Report on financing and governance models for organic breeding initiatives

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V1	16.04.2025	Claudia Meier, Mariateresa Lazzaro	Draft outline
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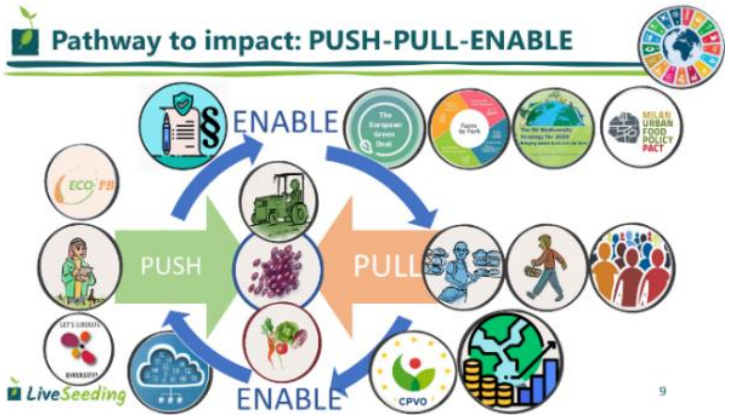
LiveSeeding - Organic seed and plant breeding to accelerate sustainable and diverse food systems in Europe *is a 4-year Innovation Action funded by the European Union, the Swiss State Secretariat for Education, Research and Innovation (SERI) and UK Research and Innovation (UKRI). The project started in October 2022 and brings together 37 organisations operating in 16 European countries. LiveSeeding provides science-based evidence and best practice solutions to help achieve 100 % organic seed.*

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 addresses the topics in a ***holistic multi-actor***, ***multi-stakeholder***, ***participatory approach*** *involving stakeholders along the value chain in 17 local* ***Living Labs*** *(LLs) and 3 established networks of organic breeders (****ECO-PB****), seed savers (****ECLLD****) and Milan Urban Food Policy Pact (****MUFPP****). 15 European countries cover the different pedoclimatic zones and socio-economic contexts, including countries with a low level of development in organic seed and breeding in East and South Europe.*

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List of abbreviations

AEG	AEGILOPS
AGL	Agrologica
CAPEX	Capital expenses
DUGA	D'une graine aux autres
€	Euro
FSiF	Fondazione Seminare il Futuro
F&T	FRAB & Triptolème
GR	Grassroot initiative
ICARDA	International Center for Agricultural Research in the Dry Areas
IPR	Intellectual Property Rights
KIS	Agricultural Institute of Slovenia
LL	Living Lab
LREF	Les Refardes SCCL
LSSV	Living Seeds - Sementes Vivas
MCA	Multi-criteria analysis
MGR	Market-grassroot partnership
MI	Market Initiative
NMB	Nordic Maize Breeding
ÖMKi	Ökológiai Mezőgazdasági Kutatóintézet -Research Institute of Organic Agriculture
OHM	Organic Heterogeneous Material
OPBI	Organic plant breeding initiative
OPEX	Operational expenses
OV	Organic Variety
PGR	Public-grassroot partnership
PM	Public-market partnership
PMG	Public-market-grassroot partnership
PO	Public Organisation
PRM	Plant reproductive material
PSR	ProSpecieRara
RSR	Rete Semi Rurali
R&B DFH	Research & Breeding Dottenfelderhof
SMART	Smarties.bio SRL SOC. AGR.
UBIOS	Union Bio Semences
VARL	Associació de Varietats Locals

Summary

Deliverable D5.2 "Report on financing and governance models for organic breeding initiatives" provides a comprehensive overview of governance and financing models used by Organic Plant Breeding Initiatives (OPBI) across Europe and strategic options to ***enhance their long-term financial sustainability****. Achieving funding stability remains a key challenge for the sector due to the long-term, capital-intensive endeavour - often requiring 10 to 15 years - to bring a new cultivar to market.*

Based on case studies from ***16 initiatives*** *across* ***11 countries*** *(scope), the report analyses key governance and funding typologies, identifies barriers and enablers to sustainability, and highlights marketing success factors for cultivars defined under the EU Organic Regulation. It is based on an online survey, a workshop with a panel of experts from OPBIs -both project partners and external participants- and input from actors of a value chain for an OV and one for an OHM, this last in synergy with D6.1 (methodology).*

The conclusion is that a collaborative effort, bringing together public bodies and value chain actors at a European level to ***mobilise public investment and cross-sector contribution*** *is essential for the long-term financial sustainability of organic breeding.*

Deliverable D5.2 "Report on financing and governance models for organic breeding initiatives" is structured in 5 chapters:

Chapter 1 provides the background and objectives of the study, highlighting the critical role of organic plant breeding in sustainable agriculture and food sovereignty, while addressing the challenges posed by inadequate financing models, and setting out the aim to analyze and map governance and funding approaches that can support the long-term viability and societal mission of Organic Plant Breeding Initiatives.

Chapter 2 provides a description of financing and governance models of Organic Plant Breeding Initiatives based on data of sixteen initiatives from eleven countries in Europe.

Chapter 3 delves into drivers and obstacles to long-term financial sustainability of individual OPBI based on key elements of the governance and financing typologies identified in the analysis of the case studies.

The expert reflection on opportunities for long-term sustainability is supported by an overview of success factors in marketing cultivars belonging to the 'Organic Heterogeneous Material' and 'Organic Varieties' cultivar types in **Chapter 4**, based on the experience of two value chains (one for OVs and one for OHM). These cultivar

types are explored in particular as they are included in the EU Organic Regulation and they are a key aspect for OPBI market differentiation.

Chapter 5 provides an analysis of the data and results presented in the first four chapters and provides recommendations.

Figure 1 summarises the report's overview of the current state of OPBI governance and finance models, as well as recommendations for actions to strengthen the financial basis of the organic breeding sector through collaborative efforts at a European level.

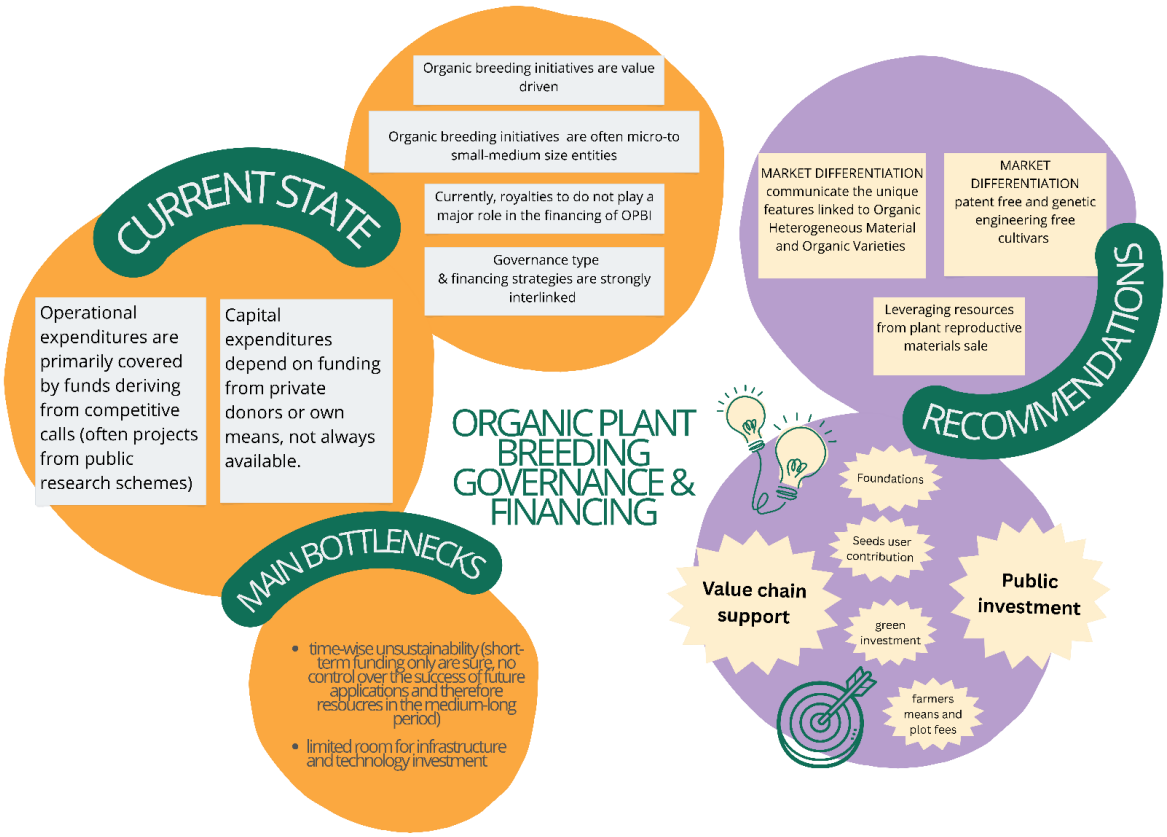

Figure 1: Overview of OPBI governance and finance models and recommendations

Key aspects emerged from **current state of play and related** analysis include:

- Organic Plant Breeding Initiatives (OPBI) are often micro-to small-medium size entities.
- Organic Plant Breeding Initiatives are committed to collaboration and participation as result of the value-driven nature of organic breeding. Most initiatives included in the study, regardless of their profit or non-profit status retain characteristics of grassroot movement organisations.
- The specific governance structures of these organisations have an important impact on their capacity to access specific types of funding.
- Currently, royalties to do not play a major role in the financing of OPBI, especially in the case of Organic Heterogenous Material -for which Plant Variety Protection

does not apply- and cultivar development for minor crops-in which anyway the acreage would not reach a critical size to make the input from royalties relevant). Nevertheless, the significance of royalties can vary from crop to crop and among organisations and countries in relation to their specific cultivar type and market share.

- In the case of the initiatives included in the study, operational expenditure is primarily covered by project funding (often competitive calls from public research schemes). Capital expenditure relies on private donors or internal funds, which are not always readily available.
  This situation highlights two major issues. First, financing is unsustainable over time because OPBIs cannot control the success of future project applications. Second, approved projects typically last only 3–5 years and offer limited scope for infrastructure and technology investment. Gathering resources for capital expenditure remains challenging.

Key **recommendations** from this study are:

- Leveraging resources from plant reproductive materials sale is an asset for improving financial sustainability.
- For non-profit organisations focusing on breeding, partnering up with for-profit entities specialised in organic plant reproductive material sale can be a successful strategy to ensure at least a part of income independent from funds and subsidies.
- The communication of the unique features specifically linked to the "organic" type of cultivars (Organic Heterogeneous Material and Organic Varieties) are an asset for market differentiation.
- Developing patent free and genetic engineering free cultivars is an asset for providing farmers freedom of choice and for aligning seed choice with the organic farming principles as well as for market differentiation.
- For the public bodies, investment in long-term public breeding and publicly supported organic and agroecology-oriented breeding programmes is important for ensuring long-term focus on cultivar development for sustainable farming systems.
- Value chain-based support, particularly from processing and retail sector actors, is necessary to drive and amplify the impact of public investment. On the one hand, investment from these sectors clearly demonstrates to public bodies the importance of the breeding and seed sector in promoting sustainable farming, and on the other hand, it can provide co-funding for activities that cannot be fully funded by public resources.
- Public donors should consider longer-term and predictable financing mechanisms (core funding or long-term grants with a blueprint approach) to support these initiatives that are currently too depends on inadequate short-term project-based funding (with a short cycle of 3 to 5 years).
- While public funding and value chain support remain a primary target for funding increase, other sources of funding (e.g. foundations, green investment, crowd funding, seeds user contribution, farmers means and plot contributions) should be explored as a way to diversify and increase funding opportunities.

1. Background and objectives

Plant breeding is a long-term, capital-intensive endeavor, often requiring 10 to 15 years to bring a new cultivar to market. In the context of organic and agroecology-oriented farming, this continuous process is essential for adapting crops to the growing conditions of these sustainable farming systems, which are based on a system-level approach that minimizes external inputs and promotes natural processes (ECO-PB, 2012). Specifically, organic cultivars are developed for enhanced resilience to pests and diseases, which in turn reduces the need for expensive, non-renewable inputs such as synthetic fertilizers and pesticides. This reduces costs for farmers and mitigates the environmental impact of agriculture. Furthermore, organic breeding is critical to maintain and enrich cultivated diversity, a key factor for adaptation to evolving environmental conditions. Organic breeding aims to maximize access to seeds giving centrality to the role of seed as a commons (Sievers-Glotzbach et al., 2020).

The organic production regulation proposes two types of cultivars conceived as organic from their breeding process: organic varieties (OV) and organic heterogeneous material (OHM). The operational framework, in relation to governance and funding of initiatives aiming at breeding these materials and conserving locally adapted cultivars such as landraces and heirloom varieties, is what this report analyzes.

In organic and agroecology-oriented farming, seeds are considered essential for food sovereignty and are treated as a common good, not just a commodity. Thus, the value of organic breeding extends beyond the aspect of providing quality seeds for the organic production method, offering significant contributions to long-term agricultural resilience, environmental stewardship, and human health, becoming an important link of the overall agri-food system. The traditional model of financing variety development, where royalties based on Plant Variety Protection constitute the primary source of income and re-investment, has proven to be inadequate for organic breeding (Kotschi et al., 2015; Winter et al., 2021). While these approaches may be functional for mainstream, large-market crops, it can only cover a small fraction of the total cost for the organic sector due to its smaller market share, the focus on crop diversification (e.g. work with niche crops), genetic diversity and local adaptation (Winter et al., 2021). Moreover, market protection based on patents is a no-go in the organic sector. This economic limitation is exacerbated by the ethical perspective to ensure farmers and people's right to seed access (Tschersich et al., 2023). Plant breeding driven by the global market logic only often neglects other crucial tasks beyond delivering seeds as input for crop production, tasks central to organic principles, such as increasing agrobiodiversity, preserving genetic resources and their

cultural heritage. Financing organic breeding initiatives is challenging due to the dual objective of delivering quality, adapted seeds for commercial production while respecting the role of seeds as a cultural and natural resource. Additionally, organic breeding initiatives operate in a market landscape characterized by (i) very strong consolidation of actors in the breeding and seed industry (Howard, 2022 & 2015), (ii) significant loss in public breeding programs and (iii) high market entry barriers for SMEs. This market environment is a challenge for the economic stability of organic plant breeding initiatives.

Against this background, the objectives of this study were (1) to analyze and map the governance and financing models of existing organic plant breeding initiatives, (2) to identify existing model types and (3) to assess and discuss their financial sustainability and out-scaling potential. The importance of studying governance and financing strategies at the same time extends beyond mere economic considerations. It is needed to link them with the way we manage seeds that are indispensable for food sovereignty, ecological resilience, and a broader societal transformation toward sustainable, healthy, fair and climate-neutral local food systems. The evidence demonstrates that the existing mainstream models are not equipped to support the long-term, public-service nature of organic breeding.

Therefore, this study aims to support existing and future organic plant breeding initiatives in the selection of models that can sustain both economic and societal objectives and to foster sector-wide collaboration for advocacy activity to increase funding at European level.

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*A **GLOSSARY** of the key terms necessary for understanding this report can be found at the end of the document. The words included in the glossary are underlined in the text (e. g. Plant breeding)*

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2. Analysis and mapping of governance and financing models of organic plant breeding initiatives

2.1 General approach and methodology

To analyze and map the governance and financing models of existing organic plant breeding initiatives (OPBI), we conducted an online survey with 16 existing OPBI in 2024. Survey inputs were checked and validated in a call, where needed, with the respective initiatives in 2025. Survey responses were then used to identify existing

types of governance and financing models among OPBI. Additionally, in a workshop, the survey results were presented and the governance and financing strategies identified were discussed with respect to the financial sustainability and up and out-scaling potential of the financing strategies of existing OPBI (for further details on the workshop, see chapter 3).[1]

2.1.1 Selection of survey participants

OPBI have been framed as individual or collective experiences or organizations, public or private, with or without profit, dedicated to organic plant breeding and/or landraces and heirloom varieties conservation as their sole activity or alongside others such as seed or produce production or service providers. They were selected with task partners with the aim to reach a diverse and balanced sample with respect to country (where the initiative is based), focus crop (of breeding activity) and founding year (both new and established initiatives). We did not have the ambition to reach a representative sample of OPBI in Europe. We intended to explore the diversity in governance and financing models and not to quantify the frequency of governance models used or the frequency of financing sources used. For this reason and the small sample size, we do not summarize results in this report – to average values or other summary statistics. The OPBI were contacted via e-mail, sending a link to an online survey. The survey was completed by 16 initiatives. Table 1 shows the OPBI that took part in the survey and that were further analyzed.

Table 1: Overview of the OPBI participating in the survey.

ID	Acronym	Breeding initiatives	Country	Founding year	Focus crop	Involved in LiveSeeding	LivingLab (LL)[2]
1	PSR	ProSpecieRara	Switzerland	1982	Vegetables	Yes	Vegetables_CH (A,R,C)
2	RSR	Rete Semi Rurali	Italy	2007	Arable crops	Yes	Rice_IT (E,R,C)
3	LREF	Les Refardes SCCL	Catalonia (Spain)	2014	Vegetables	Yes	Vegetables_ES1 (A,P,C)

[1] Two of the 16 initiatives were used to pretest the survey. As the survey was adjusted after the pre-test, with some questions being added, answers to added questions are missing for these two initiatives. Usually, pretests are fully excluded from the analysis of results. Due to the small sample we decided to keep them for the available answers.

[2] The living labs were described in the project using different attributes. The abbreviations in parenthesis stand for: A = Advanced, E = Emerging, N = National, R = Regional, P = Periurban, C = Citizens directly involved.

