



Success stories on organic seed production & breeding



Experiences from
LIVESEED Cross Visits



www.liveseed.eu

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Introduction

Seeds and their biodiversity are key elements for the development of organic agriculture and for the agro-ecological transition of food systems. The availability of seed and vegetative propagating material that are not only adapted but also adaptable to the diversity of organic farming systems and agro-ecological environments, can boost organic farms' productivity, their yield stability and the quality of their end products, while making them more independent from the conventional sector.

Yet, although the supply and diversity of organic seed is improving, the majority of organic crop production¹ is still based on seed selected for and produced within the conventional sector. Major changes in how seed for organic regimes is bred and multiplied are long overdue, and will involve all the actors of the seed value chain, from producers to final users.

In this context, the LIVESEED project organised a discovery journey through a number of cross-visits in Europe (see chapter 2) with the aim of:

- documenting success stories of organic seed selection and production/multiplication,
- enabling mutual learning among professionals,
- forging relationships as a basis for an EU professional network on organic seed
- inspiring and initiating change

This booklet illustrates a selection of these success stories. It is based on interviews recorded during the LIVESEED cross-visits in France, Italy, the Netherlands, Switzerland and Germany. All of the farmers, breeders, seed companies or cooperatives portrayed in this publication have something in common: having embarked on a unique and inspiring journey towards becoming leading organic seed producers or breeders of their particular crop. We hope you will be inspired by them!

What is organic seed?

Organic seed is seed of which the mother plant (if seed) or the parent plant (if vegetative propagating material) has been produced following the principles of organic agriculture, as laid out by the European organic regulations².

Seed production is a highly specialised activity and producing seed

organically requires an even more specific skill set (it is indeed a much more risky business to produce seed organically than conventionally). Seed crops need to stay in the field longer than edible crops to reach full seed maturity: this means a higher risk of weeds, pests, diseases or abiotic stresses spoiling the harvest.

¹ See LIVESEED booklet: "The State of Organic Seed in Europe" https://www.liveseed.eu/wp-content/uploads/2019/12/FNL-FNL-Web-Interactive-NOV19-Booklet2-LIVSEED_web.pdf

² EC No 834/2007; EU 2018/848

Why should we produce and use organic seed and organic cultivars?

Despite the challenges, there are a number of good reasons for using organically bred and reproduced seed in organic agriculture. Conducting seed production under organic conditions would create a more fully coherent value chain (from seed to plate) for organic regimes, avoiding all chemical interventions since the very beginning. Devising non-chemical solutions for the production of organic seed implies investigating and applying alternative, more sustainable techniques for seed quality and health management. This process in itself is likely to positively influence the adaptive capacity of the resulting seed to the conditions of organically managed fields in which it will eventually be used. Further adaptive advantages of organically produced seed can be achieved through using existing cultivars which are known to be better capable of thriving under low-input conditions (such as landraces, local varieties or heterogeneous material), or through breeding specifically for such traits. Organic plant breeding³ holds great potential in this direction, by generating new cultivars which are more robust and perform better under organic conditions, both as food and as seed crops, while also responding to present-day producer

and consumer expectations. All the above would increase the coherence and credibility of organic agriculture, making it more independent from conventional agriculture and mainstream research & development for the seed it requires.

In addition, the European organic regulations require that the seed and vegetative propagating material used by organic farmers must be organic. However, it currently provides a series of derogations which allow the use of untreated conventional seed in organic production in a number of cases (Article 22), until 2035.

Producing organic seed

While organic seed production is a highly specialised trade, it can also represent an attractive income diversification strategy for organic farmers. However, it requires a certain level of technical skill and entails specific risks, two aspects that should not be underestimated.

The production of certified organic seed must comply with the existing European seed and plant propagation directives, as well as with the European organic regulations.

The quality standards (germination rate, varietal purity, seed health) which apply to the marketing of organic seed are the same as those for conventional seed: when the quality doesn't meet the set thresholds, cer-

For technical resources and useful tools on organic seed production and plant breeding please visit the new "seed" section on www.organic-farmknowledge.org



³ <https://www.fibl.org/fileadmin/documents/shop/1202-plant-breeding.pdf>

tification will be denied, leading to a net loss to the seed multiplier unless the seed production contract includes some form of guarantee. Such a contract is drawn up between a seed company and the farmer/seed multiplier before the crop is grown, laying down the rights and obligations of each party and the conditions of remuneration. Risk-sharing clauses can be difficult to determine in advance, which is why it is important to get advice before committing oneself. For reasons related to biology (autogamy, allogamy), life cycle (annual, biennial), and weed or pest and disease management, some species are “easier” to multiply than others. Seed production is generally

the cultivation of seed crops, especially for biennial vegetable species that can stay in the field for over 12 months: carrot for instance is sown at the beginning of August of year 1 and seed is harvested at the end of August of year 2; leek, the absolute champion in terms of cycle length, takes 17 to 18 months to produce seed! Weed control under organic conditions tends to generate high labour costs (accounting for up to 30-70% of the total seed production costs), and is among the main reasons for the extra price of organic seed on the market. In some cases it is extremely difficult to sort out certain weeds whose seeds closely resemble those of the crop itself.

