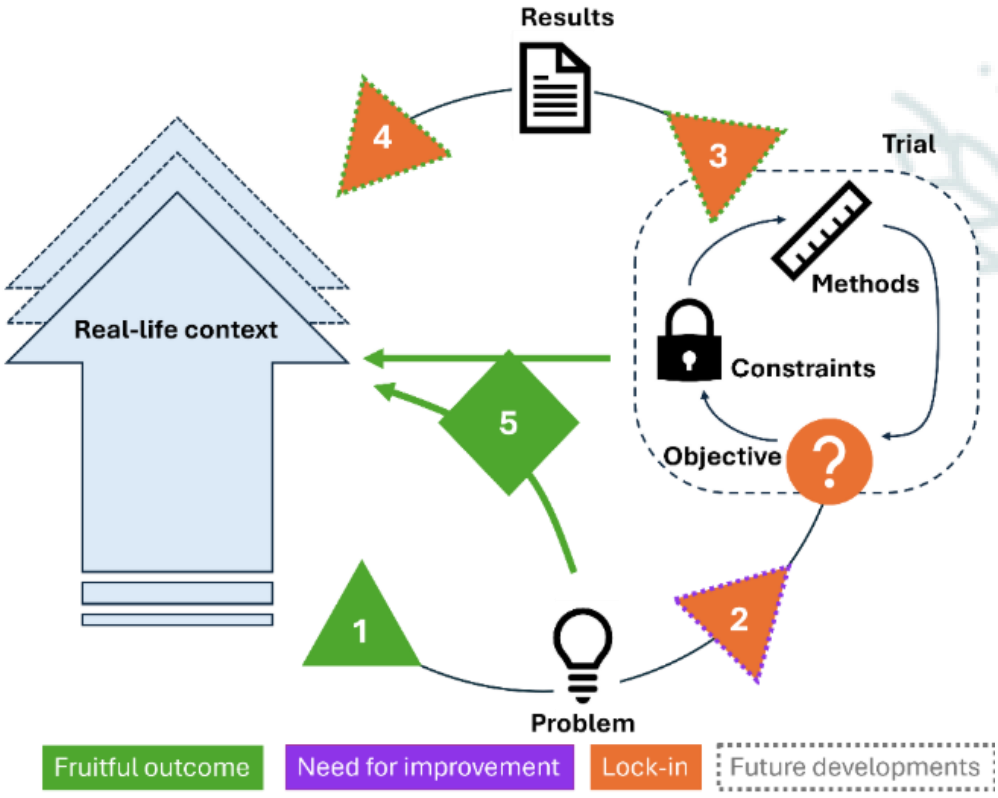


Figure 3: Graphical synopsis of the FR1 Case-study in France. Although the objective-setting (2), the experimental activity (3) and the production and adoption of results (4) had fallen short of the original expectations, the formalization of the original problem (1) has had a significant impact (5) in raising awareness and creating opportunities.

[2] The case study descriptions and analyses presented in this and the following boxes are derived from LiveSeeding Deliverable D2.5: *Costanzo, A., Bickler, C., Kessous, G. & Rey, F. (2026). Synthesis of cultivar evaluation case studies: recommendations and follow-up plans. LiveSeeding Deliverable D2.5*

3.2 Co-design of operational objectives: *"what can we do to work towards addressing the identified problem?"*

As seen in section 3.1, actors often start from legitimate aspirations and commitments that, however, are naturally too broad to directly guide the design of an evaluation programme. This is where the distinction between "the problem" and "the objective" becomes relevant: **the objective is a tangible, concrete question, precise enough to be answered in full through an appropriate method**, and whose fulfilment can help solve the initial problem.

For example, if the problem is "how to improve the yield of organic wheat in a given region through appropriate cultivars", the objective might be "determine which of the cultivars available on the market are performing well under organic conditions", or "screening wheat genetic resources from genebanks to find the right parents to start an organic breeding programme". Both objectives are relevant to the problem but might lead to completely different actions and timescales.