4	ÖMKi LL	ÖMKi-VSZT-Nébih organic post-registration network	Hungary	2011	Organic winter wheat, spelt, einkorn and emmer.	Yes	Arable_HU (A,N,C)
5	F&T	Farmers members of FRAB and Triptolème	France	2003	Arable crops	Yes	Arable_FR1 (A,R,C)
6	KIS	Agricultural Institute of Slovenia, plant breeding unit	Slovenia	1898	Arable crops (wheat, buckwheat), vegetables (beans), forage crops (red clover, fescue)	Yes	Arable_SI (E,N)
7	AEG	AEGILOPS	Greece	2004	Arable crops	Yes	Cereals_EL (A,N,C)
8	DUGA	D'une graine aux autres	France	2022	Arable underutilized crops	NO	NO
9	UBIOS	Union Bio Semences	France	2013	Bread wheat	Yes	Cereals_FR2 (A,R)
10	AGL	Agrologica	Denmark	1984	Cereals	NO	NO
11	NMB	Nordic Maize breeding	Netherlands	2005	Maize	NO	NO
12	R&B DFH	Dottenfelderhof	Germany	1977	Arable and vegetable crops	YES	NO
13	FSiF	Fondazione Seminare il Futuro	Italy	2019	Cereals	NO	NO
14	SMART	SMARTIES.BIO SRL SOC. AGR.	Italy	2019	Vegetables	NO	NO
15	LSSV	Sementes vivas	Portugal	N/A	N/A	Yes	Vegetables_PT (E,R,C)
16	VARL	Associació de Varietats Locals	Spain	2002	N/A	Yes	Vegetables_ES1 (A,P,C)

2.1.2 Survey design and implementation

In order to design the survey, we drew upon existing literature on governance and financing models, particularly the publication by Egusquiza et al. (2021), who mapped and integrated governance, financing, and business models for nature-based solution projects into one single conceptual framework. Several questions in the survey are inspired by their work. We also drew upon our own experience in previous projects, including LIVESEED and Engagement.Biobreeding which resulted in a publication on "Strategies for integrating organic breeding and seed production into value chain partnerships" (Winter et al., 2021) and a factsheet on "Governance and financing strategies in Organic Breeding" (Lazzaro & Messmer, 2023).

The survey included 5 sections (Table 2) to cover general info about the OPBI, collecting info about their governance and decision-making and the topic of the financial sources for their breeding work. The survey was tested with two initiatives using an online call. After integrating feedback, the survey was distributed to the initiatives to be filled up independently.

Table 2: Overview of the structure of the survey, showing the covered topics per section

Sections	Content
Descriptives	country, founding year, focus crop(s)
Activities	pursued breeding activities, pursued sales activities and other activities, sales channels
Governance model	organizational form, initiator, operational scale, number of employees, type of organization, perceived support from government and community, organizational structure
Decision making	characteristics of decision making, involvement, decision power, decision making processes on financial issues, on breeding and conservation targets, and on values
Financing sources of operational and capital expenses 2023 (and if different: 2022)	Total operational expenses, total capital investments, respective sources (sales or subsidies/funds or others) and proportions of the latter

2.1.3 Approach to mapping initiatives

As mentioned in chapter 2.1.2, we used the conceptual framework proposed by Egusquiza et al. (2021) to classify and map the 16 initiatives surveyed according to

their governance models. The conceptual framework consists of a total of seven governance model types, spanning across three dimensions in a triangular space (Figure 2).

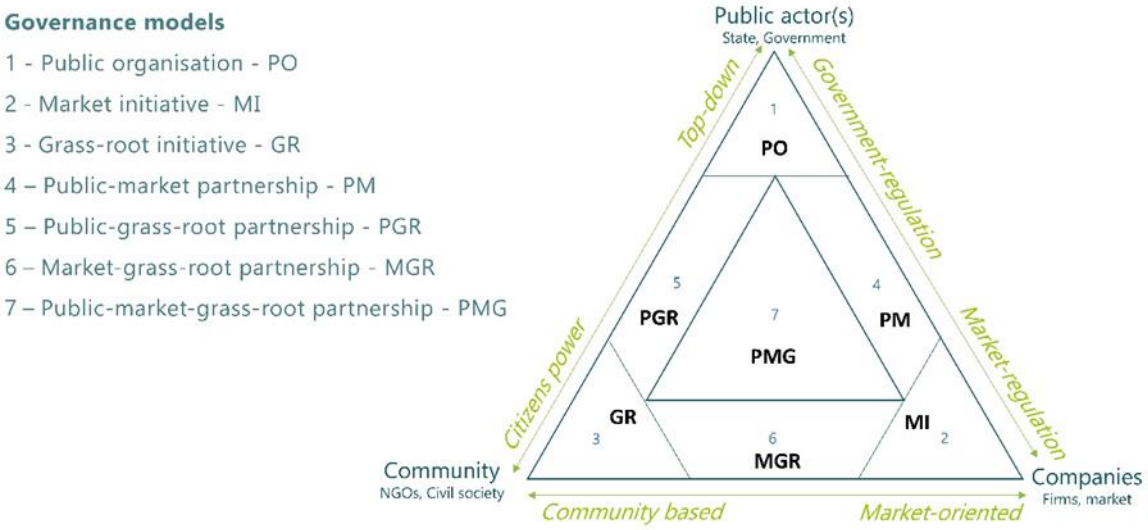


Figure 2: Conceptual framework adapted from Egusquiza et al (2021).

There are three 'pure' governance types located in the corners of the triangle (Public Organization - PO, Market Initiative - MI, and Grassroot Initiative - GR) and four hybrid forms – three representing a partnership between two of the three pure types and one representing a partnership between all three pure types.

The governance type "public organization" (PO) is located on the top of the triangle. It is top-down regulated by the government. Examples of public organizations are governmental research institutions. In the lower right corner of the triangle are located the "market initiatives" (MI). They are defined to be regulated by and oriented towards the market, e.g. private companies. In the lower left corner of the triangle are located the "grassroot initiatives" (GR). They are strongly based on the community and powered by citizens. NGO's or associations from civil society can be listed here. Further, the model classifies four hybrid governance types. The hybrid form of public organization and market initiative is called a "public-private for-profit partnership" (PM). This applies when an initiative is part of a (legally defined / formalised) partnership that includes private for-profit and public organisations.

The hybrid form of public organization and grass-root initiative is defined as a "public-private non-profit partnership" (PGR). This is the case for organizations members of a (legally defined / formalized) partnership that includes private non-profit and public organizations.

The hybrid form between market initiatives and grass-root initiatives is a "private non-profit – private for-profit partnership" (MGR). This applies when an organisation is part of a (legally defined / formalised) partnership that includes private non-profit and private for-profit organisations.

Finally, the model defines a hybrid form of all three governance models: a "public-private partnership (for-profit & non-profit)" (PMG). In this case, the initiative includes a formalized framework among private nonprofit, private for-profit and public organization(s).

2.2 Results

2.2.1 Description of organic breeding initiatives

The 16 OPBI participating in the survey spread across eleven different countries in Europe (see Figure 3A).

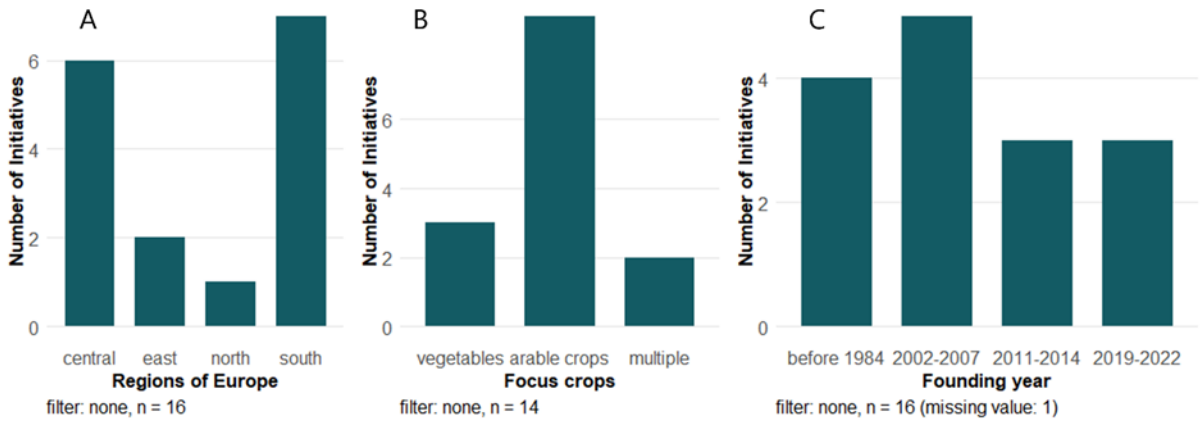


Figure 3: Regions of Europe (A), focus crop categories (B), and founding years (C) of the OPBI participating in the survey.

As shown in Figure 3C, three of them were founded only recently, between 2019 and 2022. Another three were founded between 2011 and 2014. Five were founded between 2002 and 2007 and four before 1984. Most of the initiatives' breeding efforts focus on arable crops (n = 9). Four of those specified that they concentrate on cereals and one specified to work on maize. Another three initiatives focus on vegetable breeding and two have multiple focus crops, working both on vegetables and arable crops, with one of them also including forage crops (Figure 3B).

2.2.2 Activities that organic breeding initiatives typically follow

The 16 initiatives were asked to indicate the type of breeding activity they are committed to as well as related activities like the sales of plant reproductive material and food or the provision of information through training and events (Figure 4).

Figure 4: Reported activities of breeding organizations/initiatives [n = 16]. Question type: Multiple choice. No filter applied.

In terms of breeding activity, eleven of them conserve/ improve landraces, heirloom varieties, nine of them breed/develop organic heterogenous material (OHM) and eight of them breed/develop organic varieties (OV). Considering breeding-related activities, ten of them offer training/information events, eight of them sell plant reproductive material (PRM), and four initiatives sell raw and/or processed products. Finally, five initiatives reported to sell or offer other products or services, like for example books on seeds, advisory services, and support with variety trials. Only three initiatives stated to exclusively pursue breeding, not selling any products or services. The eight initiatives which sell PRM reported various sales channels: direct selling to farmers, hobby gardeners or plant nurseries (n=6), selling to seed companies (n=4), to food retailers (n=3), to DYI shops (n=4), to garden centers (n=2), to an organic feed company (n=1), and selling via cooperatives who resell the seeds to farmers (n=1). The four initiatives selling raw or processed products indicated selling these to food processors (n=3), food retailers (n=2), consumers (n=2) and cooperatives (n=1). Two of them sell grains which do not meet seed quality requirements directly to consumers or to food processors (e.g.: local bakery). One initiative sells flour, maize, cereal grains and apples on. For them, the sales booth is a way to valorize their products, however, it mostly serves the education of and bonding with the local community. Another initiative sells potatoes to food retailers.

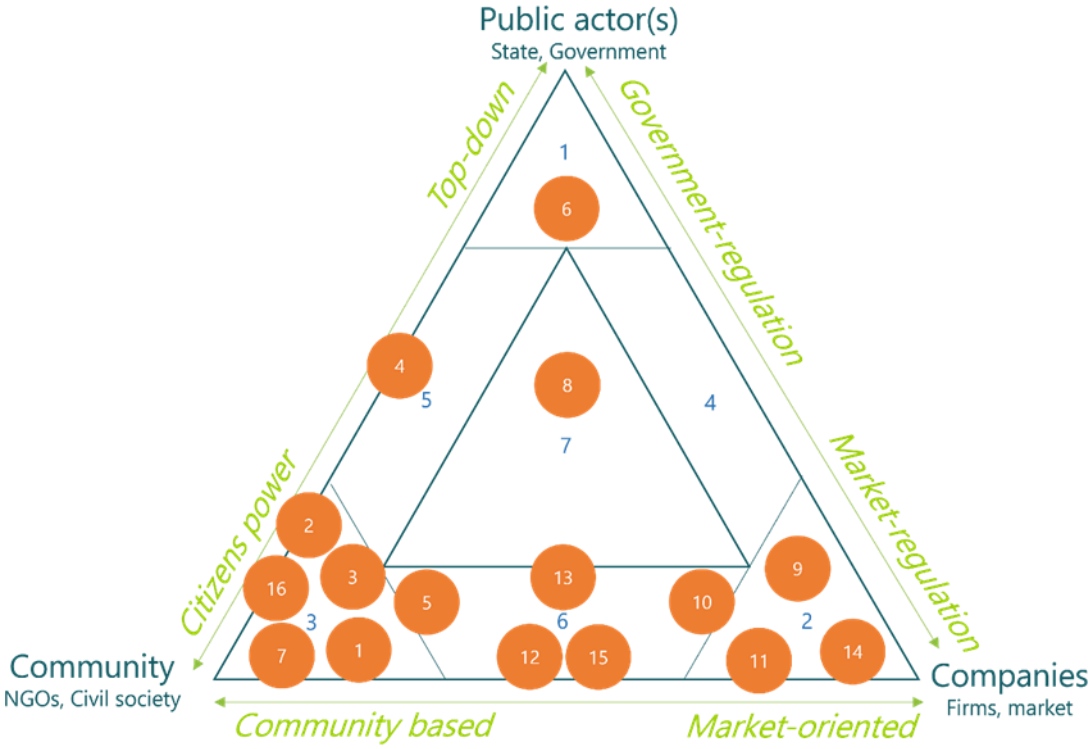
2.2.3 Governance models of the surveyed organic breeding initiatives

2.2.3.1 Mapping initiatives

To map the 16 initiatives surveyed according to their governance model, we used the classification scheme proposed by Egusquiza et al. (2021) consisting of a total of seven

governance model types, spanning across three dimensions in a triangular space (see chapter 2.1.3 for further information on the classification scheme).

In the survey, the initiatives were asked to choose one of the seven governance model types they think best describes the way their initiative is managed and operated. Based on answers to additional questions concerning their initiative's governance and organizational structure, the self-selected governance models were internally validated by the project team and three of the 16 OPBI were re-classified based on this internal consistency check[3]. Figure 5 shows the resulting map[4].



Source: Egusquiza et al. (2021), Conceptual and Operational Integration of Governance, Financing, and Business Models for Urban Nature-Based Solutions, *Sustainability*.

Figure 5: A mapping of governance and business models of 16 breeding organizations and initiatives, based on the scheme of Egusquiza et al. (2021).

Except for one governance model type ('public-private for-profit partnership' – type 4), each type was selected by at least one initiative.

In addition to choosing a governance model type, initiatives were asked a series of questions related to their governance models, including the type of actor initiating the organization, operational scale, number of employees and volunteers, dependence on government or community actors, style of decision making, and organizational structure. In what follows, we cluster the initiatives by governance model type –

[3] Please see Appendix 1 for the original classification and re-classification of initiatives – last two rows.

[4] See Table 1 for the list of initiatives by ID number.

following the final classification – and describe in detail how each initiative is managed and operated by drawing on the responses to the other governance-related questions.

Table 3 shows focus crops by governance model type. The three MI OPBI all focus on different crops (cereals, maize, vegetables). The four GR OPBI focus on vegetables (n=2), and arable crops (n=2). The four MGR OPBI focus on cereals (n=2), arable crops (n=1), and on multiple (n=1).

Table 3: Overview of the crops (rows) that the OPBI focus on, grouped by governance type (columns)[5] of the OPBI. The OPBI which focus on multiple crops focus on vegetables and arable crops, and one of them additionally on forage crops. No filter applied, n=14.

	PO	MI	GR	PGR	MGR	PMG
Vegetables		1	2			
Arable Crops		2	2	1	3	1
Multiple	1				1	

Finally, Table 4 summarizes the founding year by governance model type. Three GR OPBI were founded between 2002 and 2007, and one before and one after. Also, most MGR OPBI are already quite old (before 1984: 2, 2002-2007: 1) and one of them was founded rather recently (2019-2022).

Table 4: Overview of the founding years (rows) of the OPBI, grouped by governance type (columns)[5] of the OPBI. No filter applied, n=15 (missing value: 1).

	PO	MI	GR	PGR	MGR	PMG
before 1984	1		1		2	
2002-2007		1	3		1	
2011-2014		1	1	1		
2019-2022		1			1	1

[5] **Public organization – PO; Market initiative – MI; Grass-root initiatives – GR; Public-Private partnership (non-profit) – PGR; Private (non-profit)-Private (for-profit) partnership – MGR; Private (non-profit)-Private (for-profit) partnership - PMG**

Public organizations (non-profit) (PO)

Definition: Public organizations, traditional top-down legal standards. For example: public research institutes under direct control of the state.

One of the sixteen interviewed organizations, the Agricultural Institute of Slovenia - KIS (ID: 6), classified itself as a public organization - PO. It is a public non-profit research institute which covers many research topics in agricultural science at country scale with 270 employees. Breeding activities (breed OV and OHM, and conserve), however, are done by the breeding group of the crop science department which only consists of 25 employees. The breeding group has its own gene bank which they operate on behalf of the government. Besides breeding activities, they offer training and events and provide expert knowledge. Further, they can sell seeds and raw and processed products (e.g. flour, apples, grains) through a structured collaboration with a dedicated department suited for this type of activity. Separating the breeding group from the rest of the institute in governance and financing questions is difficult, as they are highly interwoven. For instance, for bigger trials, the breeding group collaborates with another department, which has an experimental farm.

The institute was initiated by the government. Its value creation was stated to be rather market driven and it perceives itself to be operating in a competitive environment. The organizational structure was reported to be rather hierarchical, and the decision-making is described as neither especially participatory nor exclusive. Decisions concerning financial issues and concerning values are usually discussed by the executive board of the institute. The latter includes the department heads and the director of the institute who has the final power of decision. Decisions concerning breeding and conservation targets are discussed within the breeding group. Decisions are taken by the executive board of the crop science department, and the department head has the final decision power. This type of governance model, thus, is at least partly financed by public money and usually initiated by the government. It has clear tasks to fulfill. The organizational structure in the PO seems rather hierarchical and decisions, especially on financial matters, are taken top-down.

