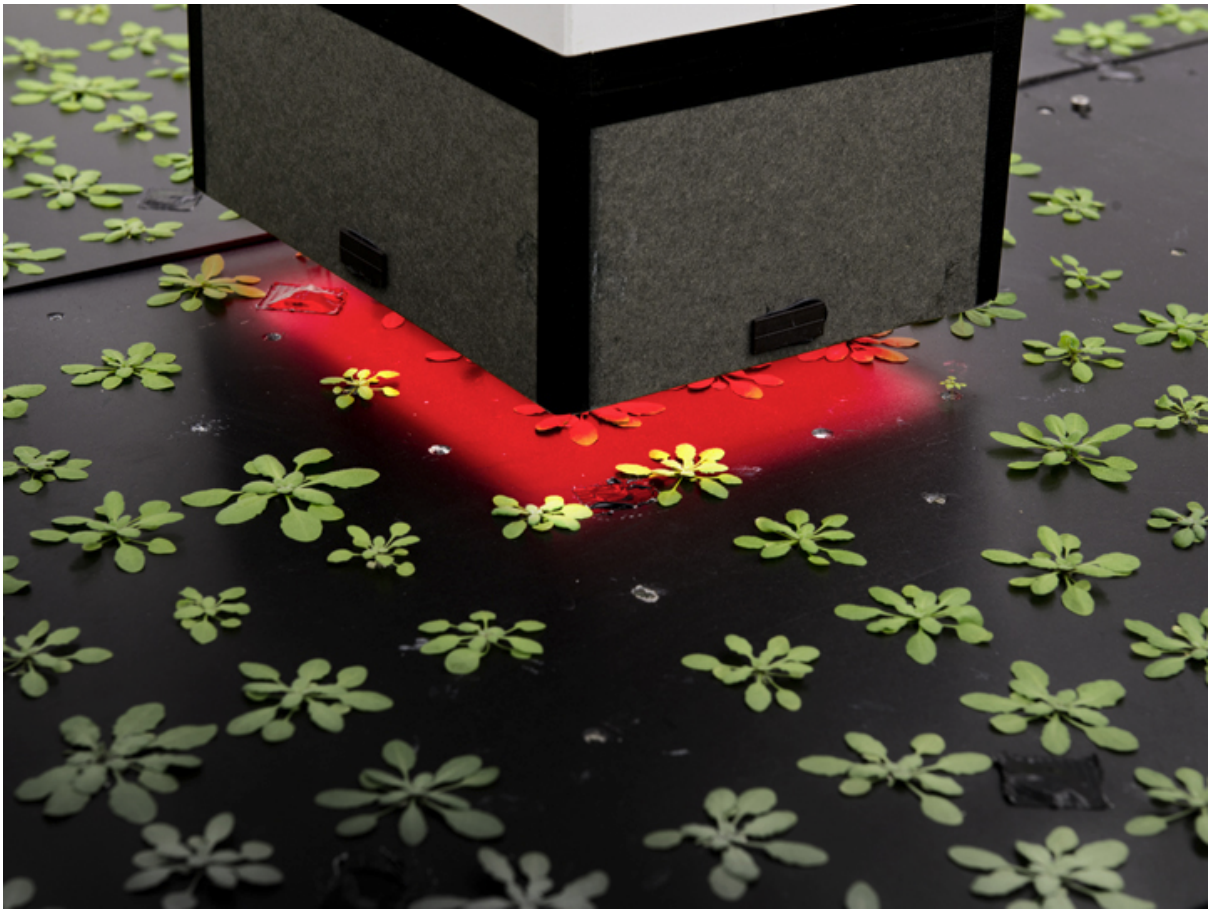
SOW, DON'T TELL

The meaning of nature and technology in Dutch seed breeders' communication strategies



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Abstract

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Traditionally, the Netherlands has always been fertile ground for the plant/vegetable seed breeding business. Many of the world's largest seed producing companies are in fact Dutch family-owned businesses. Seed breeding in the 21st century is not only a profitable business, it is also a fascinating hybrid between nature and technology. On the one hand, seeds can be seen as natural objects that become plants through natural processes. On the other hand, seeds are the results of highly complex technological processes, DNA technologies and data science. Especially with public discussions about genetically modified organisms (GMOs) in the 1990s and 2000s, this tension between the natural and the technological aspects of seed breeding has become extremely visible. In my opinion, these discussions are only the tip of the iceberg, and seed breeders are continuously facing a 'discursive dilemma': what story do we want to tell about seed breeding, a natural or a high-tech story?

My thesis will illustrate how Dutch seed breeders have dealt with the 'discursive dilemma' in general, and during the European 'rise and fall' of genetic modification technology in particular. I have looked at internal and external communication channels including sales catalogues, corporate communication and press coverage of two of the Netherlands' largest independent seed companies: Bejo and Rijk Zwaan. Did they present their activities as highly technological, or as purely natural? Both could be justified.

It turns out that the focus on naturalness is only a very recent one, probably in part motivated by the societal backlash regarding GMOs. Another conclusion will be that the breeding companies have been strikingly absent in public and political debates about genetic modification, and that it was never a controversial topic in the sector before the general public became aware of it. I will argue that in order to become more visible and be prepared for future controversies, Dutch seed breeding companies should invest more in their external communication strategies, and become as transparent as possible.

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We have before us the possibility… of 'sculpturing organic forms at will'. In the near future man will be able […] to synthesize forms such as are absolutely unknown in nature.
Nikolai Vavilov, spiritual father of modern plant breeding, in 1925

You got to do what you can
and let Mother Nature do the rest
Meat Loaf - Paradise by the Dashboard Light

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Prologue

On Wednesday, July 25, 2018, Europe's highest court, the Court of Justice of the European Union (ECJ), ruled a decision that shocked plant seed breeders all over Europe. 'We are very disappointed,' responded the spokesman of the Dutch seed breeders' sector organization. The Netherlands' most well-known plant breeding professor said it was 'a short-sighted decision'.[1] At the same time, Greenpeace proclaimed the decision was 'good news!' and 'a big win for you as a consumer'.[2]

What did the ECJ decide on the 25th of July? The court ruled that new DNA editing techniques, such as CRISPR-Cas9, were to be subject to the same laws and regulations as older genetic modification techniques. For seed breeding companies, the implications of this decision are far-reaching. If they want to introduce a CRISPR-edited crop to the European market, they will have to go through lengthy, pricey application procedures - the same procedures that have discouraged these companies to develop and market genetically modified organisms (GMOs). The benefits simply do not outweigh the costs.