Producing and using more organic seed and cultivars can:

- ensure the operation of fully organic value chains from seed to plate
- foster the development of seed production and seed quality management techniques specific to the organic sector
- boost breeding and selection activities specifically tailored to the needs of organic farmers and the market they serve
- enhance the credibility and independence of the organic sector

more predictable with annuals (e.g. lettuce, chicory, cucurbits and solanaceae), and more uncertain with biennials (carrot, cabbage or onion) due to their longer cycle and greater weed and disease challenges. However, even some annual seed crops, although apparently easy to grow, can present technical challenges: for example threshing of small batches or bacterial blight and weevil attacks can be a problem for beans, broad beans and peas. Weed control is the trickiest issue in

This can heavily depreciate the seed lot, sometimes even leading to its rejection. It is therefore preferable to accurately plan weed control strategies even before planting the crop (including preparing the plot appropriately, performing advanced or false sowing, hoeing in pre-emergence and other possible solutions) and to be equipped with suitable tools. Adapted irrigation equipment is also essential for carrying out some of these weed control strategies successfully.

LIVESEED Cross-Visits in France, Italy, the Netherlands, Switzerland and Germany

The LIVESEED cross-visits⁴ took place in June 2018 (France), June 2019 (Italy), October 2019 (the Netherlands) and May 2020 (Germany and Switzerland⁵). They primarily targeted organic farmers, advisors, seed producers and multipliers, breeders, and to a lesser extent researchers, national authorities, processors, retailers, seed health and quality officials. Most of the participants who attended the visits came from Member States where organic seed production is less developed, such as Poland, Hungary, Romania, Bulgaria, Greece, Spain and Portugal. The methodology for structured learning which was followed was partly adapted from the approach developed within the AgriSpin project's cross visits⁶. In each of the countries, an effort was made to cover different crop groups and pedo-climatic conditions, as well as different aspects of seed production and socio-economic and organisational seed production models. The choice of the examples presented in this booklet reflects this diversity of aspects but also keeps in mind the transferability of each case, highlighting the success that was achieved in-country and the possibly different scales at which it could be

applied elsewhere. The French cases describe the activities of organic cereal farmer and seed producer Vincent Lefevre, and those of UBIOS, an organic seed cooperative which produces and commercialises seeds of arable crops and with whom Lefevre successfully collaborates (as seed multiplier). The Italian cases include a short value chain model involving the Floriddia organic Farm (which grows cereal Organic Heterogeneous Materials and conservation varieties), and a vegetable seed cooperative whose activities stem from breeding to seed processing (in a dedicated organic seed processing facility). The two examples from the Netherlands highlight two different models and scales under which organic seed production can be made successful: the (initially small) vegetable seed company Vitalis, and the seed potato giant Agrico which engages farmers in the production of organic seed potatoes. The cases from Germany and Switzerland target organic fruit propagation: a successful selection and marketing of modern organic apple varieties, and a well-working model for the propagation and processing of organic grapevine.



⁴ <https://www.liveseed.eu/results/wp2/reports-cross-visits/>

⁵ Due to the Covid-19 emergency, the German & Swiss cross visit took place in the form of a series of webinars

⁶ <https://agrispin.eu/about/>

1. Organic seed multiplication on farm

Preserving diversity with Vincent Lefevre, France

Conventional breeding and selection is usually performed in fertile soils and under optimal conditions. My farm is not like that. So I had to find something different to grow and I made a different choice. Instead of uniformity and high input varieties, I choose dynamic populations. And I choose to produce them myself.



Business name:
Vincent Lefevre Ferme Bio

Location:
Puisaye region,
annual rainfall 740 mm

Area:
220 ha

Soil type:
mostly hydromorphic, shallow,
heavy textured (silty clay),
with a high content of
flint-type stones (>25 %).

Crops:
cereals, legumes, green manures.
All intercropped, except for seed
crops.

Workforce:
1 to 3 depending on season

Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

I work on three aspects of organic seed production:

- I multiply cereal and pulse seed (wheat, rye and peas) for UBIOS (see next interview, page 10).
- I conserve heritage germplasm collections: I started with 35 populations and now I have about 100. I test them to check for their adaptation capacity in my tough soil conditions and keep those mixtures that appear to be best adapted to my context, letting them adapt dynamically. I also try to select dynamic populations adapted to specific crop systems such as intercropping with clovers, or which have high quality and taste traits.
- I participate in breeding programs to create new composite cross populations (CCP) with INRAE (Isabelle Goldringer).

I like diversity and I do my best to develop it on my farm.

Why are you producing organic seed/PRM?

The reason why I produce organic seed is that there is a need for it, and UBIOS is capable of providing good quality planting material for organic farmers in France. I also do it because I enjoy the technical challenges of seed production: sowing, sorting, harvesting and storing. I am also interested in the added value that seed production provides.

When did you start?