Market initiatives (for-profit) (MI)

Definition: Market initiatives, business-led, self-regulation, market-driven governance. For example: any fully private company.

Three of the participating initiatives (Nordic Maize breeding - NMB, Smarties.bio - SMART), Union Bio Semences - UBIOS) were classified as market initiatives. NMB is a small company in the form of a general partnership (in Dutch: "VOF"), in which every participating person is liable for debts. Their organizational form is private for-profit with two people employed. Besides breeding OV and OHM, they sell seeds and seedlings. They also sell maize grains to a processor that processes grains for a local bakery. Additionally, they offer training and events, and they advise maize producers

and collaborate on projects. SMART, too, is organized as private for-profit and counts ten employees. They breed OV and conserve heritage varieties. Beyond breeding activities, they sell seeds/seedlings and offer trainings/events. Another private for-profit company is UBIOS with twelve employees. Their organization was initiated and is still owned by two organic farming cooperatives that decided to join forces for the breeding of organic seeds. A very small share (2 %) of the organization is owned by a commercial, conventional seed producer which does not have its own infrastructure for handling organic seeds. UBIOS breeds primarily OHM, and one of their farmers might start with breeding some OV. Besides this, they are active in selling seeds, seedlings, and raw products, e.g. lentils or grains that do not meet seed quality criteria.

All three organizations were privately initiated, and they operate on an international scale, except for UBIOS which operates on the country scale. The organizational structures of the initiatives are diverse. While NMB classified itself as non-hierarchical, SMART chose to be average and UBIOS rather hierarchically structured. The value creation of UBIOS and SMART is reported to be market-driven, while NMB chose it to be community/citizen-driven. They commented that they are very much rooted in the agroecological movement and therefore the idea and the initiative identify as a grassroot movement. Also, NMB described their environment as collaborative, whilst UBIOS and SMART perceive it as rather competitive and as competitive respectively.

When asked about their decision-making processes, NMB and UBIOS described them as rather open-participatory and inclusive, whereas SMART reported theirs to be closed and exclusive. "Exclusive" in this context means that only a few of the people affected by a decision take part in the decision-making process. For discussions about financial issues, the three founders of SMART are involved and have the decision power, the decisions are usually taken in a council meeting between them. In UBIOS, decisions on finance are taken by the board members, all of them farmers of the two cooperatives. They are supported by financial tools and political vision. In NMB, the two employees (breeder and seed producer) are both involved in decision making and both have decision power. They do not adhere to strict processes for decision making. All three initiatives reported the same involvement and processes for decisions concerning breeding and conservation, and for decisions on values like they have for financial issues.

The three MI seem very diverse in their size and structure, and therefore also have differing decision making processes. However, **the OPBI were all initiated by private actors, driven by conviction** in organic farming and the need of providing farmers with organic seeds.

Grass-root initiatives (non-profit) (GR)

Definition: Grass-root initiatives, private self-governance. For example: Associations, Foundations.

Five initiatives were classified as grass-root initiative (Rete Semi Rurali - RSR, AEGILOPS - AEG, ProSpecieRara - PSR, Les Refardes - LREF, Associació Varietats Locals - VARL). RSR focuses only on experimentation, breeding and conserving OHM and raising awareness in form of trainings/events. As they are non-profit, they reinvest any revenues into the entity. They have 20 employees and 2 volunteers. AEG, too, is a non-profit organization. They are organized as a member organization with a board of directors and a regular assembly. They have two employees but work mainly with volunteers; the number of up to fifty active volunteers depends on the work to be done. The volunteers are sometimes members, and sometimes other stakeholders from their networks. PSR is a foundation with a big network of private actors, farmers, nurseries and seed organizations. Most market activities lie within this network and not with PSR per se. PSR employs 35 people and counts on the conservation work of around 2500 volunteers. They do not pursue any breeding but focus on conservation, selling seeds and offering trainings/events. LREF is a non-profit farmers' cooperative. They have two people who legally are responsible for the cooperative, and two employees who mostly cover administrative tasks like accounting and sales. Additionally, 18 producers are included in the cooperative, of which three of them are also legally involved in the cooperative. Like PSR, they only do conservation of PRM. Besides breeding, they pursue selling seeds/seedlings, and they offer trainings/events and sell books about seeds. The fifth OPBI classified as GR, VARL, reported to be a private non-profit organization. They consist of 360 members and have an executive board of 10-12 members. They reported that they only conserve PRM and sell seeds.

RSR operates mostly on a national level but sometimes on an international level, while AEG and PSR operate only on a national scale. LREF operates mostly on regional scale, and partly on national (20%) and international scale (10%). Three of them were initiated by the community and one by a private actor (no data for VARL). For LREF, additional to the 2 citizen initiators, an agricultural school (public) and a private funding organization were involved in initiating. All of them stated to operate rather or totally in a collaborative environment and most stated that the driver for their value creation is rather or totally community driven (no data for VARL). Only RSR estimated the driver for their value creation as neither market- nor community-driven. Two of them (AEG, LREF) described their organizational structure as "rather not" or "not" hierarchical. LREF described their decision-making processes to be rather open-participatory, yet AEG described it as neither open-participatory nor non-participatory. PSR described its organizational structure as neither hierarchical nor non-hierarchical and positioned its decision-making processes as average participatory. RSR also described their decision-making processes as average

participatory. However, their organizational structure is allegedly rather hierarchical (no data for VARL).

The reported decision processes regarding financial issues are diverse. On the one hand, there is LREF, where the two legally responsible people of the cooperative discuss together and decide. Also, for RSR, decisions are made rather top-down; for decisions concerning financial issues, the board of directors is involved. The decision power has the general director and the president. Under a threshold of €5000, the general director can reportedly proceed autonomously. Decisions on breeding and conversation targets, i.e. germplasm acquisition, number of plots or catalogue fields are made by the person responsible for the action-research in coordination with the technical director and the technical specialists. Decisions on values are taken by the general director in coordination with the board of directors, based on the statutes and orientation of the assembly of the association. On the other hand, there are AEG and Varietats Locals, with a decision process, where all members can decide during assembly meetings. For both, the decision power lies within the executive board. In the case of PSR, the management board, sometimes with expansion to division leaders, are involved and have the decision power. Budget-related matters are discussed once a year at PSR. The breeders discuss with the project leaders, who themselves discuss with the division leaders who have the decision power. At AEG, decisions must be accepted by the general assembly. The latter reported that breeders will propose their ideas for development of breeding activities to the assembly, and scientific advisors might make some suggestions for improvements, which is then followed by voting. Likewise, the decision-making at LREF follows a participatory process. Once a year, all seed producers and the responsible people of the cooperative meet at a farm. The cooperative responsible then proposes crops/varieties for the following year and the producers can make their proposals, too. The producers choose the varieties which they are interested in growing, and the remaining varieties will then be grown by the cooperative. At VARL the decision process on breeding targets follows a similar structure. All employees can propose new interesting varieties. They will first be tested and then added to the catalogue. For being interesting to them, a variety must be endangered, tasty and healthy.

All the five GR OPBI perceived their environment as rather collaborative, and most of them are active on a national level, some of them being also active internationally, some of them being also active on a regional level. Three of them do not breed per se but engage in conservation of PRM, while two also do breeding. None of the GR OPBI sell products, they all reported to exclusively sell seeds/seedlings. Three pursue education/dissemination activities like trainings or events. Most GR OPBI reported to be **structured rather non-hierarchical**. For decisions about values, finance and breeding issues, there are two major patterns seen. Some **decide in open-participatory processes where everyone** (e.g. members, farmers from cooperative)

can take part in deciding, e.g. in a yearly assembly. Others decide **in processes which are a bit less open-participatory where rather the people being directly involved or responsible decide for respective subjects**. In such a case, breeders decide about breeding topics, value concerning decisions are taken by the people which are affected, and financial decisions are often taken by board members.

Public-Private partnership (non-profit) (PGR)

Definition: Public-private partnership (non-profit), co-regulation public + NGOs. If an organization is part of a (legally defined / formalized) partnership that includes private non-profit and public organizations.

One initiative, a project of ÖMKi, the Hungarian Research Institute of Organic Agriculture, was classified as a public-private non-profit partnership (PGR). This project of ÖMKi is a Living Lab in LiveSeeding. It is legally organized by an annually renewed contract between three coordinator organizations (ÖMKi, VTSZ – Organic working group, Nébih). In this so called "ÖMKi-VSZT-Nébih organic post-registration network" no profit is possible. It will be referred to this partnership as "ÖMKi LL" in the following, while meaning the project, and not the research institute itself. ÖMKi LL has two employees in their initiative who work on breeding and breeding-related activities such as breeding of OV, conservation and trainings/events on the topic. They were initiated by private actors and operate on a national scale. They perceived their environment as rather collaborative. ÖMKi LL reported that the driver of their value creation is rather market-driven. They described their organizational structure as average in terms of hierarchy, and their decision processes as average in terms of participation.

At ÖMKi LL the three partner organizations decide together on financial issues in face-to-face meetings that happen at least once a year. Regarding breeding/conservation targets and value, the breeders are involved in the decision-making processes, and the power of decision lies with the three partner organizations, based on joint agreement.

This PGR OPBI is, thus, a partnership of three different actors, some more public, some more private non-profit. The OPBI seems rather average in terms of hierarchy and participation in decision making.

Private (non-profit)-Private (for-profit) partnership (MGR)

Definition: Private (non-profit)-private partnership (profit). If your organization is part of a (legally defined / formalized) partnership that includes private non-profit AND private for-profit organizations.

Five of the surveyed breeding initiatives were classified as a partnership between private non-profit and private for-profit partners (Agrologica - AGL, Fondazione Seminare il Futuro - FSiF, farm members of FRAB and Triptolème - F&T, Research & Breeding Dottenfelderhof - R&B DFH, Sementes Vivas - LSSV). AGL is a one-man

company, initiated and still managed by the same person. It is fully financed by public research grants. Its organizational form is private for-profit, but it works together closely with the non-profit member organization Landsorten. While AGL only pursues breeding of OHM and conservation, their seeds are sold through Landsorten. Grains from their PRM is sold by farmers that are members of Landsorten. FSiF is a non-profit organization which was established as a partnership of two commercial partners for the Italian organic sector. They are nationally registered as a research institute and collaborate with a university experimental farm in terms of infrastructure and research projects. They employ two permanent staff members and during peak times 2-3 people additionally. Besides breeding of OV they offer breeding support. The third initiative has no name and is a collaboration of a group of organic farmers coming from the organization FRAB and the peasant seed association Triptolème, called here "F&T". They are both organized as private non-profit. F&T is closely working together with D'une graine aux autres (DUGA) (also portrayed in this report). F&T breeds OHM, sells raw and produced products and offers trainings and events, often as part of bigger projects in which they are participating. R&B DFH is a subunit of an NGO ("Landbauschule Dottenfelderhof e.V.") which, among others, offers biodynamic courses. This subunit employs twelve people. It is organized as private non-profit but works closely together with the private for-profit company "Dottenfelder Bio-Saat GmbH", that is owned by 99 % by the NGO. R&B DFH does only breeding of OHM and OV, while distribution or marketing activities take place at Dottenfelder Bio-Saat GmbH. License fees of registered varieties and variety development contributions accrue to the latter. The fifth organization, LSSV, is a Demeter-certified seed producer located in Spain and Portugal that is managed as a private for-profit organization. Their number of employees was not reported. It is closely linked to the non-profit association "Lebende Samen" (= living seeds) that runs the breeding program for LSSV. LSSV reported to breed OHM and OV and to conserve PRM. Besides breeding, they sell seeds.

While F&T operates on a regional scale, FSiF and R&B DFH mostly operate on a national scale and sometimes FSiF collaborates with a few foreign companies. AGL reported to be operating on an international scale. AGL was initiated by the founder alone, while the OPBI of R&B DFH and F&T was initiated by the community (F&T: "farmers and citizens"). The initiators of FSiF were private actors (no data for LSSV). All initiatives describe their environment as (rather) collaborative (no data for LSSV). Their driver of value, however, varies: R&B DFH and F&T described it as community/citizen-driven, AGL as market-driven, and FSiF as somewhere in between. Also, their assessments regarding their organizational structures differ. AGL described themselves as hierarchical, R&B DFH and F&T as non-hierarchical, and FSiF as average. This is also partly mirrored in the description of their decision-making processes. R&B DFH, AGL and F&T described them as (rather) open-participatory, FSiF as average

participatory (no data for LSSV). For financial issues, breeding/conservation related questions and values, the founder of AGL decides by himself after consulting with partners and the organization Landsorten. On the other hand, in F&T, everyone is involved in decisions on financial issues and values with no fixed processes. Each farmer can decide on its own on breeding/conservation targets. Within FSiF, the director and board members and the president are involved in decisions. For major decisions, the board has the decision power. When it comes to breeding/conservational targets, the director and breeders are involved. Decisions are taken in a meeting between those parties, and the decision power has the director. For decisions on values, everyone is involved and if necessary, external staff are consulted. Similarly for R&B DFH: All employees and team leaders are involved in budget-related decisions and decisions on values by consensus. However, the team leaders have the right of veto. In a few issues, the board members of the "parent" NGO are involved. Decisions concerning breeding and conservation targets are taken slightly differently than the ones on financial issues for most of the initiatives. Decisions are mostly taken on the fly or in weekly meetings by breeders and team leaders at R&B DFH. In LSSV, decisions about financial issues are made during regular board and management meetings which happen every week in the company and all three months in the association. The company has three directors who are involved, and the association has 5 board members. Breeders of the association are involved too. LSSV reported different involvement and processes for decisions about values. In the company, they have a shareholder assembly where it needs 2/3 of the shareholders' votes to change the constitution. The processes are comparable in the general assembly of the association.

Overall, three of the MGR OPBI are quite similarly structured: **there is a non-profit part of the partnership who pursues breeding and development work and sometimes also educational activities. These non-profit parties work closely together with for-profit organizations which e.g. sell seeds/seedlings and/or do marketing.** The other two organizations are rather initiated as partnerships by established private actors in the organic sector, working still closely together with them. In terms of organizational structure and decision making, the MGR OPBI are quite diverse, yet rather on the open-participatory, non-hierarchical side.

Public-Private partnership (for-profit & non-profit) (PMG)

Definition: Public-private partnership (for-profit & non-profit): NGO+ company + public. If an organization is part of a (legally defined / formalized) partnership that includes private non-profit and private for-profit organizations and public organizations.

One initiative was classified as a public-private partnership (D'une graine aux autres - DUGA). DUGA is part of a cooperative with around 250 members ("Oxalis"). DUGA

itself is composed of the two founders who are sometimes joined by interns. They are not directly involved in breeding or conservation activities but work in research and offer trainings and other services, like offering educational games and advisory services.

DUGA was initiated by two private people coming from the research sector. They operate on a country scale and perceive their environment as rather collaborative. DUGA reported that the driver of their value creation is average (between market- and community-driven). They classified their organizational structure as non-hierarchical and their decision-making processes as rather open-participatory.

Regarding financial issues, the two founders of DUGA take decisions bilaterally, and occasionally with the participation of the cooperative. Regarding breeding activities, decisions are taken together with project partners (farmer cooperatives, retailers, distributors, bakers) in meetings organized about twice a year. The same decision process applies for value related issues.

This PMG OPBI is closely related to a public research institution and has a strong community focus, yet, it is a for-profit institution with the aim to act independently on the market, experimenting with new forms of governance.

2.2.3.2 Comparative analysis of governance model types

Whereas community dependence is clearly lower for PO and MI and higher for GR and hybrid forms, **government dependence seems to vary quite a lot across governance model type** (Figure 6). AEG, for instance, commented that they do not get subsidized by the state, but sometimes they get commissions from public institutions, either as an expert institution or as a collaborator in a financed project. Also, they are slightly interwoven with public entities, as for some projects, they can use infrastructure or machines from the public sector. Many of the OPBI see a lack of governmental support. NMB, for example, pointed out the administrative burden linked to public funds. As they are a very small company, they are quickly overwhelmed by the rules, regulations and required paperwork. F&T described that they get supported by the public entities rather regionally (e.g.: the city provides them with a building and some fields) than nationally.

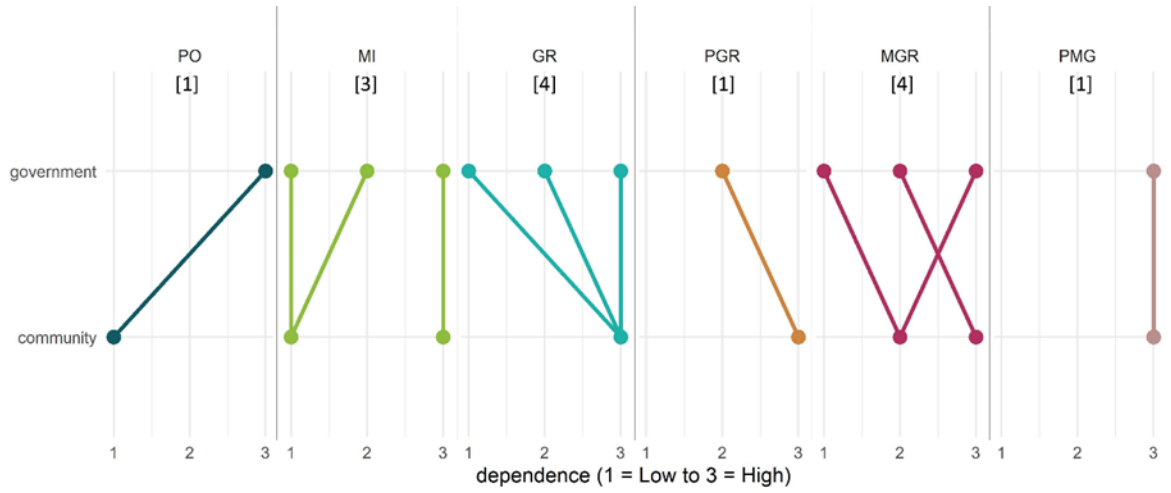


Figure 6: Answers to the question "To what extent is the success of your organization/initiative dependent on the involvement, participation, and/or support of the government/community?" grouped by governance type. SP, filter: none, n = 14. Please note: for the PO OPBI the value in "governance dependence" was modified from low to high after plausibility check.