On one of the warmest days of the Dutch summer, this hotly anticipated decision was widely discussed in the press and public debates. For those who know the sector well, the court ruling came as an unpleasant surprise. The Netherlands is a leading country in plant breeding, and has a huge share in the world's seed production. The ECJ decision therefore affects many Dutch companies, such as Bejo, Rijk Zwaan, Enza and Pop Vriend. Many of these seed breeders had already invested much money in CRISPR and other gene editing tools. Experts are afraid that innovation will now stagnate, and that Dutch companies will be forced to relocate some of their activities outside of Europe.[3]

Earlier this year, spokespeople of Bejo and Rijk Zwaan told me how they were looking forward to the European court decision. They were hoping for a positive outcome, because they could very well benefit from implementing CRISPR into their breeding practices - in fact, they had already started to do research and experiments with it. On their websites, some of the companies communicated how they were waiting for the court ruling, which they expected to

[1] Geertje Tuenter, 'Rem op nieuwe gentech in Europa', *NRC Handelsblad,* July 27, 2018, https://www.nrc.nl/nieuws/2018/07/26/barriere-voor-genbewerkte-planten-a1611214 (accessed August

[2] Greenpeace, 'Ook nieuwe gentechnieken vallen onder Europese GMO-wetgeving', July 26, 2018, https://www.greenpeace.org/nl/natuur/7931/europees-hof-ook-nieuwe-gentechnieken-vallen-onder-europese-gmo-wetgeving/ (accessed August 4, 2018).

[3] See e.g.: Stijn van Gils, 'Europese rechter keurt 'verboden' vrucht,' *Het Financieele Dagblad,* March 31, 2018, LexisNexis Academic; Anon., 'Europees Hof legt nieuwe gentechnieken zoals CRISPR-CAS aan banden', July 26, 2018, https://www.wur.nl/nl/nieuws/Europees-Hof-legt-nieuwe-gentechnieken-zoals-CRISPR-CAS-aan-banden.htm (accessed August 4, 2018).

result in a positive outcome, or at least clarification on the topic. After July 25, however, the companies remained entirely silent. None of them issued a public reaction to the ECJ decision. None of them announced to go abroad. None of them spoke out. Only through sector organization Plantum their disappointment was communicated.

The whole CRISPR controversy reminds us of a similar episode in the history of biotechnology in seed breeding: the public discussions surrounding the rise and fall of GMOs in Europe. Between the 1980s and the turn of the millennium, genetic modification went from a promising crop editing technology to a maligned, strictly regulated and in part even forbidden practice. As we will see, the aforementioned Dutch companies were similarly affected by a sudden European regulation; and the public responses to both the rise and the fall of GMOs were as mixed as today's responses to CRISPR technology. And just like today, while everyone was talking about the permission and limits of biotechnology in seed breeding, those who actually practicioned these technologies remained awfully silent. History does not repeat itself, but it often rhymes, as a popular proverb has it. Consider it the hidden agenda of this research project to find out if these rhymes really rhyme – and if so, whether or not these rhymes can teach us a lesson.

Chapter 1. Introduction

Seeds and the 'discursive dilemma' of nature and technology

'Instead of letting nature run its course, we should grab, knead and steer nature; push it in the direction we want it to go'.[4]

Introduction: quintessential questions

In the back of the documentary photo book *Seeds: On the Origin of Food Crops* (2014), two small essays are included: one by Dutch philosopher Bas Haring ('Grabbing, kneading and steering nature') and one by the photographer himself, Jos Jansen ('The chosen one'). Jansen describes the fascination that he felt during the making of the book, which is a beautiful collection of pictures of plants, seeds, laboratories, greenhouses, breeders - ranging from surreal close-ups of viruses attacking leaves to wide landscape photographs of Seed Valley's trial fields. 'Behind the images in this project,' Jansen writes, 'quintessential questions arise. Who is actually in charge on this planet? Nature? Human beings? A god? [...] Where do you draw the line between acceptable and unacceptable? Between natural and unnatural? And what does 'natural' mean anyway?'[5]

What does 'natural' mean anyway? As one review has it, Jansen's pictures at least do not represent anything natural:

> [h]ighly stylised, the whole thing feels more like a science fiction film than a documentary [...] There is a bombardment of visual imagery that extends beyond the photographs taken inside the facilities, to include outputs from visual DNA software and x-rays of the seeds themselves.[6]

According to this reviewer, Jansen's book just 'documents how some plant breeders, farmers and scientists, are attempting to play God'. However, the reviewer eventually admits that he

[4] Bas Haring, 'Grabbing, kneading and steering nature', in *Seeds: On the Origin of Food Crops*, ed. Jos Jansen (Breda: The Eriskay Connection, 2014).
[5] Jos Jansen, 'The chosen one', in *Seeds*.
[6] James Brown, 'Review of "Seeds: On the Origin of Food Crops"', *Paper Journal,* November 25, 2014, http://paper-journal.com/jos-jansen-seeds/#.W6OYlXszaUk

does favour the 'philosophical questions' that the book asks about 'these genetically modified crops'.[7]

Interestingly, the seeds and crops that Jos Jansen has documented in *Seeds* are not genetically modified. At least not according to the most recent legal definition given by the European Commission: 'Genetically modified organism (GMO) means an organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination'.[8] In other words: a genetically modified organism is an organism altered in an *unnatural* way. Whatever combination of genetic material could have come into existence *naturally* is not a GMO.[9] Most of Jansen's photographs were taken in Seed Valley, a collaboration of around 25 plant breeding companies between Schagen and Enkhuizen (in the north-west of the Netherlands). These companies claim that they do not, at this moment, produce GMOs in the abovementioned strict sense.[10] They do, however, work with highly sophisticated technological methods in order to create and improve the best possible seeds - seeds that, for example, produce higher-yielding, pest-resistant or regionally adapted fruit and vegetable crops. They make use of the latest available technologies as far as those are accepted - and they take pride in it. The seeds they produce are definitely 'genetically modified' in a very broad sense of the term: the DNA of the plant crops has been investigated as profoundly as possible, the plants have been crossed and selected until the best variety has come out, and the eventual seeds are 'modified' in all possible ways: they are tested, sorted, cleaned, primed, coated, uniformed, certified. But in the strict, legal sense of the term, Dutch plant seeds are never 'genetically modified'. They are the result of breeding and selection processes that does not cross the boundaries of nature. In spite of the reviewer's comment, Jos Jansen's pictures in *Seeds* are not genetically modified.

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[7] Ibid.

[8] *Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms*, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0018 (accessed March 14, 2018).

[9] I could write another thesis about this legal definition and its philosophical implications alone. There is something very peculiar about it: the concept of 'natural' marks the boundary. Whatever could occur in nature, is permissible. The history of seed breeding, however, shows that the entire discipline was always essentially looking at ways to *cross* that boundary.

