



M3.5 - Organic plant breeding in a systems-based approach and integration of organic plant breeding in value chain partnerships

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Document Version

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1. Objectives and description of activities

Developing organic breeding is a key challenge for the organic sector. It is necessary to better adapt varieties to the specific needs of the organic sector (disease resistance, taste, weed suppressing ability, etc). It is also important to enable the organic sector to face the requirements of the New Organic Regulation ([EU 2018/848](#)). From 2036, exemptions to the use non-organic seeds will not be granted any more (Article 53, Regulation 2018/848). The active participation of breeders, farmers, processors, retailers and traders is crucial to develop organic breeding. They all play a critical role and share the responsibility in upscaling organic plant breeding and ensuring future food security, food quality and climate robust agriculture as well as integrity of the value chain. Even consumers could take part in supporting organic plant breeding with informed purchases.

On the 12 of February 2019, IFOAM EU, the Louis Bolk Institute (Netherlands) and FiBL Switzerland co-organized a workshop ‘*Organic plant breeding in a system-based approach and integration of organic plant breeding in value chain partnership*’ as part of the Horizon 2020 project LIVESEED. The workshop took place at the largest organic trade fair at Nürnberg Messe biofach to reach out to different actors of the organic sector. The main objective of this workshop was to gather interested stakeholders across the value chain to discuss the responsibilities and their potential concrete engagements in facilitating organic plant breeding. Organized as a world café workshop¹, the participants had the opportunity to discuss three main issues:

- Why should different value chain actors support organic plant breeding?
- The advantage of organic plant breeding for the value chain (farmer, processors, traders).
- The advantage of organic plant breeding for consumers and society (local and global).

This report describes in detail the main conclusion of the discussions held during this workshop.

2. Context

2.1. Why is it necessary to engage all stakeholders in the development of organic plant breeding?

2.1.1 The systems-based breeding approach²

The seed market has faced increasing concentration. Nowadays, only a few companies (Bayer, Syngenta, DuPont, Bayer, Dow) own intellectual property rights on seeds, an increasing trend with mergers amongst them (Monsanto and Bayer, DuPont and Dow, ChemChina and Syngenta). The system is shifting from plant breeding to trait breeding: more and more patents are granted on plant traits, covered by cross licensing agreements shared amongst those few companies. As a consequence, there is a drastic loss of diversity in breeding initiatives and of available varieties. But, breeding, and organic breeding in particular, could contribute to achieve different sustainable development goals (SDGs) defined by the UN and important ecosystem services.

Organic plant breeding needs to embrace a broader approach not only with technical breeding aspects, but also socio-economic, environmental, climatic and ethical factors. It is necessary to develop high-yielding, healthy, nutritious, resource-efficient cultivars that are climate-robust, culturally acceptable and contribute to ecosystem services. To deal with so many different aspects simultaneously, it is necessary to have a broader approach. The systems-based breeding approach³

¹ https://en.wikipedia.org/wiki/World_caf%C3%A9

² Based on the presentation of Edwin Nuijten, Louis Bolk Institut.

³ Lammerts van Bueren, E. T., Struik, P. C., van Eekeren, N., & Nuijten, E. (2018). Towards resilience through systems-based plant breeding. A review. *Agronomy for Sustainable Development*, 38(5), [42]. <https://doi.org/10.1007/s13593-018-0522-6>



proposes a balance of four co-existing paradigmatic orientations: community-based breeding, ecosystem-based breeding, trait-based breeding, and corporate-based breeding; and the integration of key-elements of these orientations as much as possible. Based on this concept, not only breeders but also other value chain actors can play an active role in the development of an ecologically and societally resilient, sustainable agriculture.