A recurring observation in the LiveSeeding experience was that evaluation **programmes often move directly from general intentions (problem definition) to methodological decisions**. Questions such as how many cultivars to test, how many sites to involve, or which statistical design to use, are addressed before clarifying what specific question the programme is trying to answer. As a result, objectives may remain implicit, and methodologies may become disconnected from the decisions they are expected to support.

Whilst the "problem definition" step clarifies the ambition; the definition of objectives translates such ambition into questions that are sufficiently precise to **guide action**. This often requires difficult choices and implies not to find the universally "best decision", but an optimal compromise. Parameters such as the number of cultivars evaluated or the number of testing sites are not mere technical variables. These are political choices that reflect specific objectives, constraints and expectations, and that cannot be guided by any objective procedure, but only by an explicit discussion to understand the needs, wants and other opportunities or restrictions within the network of stakeholders involved in the programme

It is the same "real world context" from which the need for cultivar evaluation stemmed, that leads to overlooking the definition of explicit objectives. The agents of research and development involved in cultivar evaluation, starting from the authors of this handbook, are often well-trained to implement experiments and protocols but receive less support to facilitate a dialogue to find the best acceptable compromise: either they are not trained to do so, or they have no time, or both.

Conversely, undertaking an explicit codesign process to translate the original problem into tangible, realistic objectives can have its own impact on the "real world context". All the actors involved will have a deeper, shared understanding of their respective priorities, will have participated in the decision-making process, and will take responsibility for the subsequent steps: a real occasion for empowerment.

Key lesson: One of the most important conditions for improving cultivar evaluation systems is the ability to translate broad intentions into explicit and operational objectives. This can only be done by involving the relevant players and engaging in an explicit discussion about priorities and realistic actions.

Box 2. From biodiversity conservation to a testable objective

Spanish local variety registration initiative (case-studies ES1-2)

The initiative pursued two broad ambitions: valorising local biodiversity and supporting the registration of local varieties in regional catalogues. These ambitions had to be translated into a concrete evaluation programme.

In theory, the involved network was ready and willing to pursue a collective learning process, supported by adaptive methodologies, about how to manage local genetic resources. In practice, regulatory requirements associated with registration of landraces imposed a collection of specific morphological descriptors and the adoption of standard, preconceived methodologies.

The exercise revealed how broad intentions are progressively transformed into operational objectives, and how external constraints shape this translation process.

Lesson learned: Operational objectives emerge from the interaction between aspirations and constraints, not from aspirations alone.

(continued in Box 3)

3.3 Choosing and applying appropriate methodologies: *"what is the optimal experimental design to test the agreed objectives?"*

The LIVESEED project developed practical guidance to help cultivar evaluation networks select appropriate methodologies according to their objectives and constraints. The proposed **frugal strategy** follows a simple logic: Define objectives → Identify constraints → Apply an appropriate methodology.

From this perspective, there is no universally "best" experimental design. **Different methodologies are suitable for different situations**, depending on factors such as the number of cultivars, the number of locations, the type of data that can be collected, the intended users of the results, available resources, and the level of participation sought. The objective is therefore not to apply a standard method, but to select a methodology that is coherent with the specific context and purpose of the evaluation programme.

The LiveSeeding case studies confirmed the relevance of this principle. However, the choice of appropriate methods is limited by several constraints, either internal or external to the programme manager or organization. In addition, some are **apparent and explicit constraints**, some others, harder to grasp, and hence extremely hard to manage, are **hidden constraints**. We attempt in Table 1 a summary of the main constraints that emerged during the LiveSeeding experience.