[10] See the non-GMO statements on the websites of Rijk Zwaan and Bejo: https://www.rijkzwaan.nl/gmo-verklaring and https://www.bejo.nl/sites/default/files/niet-gmo_verklaring.pdf.

Figures 1.1-1.4. Pictures from Jos Jansen's photo book Seeds *(courtesy Jos Jansen). With these pictures Jansen seeks to demonstrate the twofold character of seed breeding that this research project is centered around: the unbreakable connection between nature and technology.*

What is a seed?

But the reviewer of *Seeds* is right in another respect: the pictures raise the right questions about the philosophy and ethics of seed breeding. Just like Jos Jansen, I have been fascinated by these questions ever since I first realized that none of our current food crops are 'natural' results of evolutionary processes: they are all products of human manipulation - unconscious at first, very conscious today. What Jansen's photographs visualize is that seeds are in themselves the perfect hybrids between nature and technology. The work of seed breeders takes place on a very interesting junction: 'nature' as a starting (and end) point, 'technology' as inevitable method, 'seeds' as the cross-over result of combining the two fields. Seeds can therefore be understood as natural, biological objects - and at the same time they can equally well be understood as technologically processed objects, 'taken from (a state of) nature', to use the term that Charles Darwin used to distinguish domesticated from wild species.[11]

Seed breeding has been done for thousands of years, unconsciously and increasingly consciously, ever since humans started to 'do' agriculture, around 10,000 years ago. As soon as it became known that genes were responsible for traits, conventional breeding techniques were rapidly expanded by plant scientists and breeders. Today's seed breeders indeed work with technologies ranging from software to map a plant's genetic makeup to molecular techniques that help them edit this makeup in the most precise ways. Since the biotechnological revolution of the 1980s and 1990s, this expansion accelerates at a higher pace than ever before. The history of seed breeding, which is essentially a story of increased understanding of natural processes plus increased use of tools to master these processes, will be further explored in the next two chapters.

So, what is a seed? What is this tiny object that contains the biological future of a new plant? This little thing that is designed on a drawing board, sown and harvested on an outdoor field, examined and uniformed at a Dutch seed technology center, and eventually sold for a higher price than a piece of gold of the same size? Many metaphors have been used to describe it: from 'Mother Nature's gift' to 'a package of DNA'.[12] In this research project, the meaning of seeds will be investigated at the level of those who come closest to it and work with it on a daily basis: the seed breeders. What is a seed, according to someone whose greatest effort is to improve it? What is breeding, according to those who make big money out of it? What is a food

[11] Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life (*London: J. Murray, 1859), 17.

[12] See for some examples: Michael S. Carolan, 'Saving seeds, saving culture: a case study of a heritage seed bank', *Society and Natural Resources* 20, no. 8 (2007): 739-750. For the notion of seeds as software, see for starters: J. Stallen, 'Meer aandacht voor Seed Valley: groene software in een zaadje', *Boerderij Vandaag,* September 19, 2014, LexisNexis Academic. This notion, as well as the meaning of the name of Seed Valley, will be further discussed in Chapter 7.

crop in the eyes of those who have developed it, in a laboratory, behind a computer screen, or in the field? Two of the Netherlands' largest seed breeding companies will form the focus of this research: Rijk Zwaan and Bejo.

The 'discursive dilemma' of Dutch seed breeding companies

Although unknown by most of the Dutch people, some of the largest fruit and vegetable seed breeding companies in the world are located, and historically rooted, in the Netherlands. They have typically Dutch, cute sounding names, such as Bejo, Enza, Nunhems, Pop Vriend, and Rijk Zwaan. Currently, about 85% of the seeds produced in the Netherlands is exported; the other way around, about 40% of the seeds used in agricultural production worldwide have their origin in the Netherlands.[13] However, the average Dutch consumer knows surprisingly little about the sector. We will discuss this phenomenon in detail in Chapter 3, as well as the reasons why the Netherlands is such an important seed breeding hub.

Rijk Zwaan, Bejo and the others are 'high tech' seed breeders, investing large sums of money in technological innovation in order to produce the best possible fruit and vegetable seeds. At the same time, the eventual produce of their direct customers (fruit and vegetable *growers*) is marketed and seen by consumers as 'natural foods'.[14] Every head of lettuce that grows out of a Rijk Zwaan seed, for example, is '100% natural' and sold as such.

This tension between 'natural' on the one hand and 'technological, innovative, man-made' on the other hand will be the main topic of this research. Since nature and technology are both so strongly encapsulated in every individual vegetable seed that they produce and sell, seed breeders inevitably have to deal with this two-sided coin. As a result, they have to emphasize both the naturalness and the high-tech aspects of what they are doing. In their communication strategies, the companies thus continuously face 'discursive dilemmas' of what discourse to choose and use. I want to find out: what do they focus on? And for whom? What is the story about seeds that the Dutch seed breeders prefer to tell? And do they perhaps use different discursive strategies for their internal and external communication?

[13] Jan Verbeek and Ilse Zeemeijer, 'Voor groeiend Seed Valley ziet toekomst er rooskleurig uit', *Het Financieele Dagblad,* November 10, 2017, LexisNexis Academic.

[14] See for instance: Paul Rozin, Claude Fischler and Christy Shields-Argelès, 'European and American perspectives on the meaning of natural', in *Appetite* 59.2 (2012): 448-455.

The essentially philosophical question whether a seed is 'natural' or not, is a hot potato among those engaged in food production, sustainability, environmental issues and so on. The Dutch Slow Food Youth Network, a grassroots movement raising awareness about sustainable food, created an online video series about seed breeding (the project was commissioned and paid for by sector organization Plantum, in an attempt to make seed breeding more relevant and attractive for the 'Slow Food' youth). In this series, a moderator interviewed ten young people working in various seed-related functions: a breeder, an IP lawyer, an activist, a food historian, et cetera. 'Is seed natural or not?' was the first question he posed to each of these people. Find their answers (and the rest of the series) here: https://www.youtube.com/user/plantumnl/feed

ZAAD! #2: Samen met de natuur een betere tomaat ontwikkelen

Figure 1.5. Still from vlog series '#ZAAD'. The title reads: 'Developing a better tomato together with nature'.

Research question: what do *they* think a seed is?

The fascination for the two (or perhaps more) completely different stories that can be told about seeds, has inspired me to the following research question. In order to make sense of the 'discursive dilemma' that seed breeders face, I will study the communication strategies of two of the largest Dutch seed breeding companies, Bejo and Rijk Zwaan, over the last c. 25 years, and I will focus particularly on their framing of food crops and seeds as either belonging to the domain of *nature*, or the domain of *technology*, or both. I want to find out how these high-tech companies deploy either 'natural' or 'technological' imagery in selling their products. So how do Bejo and Rijk Zwaan present their seeds: as objects of nature, as results of high-tech research and development, or as hybrids between the two worlds - or even in a completely different manner? How is this played out in their seed catalogues and other external

communication? Is any of these strategies a deliberate choice? And what do seed breeders actually tell me when I ask them where nature ends and technology begins? In other words: what do seed breeders think a seed is?