2.1.2. The need of an integrated approach for organic plant breeding for medium and long-term security and integrity of organic food⁴

Society, and agriculture in particular, has to face great challenges in a difficult context: to increase the quantity and the quality of food production with less external inputs, less predictable weather events and new emerging pests and diseases. It is therefore very important to develop organic breeding with good linkages with society. Currently, only few companies own most varieties available (more than 90%) in a market which does not contribute to fostering genetic diversity. Furthermore, conventional breeding focuses on the need of industrial agriculture while it would be necessary to develop breeding dedicated to a range of specific needs of organic agriculture, reflecting the different production approaches⁵, and to adapt cultivars to changing conditions without the use of genetic engineering techniques. In organic agriculture we are aiming for a large portfolio of crop species and cultivars locally adapted for different organic farming practice and markets. Does the area under production of one organic bred cultivar will always be very small, even if the organic share will grow rapidly in the near future. Therefore, refinancing organic plant breeding through a royalty system on seeds of protected varieties will not be sufficient. In addition, in this scenario only the farmers will financially contribute to the cultivar development, whereas the whole value chain including the consumer and society will profit.

Different funding schemes have been explored to finance organic plant breeding, resulting in a multitude of organic breeding approaches:

- Private foundations
- Farmers and gardeners (via sale of seeds, royalties, incentive fee or voluntary contributions)
- Public funding (which is mainly devoted to breeding research)
- Participation of the value chain (organic associations, processors, specialized trader, retailers, consumers...)⁶
- Crowd funding

Today the private foundations cover most of the costs of plant breeding, whereas seed based financial contributions play a minor role⁷. Public funding is in general based on research driven projects, which is very important, but does not cover cost for the daily breeding work. A few cases exist, where the value chain gets engaged either via donations, contribution of a certain percentage of the price at the point of sale, or temporary commitment to a specific breeding program, e.g., high oleic sunflower. In most cases the breeding initiative has to cover its costs by a combination of these options. Still, these funding options are timely limited and very fragmented and do by far not cover the investment needed for organic plant breeding for a larger range of crop species. In addition, it takes a lot of efforts and time for breeders to obtain sufficient funding each year, preventing him from the daily breeding work. This is very critical for the survival of organic breeding initiatives, which is a long-term activity

⁴ Based on the presentation of Monika Messmer, FiBL-CH, see Annex III.

⁵ The organic agriculture needs varieties with stable yields of high quality, even under low-input conditions. Breeding should concentrate to specific requirements: rapid youth development, nutrient efficiency and high N-fixation, weed suppression capacity or weed tolerance, resistance to soil and seed-borne diseases, good digestibility and nutritional value of forage plants, good processability, nutritional quality and taste.

⁶ See example for cross-sector promotion of organic cotton breeding: [Seeding the Green Future](#).

⁷ https://www.opensourceseeds.org/sites/default/files/downloads/Who_pays_for_seeds.pdf



and thus, needs long-term commitment. It also prevents young breeders to commit themselves to organic breeding initiatives if they consider such jobs as unsecure. As breeding is key for the future integrity and development of the organic sector, breeding should therefore be seen as integral part of the whole value chain.

*Engagement.BioBreeding*⁸ is a cross sector concept for organic breeding which facilitates the sector to make targeted investments in organic breeding in a partnership-based cooperation. The initiative is calling for a joint action of the organic value chain to support organic plant and animal breeding. The whole organic sector will benefit from the development of organic breeding: while respecting organic values and principles, the integrity of organic products will be ensured, and consumer confidence will be strengthened. The specific needs of the whole organic value chain (farmers, processors, traders and customers) will be taken into account. Organic breeding is the basis for a self-determined, independent further development of the organic sector.

Organic breeding now has to face this new challenge: how can the engagement of the value chain in organic breeding become the new standard? This shall be further elaborated on a European level during and beyond the timeframe of LIVESEED.

2.2. Best-practices examples

2.2.1. Commitment of organic value chain for marketing phytophthora resistant potato by 2020⁹

Because of the maritime climate, late blight occurs yearly in Netherland, but copper-based fungicides are not allowed. When 5% potato plant foliage is infested, the foliage must be removed or burned. As a consequence, since 2009, 20% of organic farmers stopped growing potatoes, while research to develop GM potatoes was being developed in the Netherland.

In 2016, Dutch retailers put pressure on conventional farmers to reduce and avoid the use of chemicals. Organic agriculture was also under media scrutiny for using copper leaf fertilizer. Bionext and the organic farmers association agreed on a transition towards 100% robust varieties in 2020, with no use of copper, but they highlighted the need for support from retailers to achieve such a goal. In 2017, all Dutch retailers signed a covenant to support organic potato breeding. From 2009 to 2019, Bioimpuls has been conducted; an organic potato breeding program considering requirements from different stakeholders of the value chain:

- Organic farmers (resistant against foliage and tuber late blight, yields, other field traits, etc.)
- Market (good quality, smooth skin, shape, flat eyes, flesh and skin color, taste).