Table 1: Examples of constraints that influence the methodological choices of an organization carrying out organic cultivar evaluation

Constraints that limit the choice of methods	Internal to the organisation	External to the organisation
Apparent, explicit	• available human resources • access to trial sites and seed material • available skills and technical capacities	• funding rules • regulatory requirements • status quo - "business as usual"
Hidden, implicit	• existing organisational routines • available time to upskill and learn • available time to manage people and negotiate • insufficient openness to experience and risk	• expectations of participating actors or beneficiaries • perceived stake of losing scientific credibility and legitimacy

As a result, methodological choices often reflected compromises between objectives and practical realities rather than purely technical optimisation. Standard, well-recognised but expensive and inefficient, methodologies are not necessarily maintained because actors are unaware of alternatives or lack imagination. In many situations, practitioners are familiar with simpler or more participatory approaches but consider them difficult to implement because of institutional expectations, accountability requirements, or concerns about legitimacy.

This observation suggests that improving cultivar evaluation systems should not focus exclusively on identifying better methods. It also requires understanding the broader factors that make certain methods feasible, acceptable or desirable. In many cases, **progress may come as much from adapting objectives, governance arrangements, partnerships or resource allocation as from modifying the experimental design itself**. The LiveSeeding experience shows that the choice and application of methodologies derive only to a limited extent from the clarification of objectives, whereas it is macroscopically influenced by the "real world situation".

Conversely, choosing and applying methods can have a significant impact on the real world even without passing from the production of formal results, as long as the involved agents are aware of this potential and are clear about the objectives to pursue. The **testing environment is not just a biophysical medium in which different cultivars grow side-by-side: it is a meeting place for different people to meet and discuss**, and a playground to learn new things about the plants growing on it and about us and the other people that meet on it.

The role of methodology therefore remains central, but it should be viewed as one component of a wider system rather than as the sole driver of improvement.

Box 3. Constrained methodological decisions in a participatory initiative

Spanish local variety registration initiative (case-studies ES1-2 (continued from Box 2)

The decision of the involved multi-actor network to register local landraces in the regional catalogue was taken as an opportunity for empowerment and public recognition, yet it imposed methodological constraints. The procedure for landrace registration required standard trials for the documentation of preconceived morphological descriptors.

The involved actors reported a tension between carrying out a laborious experimental process and the real, practical relevance of its results. However, the adoption of a preconceived, reductionist stance in methodology was not in contradiction with an engaged epistemology and with an implementation stance oriented to empowerment and not to knowledge transfer.

Results were not directly useful to the collective involved in cultivar evaluation: but they were politically instrumental for their work to be recognised through the inscription of the local landraces in the regional catalogue.