I started in 2013, since my establishment as a farmer but my father used to multiply seed for Cocebi since 2000.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

Yes, it is economically viable. An extra price is paid for crops used as seed. It's about 60 €/t for cereals, and 120 €/t for protein crops. The latter are harder to produce because their seeds are more delicate and less durable, so extra attention must be paid during harvest and storage. It is a technical challenge and this is an indirect benefit to me. Another benefit is the connection with other farmers who share my passion for diversity and maintenance of heritage crops.

What are the main success factors?

Passion and motivation are necessary because seed multiplication and conservation need more time and more care than simply producing grain crops. Rigour is needed to prevent cross-contamination with other varieties or with weeds.

An important success factor is also being part of a network that gathers highly professional and skilled people, be they farmers like myself or technical advisors who work for organic cooperatives. Being part of a European project like LIVESEED

has been important to me. During the cross-visit on my farm I met people with whom I'm still in touch. We exchange tools and tricks that help me improve my knowledge and my procedures.

What are you most proud of?

I'm proud of my breeding work to obtain heterogeneous material, which is more adapted to my fields and to my crop management techniques. I'm proud of my fields. In June, when the wheat ears come out, I look at their different colours and shapes and find it wonderful. I'm very proud to be part of UBIOS, which today is able to provide high quality seed to organic farmers in France. And finally I'm proud to participate in the small revolution that is taking place and that will bring breeding back in the hands of farmers.

What are your plans for the future?

I hope there will be more breeding activities targeting heterogeneous material and that diversity will become more important as an end product of breeding programs. This will allow farmers and society in general to face climate change through the development of a more resilient agriculture. This goes hand in hand with a greater involvement of farmers, not only in the organic seed multiplication phase but also in the definition of the selection guidelines.



2. A cooperative organic seed company

Producing organic seed of arable crops with UBIOS, France Interview with the president, Jean-Pierre Bouchet

As organic farmers, autonomy is an important part of our overall strategy. Our ambition is to master the whole chain of organic production, from seed to the final product. We believe that seed production plays a key role and has to be managed by organic farmers themselves.



Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

Our work on seed starts when we receive grain lots from farmers' multiplication fields, and we transform them into ready-to-use seed. To get there, we have to sort them accurately, in order to eliminate any foreign or damaged element (weed seed, broken or irregular grains, dust, stones). Germination and other tests are done to ensure performance and health. All wheat seeds are treated with vinegar, and lots that are too contaminated with common bunt are not sold as seed. Then seeds are bagged and prepared for delivery. We produce organic seed of a wide diversity of species. We never refuse any lots as long as they respect the health and germination standards. Our only limit can be our sorting capacity concerning weed seeds.

Why are you producing organic seed/PRM?

Because it makes sense! Organic farming has its own needs which require specific solutions. Organic seed crops are often contaminated with weeds. Conventional seed companies are not ready to accept and process this kind of product because it needs more time, more knowledge and more specific tools than what they are prepared to engage in, especially considering that organic seed production is often only a small share of their activity. As a

Business name:
Union Bio Semences (UBIOS)

Location:
Maise, France

Area:
Seed crops are grown by a network of 40 farmers belonging to the cooperatives Biocer and Cocebi

Crops:
Seed production of wheat, barley, oat, triticale, spelt, pea, lentils, buckwheat, faba bean, rye, and alfalfa.

Assets:
The company holds a certification laboratory approved by the national authority (SOC).

Employees:
10

Website:
<http://unionbiosemences.fr/>

result, many seed lots are refused. This is a huge loss for farmers.

We ensure a high quality level for our seed, and farmers may reproduce our seed on-farm. Once again, autonomy is promoted.

When did you start?

We started in 2011. Before, cooperatives Biocer and Cocebi produced organic seed alongside their grain producing activity, but these two activities soon entered into conflict: after the harvest, the sorting machines which were usually used for grain sorting were needed for seed sorting and this had a negative impact on their grain production sector. Moreover, the two cooperatives were growing fast and needed to invest in seed production machines anyway. This is why we choose to create a specific, separate seed production activity.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

The high quality standards that we impose on our product make it expensive. Until last year our seed production was not viable, because we wanted to stay competitive in terms of prices. Seed processing required a great amount of time and we should have produced larger amounts to make the factory profitable. We could have made much more money if we had chosen to select only the cleanest lots and to multiply only the most widely cultivated varieties. But this is not our goal. So we had to increase the seed prices this year, which has led to economic sustainability.

What are the main success factors?

Our main success factor is the high seed quality and the crop diversity that we provide. Organic seed production is not easy. There is a huge need for knowledge and experience on sorting and processing organic seed lots, starting when the harvested seed enters the factory, to the fi-

nal seed bag. We have acquired this knowledge over time.

What would your advice be for someone who wishes to become a seed producer?

Our advice to create an organic seed company is to start providing high-performance sorting tools to farmers. This will reduce the time and costs of processing at the factory. Once the farmers are well equipped, it is easier to go forward. The second advice is to find experienced staff, in the specific field of organic seed production.

What are you most proud of?