In 2019, 17 varieties resistant to late blight are available and three early varieties (which can be harvested before phytophthora attacks).

From this experience, it is obvious that the value chain consists of many different actors with their own goals. Thus, it is necessary that the initiative comes from the food chain, even though it might be necessary to have the help of a neutral facilitator to bring balance between the different interests.

2.2.2. How retailers can be involved: example of Odin in the Netherland¹⁰

Retailers can also actively support organic plant breeding. Odin, an organic retailer in the Netherlands, decided to do so, with simple actions, notably in terms of communication and marketing activities towards consumers. In order to promote some products coming from specific organic breeding programs, Odin has showcased those products in their shop with specific poster campaign and provide specific information to consumers. The company considers that supporting organic breeding is also

⁸http://www.biozuechtung.org/wp-content/uploads/Flyer_Engagement-for-BioBreeding_english.pdf

⁹ Based on the presentation of Prof. Dr. Edith T. Lammerts van Bueren, see Annex III.

¹⁰ Based on the oral presentation of Merle Koosmans and David Egelmeers, Odin



beneficial for them, as they can provide better quality products to their consumers. Odin is also actively involved in the Dutch potato covenant (see section above).

2.2.3. Fair-Breeding®: a German multi-actors organic breeding program¹¹

The majority in society considers that seeds are only the interest of farmers, or do not even consider seeds at all. As a consequence, there is a lack of awareness and interest in seeds. During the last 50 years, breeding was concentrated on high performance agriculture, but there is a decrease of food quality and available biodiversity. The organic sector is increasingly dependent on conventional seed companies.

Fair-Breeding® was initiated in 2007 by Naturata international gemeinsam handeln e.V. and Kultursaat e.V. based on the analysis that the whole value chain should be involved with specific activities to be defined by the partners. The breeding of new varieties should be supported by the value chain. Fair-Breeding® partners spend 0.3% of the whole turnover of fresh products to long term breeding projects. Varieties developed are not covered by property rights. They are marketed as truly organic products „from the very beginning of breeding from farm to fork“. Consumers are provided with proper information and their expectations and needs are also taken into account. However, this initiative does not solve all problems, there is still a need for alternative breeding initiatives and approaches.

3. World Café Table Discussions

3.1. Why and how should value chain actors be engaged in organic plant breeding?

3.1.1. Why should value chain actors be engaged?

- It is important to engage **processors and other chain actors**, as the characteristics of cultivars directly shape their work, together with other socio-economic and agro-ecological factors. In this respect, processors and breeders could work together to better define and meet their needs. Cases of such cooperation exist, but usually such initiatives are small-scale or regional.
- A further advantage of a better cooperation between value chain actors would be that breeding could meet the demands of the **farmer and the market in general**.
- For **traders**, participating into organic plant breeding could be used as a commercial argument, advertising ‘biodiversity’ through the use of organic, or locally adapted cultivars for larger and smaller scale value chains, respectively. **Exporters** could therefore also play an important role as they function as kind of nodes in larger chain networks.
- Working on organic plant breeding could also help to tackle issues common to agriculture in general: Mitigation of water quality problems, reduction of pesticide (residues), new approaches to deal with climate change and control of new pests and diseases.

3.1.2. What could be the obstacles to the engagement of all actors?

Several obstacles were observed. Many of them are intertwined:

- There is not enough awareness of the differences between organic and conventional breeding. By buying conventional bred seeds, the organic sector also contributes to the financial support of

¹¹ Based on the presentation of Gebhard Rossmanith, Bingenheimer Saatgut, see Annex III.



conventional breeding. This indicates that there is also not enough awareness about the need of organic breeding.