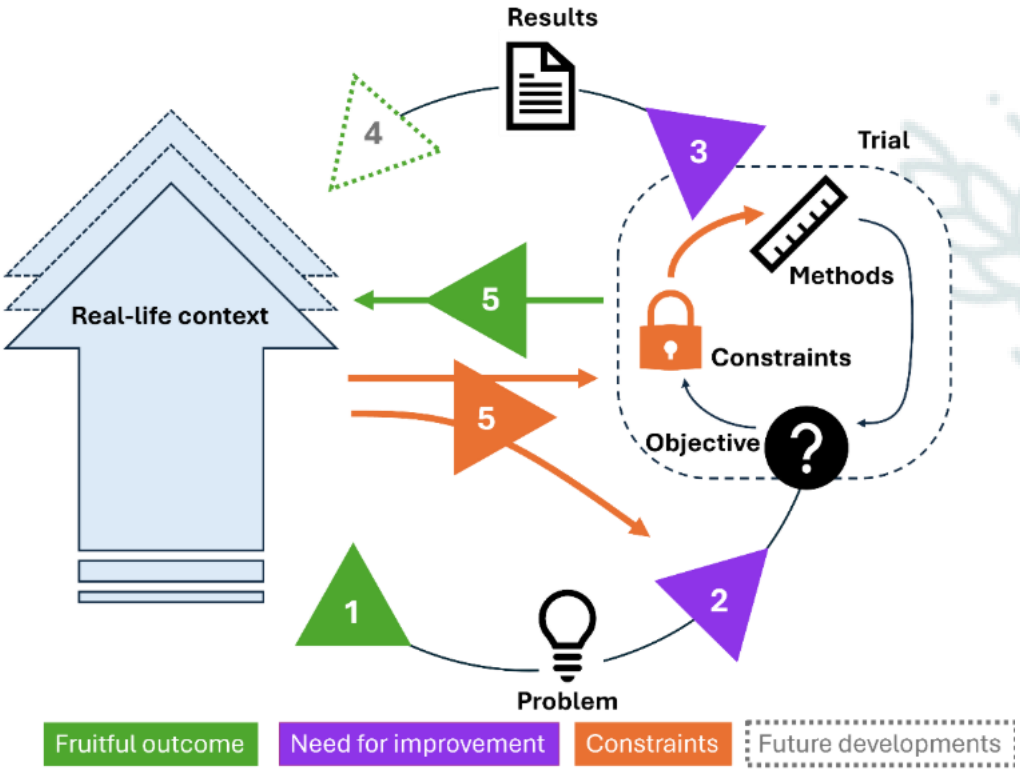


Figure 4: Graphical synopsis of the ES1-2 case-study in Spain (Box 2 and 3). The "Real-life context" provided the opportunity to register local landraces in the regional catalogue, but at the same time strongly constrained the objective-setting and the methods due to requirement of collecting formal morphological data. The acceptance of these constraints was instrumental to fulfil a political objective.

3.4 Producing and using results to guide decisions and to reflect on the experience: *"do the results reach the objective, who decides this and/or what have we learned from the work as whole?"*

Cultivar evaluation programmes are often assessed through the results they generate. Cultivar evaluation is often assumed to generate recommendations for farmers. However, the primary users of results may also be breeders, advisors, seed organisations, processors, value-chain actors, or public authorities. Clarifying who is expected to use the results is therefore an important part of programme design.

The case studies also highlighted an important distinction between results and recommendations. Evaluation activities produce results, but these **results often need to be interpreted, discussed and combined with other forms of knowledge before they can support decisions**. Recommendations are therefore not produced automatically by the evaluation process itself.

The nature of the results, and their possibility to be generalized, directly stemming from the methods and the objective-setting, can enable or constrain the production of recommendations. Sometimes, as described by the leader of a Swiss case-study on vegetables, "results remain highly subjective and specifically tailored to the particular farmer, making the transfer of results often difficult"[3].

The case studies also highlighted that formal reports are not always the most effective pathway to impact. **Demonstration events, collective discussions, farmer-to-farmer exchanges or the direct experience** of testing cultivars may sometimes play a more important role in supporting decision-making and change. The leader of a Hungarian case-study on cereals stated, *"the impact did not come by the results of the trial, but by the fact of having done the trials"*. In the UK, after 7 years of decentralised cultivar evaluation of bread wheat, *"results have informed farmers' decision making, but the experience of having access to a range of cultivars and growing them side-by-side next to one another has had the most impact within the network"*. A significant example of this is summarized in Box 4 and Figure 4.

These experiences raise an important question: what constitutes a useful result? The answer depends on the objectives pursued, and on the actors involved. Information that is highly valuable for breeders may be of limited relevance for farmers. Conversely, observations that farmers find highly useful may not always meet the standards required for formal evaluation procedures. The challenge is therefore not simply to generate more information, but to **ensure that information is meaningful and usable within a given context.**

There is however a relatively unexplored aspect about the production and use of results, that can potentially be transformative for the evolution of organic cultivar evaluation and any participatory

[3] This and the following quotes from case study leaders are taken from LiveSeeding Deliverable D2.5.

experimentation activity. In a view in which the knowledge production process is not a linear sequence but rather a cycle, **the production of formal results might be the critical link between one cycle and the next**. If a multi-actor network engages in testing different cultivars over a season, they acquire invaluable experience. However, is it when (and if) they meet to see and discuss the results of the season that they can learn, by reflecting on their experience, what really matters and in which direction their activity could further develop.