Figure 7 shows another four governance-related variables, grouped by governance model type: whether an initiative acts in a collaborative or competitive environment; whether the decision-making in the organization is open-participatory and inclusive or closed-participatory and exclusive; whether the value creation of the organization is community/citizen-driven or market-driven; and, whether the organization has a hierarchical or non-hierarchical structure.

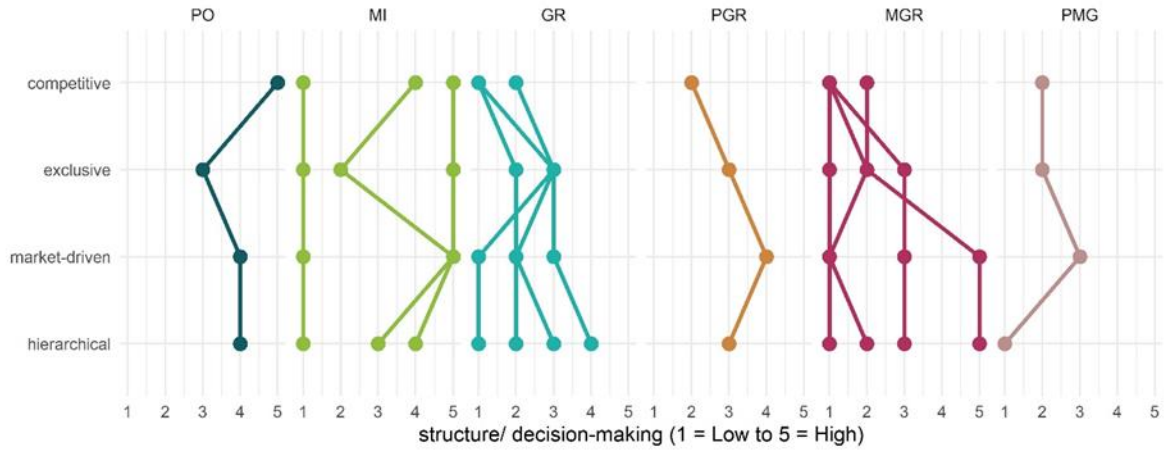


Figure 7: Answers to the questions "Does your initiative operate in a competitive environment?"; "Is the decision-making exclusive?"; "Is the value creation market-driven?"; "Is the structure hierarchical?" – all: SP, filter: none, n = 14.

"Exclusive and closed-participatory" in this context mean that only a few of the people affected by a decision take part in the decision-making process Overall, a tendency to the lower part of the scale can be observed – meaning **initiatives perceive to operate in collaborative environments, follow inclusive decision-making processes, are**

community driven in their value creation and have a non-hierarchical organizational structure. Clear exceptions are the public organization and one of the market initiatives who consistently have a value of 3 or above – meaning they act in a rather competitive environment, have a decision making that is rather exclusive, a value creation that is rather market-oriented and a structure that is rather hierarchical.

2.2.3.3 Summary Governance

Only three of the sixteen initiatives surveyed work exclusively on cultivar development. Most have a portfolio of activities from which other types of products and services are derived. Examples of these are offering training and information events, selling plant reproductive material, and selling raw or processed products for the feed or food value chain.

Overall, **six governance model types could be identified**. However, when looking at the distribution of the 16 OPBI in the governance model triangle, the OPBI clearly accumulate in the bottom part, and particularly in the left corner of the triangle, where the GR are located. Five OPBI were classified as GR, and another five were classified as MGR (mixture between GR and MI). Three OPBI were classified as pure MI, being market-oriented and market-regulated. However, all OPBI classified as MI in this study still show some characteristics of grassroot initiatives, with some being initiated by private actors that emerged from grassroot movements. One initiative was classified as a mixture between PO and GR (PGR) – as one actor from the partnership is partly public and others rather private (non-profit) – and one was classified as a hybrid form between all three forms, PO, GR and MI. The latter has characteristics from both GR and MI and is tightly interwoven with a PO. Only one of the 16 OPBI was classified as a pure PO, being organized primarily top-down and initiated by the government. None of the initiatives was classified as a partnership between PO and MI.

Thus, these findings highlight that:

- **many of the OBPIs surveyed exhibit characteristics of grassroots initiatives**. Consequently, they perceive their environment as collaborative in terms of the network from which they originated and with which they work, rather than the seed sector per se, and they are structured in a non-hierarchical way, with decisions being taken in a participatory manner.
- grassroots initiatives often form partnerships with private, for-profit organisations, which could facilitate the distribution of plant reproductive material while the breeding activity remains non-profit.

2.2.4 Financing sources of breeding-related expenses

In chapter 2.2.4.1 and 2.2.4.2, the financing sources which the surveyed organic breeding initiatives use for their breeding-related operational expenses[6] (OPEX) and capital expenses[7] (CAPEX) are described. Data on OPEX was collected for the year 2023 – and if different also for the year 2022. Data on CAPEX was collected referring to the 'last three to five years', thus for the period 2019 to 2023. Initiatives were asked to focus on the breeding-related expenses that arise in relation to their focus crop categories.

2.2.4.1 Operational expenses

Operational expenses for the year 2023

First, initiatives were asked about the amount of operational expenses in Euros (€). This question was optional. Only eleven initiatives provided an answer. For these initiatives, the breeding-related OPEX for the year 2023 ranged from less than €10,000 to €2,500000 – with nine initiatives indicating an amount below €400000. Figure 8 shows an anonymized overview of the OPEX of the OPBI. Two initiatives that did not indicate the amount of OPEX, stated that their breeding related finances are so interwoven with other agricultural research expenses of the organization that they cannot break it down.

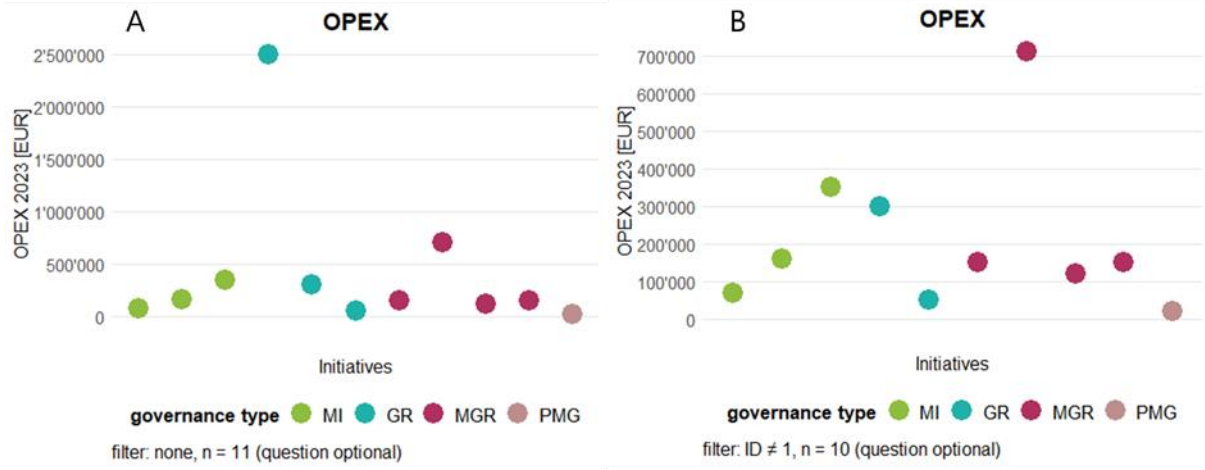


Figure 8: Operational expenses (OPEX) of the different initiatives in 2023. The optional question was answered by 11 of 16 initiatives. While A shows all initiatives, B does not show the initiative with the highest OPEX to have a closer look at the others.

[6] Operational expenses were defined as follows: "With '**OPERATIONAL EXPENSES**', we mean expenses that arise whilst your business is running, e.g. expenses for salaries, rent (of machinery or land), and inputs (e.g. seeds, energy, water etc.)."

[7] Capital expenses were defined as follows: "With '**CAPITAL EXPENSES**', we mean expenses that arise when buying assets like machinery, land, buildings etc."

Next, all initiatives were asked about the financing sources of their OPEX. An overview of their answers is presented in Figure 9A through C.

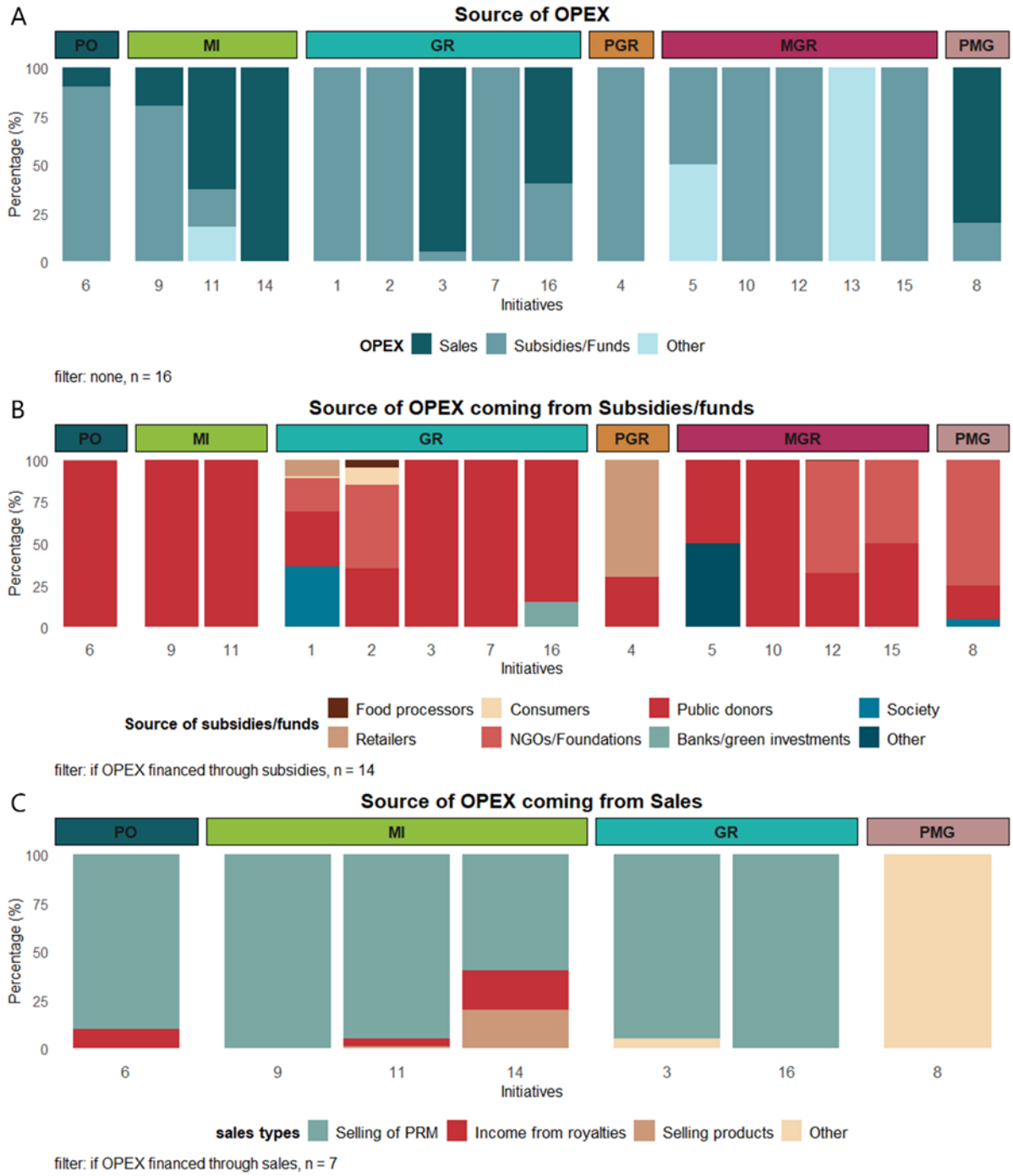


Figure 9: The source of operational expenses (OPEX) of the OPBI are visualized here, grouped by governance types (PO = public organization, MI = Market initiative, GR = Grass-root initiative, PGR = public – grass-root partnership, MGR = Market – grass-root partnership, PMG = Public – Market – Grassroot partnership). A: overview, B: source of subsidies/funds, C: source of sales.

Figure 9A shows the share of OPEX covered by subsidies/funds[8] and/or sales, which are further specified in Figure 9B (for subsidies/funds) and C (for sales).

Generally (Figure 9A) it can be observed that **subsidies/funds are clearly the strongest pillar for financing** the 16 OPBI's OPEX across all governance model types. However, all the MI at least partly finance their OPEX by sales. Interestingly, none of the MGR reported to finance their OPEX through sales.

A total of five initiatives reported their OPEX to only be financed by subsidies and funds (AGL, LSSV, RSR, PSR, and R&B DFH). Another six initiatives reported their OPEX to be covered by both subsidies/funds and sales (NMB, DUGA, VARL, UBIOS, LREF, KIS). Another three initiatives reported to finance OPEX through subsidies/funds and other sources like for example projects (AEG), farmers' means (F&T) and plot fees from members (ÖMKi LL). Only, one initiative (SMART) reported to cover their operational expenses exclusively through income from sales. Another one (FSiF) reported to cover its OPEX from donations by their founding partners.

It is important to mention that three of the initiatives who stated to cover their OPEX only through subsidies/ funds do generate sales (AGL, PSR, R&B DFH). However, the related income is not attributed to sales for different reasons. AGL specified that they receive royalties from Landsorten which sells their seeds. However, these royalties are financed by a public fund, which is why they classified the related income as subsidies/funds. PSR stated that whereas they receive income through labelling fees, these sources do not at all cover the costs of their conservation activities. Thus, the latter need to be heavily cross-financed through subsidies and funds. In fact, in the case of one important sales partner – a food retailer – PSR follows an interesting collaboration. Whereas the food retailer does not have to pay labelling fees to PSR, it supports them financially through project funds and other remuneration services. In the case of R&B DFH, they do not sell their seeds themselves but through the Dottenfelder Bio-Saat GmbH. The latter finances their OPEX about half through royalties and half through research projects.

The **subsidies/funds that are used to cover breeding-related OPEX largely come from public donors** (Figure 9B). Some few percentages come from food processors and retailers, some from NGOs/foundations and from society (consumers/ citizens, farmers).

Two of the GR initiatives (ID=1 & 2) show the broadest diversity in subsidies/ funds. The OPEX that are covered by sales (Figure 9C) stem primarily from sales of plant reproductive material. Three of the initiatives who reported sales, specified income from royalties, but only small shares.

[8] With **SUBSIDIES** we mean non-competitive resources (for example, CAP subsidies, organic farming subsidies, local subsidies for biodiversity etc.). With **FUNDS** we mean competitive, project-application based resources.

Next, the initiatives who cover their OPEX through public funds were asked if these funds are competitive (= project-based funds) or not competitive (CAP subsidies, organic farming subsidies, local subsidies for biodiversity etc.). Ten initiatives reported the public funds to be competitive, and only two out of those ten reported that they also received some non-competitive public funding (Figure 10).

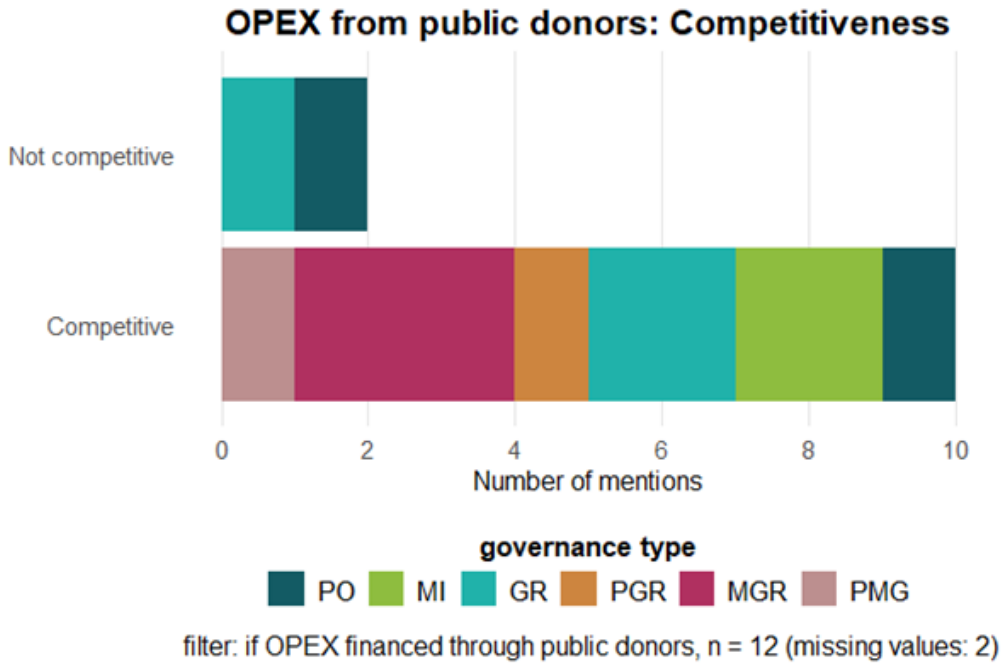


Figure 10: Competitiveness of funding received from public donors, answers grouped per governance type (PO = public organization, MI = Market initiative, GR = Grass-root initiative, PGR = public – grass-root partnership, MGR = Market – grass-root partnership, PMG = Public – Market – Grassroot partnership).