- According to the Organic Regulation, derogations to use conventional multiplied untreated seeds are granted in the EU. This does not contribute to the development of the organic breeding sector. Furthermore, there is competition with seed imports.
- Even if the organic sector is steadily growing, it is still a small market with small amounts of subsidies.
- There is a low support for organic plant breeding by universities and a low support through public financing in general compared to conventional breeding.
- It would also be necessary to receive more public support for variety testing.
- Developing various financing strategies for practical organic breeding is a challenge in general. The question arises if this issue should be addressed at European or national level. It seems that a European common strategy could be interesting. EU subsidies should be invested in organic breeding and should in general be more targeted and their beneficial use controlled.

3.1.3. What arguments could be used to engage more actors?

- Possibility to have seeds as common good as an alternative to seeds protected by patents and other Intellectual Property Rights. It is also a way to be independent from multi-national companies.
- Integrity of the value chain to ensure consumer trust
- Provide innovation to the market, processors and traders are usually looking for it.
- It is a way to invest for the future (used as commercial narrative and as a matter of principle).
- It could enable to change the system and make organic breeding economically viable through this change by true cost accounting for the beneficial aspects.

During the discussion, participants stressed the fact that rational arguments do not necessarily inspire consumers and other value chain actors. There is a need for better communication strategies to really attract them.

3.1.4. What should be the focus of our communication?

Communication should be done on multiple levels simultaneously:

- Our communication should not focus on problems. Instead, it should focus on the positive aspects, its potential, that it is funky, sexy and tell stories in a touching way (for example, describe the wonders of how plants propagate, or highlight that some seeds are illegal as was done for heterogeneous material that is not yet allowed to be sold to professional growers as a population cultivar). We should try to inspire and connect to feelings, positive emotions through good taste, good looks, and describe challenges in craftsmanship.
- The creation of a new label to communicate on organic plant breeding does not seem as a good opportunity for communication. But some participants consider that the breeding philosophy could be part of a brand.
- Our communication should highlight positive statements on the products, show good examples: e.g. gardens where chefs show their guests what vegetables were used in the menu.
- Communication should also involve different actors (processors, traders etc.).
- At the same time, also explain clearly why organic breeding is so important, describing the agro-ecological, socio-economic and ethical benefits.



3.2 The advantages of organic plant breeding for value chain (farmer, processors, traders).

3.2.1. What are the specific needs of different actor groups?

To identify the advantages for the different actors of the value chain, it was necessary to first consider their specific needs. For many value chain actors, it is not always about cheaper prices. Hence, our communication should not be focused on that argument.

- **Farmers:** They want to be sure they will be able to sell their produce, that the cultivars will be resistant to diseases or perform well under different weather conditions, that they can gain new opportunities to access the market and can have premium prices.
- **Retailers:** They are looking for good quality products to sell.
- **Consumers:** They need more diversity in food and are looking for more quality.

To convince chain actors on the long term, participants highlighted the need to also be transparent about potential disadvantages when trying to develop alternative value chain approaches (lack of knowledge from consumers, extra costs in distribution, different methods of communication, etc.).

3.2.2. Which arguments & actions will address the needs of different actor groups

For the arguments that could be used to promote organic plant breeding it is also important to take into account the political and socio-cultural context:

- **Farmers:** independence from big seeds companies. Regarding climate change, to keep the ability/flexibility to continue to produce food. Varieties with specific traits, for example more resistant to diseases, could mean less work on the farm. Having access to better locally adapted seeds, with no patent and no property rights.
HOW: by proposing varieties adapted to their needs with good yields and to offer them support for the first years. It is also important to communicate good examples.
- **Retailers:** ability to distinguish their products from mainstream products, so they can gain visibility.
HOW: Promotion of local and regional products with good quality
- **Consumers/citizens:** As they are probably already convinced by the need to act regarding the loss of biodiversity and climate change, we have to highlight the link with seeds and how breeding is part of the solution. This needs to be integrated with taste, quality and common goods.
HOW: Next to information to consumers, it is important to start with the education of children and teenagers.

3.3. The advantages of organic plant breeding for consumers and society (local and global).

As organic breeding can be organised in different ways, consumers and society can be involved differently. For some participants, it was logical that organic plant breeding should be conducted in a participatory approach (with farmers and breeders). For others, organic plant breeding can be done in less participatory approaches. Some participants highlighted the need for education about organic agriculture and organic breeding in particular.