In addition, I will study the ways in which these companies reflected on and dealt with new genetic engineering technologies that emerged in the 1980s and 1990s (genetic modification) and recently (CRISPR-Cas9). How did they represent these technologies within the image of their own business? How did the seed companies deal with societal sentiments about GMOs - and more recently, with the temporary rise and sudden fall about CRISPR-Cas9 as a promising gene editing technology? Given the fact that genetic engineering is seen by many as something completely 'unnatural', how can seed breeders incorporate this kind of activities into their corporate stories about 'naturalness'?

Apart from these two case studies, I will also investigate the role of the communication strategies of Keygene (a biotech company that cooperates with many Dutch seed breeders), Plantum (the Dutch seed breeding sector organization), and Seed Valley (the aforementioned seed breeders' partnership around Enkhuizen). What kind of stories do these three initiatives tell about seeds? Do they present seed breeding as something natural or technological? How do they deal with image and communication problems within the sector? The answers to these questions will provide insights about the relevance of 'naturalness' or 'technological-ness' in the framing of crop production by seed breeders. And these insights may be of use in the very complex philosophical, sociological, political and social debates about the most well-known yet most infamous 'technology topic' in seed breeding: genetic modification. With this research project, I hope to shed some light on, and increase our understanding of the heated debates about GMOs, debates that take place all over the world. We will find out how important solid communication strategies and a strong, positive image are for the sector in order to create more societal goodwill about these highly controversial topics. For me personally, the aim of this research project is also to show that it is slightly paradoxical to tell a story about 'natural foods' in a production system where technology is so dominant – i.e., the seed breeding sector. I will not, however, go into discussions about GMOs, whether they are 'good' or 'bad', their legal status and their future applications. Instead, this will be a historical investigation of the Dutch seed breeders' dealings with these questions – and what the general public has seen of it.

Case studies: Bejo and Rijk Zwaan

Two large Dutch seed breeding companies form the case studies for this research project: Bejo and Rijk Zwaan. Before introducing the two seed breeding companies that will be at the core of the forthcoming chapters, I will briefly explain why these companies were chosen in the first

place.[15] What do they have in common, and why do they serve as the perfect case studies to provide answers to my research question? (A general introduction to the two companies will be given in Chapter 5 and 6 respectively.)

Bejo and Rijk Zwaan are two of the largest autonomous (i.e., not part of a larger multinational such as Monsanto or Syngenta) and originally Dutch seed breeding companies in the Netherlands. Their core business: improving, breeding and producing fruit and vegetable seeds for the international agricultural market. They are both family businesses, still owned by descendants of the founders. Rijk Zwaan has been part of a larger conglomerate for some years, but eventually returned to their 'roots' as a family business. Apart from the 'family business values' that the companies like to emphasize themselves, they are also both strongly locally embedded. This means they have a high status in the regions where they are settled; for Bejo, located in Warmenhuizen, this is especially relevant since they are a member of Seed Valley. Rijk Zwaan is no member, because their headquarters are located close to Rotterdam. Both firms are usually depicted as nationally embedded, as Dutch pride (e.g. when they report about their activities abroad) and as typically Dutch (in Dutch: 'Oer-Hollands').[16] Another similarity is that the two companies are both increasing their annual turnover; most of them are breaking sales records every year. In the Dutch press, both companies have regularly been described as highly profitable companies in a sector that is growing very solidly.[17] Consequently, both companies invest big money in R&D. For example, in the next five years, Rijk Zwaan plans to invest around 250 million euros in order to improve and expand their research labs, facilities and greenhouses.[18]

Plantum, Keygene and Seed Valley

Before turning to the case studies about Bejo and Rijk Zwaan, I will say a few last words about the three other initiatives that I will investigate: Plantum, Keygene and Seed Valley. They all play a significant role in telling a certain story about seeds in the Netherlands, and in doing so they emphasize either the natural or the technological aspects of the business – or both. I will

[15] In an early stage of this thesis project, I wanted to analyse three instead of two seed companies: Enza Zaden would then be included as well. Unfortunately, Enza did not want to cooperate in the way Rijk Zwaan and Bejo did (granting me access to archives and historical sources, having me interview their spokespeople, showing me around the facilities, and so on). Therefore I have decided to leave Enza out of my project.

[16] Carlijne Vos, 'Rassenveredeling zonder bijklank', *De Volkskrant,* April 27, 2015, LexisNexis Academic.

[17] *Het Financieele Dagblad* in particular has followed the seed breeding companies closely and has reported many articles over the last ten to fifteen years.

[18] Jan Verbeek, 'Groenteveredelaar Rijk Zwaan rijgt recordjaar aan recordjaar', *Het Financieele Dagblad*, October 25, 2017, LexisNexis Academic. See also: Anon., 'Topjaar voor veredelaars van sla, tomaten en komkommers', *Het Financieele Dagblad,* December 1, 2014, LexisNexis Academic.

find out how they tell their story and how these stories contribute to the sector's discourse as a whole. Chapter 7 is entirely devoted to these three organizations, but they deserve a little introduction already.

Keygene is an independent research lab that we will encounter quite often throughout the analyses of Bejo and Rijk Zwaan's communication strategies. The lab is owned by several seed breeding companies; as we will see, research collaborations and cooperation on a general level are quite common in the seed breeding business. Keygene is included in this research project because the story they tell seems to be entirely about technology and scientific innovation. I want to find out how that story relates to the discourse of the seed companies they work for.

From all interviews I have conducted for this research, it soon became clear that Plantum should also play a prominent role. Even though this sector organization was officially founded only in 2001, their communication strategies ever since are very relevant in the context of this research.[19] The people working at Plantum are highly aware of the 'discursive dilemma' I have laid out here; they would call it a 'communicative challenge', but I think we mean the same thing by it. 'It is the most complex aspect about the companies we represent', said Nanja Stams, communications advisor of the organization:

> [Seed breeders] are working with nature, but at the same it's so high-tech. How on earth do you combine those two aspects? When we talk about technology in, for instance, the mobile phone industry - things can't go quick enough. The new iPhone you crave - it's built from patents and technology. But for some reason, we don't want that technology in our food.[20]

Overcoming the discursive dilemma in their external communication is therefore one of Plantum's most difficult tasks.