We are organic farmers and we created a seed company which has a direct connection with the needs of organic farmers themselves. UBIOS allows us to be independent and self-governing. We are proud of our highly professional staff. And we are proud of the high quality of our product.

What are your plans for the future?

We would like to produce seed of crops that can be sown later than cereals (for example legumes like beans or soy). This would optimise the factory's operations guaranteeing seed production throughout the year. And, at the same time, it would increase the diversity of our cropping systems.



3. Organic open pollinated vegetable seed production

Interview with Antonio Lo Fiego, Arcoiris & CAC, Italy

Arcoiris is a pioneer of organic seed production with a particular regard for biodiversity. Since 1988 it has been producing organic seed of open pollinated varieties. The company specialises in vegetables, cover crops, conservation varieties and evolutionary populations of cereals. Arcoiris has recently joined forces with Cooperativa Agricola Cesenate (CAC), a leading seed producing cooperative at EU level.



Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

Arcoiris is the only seed company in Italy that is supported by 100% Italian capital and produces exclusively organic seed. All our vegetable production takes place in Italy, thanks to agreements with producers/multipliers whose fields are fully certified organic. As a company, we chose to deal with open pollinated varieties and not to use hybrids. Our core business are vegetable crops, followed in order of importance by cover crops, cereal conservation varieties and heterogeneous populations. A portion of our work consists in “rescuing” landraces and making their seed available on the market: over the past few years we’ve registered (or supported the registration of) 12 vegetable landraces “with no intrinsic value for commercial crop production”⁷; we collaborate with Slow Food to rescue the seed of those varieties whose end products are registered in their list of Presidia. Our main market is the Mediterranean region (Italy, Spain, Portugal), but in recent years we have witnessed increased market space in France, Germany, the Netherlands, the UK and Sweden. We are among the few seed companies which offer a broad range of organic cover crops. And since 2017 we have been commercializing heterogeneous populations of bread wheat (Biadapt,

Business name:

Arcoiris Sementi & Cooperativa Agricola Cesenate (CAC)
Seed company

Location:

Cesena, Emilia Romagna
(Central Italy)

Area:

production is undertaken through the CAC’s cooperative network (2100 farmers of which 105 organic) and seed processed at CAC’s dedicated organic plant.

Crops:

vegetables, cover crops, cereals, legume

Turnover:

Arcoiris: € 800k, 100% organic;
CAC € 34mln of which 5% organic

Employees:

Arcoiris 5; CAC 220

Website:

<https://arcoiris.it/en/home> & <http://www.cacseeds.it/>

⁷ According to Directive 2009/145/EC

Bioappennino, Bread mix Tuscany 1, Bread mix Tuscany PA1) and durum wheat (Evdur and Durum mix Tuscany PA1) within the temporary experiment 2014/150/EU, as well as wheat, emmer and millet conservation varieties. We are working on the selection of three local varieties of *T. turanicum* (Khorasan wheat), having requested and obtained the creation of the voluntary register of Khorasan wheat from the Italian Ministry of Agriculture.

Why are you producing organic seed/PRM? When did you start?

The original founders of Arcoiris in 1998 were four organic/biodynamic farmers, together with an agronomist and a person with a background in management: the choice to produce organic seed came as a natural response to our desire to foster and support organic agriculture and agricultural biodiversity, providing farmers with a product which, at the time, barely existed on the Italian seed market.

Is it economically viable? Or which other benefits do you see in producing organic seed?

The company as a whole is certainly self-sustainable. The sectors with the best turnover are vegetables and cover crops. On its own, the production and marketing of cereal conservation varieties and heterogeneous populations would not be economically viable. This means that our leading sectors contribute to the sustainable use of agricultural biodiversity (which is not currently self-sustainable per se), and this responds to a deliberate choice from our side. We certainly are very proud to be contributing to safeguarding and spreading agricultural biodiversity.

What are the main success factors?

We are now associated to the CAC (Cooperativa Agricola Cesenate based in Cesena), one of the most important seed producing cooper-

atives in Europe. This collaboration has brought important benefits to both partners. CAC inherited a fully functional and already well-known organic seed brand, allowing the organic members of the cooperative to immediately get engaged in production and multiplication of organic seed. Arcoiris benefited from a consistent quality improvement in the whole process of seed production and multiplication, thanks to CAC's long-lasting experience and efficient seed handling infrastructure.

What would your advice be for someone who wishes to become a seed producer?

The organic seed market is growing and will be doing so even more over the next few years, when derogations will be definitely phased out. So now is definitely a good moment to enter the playing field. Opportunities can also come from the possibility to create small regional seed companies for the production of organic seed within local value chains geared towards the production of healthy, artisanal foodstuffs.

What are you most proud of?

We are most proud to have contributed to the conservation and sustainable use of agricultural biodiversity, as within the recent effort to study and commercialize heterogeneous populations of cereals, in which we were involved together with Rete Semi Rurali and the Universities of Florence and Bologna.

What are your plans for the future?