Key lesson: The value of cultivar evaluation depends not only on the quality of the information produced, but also on the capacity of actors to interpret, share and use that information.

Box 4. Impact without formal results

Local pepper landraces (Case-study GR1, Greece)

The initial objective was to evaluate several local pepper varieties. Standard methodologies were adopted and formal quantitative results on plant descriptors were produced. However, local growers were not interested in trial results, but rather in directly experiencing the cultivars, in visually assessing their performance and potentially testing them in their fields.

As the project progressed, the evaluation activities evolved into demonstration events involving farmers, consumers and processors, and including the distribution of seeds to growers interested in testing cultivars in their farms.

The most significant impact(s) did not come from formal trial reports. They resulted from the field visits, seed distribution, tasting events and direct interactions among actors. Therefore, local varieties began to be cultivated again and demand for seed steeply increased.

Lesson learned: Cultivar evaluation can generate change through participation and interaction, even before formal results are analysed or disseminated.

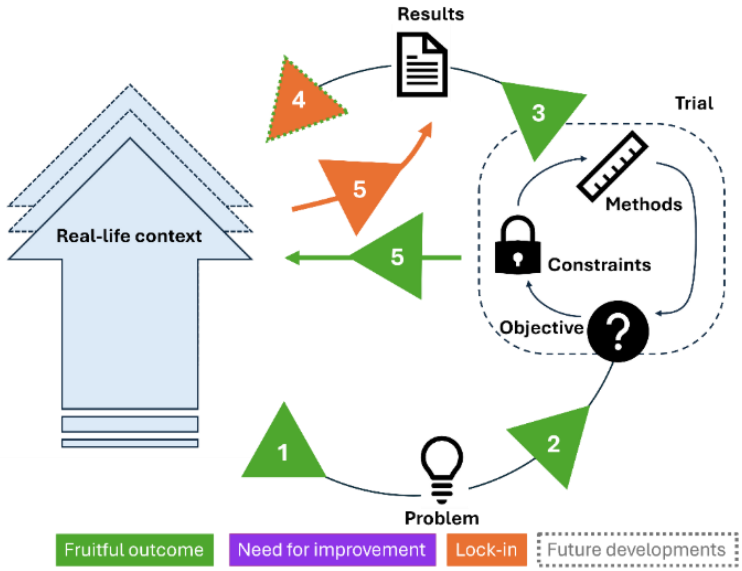


Figure 5: Graphical synopsis of the GR1 case-study in Greece. Constraints in the diffusion of results (4) have led the agents to transform the experimental field in a platform for open field days and seed exchange, leading to significant impact in the diffusion of the tested landraces (5)

4 RESULTS AND PROCESS: A STRATEGIC STANCE TO ENSURE IMPACT AND CHANGE

The experiences analysed in LiveSeeding suggest that the future of cultivar evaluation does not lie in the identification of a single optimal methodology. Organic farming systems are too diverse, objectives are too varied, and contexts are too dynamic for any universal solution to exist.

This observation does not mean that methodologies are unimportant. On the contrary, robust experimental approaches remain essential. However, the effectiveness of a cultivar evaluation programme depends not only on the methods it uses, but also on its ability to align objectives, resources, actors, institutional constraints and expected outcomes as well as building in coherent mechanisms for reflection, feedback and evolution of objectives and process.

In Section 3, we briefly outlined how each step of the knowledge production process of a cultivar evaluation activity is conditioned by factors and constraints, whether internal or external to the organisation managing the activity.

Funding limitations, regulatory frameworks, institutional routines, limited availability of sites, insufficient coordination capacities, and stakeholder expectations are all integral parts of the "real-life context". Such factors can restrict the range of options available and shape the trajectory of an evaluation programme.