The third overarching organization whose discourse will be analysed in the light of my research question, is Seed Valley. As said, Seed Valley is a partnership of several seed breeding companies in and around Enkhuizen. Seed Valley's main ambition is creating more awareness about the plant breeding sector among students and graduates: a lack of qualified staff is the main reason behind its foundation. In order to reach this goal and to make breeding attractive for this particular audience, Seed Valley has chosen to tell a very high-tech, innovative story about seed breeding. Their name already invokes certain assocations; we will get back to Seed Valley's technological discourse extensively in Chapter 7.

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[19] 'Geschiedenis', plantum.nl/hoofdnavigatie/over-plantum/organisatie/geschiedenis (accessed September 2, 2018).
[20] Interview with Nanja Stams, May 22, 2018.

How to investigate an invisible sector?

'It may sound pompous but it's true. Everything begins with the seed.'[21]

Shyness or modesty? A word on 'seed sector communication' in general

The Dutch seed breeding sector is, in general, not a very visible sector. Even though it constitutes quite a large part of the Dutch economy, the general public seems not to know much about plant seed breeding.[22] The reasons behind this ignorance are various, but the lack of external communication in the sector is beyond dispute. Many of the seed breeding companies do acknowledge this lack of communication; in most cases, it is even a deliberate choice *not* to focus communication strategies on the 'general public'.[23] After all, the breeding companies do not directly benefit from familiarity with the sector among the general public. Their direct customers are professional agricultural growers, and the vegetable processing industry. The consumer who goes shopping is at least two giant steps away. Why would breeding companies' marketing departments make an effort to get in touch with consumers who do not purchase anything directly from their company? As Steven van Paassen, Rijk Zwaan's communication specialist, explained to me: a seed breeder can't do marketing for cucumbers without helping his competitors, who breed cucumber seeds too.

In March 2017, sector association Plantum executed a survey into the public knowledge and image of the Dutch seed sector among the general Dutch public. The reason behind this research was to empirically back up the public campaign that Plantum wanted to set up for the seed breeding sector.[24] One of the not so surprising outcomes of this survey was that the Dutch public is generally 'unaware' of the existence of a flourishing seed breeding

[21] Coen van de Luytgaarden, 'Proeftuin Zwaagdijk gooit deur open voor de wereld', *Noordhollands Dagblad*, September 14, 2015, LexisNexis Academic. Original quote: 'Het is in de zaadveredelingsector nooit vanzelfsprekend geweest naar buiten te treden.'' Die ommezwaai is volgens Kos goed geweest: ,,Wat hier in deze streek gebeurt, is mede bepalend voor het oplossen van de wereldvoedselproblemen. Dat klinkt wat hoogdravend, maar het is wel zo. Alles begint met het zaadje.'

[22] See for instance: Marc van den Eerenbeemt, 'Onbekend, maar wereldtop in zaadjes', *De Volkskrant,* February 25, 2008, LexisNexis Academic; Anon., 'Zaadteelt schreeuwt om mensen', *Noordhollands Dagblad*, April 1, 2008, LexisNexis Academic. For a more in-depth image analysis of the unfamiliarity with the sector, see Chapter 5 on overarching image problems.

[23] As concluded from (personal) interviews with spokespeople at Bejo, Rijk Zwaan and Plantum.

[24] Jaap Bouwmeester and Romany Titre, *Rapport Imago-onderzoek Plantum* (Amsterdam: I&O Research, 2017), 5.

sector; less than 25% of the respondents was able to name one single seed breeding company.[25] Those respondents who had heard of the sector or related companies could not mention any associated activities by themselves.[26]

At first sight, the lack of consumer communication is easily explained. As said, there seems to be no direct benefit for seed breeding companies to become visible among a general public. However, recently the seed sector at large puts more and more effort into communication with a non-specialist audience, reflected in initiatives like Seed Valley, Klas in de Kas, and the annual event Seed Meets Technology. The latter event is co-organized by Proeftuin Zwaagdijk, a research lab that support seed breeding companies. One of their spokespeople said in 2015 that the event's success gave Proeftuin Zwaagdijk a feeling of acknowledgment:

> In the seed breeding sector, stepping outside was never self-evident. The shift [to more active external communication, SK] has been good. Our activities in this region do partly determine the solutions to world food problems. That may sound pompous but it's true. Everything begins with the seed [...].[27]

This sounds fair enough: if your core activities are in part solving world food problems, you would want to speak out and become visible to the average consumer. This is one reason why seed breeding companies *could* actually benefit from a more active external communication strategy. Instead of the modesty restraint that many 'seed storytellers' implicitly seem to practice, they could demand more attention.

The Monsanto effect

Another reason to communicate more actively with the general public would be to stay ahead of criticism: a strategic, proactive communication strategy could serve as a 'reputation shield' for a commonly maligned sector. As we will learn throughout the forthcoming chapters, the seed sector has had to deal with a lot of criticism over the last 30 years – especially targeted at the high level of technology that modern seed breeding requires. Whenever seed breeding companies are discussed in general, associations with genetic modification - and related

[25] Bouwmeester and Titre, *Imago-onderzoek,* 9-11.
[26] Bouwmeester and Titre, *Imago-onderzoek,* 11-12.
[27] Coen van de Luytgaarden, 'Proeftuin Zwaagdijk gooit deur open voor de wereld', *Noordhollands Dagblad*, September 14, 2015, LexisNexis Academic. Original quote: 'Het is in de zaadveredelingsector nooit vanzelfsprekend geweest naar buiten te treden.'' Die ommezwaai is volgens Kos goed geweest: ,,Wat hier in deze streek gebeurt, is mede bepalend voor het oplossen van de wereldvoedselproblemen. Dat klinkt wat hoogdravend, maar het is wel zo. Alles begint met het zaadje.'

problematic topics - are never far away. Niels Louwaars, director of Plantum, has dubbed this 'the Monsanto effect': *if* someone has heard about seed breeding in the first place, chances are big that he holds a strong opinion on Monsanto and other biotech multinationals, genetically modified crops, herbicides, and other negative connotations. Even though no Dutch company is currently developing genetically modified seeds, the associations with this technology have proven to be very strong. This *Financieele Dagblad* journalist describes Monsanto's public image problems quite accurately:

> For many, Monsanto is the embodiment of the entire sector's evil. [...] Duo to Monsanto's aggressive approach, strong resistance against genetic modification arose, especially in Europe. For the consumer it is unclear whether GM is a curse or a blessing. Then again, concerns like Monsanto have never really thought about the consumer. [...] But the public resistance makes that limited vision untenable. [...] Pat Mooney, researcher at the Canadian action group ETC: 'Eventually the companies that stand closest to the consumer, will triumph.[28]