The initiatives were also asked about their OPEX in the year 2022 (optional question). Twelve initiatives have estimated the OPEX of their OPBI in 2022 as about the same as in 2023. Three initiatives reported that their OPEX in 2022 were somewhat different from 2023, and one initiative reported that their OPEX were very different.

Operational expenses 2023 grouped by regions in Europe and focus crops

To analyze possible patterns in financing strategies of the OPBI, the data on OPEX was additionally grouped by regions in Europe and focus crops (Figure 12-Figure 13). Only the results with n>10 answers were analyzed here, thus, the specific data on OPEX covered by sales were not further investigated.

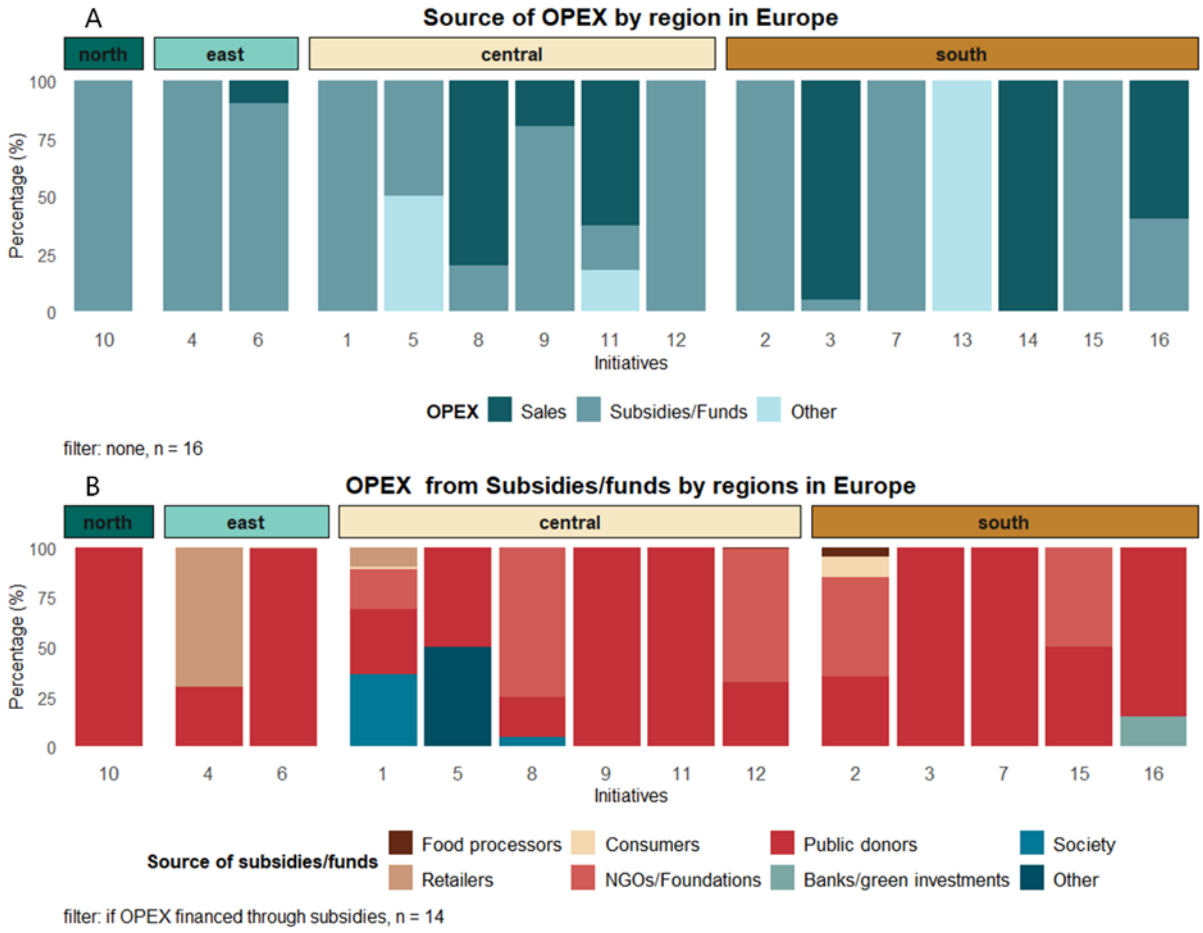


Figure 11: The source of operational expenses (OPEX) 2023 of the OPBI are visualized here, grouped by region in Europe. A: Overview, B: Source of subsidies/funds.

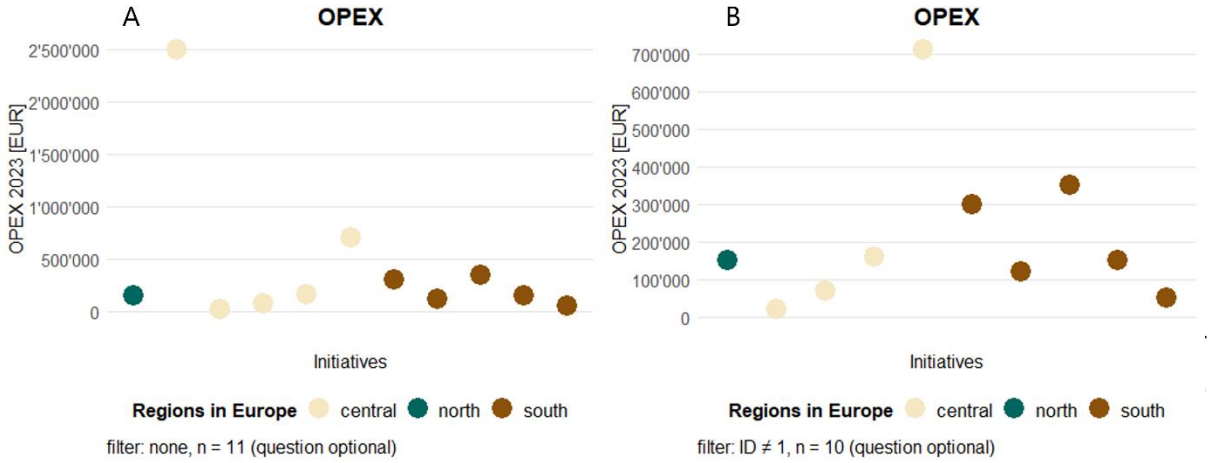


Figure 12: Operational expenses (OPEX) of the different initiatives in 2023, grouped by region in Europe. The optional question was answered by 11 of 16 initiatives. While A shows all initiatives, B does not show initiative 1 to have a closer look at the others. The results were anonymized.

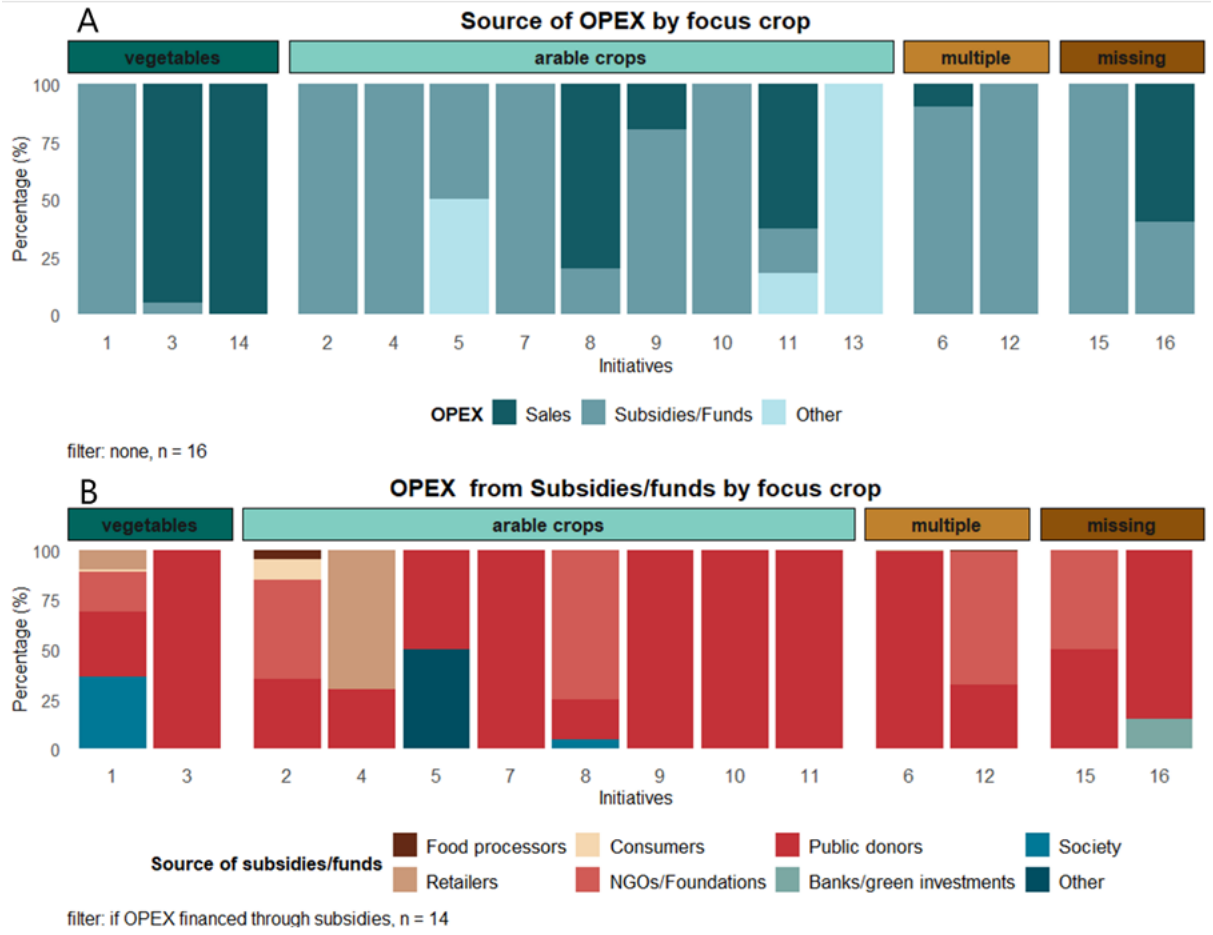


Figure 13: The source of operational expenses (OPEX) 2023 of the OPBI are visualized here, grouped by their focus crops. A: overview, B: source of subsidies/funds.

It is interesting to observe that **two out of three OPBI focusing on vegetables finance their OPEX almost exclusively by sales** (Figure 13AB). The third OPBI focusing on vegetables which is not financed by sales does no breeding but conservation of landraces and heirloom varieties.
Furthermore, three out of four OPBI focusing on **cereals** finance their OPEX almost entirely by subsidies/funds, which came primarily from public donors, and one of these initiatives received 70 % of the subsidies/funds from retailers.

Finally, the data of the OPBI considering their OPEX 2023 was grouped by focus crops. Figure 14AB shows that the amount of OPEX 2023 was highest for the three OPBI that focus on vegetable breeding (ID 1, 12, 14). Here, also initiative 12 is counted, as they stated to focus on arable and vegetable crops. Further, the OPEX of OPBI 9, 10 and 13, which all focus on arable crops, more precisely on cereals, were all in a similar range, between €70,000 and €150000.

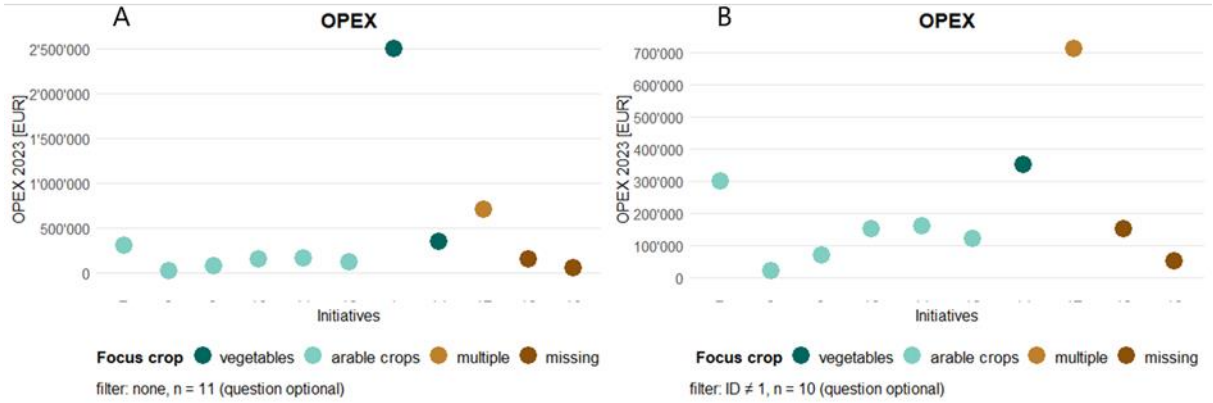


Figure 14: Operational expenses (OPEX) of the different initiatives in 2023, grouped by focus crops. The optional question was answered by 11 of 16 initiatives. While A shows all initiatives, B does not show initiative 1 to have a closer look at the others.

2.2.4.2 Capital expenses

To create an overview of the financing strategies of the OPBI, they (n=14) were asked about the amount (Figure 15) and the sources (Figure 16ABC) of their breeding-related capital expenses (CAPEX) in the last 3-5 years, e.g. for buying machinery, land, buildings, and equipment. These results were grouped by governance type of the initiatives. Most initiatives reported CAPEX of less than €50,000 or even no CAPEX during this time, only some few initiatives reported higher CAPEX (Figure 15). No trends among the initiatives of different governance types were observed. In detail, three initiatives reported that they have not made any capital investment in the last 5 years. Six of them reported to have spent less than €50,000 on capital expenses. Another three initiatives reported CAPEX of €100,000 until up to €500,000. Finally, one initiative reported CAPEX of €500,000 until **€1,000,000**, and one reported CAPEX of **€1,000,000- €2,000,000.**

Not only was the quantity of CAPEX recorded, but also how the CAPEX were financed by the different initiatives. The data was again grouped by governance type of the initiatives (Figure 16).

Overall, and especially in comparison to financial sources of OPEX, public funds/subsidies used for CAPEX are underrepresented and seem rare.

In terms of governance type versus financing strategy for OPEX, no clear patterns were observed. Yet, both market initiatives (ID 11 and 14) financed their CAPEX completely with sales, and likewise did the initiative 8, which is organized as a partnership between public, private (for-profit), and private (non-profit). Initiative 3, which was classified as a grassroot initiative, also covered its CAPEX almost entirely with sales, and with a small proportion of subsidies. While initiative 3 and 11 invest money from the sales of PRM, the CAPEX of initiative 14 is financed 60 % by sales of PRM, and the remaining part is covered by sales of products and income from royalties. Initiative 8 on the other hand covers all its CAPEX with income through other services that they sell. Only two initiatives, 1 and 12, cover their CAPEX fully with subsidies/funds. While initiative 1 gets the funds to same parts from society and from NGOs/foundation, initiative 3 uses funds from public donors for CAPEX. Initiative 12 receives 90 % of the funds they use to cover CAPEX from NGOs/and foundations, and the remaining from food processors and society. Three initiatives (ID 5, 10, 13) reported that the financial means they use for CAPEX come from different sources than sales and subsidies/funds. Initiative 5 and 13 reported that they use their own means (from the owner of the company/collaborating farmers) for CAPEX. Initiative 10 stated to raise the money by crowdfunding, which can be counted as coming from "Society".

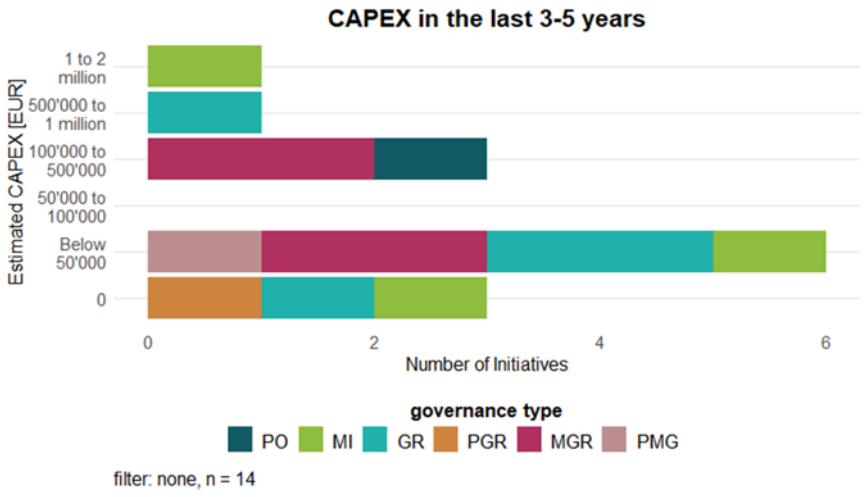


Figure 15: Amount of capital expenses (CAPEX) the OPBI have spent in the last 3-5 years, grouped by governance type. Single response question.