At the same time, opportunities may emerge unexpectedly. New partnerships, policy developments, market demand, technological innovations, or collective learning processes may create possibilities for change that were not initially anticipated. Importantly, these interactions occur throughout the process and not only after results have been produced. The previous sections may suggest a merely sequential process. In reality, as seen in Figure 2, the steps of the "knowledge production process" constantly interact with the broader environment in which they operate. Often, impact and positive change in the real-life context emerge from these interactions.

The solution is therefore to acknowledge, harness and master these interactions between the successive steps of the knowledge production process and the real-life context. It is not a hard challenge, but it requires a little reasoning and, especially, an effort to take ownership of one's work and its meaning. This includes moving beyond the mindset of projects and deliverables to ensure work is organised to effectively and strategically address aims and objectives pertaining to a particular challenge.

According to Hazard et al. (2020), the way an agent can positively harness all these interactions depends on the **research stance**: *"the strategy used to deal with an indeterminate situation, influencing choices at all steps of knowledge production"*.

For a detailed description of the different conceptual dimensions of the research stance, we encourage the reader to consult the cited work. Here we try to summarise the reasoning starting from a simple statement on which everyone would agree: "**by producing knowledge, we want to have an impact**". This leads to two perspectives:

a) **We can have this impact through the results and their application (results-led impact).**
b) **We can have this impact through the process of producing results (process-led impact).**

In an ideal world, perspectives (a) and (b) would go hand in hand. In the real world, however, it is very probable that (a) and (b) are in tension, because they attach slightly different meanings to the various decisions to be made along the knowledge production process. It is in how we manage the tension between a results-led and a process-led impact perspective that we might find a way to unravel the constraints and transform our activities.

Adopting a results-led impact perspective alone encourages the activity to evolve towards maximising efficiency, which may entail certain risks. The French case study on post-registration cereal cultivar testing provides an interesting example. In this programme, several independent organisations test a common set of cultivars through more than 50 trials each year, following a common protocol. Data analysis and publication of results are centralised. The programme has been progressively improved in terms of workflow efficiency and quality assurance of results. However, *"the continuous optimisation of the process generates a saturation lock-in: the programme cannot accommodate more partners or species, nor does it leave room for testing alternative ways of working"*.

Conversely, adopting only a process-led perspective, in which too little importance is given to results, can lead to paralysis — as in the case study shown in Box 1, where participants ultimately disengaged from the network in the absence of results — or, worse, to poor decision-making.

Nevertheless, giving due importance to a "process-led impact" perspective is key to ensuring that cultivar evaluation activities contribute meaningfully to technical and social change. From this perspective, each step of the process can play a transformative role. Constraints can become manageable, while apparent failures can generate valuable learning, reveal new opportunities and contribute to empowerment. Ultimately, it is through this process that cultivar evaluation networks can strengthen and develop as "communities of practice".

Figure 6 presents the different meanings associated with each step, the potential pathways to impact enabled by a process-led perspective. Table 2 proposes some questions to support reflection at each step.

Table 2: Questions to ask regarding each step of the organic cultivar evaluation process.

The knowledge production process	Questions to ask in organic cultivar evaluation
1. Problem definition	• In which way is cultivar evaluation linked to the problem? Is it the right thing to do? • How can cultivar evaluation influence a desirable change? • Who should be involved in discussing the problem and potential solutions?
2. Translating the problem into objectives	• Are the objectives being negotiated and codesigned with the relevant actors? • Which assumptions are we taking for granted? • Are the agreed objectives explicit enough in terms of "what to do" and "why"? *(e.g. how many cultivars, which type, which traits, etc.)* • Are the agreed objectives clear and "SMART" (Specific, Measurable, Achievable, Relevant, Time-bound)? • Are responsibilities clearly distributed among different actors in the network?
3. Choosing and applying appropriate methodologies	• What is the most effective way to fulfil the objectives? *(e.g. on-station, on-farm, quantitative, qualitative, objective, subjective)* • What are the factors genuinely limiting our options? *(e.g. funding requirements, expectations, know-how, resources)* • Which constraints could be challenged, overcome, or bypassed? • Is external support or advice needed, and where to find it?
4. Producing and using formal results	• Who is really using the information we produce? *(Farmers, breeders, processors, nobody?)* • What is surprising about the results, and the type of results that are being obtained? • What have these results enabled to happen? Do they address the objective as hoped? • What have we learnt from the process of generating these results? • What would the next step look like?