In the past few years, we have started producing organic seed for a few seed companies from Northern Europe. This is an expanding market, compared to the amateur and hobby gardener sectors which I believe will lose importance. There's a strong growth in the request for organic cover crops, particularly for the fruit and wine sectors: we are already producing tailor-made mixtures for specific farms.

4. Closing the circle: cereal populations from seed to plate

Interview with Rosario Floriddia, farmer, processor and seed producer at Floriddia organic farm, Italy

The Floriddia farm is a pioneer in innovation and valorisation of organic products. Specialized in high quality cereal products (flour, pasta, bread), it considers seed quality the central element of its fully closed value chain. Since 2010, Floriddia has been growing bread wheat populations, and since 2017 it started producing and marketing certified organic seed.



Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

We are an organic cereal farm, producing organic heterogenous cereal seed in the framework of the European temporary experiment (2014/150/EU). I wouldn't consider our work unique, as there are many other organic seed producers around, but certainly special because we are a farm that, on top of producing and transforming its own crops into foodstuffs (flour, pasta), is also producing certified seed of cereal populations.

Why are you producing organic seed/PRM?

As a member of Rete Semi Rurali (the Italian Seed Network) and as a farm with many links with our local organic farming community, we felt that there was a need for someone to take on the challenge of producing enough quantity of quality seed of cultivars that were suitable for organic cultivation and that could provide products of high nutritional value and digestibility⁸. We initially started using local varieties of durum and bread wheat, then moved on to using populations. These have the added value of offering good yield stability year after year, which makes us optimistic in relation to the challenges posed by climate change. During our journey from trialling unusual local varieties, to becoming

Business name:
Azienda agricola Floriddia

Location:
Peccioli, Pisa, Italy

Area:
200 ha of which 13 ha devoted to organic heterogeneous material seed production

Crops:
cereals, legumes and green manures

Turnover:
€ 700k

Employees:
9

Website:
<https://www.ilmulinoapietra.com/>

⁸ See: Dinu, et al. "Ancient wheat species and human health: Biochemical and clinical implications" <https://www.sciencedirect.com/science/article/pii/S0955286317300359>

ing a licenced seed producer of cereal populations, we realised the importance of becoming legitimate owners of our own seed. Producing certified seed represents a strategic goal for us: when your value chain is based on certified seed, nobody can challenge the legitimacy of its use and question the products derived from it. This applies both to our own business, and that of the farms that buy our seed.

When did you start?

The first production of certified seed of a bread wheat population⁹ started in 2017 with the backup and support of the organic seed company Arcoiris. In 2019 we obtained the seed producing licence, becoming a seed company. However, we've been experimenting and producing our own seed for over 15 years. In 2005 we started introducing local varieties in our value chain, and in 2010 we acquired the first wheat and barley populations.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

The economic advantages of becoming a seed producer are twofold: we don't have to buy certified seed elsewhere, and we make some profit selling a quality product for a good price. In our case we can say that the production of seed is financially viable and contributes a small additional profit to the overall farm budget. However, increasing the farm's revenue wasn't our primary goal. What we want is to foster a community-based model of agriculture, as opposed to the dominating global materialism. Our farm gains enormously from becoming self-sufficient with relation to seed, a vitally strategic objective for us.

What are the main success factors?

In our case, it's important to clarify that we didn't have to make any capital investments to become seed producers. We already had a com-

bine harvester and a mill with a modern grain seed cleaning plant. All we had to do really, was to intensify our quality and plant health controls in the field prior to harvest and setting up the administrative side of the seed company to fulfil the requirements.

What would your advice be for someone who wishes to become a seed producer?

My advice is directed to other farmers, who may have the right set-up to becoming a seed company for the production of organic heterogeneous material. Before even thinking of starting, look around and evaluate if there is a real need or gap in your community or network for certified seed. If that gap is there, one can think of starting this journey, otherwise there is no need to replicate what professional companies are already doing.

What are you most proud of?

The feeling of having reclaimed a small portion of freedom. Knowing that I have my own certified seed gives me a sense of financial security and a great reason of pride. I am also proud of the acknowledgement and recognition received from public bodies and research institutions during this process. We were very pleased to see that seed certifying body CREA-DC had a genuine interest in our work.

What are your plans for the future?

The recent Covid-19 emergency highlighted the positive role that agriculture can and should play in the transition of our food systems from an industrial to a localised model. Using seed that works in synergy with nature brings many benefits to our society. Being able to produce food which is good for our health using considerably less energy, is a strong incentive to strengthen our communities and move toward increased self-sufficiency at local level.

⁹ Created at the International Centre for Research in the Dry Areas (ICARDA) in 2009 by Salvatore Ceccarelli and Stefania Grando and introduced in Italy in 2010 during EU FP7 SOLIBAM project. The population was registered as part of 2014/150/EU as "SOLIBAM tenero Floriddia".

5. Organic potato production by Agrico potato giant

Interview with Daniël Slegers, account manager at the Agrico cooperative, The Netherlands

From the mid-eighties, Agrico started its first breeding program on Late Blight resistant potato varieties, resulting in a first commercial variety in 2008. This was the basis for the company's current leading position with resistant and well performing varieties for the organic market and the chip and crisp sector.