Paul B. Thompson, an American historian and philosopher of agriculture, explains this 'Monsanto effect' on the basis of the 'history of political conflict over agricultural research during the 1980s and 1990s [that] shows that biotechnology and natural farming are like oil and water'.[29] He has shown how biotechnological breeding technologies, such as genetic modification, became associated with for-profit companies only (big, bad Monsanto), and how harmful this association has been for the general public acceptance of *non*-profit GMO applications. Rijk Zwaan's communication specialist summarized it as follows: 'Whenever I tell people I work at a vegetable breeding company, they don't know a thing about what I'm doing, they can only think of GMOs'.[30] From what one could call an educational perspective, it may

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[28] Pieter Lalkens, 'Zaadveredelaars getest op resistentie', *Het Financieele Dagblad,* April 17, 2002, LexisNexis Academic. Original quote: 'Het Amerikaanse Monsanto is voor velen de belichaming van al het kwade in de sector. [...] Door de agressieve benadering van Monsanto is er veel weerstand ontstaan tegen genetische modificatie, met name in Europa. Voor de consument is het onduidelijk of genetische modificatie nu een zegening of een gevaar is. Concerns als Monsanto hebben ook nauwelijks aan de consument gedacht. [...] De weerstand tegen GM-technieken maakt die beperkte visie op termijn onhoudbaar. 'Uiteindelijk zullen de bedrijven winnen die het dichtst bij de consument staan.''

[29] Paul B. Thompson, 'Unnatural farming and the debate over genetic manipulation,' *Genetic prospects. Essays on biotechnology, ethics and public policy* (2003): 27-40, 32. Note, however, that this applies specifically to the situation in the United States. Monsanto is a company with one of the worst public images in the world (see for instance http://naturalsociety.com/monsanto-3rd-hated-company-abroad-right-behind-bp/ for an entertaining piece about some of America's most hated companies). At the same time, Dutch seed breeding companies are generally hailed for what they are doing; there was never a public turmoil about companies such as Rijk Zwaan and Bejo, not even during the time when they were still producing genetically modified organisms. This is one of the fascinating aspects about the Dutch seed breeding industry that has led me to do this research project.

[30] Interview with Steven van Paassen, April 24, 2018.

therefore indeed be worthwhile for seed companies to focus more actively on consumer communication, or at least communication with a non-specialist audience. If the general public better realizes what seed breeding entails, the companies may find themselves in a more comfortable position whenever fiery criticism resurfaces.

How to study an invisible sector?

All in all, the seed breeding sector is not the most visible business to analyse historically. Still, I was able to find plenty of sources that together constitute the 'communication strategy' of the seed breeding companies. These sources will help me in providing an answer to questions like: what is the first impression that one gets of the seed breeding sector? Do the companies present themselves as agricultural, 'natural' or high-tech business? Did that change over time? What are similarities and differences between the two companies and their communication strategies? How did the companies deal with the emergence of genetic modification technologies in the 1980s (internally as well as in their external communication) and with the related public anxiety about GMOs? To what extent did these developments urge the companies to change their communication strategies? All in all, what side of the discursive dilemma do the companies seem to base their communication strategy on?

As indicated, I will study the communication strategies of Bejo and Rijk Zwaan, from c. 1980 (rise of genetic modification technology) until very recently. In order to create a coherent communication strategy out of the many materials that I have investigated, I will make use of a theoretical model called the 'Poiesz Triad', as explained by Bakker and Minten in a historical overview of biotechnology in the breeding sector. [31] The authors use this triad in order to distinguish different factors that contribute to a company's communication strategy. Network developments, public developments and technological developments all have an impact on the company. In a 'black box' of motives and decisions, the company decides which strategy it should follow. For a researcher, this black box can never really be opened; what is in the black box will never be completely available for analysis. I will try, however, to give more insight in the outcomes of this box: the actual communication that the company sends out, the image that the company willingly creates of itself. 'Communication' in this research project means internal (corporate communication, employer's magazines, internal memos, etc.) as well as external communication (public annual reports, public statements, press releases, corporate websites, representation in the media, sales catalogues, open house days, and communication

[31] Tom Bakker and Sanne Minten, *Biotechnologie in de plantveredeling sector: Een historisch overzicht van technologische ontwikkelingen en maatschappelijk debat* (Wageningen: LEI, 2010), 7.

directly aimed at a general public). As far as I am aware, this is the first research project in which seed catalogues of Dutch seed breeders were used as historical materials.

Classifying 'technological': the Pyramid of Technology

Before we turn to the history of plant breeding, and the public concerns about it becoming increasingly 'unnatural', we need some frame of reference. What are we talking about when we talk about 'natural' or 'naturally produced' food, or 'food from nature'? If genetically engineered seeds and foods are conceived as 'less natural' than the products of conventional breeding techniques, what does that mean?[32] What kind of technologies do invoke this image? Several frameworks have been proposed that may help understand our conception of 'natural' and 'technological', and help classify different views and convictions.[33] We will have a closer look at one model that goes into different levels of technology, a model that can be especially useful as an analytic tool.

Artist and philosopher of technology Koert van Mensvoort has proposed a model to help understand the different stages of the introduction of a new technology in society: the Pyramid of Technology.[34] Essentially, this model shows us *how technology becomes nature*. Nature, in Van Mensvoort's view, is nothing but technology that has become embedded and accepted - an idea that

> [...]brings an entirely new perspective on the relationship between people, nature and technology. While we traditionally see nature and technology as opposites, like black and white, we now learn that our technologies can be naturalized over time. Throughout human history we practised technology to emancipate us from the forces of nature – this starts with building a roof above our heads to protect us from the rain, or wearing animal furs to survive in a colder climate – yet, as our technologies become successful they in turn constitute a new milieu, a new setting, that may eventually transform our human nature.[35]

Van Mensvoort's pyramid is divided into seven levels: from '1. envisioned' to '7. naturalized' (see image 2.1). In this model, a new technology (e.g., the internet - or CRISPR-Cas9 for seed breeders), when successfully adopted by society, becomes increasingly invisible, or

[32] See for instance: Petra Tenbült, Nanne K. de Vries, Ellen Dreezens, and Carolien Martijn, 'Perceived naturalness and acceptance of genetically modified food', *Appetite* 45, no. 1 (2005): 47-50.
[33] Not used in this research, yet quite useful for the classification of naturalness in ecosystems: J.E. Anderson, 'A conceptual framework for evaluating and quantifying naturalness', *Conservation biology* 5:3 (1991), 347-352.
[34] Koert van Mensvoort, *Pyramid of technology: how technology becomes nature in seven steps*. Eindhoven University lectures; Vol. 3 (Eindhoven: Technische Universiteit Eindhoven, 2013).
[35] Van Mensvoort, *Pyramid*, 32.