The answers of participants are divided into three aspects: practical, emotional and spiritual. Currently, too often communication focuses on the practical aspects. However, to make a connection with people emotional and spiritual aspects are equally important, or even more important.

3.3.1. Practical advantages for consumers and society:

- Respect the health of people (better nutritional value and no pesticide residues).
- Maintaining biodiversity and local varieties, contribution to local ecosystems, which would lead to more food security.



- Better adaptation for local products.
- Independence from mainstream industry.
- Guarantee for quality, by keeping connection between the plant and its environment.
- Quality innovation.
- Support fair and sustainable food production from the start.
- Engage consumers to participate by choosing those specific products and let them take the responsibility for the future of the next generations.

3.3.2. Emotional advantages for consumers and society:

- They can have access to more tasteful food. Communication towards consumers should be fun, concentrate on the freedom of choice for them.
- New varieties could give consumers more inspiration for cooking and enjoy food differently.
- Marvel at the wonders of life: how plants reproduce themselves in many different ways. Breeding should be seen as something fun (instead of concentrate on the complicatedness of technical/funding issues).

3.3.3. Spiritual advantages for consumers and society:

- To respect the integrity of reproduction of plants (no CMS, etc)! In other words: respect plants as living organisms.
- When considering plants as life (or living organisms), it helps make people reflect on their own life, and in that way supports people reconnecting to life, and to themselves. It opens eyes of consumers on new perspectives (related to IFOAM Organics International’s principles of CARE and FAIRNESS)¹².

4. Conclusions

From the above it becomes clear that there is no simple clear-cut approach. For each of the issues of the discussion, it is obvious that they are multi-faceted, and that these aspects are intertwined:

- Why should different value chain actors support organic plant breeding?
- The advantage of organic plant breeding for value chain (farmer, processors, traders)
- The advantage of organic plant breeding for consumers and society (local and global)

Already some successful examples exist for involving various chain actors in breeding. These examples are different because of their different economic and historical contexts. Hence, for stimulating value chain actor involvement in breeding we need tailor-made approaches. Agriculture and plant breeding are complex resultants of agro-ecological, socio-economic, historical, cultural and policy aspects (See Geels and Schot, 2007)¹³. Trying to change one, means taking into account other aspects at the same time. It means we cannot provide a single recipe, but rather define a set of general principles and develop a plurality of approaches for different contexts. This may seem to be a disadvantage, but the advantage is that it will help develop a broader diversity in breeding approaches and actor engagements.

¹² <https://www.ifoam.bio/en/organic-landmarks/principles-organic-agriculture>.

¹³ [Geels, F.W., Schot, J. \(2007\) Typology of sociotechnical transition pathways, Research Policy 36\(3\), 399-417, https://doi.org/10.1016/j.respol.2007.01.003.](https://doi.org/10.1016/j.respol.2007.01.003)
https://is.muni.cz/el/1423/jaro2013/HEN621/um/S5a - Geels_Schot_2007_Typology_of_STS_pathways.pdf



A general lesson is that communication is very important. With all value chain actors, we need to talk about the advantages of organic plant breeding at various levels: not only at the practical level, but perhaps more importantly at the emotional and spiritual level.

So far, the general interest in seeds and breeding is very low. Because of the many agronomic, economic, historical, cultural and political aspects related to plant breeding, it is a complex topic which cannot be communicated in a simple way. This hampers awareness raising along the value chain up to consumers and society. Because of the limited interest of other value chain actors, awareness raising will need to be done over a longer period of time. The importance and the potential impact of organic plant breeding need to be communicated repeatedly. It would be very helpful if in education more emphasis is put on the relationships of agriculture with society, and organic agriculture and organic breeding in particular.