Business name:
Agrico

Location:
Emmeloord, The Netherlands

Area:
14,000 ha seed potato (250 ha organic) and 2000 ha ware potatoes (500 ha organic)

Crops:
Seed potatoes, including Next Generation blight resistant cultivars

Scope:
Cooperative with 900+ members (ware and seed potato growers). Has its own packing station and research branch (Agrico Research)

Employees:
100 in NL and 200+ in subsidiaries in 8 countries

Website:
<https://en.agrico.nl/>

Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

Daniël's work focuses on the sale of organic potatoes for table potato production. In the Netherlands, potato breeding companies organize the production of their seed potatoes in so-called pools with seed potato farmers. In these pools, production and market risks are levelled. The account manager strives to obtain the best overall seed potato price that is paid to all participating farmers at the end of the sales season. The Dutch system in which variety development, seed production and seed sales are integrated is unique in the world and one of the success factors for the potato industry in the country. Amongst the Dutch potato companies, Agrico is the only cooperative owned by seed producers themselves. Furthermore, Agrico has a strong position in the consumers' market thanks to subsidiaries and participations.

Why are you producing organic seed/PRM?

The market for organic table potatoes is rapidly growing, also in the Netherlands. Agrico occupies about 40% of the organic market share thanks to a good portfolio of varieties which meet consumers' demands. For Daniël, it is a pleasure to work on behalf of very dedicated and knowledgeable organic seed producers and in close contact with customers and farmers.

When did you start?

Agrico was established back in 1973 as a merger of 3 cooperatives. It started developing varieties for organic farming already in the late eighties, resulting in the first Late Blight resistant variety 'Toluca' in 2008.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

The main determinant of economic viability is the final seed potato price that is achieved for the producers' pool. The average gross margin for growing organic seed potato is competitive amongst the crops which compose a typical Dutch organic crop rotation. Another aspect is that varieties for organic farming provide more certainty, as they are typically Late Blight resistant and more resilient to unfavourable growing conditions.

What are the main success factors? What would your advice be for someone who wishes to become a seed producer?

Success starts with a good variety, capable of growing under a wide range of favourable and unfavourable conditions and for which there is a demand in multiple countries. Another unique success factor in the Netherlands is the agreement between breeders, growers, traders and supermarkets to sell only 'robust' (resistant and resilient) potato

varieties under an organic label. This approach caught international attention and has been copied in Belgium already. Company-wise, short communication lines and chain integration are other success factors; Daniël is also involved in production planning, monitoring of quality and quantity of (stored) potatoes and logistics.

What are you most proud of?

Daniël is proud to work for a large player in the market and the 'just do it' mentality. Working in the organic sector is very fulfilling, as forward-thinking, sustainability and economy come together.

What are your plans for the future?

To have at least one robust, resistant variety for each segment of the organic market, that is productive under a wide range of conditions. To date Agrico provides potato varieties for cooking, both firm (waxy) and mealy (starchy) types, as well as a resistant crisp variety. A major trait of a robust variety is a durable Late Blight resistance that holds under heavy infestation pressure. In the future, Agrico only wants to have durable resistance, based on 'stacked' combinations of resistance genes within one variety. The greatest challenge is to develop organic varieties for the crisps and French fries industries, as the specifications are skin-tight and the monetary returns for the processor is what counts.



6. A leading seed company with 'organic blood' in its veins

Interview with Marcel van Diemen, breeder at Vitalis Organic Seeds, the Netherlands

Vitalis is the world market leader in the development and production of organic vegetable seed. The company operates along the whole organic seed chain, from breeding to marketing and sales. Vitalis is growing rapidly: the worldwide increasing demand for healthy, organic food fits in seamlessly with the high-quality organic vegetable varieties that Vitalis has in its portfolio.



Business name:

Vitalis Organic Seeds (part of Enza Zaden group)

Headquarters location:

Voorst, The Netherlands

Employees:

35 (at headquarters)

Crops:

Vegetable seed

Production:

The organic seed production is carried out through contracts with third parties in the EU (Netherlands, Denmark, Italy), North and South America, Asia and New-Zealand.

Breeding:

Vitalis currently breeds several leafy crops, cucurbits and leek. The portfolio of organic varieties, however, is much broader. The varieties with the best resistance and a strong root system are selected from the Enza Zaden breeding programmes. These varieties are then tested under strict organic conditions, before the production of organic seed for the market starts.

Website:

<https://eu.biovitalis.eu/>

Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

Marcel van Diemen is a breeder of winter squash and leafy crops (lettuce, endive and spinach). Vitalis' unique approach is to develop organic varieties which serve the needs of local markets and short vegetable value chains. For this, Marcel has 'organic' colleagues all over the world.

Why are you producing organic seed/PRM?

The Vitalis team is convinced that organic farming can have a huge role both in feeding the world and in taking care of our planet to the benefit of future generations. Organic breeding and seed production enable the growth of the organic farming sector by providing strong, resilient varieties and high-quality seed, which are perfectly adapted to organic growing conditions.