'naturalized'. Consumer acceptance of a technology therefore is defined by its level of naturalization. Those technologies that we use on an everyday basis, 'have moved beyond being a vital tool or habit within our society: they are so integrated in our lives we consider them part of our human nature' (example: cooking our food).[36]

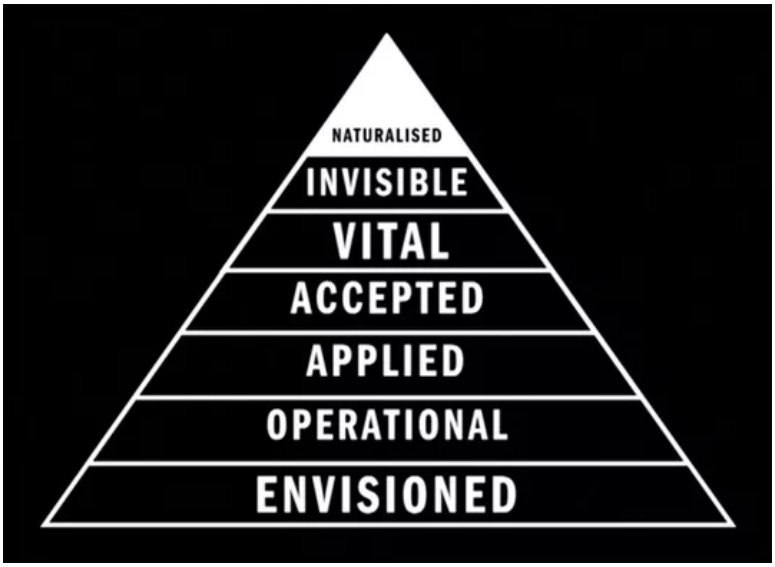

Image 2.1. The 'Pyramid of Technology' according to artist and philosopher Koert van Mensvoort. New technologies move upwards through the pyramid in parallel with increasing acceptance.

The difference between consumer acceptance of conventional seed breeding techniques and the 'new' GM technology (in the 1990s) or CRISPR-Cas9 (today) may be explained on the basis of their different position within this pyramid. Conventional breeding, however high-tech and artificial it has become, is a technology that most consumers are not particularly aware of; they take it for granted, they consider it 'natural'.[37] Van Mensvoort would call it 'truly successful technology': '[it has become] invisible. It is no longer recognized as technology at all'.[38] Genetic modification techniques, however, are located somewhere between '3. applied' and '4. accepted', depending on where you are and whom you ask. As I have indicated in the introduction, Dutch breeding companies are currently not working with genetic modification in the strict sense. Not only due to the strict European legislation, but also because they know that genetically modified crops are commonly perceived as highly unnatural by the European

[36] Van Mensvoort, *Pyramid,* 29.
[37] Sector organization Plantum conducted image research in a representative group of Dutch citizens. It turned out that about 30% of the respondents held any ideas about what seed breeding consists of. Only 4% thought it had something to do with DNA. We will learn more about the public imago of the Dutch sector, and Plantum's image research, in Chapters 2 and 5.
[38] Van Mensvoort, *Pyramid,* 27.

population.[39] The companies do, however, have the technical knowledge to create GMOs, so the technology is at least 'operational'. And outside of Europe, GM breeding is much more common, especially in the United States. The technology coud even be considered 'vital' there.

Throughout my investigation of the nature/technology-discourse of the seed breeding companies, I will keep in mind the question: how did new possibilities in seed breeding, genetic modification being most 'visible', work their way up on the pyramid of technology (or not)? How did the companies deal with technologies that were controversial at first and how, if at all, did they contribute to acceptance of these technologies? Could we ever expect DNA technologies in seed breeding, such as CRISPR-Cas9, to reach the seventh level, to become completely 'naturalized'? And in what way may the companies' own communication strategies contribute to this?

Structure of this thesis

Now that we have become acquainted with sources from the seed breeding sector and with a theoretical framework to understand 'levels of naturalness', it is time to turn to the history of plant breeding - and find out about the major role that the Netherlands plays in this history, Bejo and Rijk Zwaan being two 'success stories'. But first, let me outline the structure of the rest of this thesis.

In Chapter 3, the history of seed breeding will be discussed on a general level, outlining the background of important historical events. Since my research focuses on two particularly Dutch seed companies, some specifically Dutch historical context is required. This context will be provided in Chapter 4, about how the political, societal and technological climate surrounding seed breeding has changed in the Netherlands, between 1980 and today. After all, this is the specific background to the 'seed stories' that are told by Bejo, Rijk Zwaan and the overarching sector organizations. Chapters 5 and 6 are dedicated entirely to the analysis of the two case studies, Bejo and Rijk Zwaan respectively. Subsequently, the communication strategies of three overarching iniativies (Keygene, Plantum and Seed Valley) will be analysed and discussed in Chapter 7. Finally, I will share my conclusions in Chapter 8, as well as some recommendations for further research. As always, the deeper one goes into a certain subject, the more related questions and side projects seem to come up. But let us start from the beginning: analysing and interpreting the communication strategies of Bejo and Rijk Zwaan in their specific historical context, kicking off with a basic history of seed breeding.

[39] See the results of the latest Eurobarometer survey on this topic: George Gaskell, Nick Allum, and Sally Stares, 'Europeans and biotechnology in 2002: Eurobarometer 58.0', *Brussels: European Commission* (2003).

Chapter 3

From unconscious domestication to CRISPR-Cas9: a short history of plant breeding

> 'Improving upon nature is the very essence of plant breeding, and so it goes to the heart of one of the central debates on the human condition: the relationship between humanity and nature and the degree to which the human race has a right (or indeed a responsibility) to change plant life for its own ends.'[40]

Introduction

This thesis was partly written right after what we might call an averted breakthrough: the ECJ's classification of CRISPR-Cas9 as being a genetically modified organism (see Prologue). Now that the European Court has decided that CRISPR and related techniques fall under GMO regulation, the European breeding industry will most probably not be able to apply the techniques, because of the high costs for trial applications. Before the Court had finally decided so, the underlying question – to regulate or not to regulate CRISPR-Cas9 – had already caused heated debates, because it would have so many legal, financial and research consequences for the sector - in all of Europe.[41]

We will learn more about CRISPR soon, but in order to understand how plant breeding science got to this point, we have to sketch a history of the discipline first. Plant breeding has not always been exactly a 'discipline': only over the last one and a half century, it has actually grown into a systematic science. According to Noel Kingsbury, who wrote the only available comprehensive history of plant breeding, this development is historically owing to the

[40] Noel Kingsbury, *Hybrid: the history and science of plant breeding* (Chicago: University of Chicago Press, 2009), 7. The lack of general scientific historiographies of seed breeding as a discipline is striking and tells us that the history of plant seed breeding is still an underdeveloped topic in the history of science.