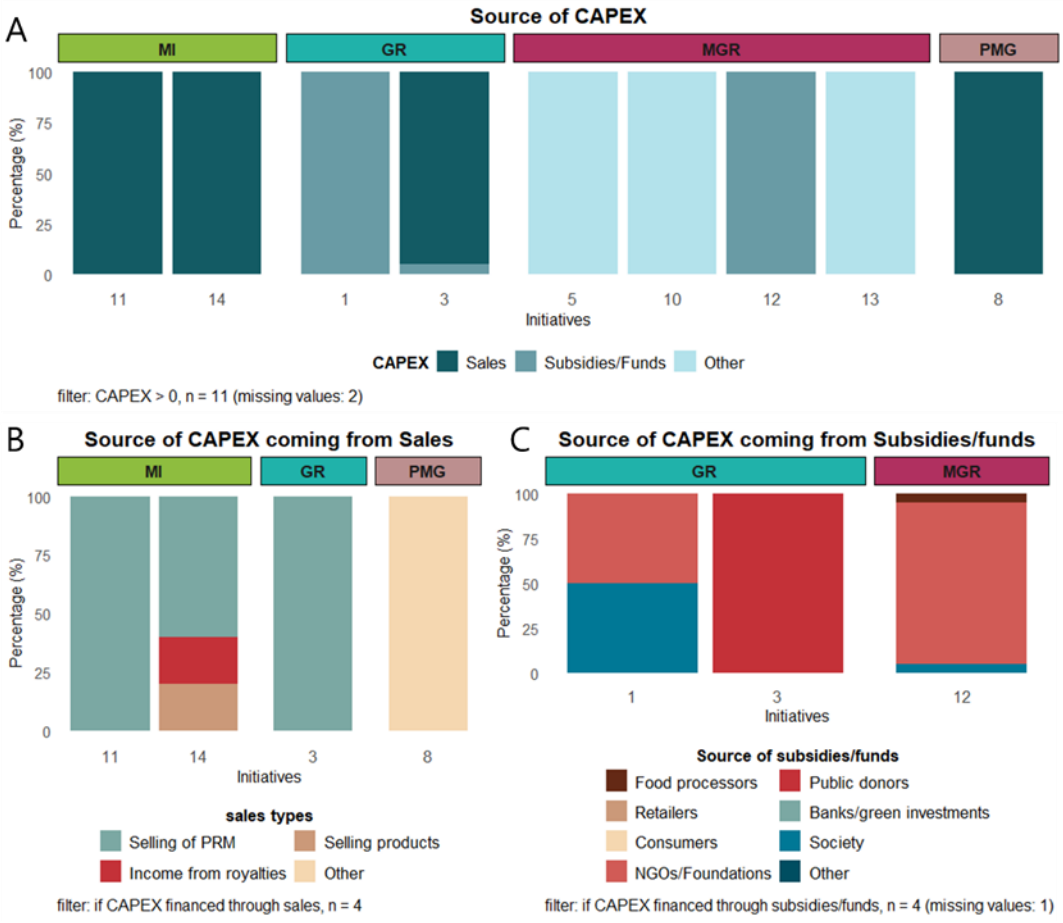


Figure 16: The source of capital expenses (CAPEX) of the OPBI are visualized here, grouped by governance types (MI = Market initiative, GR = Grass-root initiative, MGR = Market – grass-root partnership, PMG = Public – Market – Grassroot partnership). A: overview, B: source of subsidies/funds, C: source of sales.

Capital expenses grouped by regions in Europe and focus crops

The amount of capital expenses, e.g. for machinery, land, buildings, that the initiatives have spent in the last five years were further grouped by regions in Europe and focus crops, to investigate if certain patterns can be seen (Figure 17AB). Due to only sparse data on the source of CAPEX (subsidies/funds vs. sales), the more detailed data was not grouped by the above-mentioned variables.

In terms of focus crops, no clear pattern is visible (Figure 17B). Three OPBI that focused on arable crops had zero CAPEX, four had CAPEX below €50,000. One invested clearly more, €100,000- €500,000, and another one spent clearly more, €500,000- €1,000,000, on CAPEX. Two out of three initiatives that focus on vegetables invested less than €50,000, while one invested €1,000,000- €2,000,000 for CAPEX.

Finally, when looking at the European regions where the initiatives are based, no clear pattern was observed. The two highest CAPEX (**€500,000- €1,000,000** and €1,000,000- €2,000,000) were spent by initiatives from southern Europe (Figure 17A). Three other OPBI from southern Europe have invested under €50,000 or €0for capital expenses in the last 3-5 years. Likewise did five OPBI in central Europe. One OPBI from central Europe, one from eastern and one from northern Europe invested €100,000- €500,000during the relevant period.

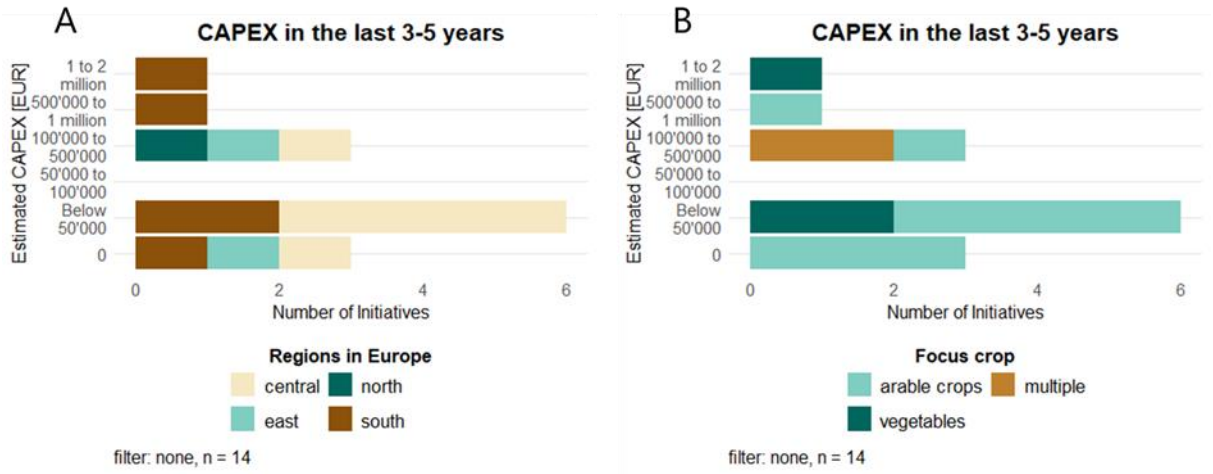


Figure 17: Amount of capital expenses (CAPEX) the OPBI have spent in the last 3-5 years, grouped by A: Country of the OPBI, B: focus crop. Single response question.

2.2.4.3 Summary Financing

The OPEX spent in 2023 was mostly less than €300,000 or even less than €50,000. Only two of the surveyed initiatives had OPEX between €500,000 and €2,500,000.

Even though the surveyed initiatives are not representative of whole organic plant breeding sector, our results points out that **Organic Breeding initiatives are often micro-to small-medium size.**

Subsidies/funds are clearly the strongest pillar for financing the 16 OPBI's OPEX. The subsidies/funds that are used to cover OPEX **largely come from public donors and are mostly acquired competitively**. On the other hand, the OPEX that is covered by sales stems primarily from sales of PRM. Almost none of the initiatives reported royalties to generate any revenue that is used for breeding-related activities. Most OPBI did not report any differences to OPEX they had in 2022. It was further observed that three OPBI who focus on vegetables were among the OPBI with highest OPEX, and two out of three finance their OPEX primarily with sales. On the other hand, three out of four OPBI who focused on cereals were mostly dependent on subsidies/funds to finance their OPEX 2023.

The pattern of financial sources looks different when looking at CAPEX. Mostly, financial means for CAPEX come from sales or other sources like own means or membership fees – sourcing through subsidies and funds, especially from public funds, are rare.

3. Financial sustainability of organic plant breeding initiatives

To assess the financial sustainability of organic plant breeding initiatives (OPBI) we used an online workshop format. The online workshop (02. July 2025) was attended by 30 participants, including partners from LiveSeeding, particularly from WP5, and stakeholders reached via the LiveSeeding project network, who are engaged and/or interested in the topic of organic breeding financing.

To workshop was divided into two parts:

1. The presentation of results from the online survey on governance and financing strategies of organic plant breeding initiatives.
2. A participatory assessment of the financial sustainability of organic plant breeding initiatives based on a survey (in Mentimeter) and open discussion spurred by the questions and corresponding answers.

According to most workshop participants, the type of governance model is important for the financial sustainability of an OPBI (Figure 18). The governance type is important, as it has an impact on the access to specific funding typologies. For example, non-profit organizations have access to funding sources specific for the non-profit framework, that are not accessible to SMEs with similar activities. On the other hand, the advantage of market orientation model (for-profit model) was mentioned, as revenue from sales is more under the control of the initiative than subsidies or funds. For subsidies and funds it is never sure for how long you will receive them.

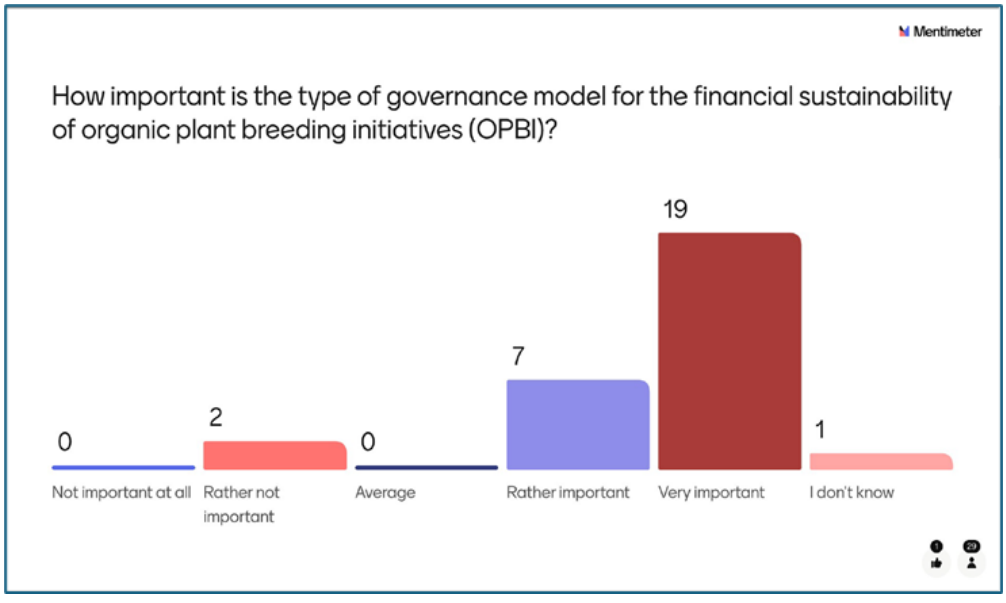


Figure 18: Answers to question 1, n = 29.

Another highlighted point related to governance and funding was the importance to have proper monitoring and validation processes in place, to demonstrate funders – like the government – the impact of their investment in a very transparent way.
Only two participants considered the type of governance model irrelevant for financial sustainability. One of these two participants, however, mainly related to the organizational structure (hierarchical or not) and the decision-making process (top-down or bottom-up) – thus emphasizing that whether hierarchical or not and whether top-down or not is irrelevant for financial sustainability as long as decisions are clear, and well taken.
Asked about their perception of the financial sustainability of current OPBI, 13 **participants evaluated current OPBI as rather not sustainable**, three participants as rather sustainable, and five participants were unsure (Figure 19).

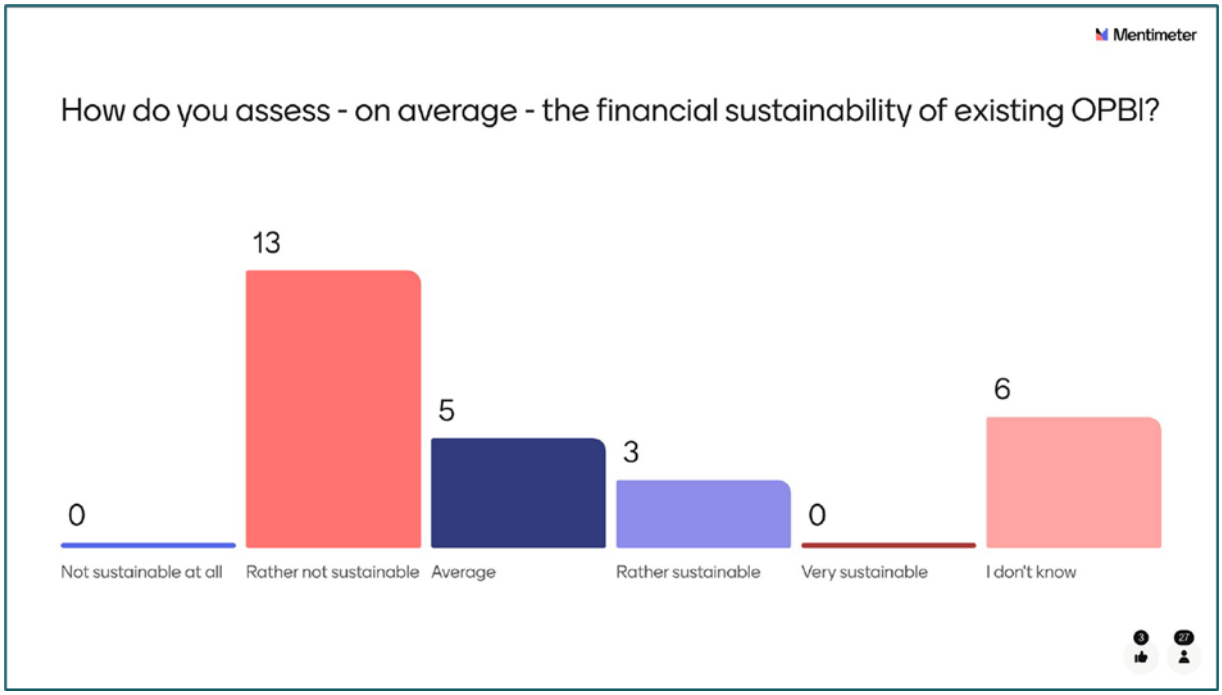


Figure 19: Answers to question 2, n = 27.

One participant who answered at the upper end, highlighted that **current OPBI are built on a good community base which is very positive for their sustainability**. Yet the difficulty and large efforts required to build up such a community support base was also mentioned. **Given the objective of OPBI to increase agro-biodiversity beyond the development of new cultivars, it was mentioned that an initiative purely relying on the market might not survive**. **The diversity of funding sources of current OPBI and also the diversity in breeding focus (OV and OHM) was also mentioned as positive for financial sustainability.** For an OV, for instance, it is possible to obtain royalties, for OHM not. At the same time, according to one participant, the development of OHM often requires less investment than the development of OV.

Shifting away from the dependance on funds from research projects to more community-based funding was mentioned as important. In the discussion 'community' related to value chain actors, including wholesalers, retailers and food processors, for example.

The evaluation of current OPBI as rather financially unsustainable was connected to the issue that their financing is not stable in the long-term, whereas the breeding process is long term. A lot of OPBI do not know what happens in the near or far future with their funding. A lot of them rely on competitive public funds from research projects which only last three to four years. This uncertainty in funding hinders OPBI from investing. The difficulty to survive on the market, where OPBI compete with organisations that breed conventional (non-organic) varieties was mentioned and related to the **influence of 'species choice' on the initiative's competitive advantage on the market and its financial sustainability (e.g. choosing to focus on neglected and underutilized crops that are not targeted to major initiatives in the conventional sector).**

Elicited by the question related to elements important for the financial sustainability of an OPBI (i) access to public funds and (ii) value-chain networking/ support emerged as perceived as most important (Figure 20). Access to private funds, revenue from sales of PRM, on-farm breeding, and market-orientation were also included as important.

Revenue from royalties and community/ citizens' support were mentioned as less important. In fact, **royalties were considered least important, as they usually only make up a share of around 5% of total sales and are only relevant if you have a significant market share.** Secondly, the community-support mentioned several times in the preceding question, turned out to be most importantly value-chain support, thus support from food processors, retailers, rather than directly from citizens.

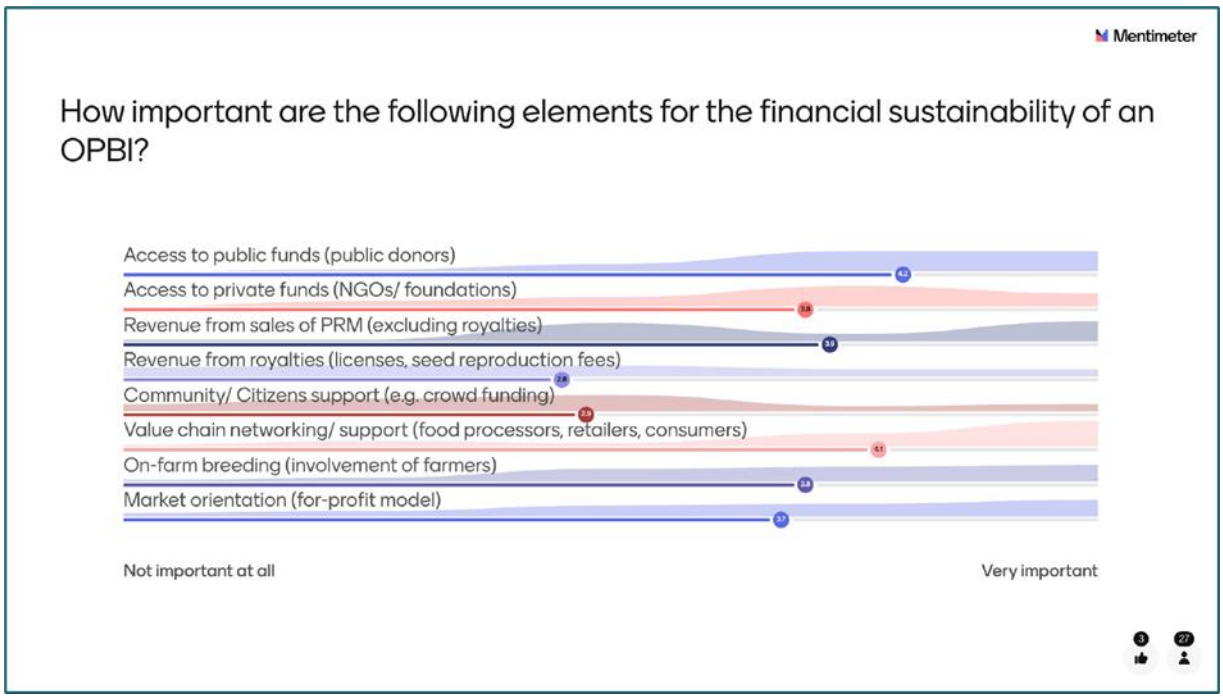


Figure 20: Answers to question 3, n = 27.