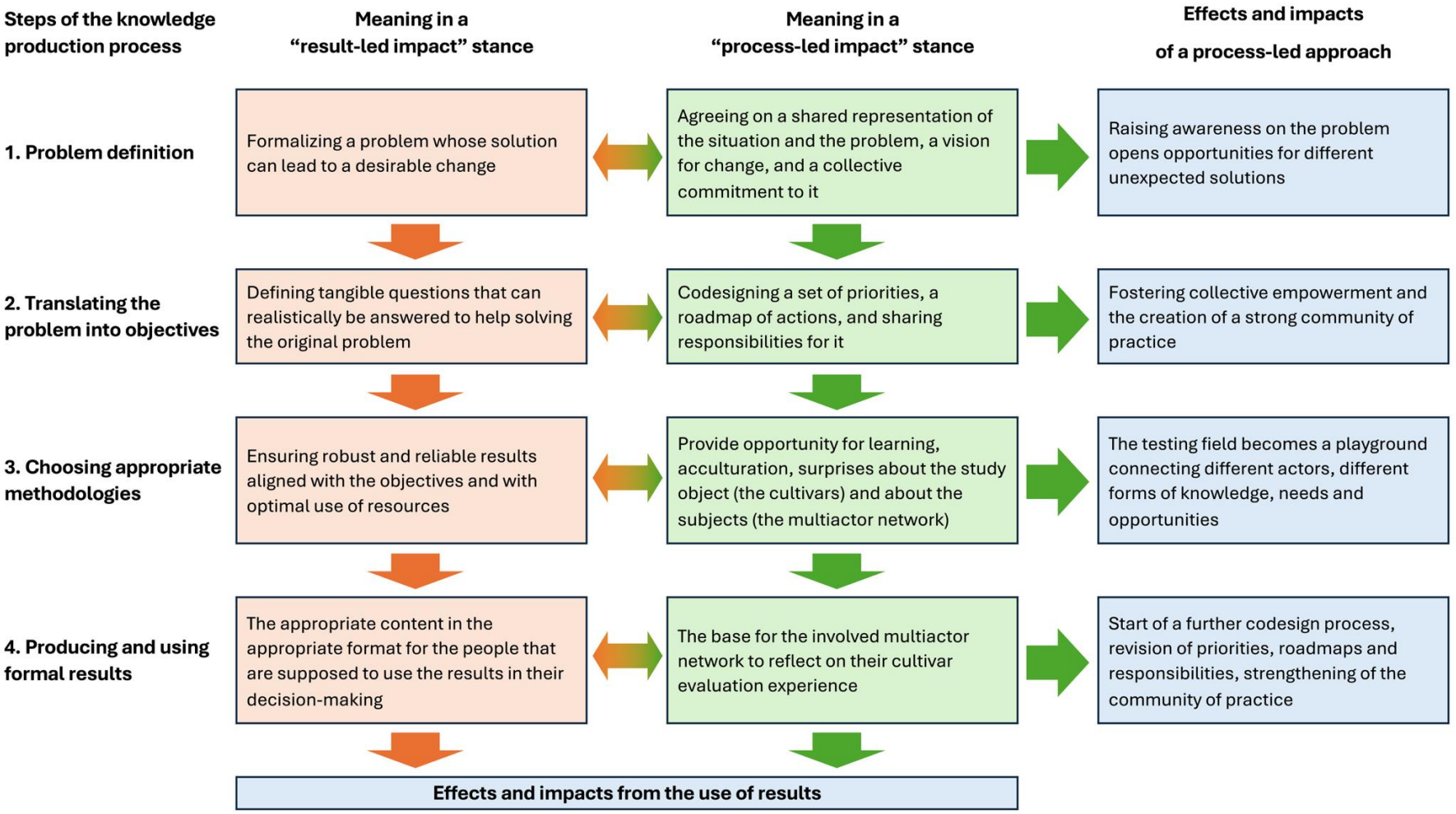


Figure 6: The knowledge production process in organic cultivar evaluation, the meaning of each step in a "results-led" or "process-led" impact stance, process-led impact of each step

5 TOWARDS MORE ADAPTIVE CULTIVAR EVALUATION SYSTEMS FOR ORGANIC

Throughout this handbook, cultivar evaluation has been considered not simply as a technical activity, but as part of a broader sociotechnical system. From this perspective, the challenge is not only to improve experimental designs, but also to strengthen the capacity of networks and organisations to reflect on their objectives and results, adapt to changing circumstances and learn from experience.

The lessons emerging from LiveSeeding suggest that some of the most important questions are not methodological. They concern the ability to collectively define problems, translate ambitions into realistic objectives, discuss trade-offs, mobilise relevant actors and make effective use of the resources available and information generated. These capacities are an essential prerequisite for making appropriate methodological choices: objectives need to be clarified, constraints identified and relevant actors engaged before selecting statistical designs, protocols or digital tools suited to the context.

The project also highlighted that cultivar evaluation can generate value in multiple ways. Beyond producing formal results, evaluation activities may strengthen relationships between actors, stimulate learning, increase awareness of emerging issues and create opportunities for collaboration. These effects are often less visible than experimental outputs, but they can play a much more decisive role in supporting innovation and adaptation.

Rather than prescribing a particular pathway, this handbook encourages actors involved in cultivar evaluation to be clear about the assumptions, objectives, constraints and opportunities that shape their activities. Doing so can help identify realistic opportunities for change and support the progressive adaptation of existing systems.