Annex I. Agenda of the Workshop

Organic plant breeding in a systems-based approach and integration of organic plant breeding in value chain partnerships

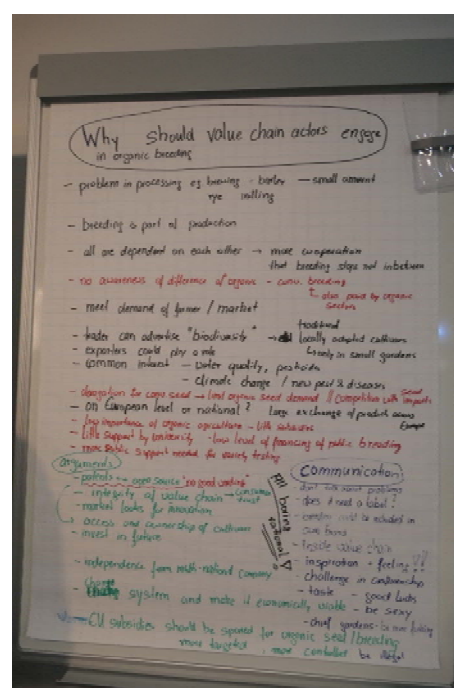
Tuesday, February 12 – 13.00h-16h30; Room Athens
BioFach, Nürnberg, Germany

Timing	Final Program
13.00 - 13.05	Welcome Note – by Prof. Dr. Edith T. Lammerts van Bueren
13.05 - 13.10	Welcome Speech – by Eric Gall, Deputy Director IFOAM EU
13.10 - 13.30	Section One: Presentations Basic concept of systems-based breeding (including social aspects) (Edwin Nuijten, LBI)
13.30 - 13.50	The need of an integrated approach for organic plant breeding for medium and long term security and integrity of organic food (Monika Messmer, FiBL-CH)
13.50 - 14.00	Discussions (Moderator: Prof. Dr. Edith T. Lammerts van Bueren)
14.00 - 14.15	Section Two: Case-studies on value chain supported organic breeding Case Study No1: Commitment of organic value chain for marketing phytophthora resistant potato by 2020 (Edith Lammerts von Bueren, WUR)
14.15 - 14.30	Case Study No2: Odin in Netherland (Merle Koomans, David Egelmeers)
14.30 - 14.45	Case Study No3: Fair Breeding Initiative (Gebhard Rossmanith, Bingenheimer Saatgut)
14.45 - 15.00	Discussions (Moderator: Prof. Dr. Edith T. Lammerts van Bueren)
15.00 - 15.20	Coffee Break
15.20 - 15.25	Introduction to World Cafe -Prof. Dr. Edith T. Lammerts van Bueren
15.25 - 15.45	Table No1: Why should different value chain actors should support organic plant breeding? (Moderators: Monika Messmer and Eva Winter, FiBL CH)
15.45 - 16.05	Table No2: The advantage of organic plant breeding for value chain (farmer, processors, traders) (Moderators: Edith T. Lammerts van Bueren and Pauline Verrière)
16.05 - 16.25	Table No3: The advantage of organic plant breeding for consumers and society (local and global) (Moderators: Edwin Nuijten and Pauline Verrière)
16.25 - 17.25	Feedback from the Group sessions (15-20 to present min. each) by the Group Moderators
17.25 - 17.30	Closing remarks by Prof. Dr. Edith T. Lammerts van Bueren

Annex II. List of Workshop Participants

List of Participants to the LIVESEED workshop

- Edwin Nuijten, LBI, NL
- Edith Lammerts van Bueren, WUR, NL
- Monika Messmer, FiBL, CH
- Pauline Verrière, IFOAM EU, BE
- Eric Gall, IFOAM EU
- Gebhard Rossmann, Bingenheimer Saatgut, DE
- Merle Koomans, Odin, NL
- David Egelmeers, Odin, NL
- Alessia Cogliandro, Aboca, IT
- Carl Vollenweider, Dottenfelder Hof, DE
- Kathrin Buhmann, Dottenfelder Hof, DE
- Rumyana Todorova, Bulagien organic association, BG
- Zdravka Smilenova, Amitica ood, BG
- Nikola Smilenov, Amitica ood, BG
- Eva Winter, FiBL, CH
- Peter Kunz, Getreidezüchtung Peter Kunz, CH
- Herbert Völkle, Getreidezüchtung Peter Kunz, CH
- Michael Fleck, Kultursaat e.V., DE
- Lea Doobe, Open Source Seeds, DE
- Szilvia Bencze, ÖMKI, HU
- Antje Kölling, Demeter, DE
- Niklaus Bolliger, Poma Culta, CH
- Barbara Eder, LfL, DE



Annex III. Presentations of the Workshop



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