The **access to non-competitive funds** – not matter if public or private – were perceived more important for the financial sustainability of an OPBI than the access to competitive funds (Figure 21).

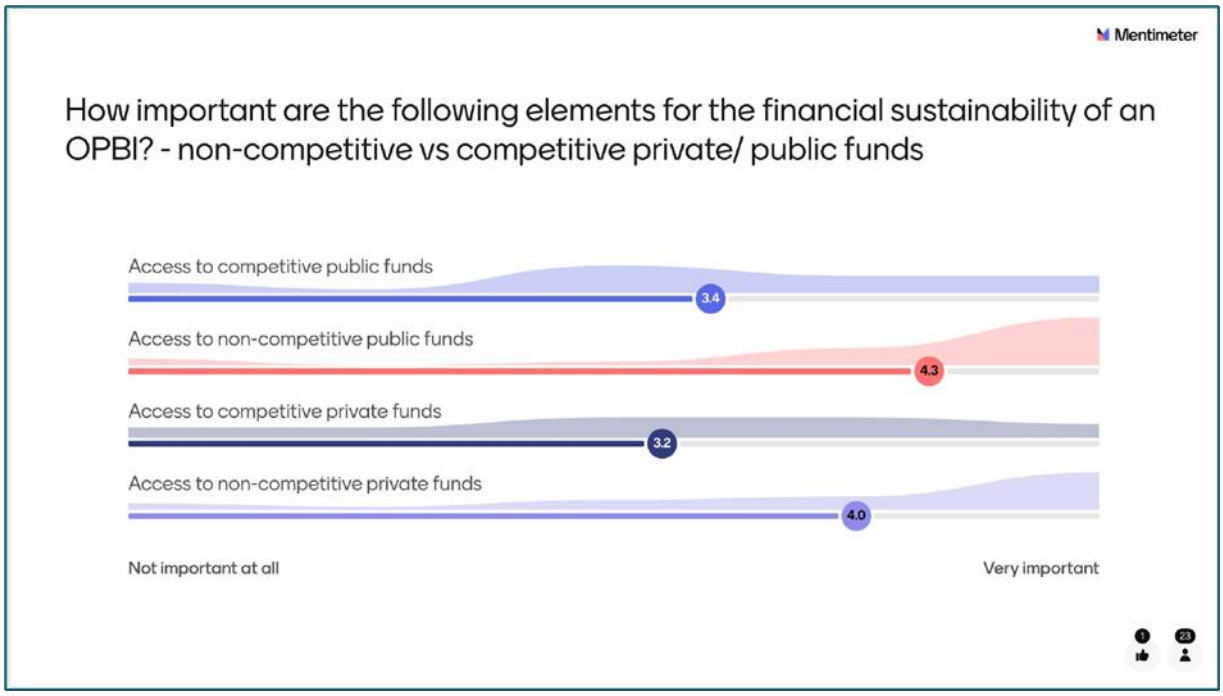


Figure 21: Answers to question 4, n = 23.

Network (with community, society, value chain actors), knowledge and politics/ political support were mentioned most frequently, followed by (food, cultural, consumer) awareness and diversity were mentioned as factors important for the financial sustainability (Figure 22). Quite a few elements stated relate to community

support, consumer preferences, and market access/ marketing of PRM. Other elements mentioned are business knowledge/ solid entrepreneurship, transparency, and fairness.

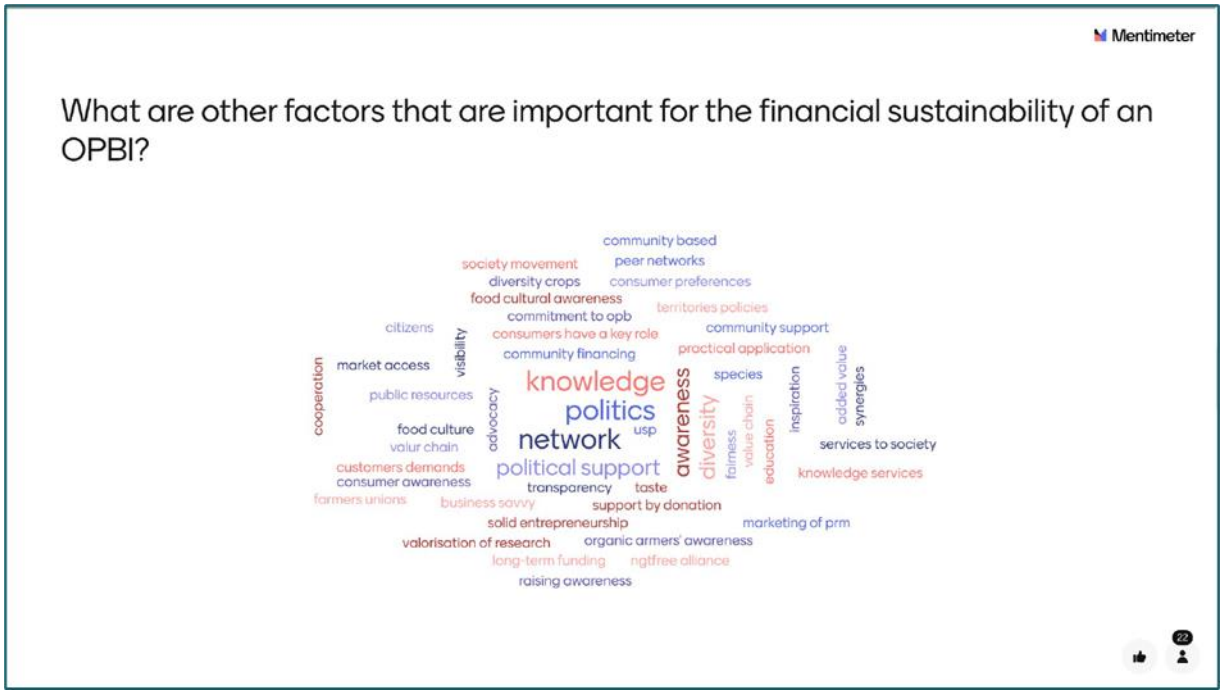


Figure 22: Answers to question 5, n = 22.

We collected recommendation for an OPBI to succeed, which are summarized below.

Topic 1: Value chain networking/ -support/ -orientation

- Involve as much as possible and since the beginning of the project, all actors of the value chain to respond to all their needs and distinguish from the conventional system.
- Involvement of growers in early stages to respond to a need in the field.
- Organize seed breeding initiatives in a community-based governance structure.
- Getting in touch with local, politicians and associations to build a community around the project – rely on diversity at every level in order to build a community driven and community supported activity.
- Act in a network at territorial scale, where the cultivars are only part of your service to the farmers and society at large.

Topic 2: Knowledge exchange/ networking within the field

- Connect with others breeding and seed producers– network, exchange knowledge.
- Learn from already existing initiatives that are open to share.
- Find alliance with existing initiatives, eg for common seed sale arrangement.

Topic 3: Market-orientation

- Have a commercial approach to PRM, beyond agrobiodiversity conservation.

- Organize PRM sales in order to get back some part of revenue for re-investments in further breeding.
- OP (open pollinated) varieties in plant nurseries. Choice of variety is often limited by nursery offer.

Topic 4: Communication/ awareness

- Create links with local institutions to show the society value of what OPBI does.
- Have an important goal for society and communicate about it. E.g. communicate the alternative to patents, ngt (new genomic techniques) cultivars.
- Increase awareness of the need of organic varieties to increase the resilience and the efficiency of the organic agroecosystems.
- Raise awareness along the value chain partners including consumers of your added values and go for (moral and financial) commitment of the organic value chain you are operating in.
- Organic plant breeding is organic from the start. That we need to bring to consumer awareness. To get support from consumers and to have a unique selling point (USP).

Topic 5: Organizational structure/ entrepreneurship

- Explore new marketing channels.
- Get started with private foundation money, reach out to local value chain actors for support, try to get matching public funding, communicate your added value.

Most recommendations were given related to value chain networking and communication and awareness raising on organic breeding. Further recommendations were provided related to entrepreneurship, knowledge exchange and market-orientation.

To summarize, value-chain networking/ -support/ and -orientation is a very important factor for the financial sustainability of OPBI. The large dependence on short-term funds from research projects was very critically discussed. The dependance should be decreased in favour of a larger dependance on long-term contributions from value chain actors or other important stakeholders. Market-orientation and communication and awareness raising also turned out to be an important topic for financial sustainability. As opposed to funds, revenue from sales is under the control of the initiative. However, market competition is high due to the competition with cultivars from conventional breeders. Therefore, the value-chain support plays a fundamental role.

4. Present strategies and success factors for adoption of OV and OHM by farmers

4.1 Approach/Methodology

As OPBI work preferentially in the development of organic heterogeneous material (OHM) and organic varieties (OV) as cultivar types particularly interesting for organic farming (based on the EU Organic Regulation), we have analysed successful strategies to strengthen their use. A successful market uptake of these cultivar types and an increased plant reproductive material sale from them can be an important factor for the financial sustainability of OPBI. To identify the present strategy and success factors for adoption of organic varieties (OV) and (OHM), we collaborated with Task 6.1 of LiveSeeding which had selected two concrete focus cases – one for OV (crop: open-pollinated (OP) beetroot variety for juice making, country: Germany) and one for OHM (crop: FURAT wheat for bread, country: Italy) – each including a relevant selection/ breeding program and an established value chain.

For the OV case Task 6.1 organized individual face-to-face interviews with breeders (n = 2), seed producers (n = 1), farmers (n = 4), and processors (n = 2). For Task 5.2 the following four questions were integrated into the interviews to identify the factors that motivate as well as enable farmers to use OV:

1. What motivates you/organic farmers to grow an OP beetroot variety such as Robuschka or Gesche? Why do you/ organic farmers grow an OP variety instead of a hybrid variety? (asked to breeders, seed producer, farmers, processors)
2. What needs/ expectations do organic farmers have regarding beetroot varieties when they grow them for juice producers? (asked to breeders, farmers)
3. Please evaluate the following statement: "[OP varieties] are adapted to the needs of organic farmers who grow beetroot for juice producers such as Voelkel or Gesa." (asked to breeders, seed producers, farmers)
4. Please express your "wishes" to breeders, seed producers and processors. (asked to farmers)

The first question addresses the motivation of farmers to grow OP beetroot varieties and question two through four address farmers' needs and expectations in relation to OP beetroot varieties. Questions were not only asked to farmers but also breeders, seed producers, and processors, i.e. the latter were asked to take the perspective of the farmers.

For the OHM case Task 6.1 organized an in-person multi stakeholder workshop in Italy, Scandicci, in May 2024. The workshop was kicked off with an exercise for Task 5.2, following an adapted version of the standard SWOT analysis exercise, to identify the factors that motivate as well as enable the use of OHM. Instead of asking for the strength, weaknesses, opportunities and threats of OHM, we asked participants about

their intrinsic and extrinsic motivation to be part of the OHM value chain as well as about enablers (=drivers) of OHM. The exercise focused not only on the adoption and use by farmers, but also other value chain stakeholders. Specifically, we asked participants to complete the following three sentences:

1. "I enjoy being part of the OHM value chain as a breeder/ seed multiplier/ farmer/ processor/ consumer/ citizen, because…". (= intrinsic motivation)
2. "I benefit from being part of the OHM value chain as a breeder/ seed multiplier/ farmer/ processor/ consumer/ citizen, because…". (= extrinsic motivation)
3. "OHM wheat will become more relevant in the organic sector, because or if…". (= enablers)

The exercise was done by each participant individually and inputs were then discussed in the plenary.

4.2 Results

4.2.1 OV case

4.2.1.1 Motivation

OP beetroot varieties hold significant value for the organic sector by balancing agronomic, economic, and ethical factors. While they may not fully match hybrid varieties in uniformity and yield, their adaptability to organic farming and alignment with organic principles make them highly attractive. Market demand, especially from processors committed to organic values, reinforces their relevance for the farmers. Overcoming ingrained biases favouring hybrids and embracing the unique benefits of OP varieties—including better nutritional quality and seed autonomy or the organic sector - will be key to their wider adoption. Ultimately, OP varieties offer a meaningful path toward more sustainable, transparent, and resilient organic beetroot production.

4.2.1.2 Needs and expectations

According to the value chain stakeholders interviewed, organic farmers' want organic breeding to remain independent with varieties suited for organic conditions that emphasize quality over visual perfection. Improved seed quality and processing, better market support, and enhanced knowledge sharing in management practises are key to fostering organic OP beetroot varieties' success.

4.2.1.3 Summary

Based on our findings, farmers' adoption of OV is influenced by a combination of economic, agronomic, ethical, and structural factors which can be of inspiration also for other cases.

Market Demand & Economic Incentives

- Clear demand from processors and customers

- Price premiums for OP varieties to reflect production risks and higher costs
- Stable and transparent seed costs

Agronomic Suitability

- Strong performance under organic conditions, including good yield potential, and better taste and nutritional profile
- Tolerant to diseases, resilience to abiotic stressors, and weed pressure.

Improved Seed Quality & Processing

- High-quality seeds to improve sowing precision and reduce labor.
- Higher germination rates and more uniform seedling development.
- Better seed processing infrastructure and attention for organic seeds

Farmer Autonomy & Ideological Motivation

- Seed sovereignty: OP seeds can be saved and reused without legal restrictions.
- Reduced dependence on global seed market.
- Alignment with organic principles, including GMO-free and biodiversity-friendly farming.
- Desire for regional adaptation and preservation of landraces, heirloom varieties.

Cultural & Educational Shift

- Acceptance of variability in size and uniformity when offset by quality and sustainability.
- Desire for farmer-led trials and local adaptation.
- Valuing inner quality (taste, nutrition) over visual perfection.

Institutional & Structural Support

- Appropriate advisory services and peer-learning networks.
- Processing flexibility to deal with harvest variability.

Risk Management & Market Structure

- Dependency on single buyers is risky — calls for more diversified and flexible markets.
- Support for shared risk models and guaranteed markets for OP produce.

4.2.2 OHM case

4.2.2.1 Intrinsic motivation

Breeders involved in the FURAT OHM case, highlighted the appreciation of collaborating, exchanging ideas, and being part of a diverse, evolving agricultural system. They emphasize the importance for organic farming, consumer health, and **creating meaningful alternatives to mass-market food systems.** And they find meaning in contributing to a value chain that benefits everyone involved.

Farmers mentioned a mix of **personal, social, and environmental reasons** for cultivating OHM. They mentioned passion about the dynamic nature of cultivating

OHM wheat. They appreciate the creative, observational, and innovative dimensions of their work. And they value the opportunity to build relationships, preserve biodiversity, and make responsible choices for the future.

Processors enjoy being part of the OHM value chain, for reasons that span **learning, identity, sustainability, and contribution to change**. Processors value the chance to understand agriculture more deeply and be part of a story that evolves. They feel a strong sense of purpose, knowing their work supports environmental and nutritional health. And they appreciate being involved in a less mainstream but meaningful movement and see it as a form of personal evolution.

Together, breeders, farmers, and processors describe the FURAT value chain as a living system rooted in relationships, continuous learning, biodiversity, and shared values. Each group contributes a unique perspective, but all are united by a common goal: to shape a more sustainable, inclusive, and conscious way of producing and enjoying food.

The following themes are shared by all three groups can be of inspiration also for other cases:

Belonging to a Network

Across breeders, farmers, and processors, there's a strong appreciation for being part of a collaborative and value-driven community. Sharing knowledge, experiences, and challenges enriches their work and creates a sense of solidarity.

Empowerment and Satisfaction

All groups emphasize continuous learning—whether it's studying plant populations or experimenting with food processing. The evolving nature of OHM wheat fosters creativity, reflection, and intellectual engagement. People across roles feel more empowered, aware, and fulfilled in their work

Sustainability and Ethics

A deep commitment to ecological responsibility and ethical food systems runs through all responses. Participants feel their work supports biodiversity, environmental health, and conscious consumer choices.

Desire to Create Change

Breeders, farmers, and processors see themselves as agents of transformation, moving away from industrialized models toward more just, resilient, and transparent value chains. A common thread is a belief in and commitment to agrobiodiversity, environmental stewardship, and social value. FURAT offers a practical path to act on these values.

4.2.2.2 Extrinsic motivation

Breeders identify multiple benefits from participating in the FURAT value chain, including. Most important is the ability to support region-specific supply chains with organic, population-based varieties. And they appreciate that their work directly contributes to climate resilience and aligns with a holistic view of food.
Farmers highlight a mix of **practical, relational, and philosophical benefits** from participating in the FURAT value chain.

They gain from growing diverse, unique, and meaningful crops. The produce can be marketed in special value chains with price premium. And they feel more in control of their production, able to plan better and align their work with ecological and social goals and be out of the wheat commodity markert.

Processors describe a blend of **personal, professional, and relational benefits** from being part of the FURAT value chain. They value to be able to produce to excellent, adaptable, and healthy products which can be marked as speciality products for their difference with the standard products. They benefit from rich relationships and shared craftsmanship, which support their production and create community. And they experience personal satisfaction and a stronger connection to the full value of food—from field to finished product.

The following themes are shared by all three groups:

High-Quality & Healthy Products

All groups recognize that the FURAT value chain produces food that is nutritious, flavorful, and environmentally sound – benefiting both producers and consumers. These added values can be exploited in the marketing.

Knowledge Exchange and Continuous Learning

Participation fosters ongoing learning, collaboration, and innovation. Breeders, farmers, and processors alike benefit from mutual support and idea-sharing that enhances their practices and personal growth.

Stronger Relationships and Trust

The value chain creates a network built on trust, transparency, and shared values. Relationships among all stakeholders—whether local or beyond—are central and deeply valued.