When did you start?

The founder of Vitalis, Jan Velema, together with Edith Lammerts van Bueren, Emeritus professor of Organic Plant Breeding at Wageningen University, made the first plans to start organic breeding in the Netherlands in the early nineties, based on the evident lack of registered vegetable varieties specifically suited for organic farming. In 1994, Vitalis Organic Seeds was founded,

based on the grounds of an organic farm site with fertile soils in the centre of the country. In 1998, Vitalis joined the Enza Zaden vegetable breeding company. Marcel started as a breeder at Enza Zaden in 1991 and moved to Vitalis by 2011.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

For sure it is economically viable; look at the increasing worldwide demand for healthy, organic food. This drives our growth rates in terms of organic seed sales. Unfortunately, the market for organic products in the Netherlands is lagging behind those of Spain, Germany, France or the US. Besides being economically viable, organic seed production has a lot of other benefits for our planet, starting with less plant protection products used even in the seed production phase. At the end of the day, it is a highly satisfying endeavour.

What are the main success factors? What would your advice be for someone who wishes to become a seed producer?

Be confident and just do it! Also, good partners and clients are essential to allow optimal positioning on the market. These are the most important pieces of advice for establishing a successful breeding and seed production program. In addition to breeding and reproducing good-performing varieties, seed quality should also be the highest possible, in terms of germination

rate, seed vigour, disease incidence, and other quality traits.

What are you most proud of?

Working for a fantastic company with the broadest organic vegetable seed portfolio in the world and an excellent reputation is a reason for pride. In an interview, a Vitalis customer once mentioned that he trusted that “Vitalis makes the right choices regarding new breeding techniques”. This appreciation is another important point to be proud of, and we need to work hard to preserve such a relationship of trust. Good communication is key in this respect.

What are your plans for the future?

In terms of our own company, since we are growing, our seed cleaning and packaging facilities will be moved close to the Enza Zaden plant in Enkhuizen. In more general terms, we are observing more and more organic growers wishing to enter the organic market. Thanks to this, the organic seed sector will also grow from a niche to a large-scale market, increasing the volumes of organic seed available and bringing prices down. To further support the development of the organic sector, much more institutional research should be conducted. However, as it stands, no professor for organic plant breeding has been reappointed at Wageningen university. This results in a very sparse research effort for the organic sector, compared to the conventional one.



7. On-farm apple breeding by non-profit organization Poma Culta

Interview with Niklaus Bolliger, breeder and founder of Poma Culta, Switzerland

As a biodynamic fruit farmer, Niklaus Bolliger was looking for new possibilities to create high performing varieties, which did not require high inputs for pest control. In other words, he was selecting and crossbreeding for cultivars which could meet the high quality standards of the market, while also being robust and healthy.



Organisation name:
Poma Culta

Località:
4577 Hessigkofen (Switzerland)

Area:
15 ha organic vegetable and fruit farm with livestock (of this 1 ha is reserved for breeding and 0,5 ha for fruit production)

Turnover:
€ 400 k

Crops:
fruit and vegetable crops

Employees:
5 full-time employees (2 of them are family members)

Website:
<https://pomaculta.org/en/pomaculta/>

Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

I do on-farm apple breeding only, since my opinion is that selection and breeding should take place within the plants' actual growth environment. I also believe that seedlings should not be treated with pesticides. This helps to identify the seedlings that will prove themselves in practice. After two years of cultivation, you can already appreciate, in a holistic perspective, how suitable an apple variety is. After that, I start with minimal pesticide treatment (Myco-Sin and bicarbonate without any sulphur - I do not use copper or sulphur because of personal and political conviction). This is also when I begin the second selection stage: 2-20% of the seedlings will come to fruit. I can judge the fruits and their storability. Only 5% will reach the third selection stage, where I assess many agronomic parameters such as tree growth, yield, robustness of the variety, etc.

Why are you producing organic seed/PRM?

The quantity of pesticides that was necessary to produce fruit for the market simply felt wrong, and led me to believe that this could not be the ecologically correct way to produce food. Hence, we needed to develop robust varieties to reduce the burden on the environment.

When did you start?

My wife Regula Bolliger-Flury and I have managed the biodynamic vegetable and fruit farm Rigi since 1985. In the late 90s, I started selecting and crossbreeding. The non-profit organisation Poma Culta was founded in 2004 to support my efforts to breed new apple varieties and in general, to promote research into biodynamic fruit breeding. In 2017 I was able to plant 20 trees of 6 varieties in different locations for further testing. I would describe two of these varieties as excellent and two as average. The remaining two have been replaced with other varieties, as I was not happy with their performance.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

I am financing the apple breeding with around 20% revenue from my own farm and around 80% with funding from Poma Culta. In the first year, when Poma Culta was established, it provided around € 20k and today, 15 years later, it is around € 200k. However, Poma Culta was not only helpful with funding my breeding work; it also brought together many people sharing a similar interest, who helped me in many other ways.