Ultimately, the redesign of cultivar evaluation systems is not a destination but an ongoing process. New challenges will continue to emerge, whether linked to climate change, the diversification of farming systems, evolving markets, new regulatory frameworks or the development of novel plant genetic resources. The ability to continuously question, adapt and improve existing practices may therefore become one of the most important capacities of cultivar evaluation networks in the years ahead.

Final message: **There is no single best way to organise cultivar evaluation. What matters is the capacity to develop approaches that are coherent with the objectives pursued, the actors involved and the realities of the context in which they operate at a certain point in time.**

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Handbook

Rethinking Cultivar Evaluation for Organic

—

A Learning-by-Doing Perspective from the LiveSeeding Experience

Abstract

This handbook draws on the experience of 18 pilot organic cultivar evaluation initiatives, which aimed to develop more cost-effective, adaptive and participatory approaches. We highlight how cultivar evaluation can generate value beyond formal experimental results, by strengthening relationships between actors, stimulating learning and creating opportunities for collaboration. We examine the critical stages of cultivar evaluation through the lens of a "research stance" balancing results-led and process-led perspectives on impact.

Rather than recommending a single best methodology, we propose a framework to help understand the diverse factors — organisational, institutional and contextual — that shape cultivar evaluation systems in practice. Ultimately, there is no single best way to organise cultivar evaluation: what matters is the capacity to have clear objectives and to develop coherent, adaptive approaches suited to one's objectives, actors and context — and to keep questioning and improving them over time. This handbook is intended as a companion for network coordinators, trial managers and other actors seeking to reflect on, adapt or strengthen their own cultivar evaluation systems.

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