Thus, the FURAT value chain is not just about producing and selling wheat—it's a community of practice and values. Across all roles, participants benefit from high-quality, ethical products, deep connections, ongoing learning, and a sense of purpose.

The FURAT value chain enables them to act on their convictions, collaborate meaningfully, and find joy in their work.

4.2.2.3 Enablers

OHM wheat's growing relevance in organic agriculture hinges on a blend of **environmental, technical, social, and economic factors** across the entire value chain:

Climate Adaptation and Resilience:

All groups agree that OHM wheat's natural diversity and adaptability make it well-suited to organic systems facing climate change. Its ability to maintain stable production under variable conditions is a key driver for increased relevance.

Suitability for Organic Farming Practices:

OHM wheat supports organic farming by enhancing weed control, seed adaptation, and biodiversity, aligning well with sustainable agriculture principles.

Awareness, Education, and Promotion:

For OHM wheat to move beyond niche status, there needs to be widespread consumer and stakeholder awareness of its benefits. Active promotion and education will be essential to increase demand and understanding.

Building and Strengthening Supply Chains:

The establishment of coordinated supply chains and networks will enable efficient production, marketing, and fair economic returns for all actors involved.

Maintaining Quality and Economic Viability:

Continued focus on quality and nutritional value will support consumer acceptance and market growth. Additionally, sharing economic benefits fairly across the chain is necessary for sustainability.

Regulatory Support and Trust:

Evolving legislation and certification rules that recognize heterogeneous populations will provide a necessary framework to build trust and facilitate broader adoption.

Preservation of Core Values:

There is a strong consensus on the need to preserve the ecological, social, and cultural values embodied by OHM wheat, ensuring that expansion does not compromise its unique strengths.

4.2.2.4 Summary of success factors for adoption of OV and OHM

All actors value the sense of community, learning, and shared purpose in supporting organic, sustainable farming with OHM wheat. They benefit from improved market opportunities, product quality, and adaptability to changing climates. For OHM wheat to become more relevant in the future, the chain requires strong promotion, consumer education, regulatory support, fair economics, and continuous technical development, while preserving the ecological and social values that make this wheat special.

Farmers adopt OHM wheat primarily because it aligns deeply with their **values and passions** (biodiversity, sustainability, community), **offers practical benefits** (adaptability, seed autonomy, economic stability), and **provides opportunities for marketing outside of the wheat commodity market**. However, **successful adoption depends on supportive market structures, regulatory frameworks, consumer awareness, and preserving the ecological and social values of OHM**.

5. Discussion and concluding recommendations

Achieving financial stability in the organic breeding sector remains a significant challenge. Organic Plant Breeding Initiatives (OPBI) are often **micro-to small and medium sized entities**. They are characterized by a high degree of effectiveness and adaptability as they manage to deliver cultivars adapted to organic and agroecology-oriented farming while protecting seeds as a common good.

Yet, they operate with **funding streams that are discontinuous, short-medium term oriented** and follow donor patterns (rather than recipient ones) and **therefore make it difficult to plan on the long term**.

The financial instability hampers the sector's ability to scale up and out, limiting the number of crops being worked on, and limiting the necessary investments in infrastructure and technology. The topic of establishing adequate financing strategies that respect the sector's values while enabling its growth is still a critical issue to be tackled by the organic sector as a whole and public donors.

Our study allowed for a reflection on the interdependence between the governance models and financial strategies of surveyed OPBI, exploring how organizational structures influence access to funding. Sectoral actors consider the **type of governance model important for the financial sustainability of an OPBI**, as it impacts access to specific funding types. This awareness can help to identify strategic dynamics that support collaborative actions for improving the situation at European level, as suited for each governance typology.

In terms of governance, the analysis of the surveyed Organic Plant Breeding Initiatives reveals a **sector deeply committed to its core principles of collaboration and participation**. The majority of OPBI surveyed are characterized by grassroots and hybrid grassroots-market governance models, which is a direct reflection of the value-driven nature of organic breeding. Even the for-profit initiatives included in the study retain characteristics of grassroot movements, with some being initiated by private actors who emerged from such movements. Another connected element is the commitment of sectoral actors to have monitoring and validation processes in place, to demonstrate transparency to funders on the impact of their investment.

This suggests that even within the for-profit segment of the sector, the influence of its value-driven origins remains visible.

However, the value-driven goals of the sector, namely provide adapted varieties and protect agrobiodiversity as a common goods, faces significant structural hurdles in relation to the current donor funding mechanisms and delivery methods, which are **too heavily reliant on short-term, competitive grants**.

In spite of the limitations in the scope of the research (16 OPBI surveyed), the authors considered that the key conclusions highlighted below can be considered valid overall, as they are in line with what sectoral experts shared in the workshop on the financial sustainability of the organic breeding initiatives.

The current two-tiered financial architecture in which **operational expenditures are primarily covered by competitive funds (often projects from public research schemes)**, **while capital expenditures depend on private means (not always available) common among OPBIs poses a challenge**. The systemic gap in public funding for long-term investments, coupled with the instability of competitive grants, creates a significant barrier to the sector's growth and resilience.

To transition from the current state to more long-term stable financing, requires **donors to move away from short term project-based funding (with a short cycle of 3 to 5 years) to longer based structural funding mechanisms (core funding or long term grants with a blueprint approach). Predictability of funding streams is also a crucial factor.**

When reflecting about financing strategies that can help to overcome this lock-in, it becomes clear that the financial models are steered by the underlying sector, with sales-based financing being more used for vegetable breeding as high-value crops compared with the breeding for arable crops, especially cereals.

To improve the situation, a **better interlink between the breeding and the plant reproductive material sale** could certainly profit the entire organic breeding sector. This aspect relates to the currently limited role of royalties as funding source for OPBI. At the moment, royalties to do not play a major role in the financing of OPBI, especially in the case of Organic Heterogenous Material (for which Plant Variety Protection does not apply), cultivar development for minor crops (in which anyway the acreage would not reach a critical size to make the input from royalties relevant) or cultivar types, such as open pollinated varieties, which have a small market share.

The aspect of plant reproductive material sale and royalties' role in financing is therefore linked to the crop type, the cultivar type, the current market share but also the projection of the market importance in the future, which each OPBI should individually evaluate to consider the importance of sales and royalties in their specific market context.

In order to be successful on the marketing side, it is important to **focus on the aspects that determine the success among farmers and seed producers of "organic" types of cultivars**, i.e. OHM and OV. According to our collaboration with two active OV and OHM value chains (one for each case), OPBI should trigger market demand and economic incentives by collaborating with food producers and retailers. The cultivars must have a good performance (good yield potential, and better taste and nutritional profile) and the seeds sold must be of high quality and with a stable and transparent

seed cost. Tolerance to diseases, resilience to abiotic stressors, and weed pressure are key aspects of cultivar choice by the farmers.

Successful adoption depends on supportive market structures (which the OPBI need as support in their development), **enabling regulatory frameworks** (which the organic breeding sector as a whole should advocate for), **consumer awareness** (which has to be actively increased), **and preserving the ecological and social values** (with protecting the role of seeds as commons).

Alignment of OPBI with organic principles, including GMO/NGT-free and biodiversity-friendly farming practice are also a key feature of success of the bred varieties among organic and agroecological farmers. Therefore, developing and using alternative, yet innovative approaches will be a pillar for the OPBI development.

Going back to the financial pillars, it is clear from our discussion on long term sustainability that **re-investment in long-term public breeding and publicly supported breeding programs** is a key asset for ensuring long-term focus on cultivar development for sustainable farming systems.

Investment in communication, awareness-raising and networking across the value chain is at the basis of transforming ethical support to the objectives of organic breeding into tangible financial contributions. This should help to mobilize public funding to sustain the general activity of OPBI and not only specific research projects. As well, it should trigger community-based support, especially by the key actors of the processing and retail sector. These two assets are meant as priority but the other pillars of funding should not be neglected (e.g. foundations, green investment, crowd funding) which also play an important role in the view of a diversified funding approach.

Concurrently, a collaborative effort at European level to focus on gathering public funding bodies and value chain actors is the most important pathway in order to mobilize more public investment (directly in public organization or as support to OPBI of other type) and value chain support).

Glossary

Breeding

The science and practice of selecting and developing plant populations with desirable characteristics such as yield, taste, or adaptation to specific environments. In organic agriculture, breeding also prioritizes resilience, diversity, and compatibility with low-input farming systems

Commons (Seeds as common good)

Shared resources that are accessed, managed, and preserved collectively by a community through self-defined rules that prevent their depletion or appropriation. The term refers both to the resource itself (in this case, seeds) and to the social and normative system that governs it.

Conservation (of landraces and heirloom varieties)

Conservation of landraces and heirloom varieties is the process of maintaining the genetic diversity of such a cultivar within their agricultural systems, primarily through the active participation of farmers. It involves preserving unique traits and promoting ongoing adaptation to environmental and social changes.

Landraces and heirloom varieties

Refers to cultivars that are open-pollinated, exhibit a certain degree of genetic variability within the population, have a generative offspring which is true-to-type, are non-GMO and non-F1-hybrids, and have a specific history of selection and culture related to a certain region and community.

Organic Heterogeneous Material (OHM)

'Organic Heterogeneous Material' (OHM) is a **novel cultivar category** introduced in the European Regulation (EU) No. 2018/848 Art. 3 (18) on organic production and labelling of organic products (the "Organic Regulation"). A key feature of OHM is that it **does not meet the variety definition** set out in Council Regulation (EC) No. 2100/94, particularly in terms of uniformity among individual plants within the material.

Instead, OHM is defined as follows:

"OHM means a plant grouping within a single botanical taxon of the lowest known rank which:
(a) presents common phenotypic characteristics;
(b) is characterised by a high level of genetic and phenotypic diversity between individual reproductive units, so that that plant grouping is represented by the material as a whole, and not by a small number of units;

(c) is not a variety within the meaning of Art. 5 (2) of Council Regulation (EC) No. 2100/94;
(d) is not a mixture of varieties; and
(e) has been produced in accordance with this Regulation."

There are **two important defining properties of OHM (at a genetic and phenotypic level)**:

1. **OHM must exhibit a certain minimal degree of heterogeneity** between its constituent plants **for some phenotypic characteristics**. These may include characteristics proposed by the 'International Union for the Protection of New Varieties of Plants' (UPOV). Note that it is not a contradiction that the **OHM must also present other common characteristics**. Of particular importance in that regard may be agronomic and quality traits.

2. In addition to its phenotypic and genetic heterogeneity **OHM is characterised by its dynamic nature** allowing it to evolve and to adapt to different growing conditions or locations. OHM is thus expected to change over time. In particular, OHM is neither a mixture of varieties nor a synthetic variety, which is also recreated from pre-defined parental stocks every growing season. Instead, **OHM is managed as a so-called bulk population**, i.e. it is repeatedly resown and harvested in subsequent generations after its initial creation. Specific local adaptions can be achieved through natural and/or human selection.

   This second important defining property of OHM is clarified in Recital (6) of the Delegated Regulation (EU) No. 2021/1189 (which supplements the Organic Regulation with more detailed rules on the marketing regime for OHM, see also Section 1.2):

Organic Plant Breeding Initiative (OPBI)

In this report with Organic Plant Breeding Initiative we intend individual or collective experiences or organizations, public or private, with or without profit, dedicated to organic plant breeding and/or landraces and heirloom varieties conservation as their sole activity or alongside others such as seed or produce production or service providers. Organic Plant Breeding is intended as in the position paper by ECO-PB (ECO-PB, 2012) and IFOAM International norms of 2014. More info at: https://www.liveseed.eu/wp-content/uploads/2019/07/Definition-of-Organic-Plant-Breeding-Breeding-for-Organic-and-Cultivar.pdf

Organic Variety (OV)

According to Regulation (EU) 2018/848): "Organic variety suitable for organic production means a variety .... which is characterized by a high level of genetic and phenotypical diversity between individual reproductive units" (Art. 3 (19)).

"For the production of organic varieties suitable for organic production, the organic breeding activities shall be conducted under organic conditions and shall focus on enhancement of genetic diversity, reliance on natural reproductive ability, as well as agronomic performance, disease resistance and adaptation to diverse local soil and climate conditions. All multiplication practices except meristem culture shall be carried out under certified organic management" (Annex II, 1.8.4)

Patent (on seeds)

Patents were originally designed to protect industrial inventions. In Switzerland, as in Europe, the system of Plant Variety Protection has been used, as it enables the preservation of free access to plant genetic resources to develop new varieties (breeder's exemption). However in recent years an increasing number of patents have been taken out on plants. A patented plant may no longer be freely used to develop new varieties. Authorisation is required to use it – which also implies paying a fee to the patent owner. And although it was originally genetically modified plants that were patented, hundreds of patents have recently been granted on so-called conventional plants. Patents on seeds thus limit access to plant genetic material for breeders and harm innovation. Patents also accelerate the concentration of the seed market. Small and medium-sized companies that do not have the means to pay for patents are under pressure.

Source: https://www.publiceye.ch/en/topics/seeds/farmers-rights/patents-on-plants

Plant Variety Protection

Intellectual property system of plant breeders' rights (PBR) based on the Convention for the International Union for the Protection of New Varieties of Plants (UPOV Convention), which provides effective IP protection for new plant varieties as such and fits the specific needs and nature of the industry. Plant Breeders' Rights gives the holder exclusive control over commercialisation of propagating material and the ability to collect royalties.

Royalties

Royalties in the context of seeds refers to payments made by farmers or seed distributors to the owner of protected plant variety as a condition for using that variety.

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Annex 1: Description of governance model types identified

	Public organisation (non-profit) - PO	Market initiative (for-profit) - MI	Grass-root initiative (non-profit) - GR	Public-private partnership (non-profit) - PGR	Private (non-profit)-private (for-profit) partnership - MGR	Public-private partnership (for-profit & non-profit) - PMG
Governance model ID	1	2	3	5	6	7
Legal form (E2)	Public (6)	Private for-profit (9, 11, 14)	Foundation (1), Farmers cooperative (3), private non-profit (2, 7, 16)	Private non-profit (4)	**Private non-profit** (5, 12 13), **Private for-profit** (10), Private for-profit with non-profit (15)	Private for-profit (8)
Initiating actor (E3)	Government (6)	Private actor (9, 11, 14)	Community (1, 2, 7), Private actor (3), missing value (16)	Private actor (4)	Community (5, 12), Private actor (10, 13, 15)	Private actor (8)
Operational scale (E4)	Country scale (6)	Country scale (9), Mixed scale (11), International scale (14),	Country scale (1, 7), Mixed scale (3), International (2), missing value (16)	Country scale (4)	Regional (5), International (10, 13, 15), Country scale (12)	Country scale (8)
Number of employees (E5)	270 – 25 involved in breeding (6)	2 (11), 10 (14), 12 (9)	2 (7), 4 (3), 20 (2), 35 (1), missing value (16)	3 (4)	1 (5, 15), 2 (10, 13), 12 (12)	2 (8)
Number of volunteers (E6)	0 (6)	**0 (9, 11, 14)**	0 (3),2 (2), 50 (7), 2500 (1), missing value (16)	0 (4), 2 (2)	0 (10, 12), 4 (13), Missing value (5, 15)	0 (8)
Dependence on community support (G1)	Low (6)	Low (9, 14), High (11)	High (1, 2, 3, 7), missing value (16)	High (4)	Medium (5, 10, 13), **High (**12**),** Missing value (15)	High (8)
Dependence on government support (G3)	High (6)[9]	Low (14), Medium (9), High (11)	Low (7), Medium (1), **High** (2, 3), missing value (16)	Medium (4)	Low (5, 13), Medium (12), **High** (10), Missing value (15)	High (8)
Decision-making 2 (H4)	Average (6)	Open-participatory, inclusive (11), Rather open-participatory, inclusive (9), Closed-participatory, exclusive (14)	Rather open-participatory/ inclusive (3), Average (1, 2, 7), missing value (16)	Average (4)	Open-participatory, inclusive (5), Rather open-participatory/ inclusive (10, 12), Average (13), Missing value (15)	Rather open-participatory/ inclusive (8)
Organizational structure (H2)	Rather hierarchical (6)	Non-hierarchical (11), Average (14), Rather hierarchical (9)	Non-hierarchical (7), Rather non-hierarchical (3), Average (1), Rather hierarchical (2), missing value (16)	Average (4)	Non-hierarchical (5), Rather non-hierarchical (12), Average (13), Hierarchical (10), Missing value (15)	Non-hierarchical (8)
Value-creation	Rather market-driven (6)	Market-driven (9, 14), Community-/citizen driven (11)	Community-/ citizen-driven (7), Rather community-/ citizen-driven (1, 3), Average (2), missing value (16)	Rather market-driven (4)	Community-/ citizen-driven (5, 12), Average (13), Market-driven (10), Missing value (15)	Average (8)

[9] Please note: For the PO OPBI the value in "governance dependence" was modified from low to high after plausibility check.

	Public organisation (non-profit) - PO	Market initiative (for-profit) - MI	Grass-root initiative (non-profit) - GR	Public-private partnership (non-profit) - PGR	Private (non-profit)-private (for-profit) partnership - MGR	Public-private partnership (for-profit & non-profit) - PMG
Environment	Competitive (6)	Collaborative (11), Rather competitive (9), Competitive (14)	Collaborative (1, 3), Rather collaborative (2, 7), missing value (16)	Rather collaborative (4)	Collaborative (5, 10, 13), Rather collaborative (12), Missing value (15)	Rather collaborative (8)
Initiatives surveyed (self-classified)	6	9, 11, 14	1, 3, 7, 12, 16	2	5, 10, 13, 15	4, 8
Initiatives surveyed (re-classified)	6	9, 11, 14	1, 2, 3, 7, 16	4	5, 10, 12, 13, 15	8