What are the main success factors? What would your advice be for someone who wishes to become a seed producer?

It is very important to do the breeding in the crops' natural growth environments. I am trying to reduce the time the seedlings are grown OUT of their natural environment (e.g. in the greenhouse), as much as possible. I conduct all selection phases outdoors. Another advice I would give is to start out with as many seedlings as possible. I grow 4.000 seedlings per year and think that 10.000 seedlings are the maximum. Everyone needs to find their own balance. However, one must be aware that only 2-20% of these seedlings will come to fruit and only 5% of them will reach the second phase of selection. That's the reason why I prefer to start with many seedlings.

What are you most proud of?

I am proud of my breeding lines: they all have really good pulp quality and are also robust and genetically diverse.

What are your plans for the future?

We have just recently applied for public funding for a pear breeding project. It will be nice to expand our work on a different fruit species, while of course continuing our apple breeding program.



8. Fungus-resistant grapevine breeding

Collaboration across the Swiss/German border - Interview with Klaus Rummel, with contributions from Valentin Blattner and Volker Freytag

This joint adventure of three pioneers wishes to achieve one goal: environmental-friendly wine production using PIWIs (Pilzwiderstandsfähige Rebsorten in German, i.e. fungus-resistant grapevine varieties). Their activities consist in crossbreeding and strengthening natural resistance, with the aim of reducing the use of plant protection agents to the minimum.



Place:
76829 Landau-Nussdorf
(Germany)

Area:
15 ha

Turnover:
€ 650k

Crops:
30 different grapevine varieties
(white and red), 15 of them are
PIWIs

Employees:
5 full-time employees (3 of them
are family members)

Website:
[https://rummel-biowein.de/
weingut/](https://rummel-biowein.de/weingut/)

Could you please describe your work with organic seed or other plant reproductive material (PRM)? What makes your approach unique?

I am engaged in fungus-resistant grapevine breeding with two colleagues: Valentin Blattner, a breeder and viticulturist from Switzerland, and Volker Freytag, a transplant grower from nearby. We collaborate closely and share responsibilities. The PIWIs are our joint adventure. Valentin Blattner does the crossbreeding and first selection. Promising cultivars are then cultivated and further tested at Rebschule Freytag. Volker Freytag also does the multiplication and grafting. I am responsible for the winemaking, marketing and sales. Something I want to clarify is that a PIWI variety is not 100% resistant to fungi. They are fungus tolerant, within a context of moderate fungus management. Fungi can break tolerances over time. If you want to preserve and maintain the crossbred resistance of the grapevine variety, you need a moderate plant protection management. The intensity of the management depends on the variety, its genetics, the annual weather conditions, etc. Nevertheless, you must be careful to reduce fungal pressure since there is a possibility that the fungi will bypass the resistances.

Why are you producing organic seed/PRM?

We are doing this work because of my own and our collective conviction

tion. When I took over the vineyards from my father, I decided to grow the grapevines organically and at the same time my interest in fungus-resistant varieties grew. I knew that the commonly used grapevine varieties would not have worked for me. They bear a high risk of fungus infestation, which can be avoided only by applying high amounts of pesticides and copper. The environmental impact is tremendous and I did not want to go down that path. I knew that breeding would allow us to seek and find naturally resistant varieties that would not need chemicals and still result in high-quality wine. Back then, people laughed at me and did not think that I would be successful. However, I never doubted my idea and knew that this is the right way for me, the environment and future generations.

When did you start?

In 1986, when I took over the business from my father.

Is it economically viable? Or which other benefits do you see in producing organic seed/PRM?

It would probably be more economically profitable to grow Pinot Gris, Riesling, Pinot Blanc or Pinot Noir – the common varieties that sell like hot cakes and do not need any explanation to consumers. If I consider the higher economic expenditures for consumer education and the increased marketing effort,

I would say no, we are not viable. In other words, if you are too lazy to educate consumers, you shouldn't cultivate PIWIs. But with PIWIs we have much better yield stability and we have more freedom, in terms of not being so heavily dependent on tight spraying times. Grapevine is a very expensive crop to breed and therefore is normally the task of public institutions. However, we did our breeding work on our own and financed it privately. We were and still are pioneers of the PIWI breeding and invest what we have available. Our team has been successful for many years now.

What are the main success factors? What would your advice be for someone who wishes to become a seed producer?

For my part, I would say that soft skills are particularly important, especially for persuading consumers. You must be eloquent, ambitious and positive about what you do. There is no master plan.

What are you most proud of?

Of making it this far! Looking back to 33 years ago, I wouldn't have thought we would be so successful.

What are your plans for the future?

Well, there are plans to pursue the 20% organic farming target, in viticulture as well. I would say this is a positive prospect.





BOOSTING ORGANIC SEED AND PLANT BREEDING ACROSS EUROPE

Duration: 4 years (2017 – 2021)
Project coordinator: IFOAM OE
Scientific coordinator: FiBL-CH



Budget: 7.5m EUR
from the European Union &
1.5m EUR from Switzerland



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