[41] Do organisms created with CRISPR-Cas9 count as GMO or not? For a long time, Europe was in a 'legal limbo' about this question (see e.g.: https://www.nature.com/news/gene-editing-in-legal-limbo-in-europe-1.21515). On January 18, 2018, the European court's advocate-general, Michael Bobak, advised the court to have new gene editing technologies largely exempted from EU legislation about genetically modified foods. He furthermore advised that individual countries should be able to choose for themselves (see e.g.: https://www.theguardian.com/science/2018/jan/18/gene-edited-crops-should-be-exempted-from-gm-food-laws-says-eu-lawyer). On July 25, however, the Court decided otherwise (see Prologue) and ruled that CRISPR-Cas9 created organisms fall under GMO legislation.

Enlightenment – he compares modern seed breeding science with 'scientifically based medicine, political and religious liberty, the freedom to travel, and modern communications'.[42]

The goal of this chapter is twofold. First and foremost I want to outline the most important moments in the technological history of seed breeding, and thus draw a chronology that is essential for understanding where plant breeding as a discipline is now. At the same time, this history will serve as the background to today's controversy over new breeding technologies such as genetic modification and CRISPR-Cas9. Historically, resistance to innovations in plant breeding such as hybridization (in general) in the 19th century and the rapid development of hybrid (F_1) corn (in particular) in the USA during the 20th century, can very often be understood in the context of an imagined opposition between nature and technology - a central opposition in my research question. Throughout this chapter, many historical examples of resistance against innovative breeding techniques will be discussed that can serve as illustrations of the nature-technology opposition that seed breeding provokes. The Pyramid of Technology by Koert van Mensvoort will serve as a theoretical model that may help us check whether the acceptance of a certain plant breeding technology is related to its position on the Pyramid.

Improving and mastering nature

Over the last century and a half, plant breeding has become a science.[43] A science, furthermore, that historians of science have generally paid relatively little attention to. With the turn to the twenty-first century, however, plant breeding has increasingly become subject to public, political and scientific debate.[44] This has everything to do with the rising public viewpoint that takes food production techniques as essentially entailing the domination or even 'enslavement' of nature for human purposes. Even though this idea of domination can be traced back to the dawn of agriculture, the heated controversy over it is very recent.

The history of plant breeding can be summarized as the history of 'improving nature' in all kinds of ways. Noel Kingsbury's *Hybrid* serves as an illustration: even though he never explicitly details how nature is improved by humans, his account is essentially the story of increased domination of man (plant growers, breeders and later plant scientists) over nature (plants). Worries and concerns over this domination move in step with the development itself, but in recent resistance against GMOs the worries are more strongly voiced than ever. This is important to keep in mind - previous advances in breeding technology were never met with

[42] Kingsbury, *Hybrid,* 419.
[43] Kingsbury, *Hybrid,* 4.
[44] Kingsbury, *Hybrid,* 5.

such strong opposition. In Van Mensvoort's terms: with the introduction of genetic modification technology, plant breeding as a whole suddenly moved *down* on the Pyramid of Technology. Even though the underlying technologies had been 'invisible' for a long time, GMOs sparked so much renewed (negative) attention, that the technology moved back to 'applied, yet not accepted'. Kingsbury suggests that GM opposition is perhaps 'part of a much wider attack on plant breeding, on modern agriculture, or indeed on science and modern society'.[45] Although confirming Kingsbury's particular suspicion is not the main aim of this chapter, it is the reason for providing some necessary historical background to my research question.

From domestication to Mendelian genetics

The history of seed breeding begins with a distinction between *plants* and *crops*. As soon as Neolithic people started to 'do' agriculture, supposedly around 10,000 years ago, humans and plants became mutually dependent. Wild edible plants were slowly domesticated for food production - they became food crops. Humans became farmers. The requirements that man placed onto nature were completely instrumental: plants were grown for a certain purpose. 'As a consequence the story of plant breeding is very much about enabling genes which serve our purposes to be expressed,' as Kingsbury has it - even though our ancestors were of course not aware of the existence of genes.[46]

Long before growers and farmers could understand the underlying principles of their work, they were already applying these principles. Each new favorable technique (transplanting, propagation through cuttings, grafting) that yielded better results, was adopted with a 'progressively greater leap of faith' - whereas the 'simple' sowing of seed was a process that could be observed, understood and copied from natural processes.[47] For quite some centuries, farming was mostly about *selection*. Even though the mechanisms of heredity were not known yet, breeders began to understand the importance of selecting plants with favorable traits and breeding new offspring from them. I began this section with the crucial difference between plants and crops, marking the beginning of agriculture. A second important distinction is that between *selections* and *hybrids*, that marks the dawn of modern, deliberate plant breeding, around 300 years ago. Selections can be understood as selected species or cultivars, whereas hybrids are the result of a cross - sometimes spontaneous or natural, sometimes deliberate - between two distinctly genetically different plants. This could be a cross between either two species, or two different races within a species. Actual seed *breeding* practices begin

[45] Kingsbury, *Hybrid,* 398.
[46] Kingsbury, *Hybrid,* 26.
[47] Kingsbury, *Hybrid,* 24.

with these hybrids. In plant breeding history, the concept and practice of hybridization can be understood as 'one of the most decisive breakthroughs of all'.[48]

The understanding of the reproductive mechanisms of plants came in the European early modern period. From the eighteenth century onward, plant breeding (and animal breeding alike) progressed in very close conjunction with the slow revelation of the facts about reproduction and the transmission of genetic information from one generation to another.[49] In the early modern period, however, religious 'obstacles' (as Kingsbury calls them) prevented plant breeding from too much progress at once: beliefs that stood in the way of improving nature. In the seventeenth and eighteenth centuries we find some of the earliest objections against too much human intervention in 'natural processes'. Kingsbury speaks of a 'mental wrestling that was clearly taking place in many learned minds between religious beliefs and the empirical evidence being gathered about how the physical world operated and, in particular, how it might be manipulated'.[50] And then there was the realization that plants actually 'had sex' – a realization that even had an influence on soft-porn and the theatre.[51] Even more baffling than the insight that plants could be male or female, or could even pollinate themselves, was the concept of hybridization. For a long time, crossing two God-given species was regarded as an act against God's will. The belief that sexual intercourse between different species - even if these were plant species - was an insult to God, was widespread. Furthermore, hybrids were sometimes problematic in a scientific context because they did not fit in classification schemes easily.[52] On the Pyramid of Technology, we see how hybridization in plant breeding moved from 'envisioned' to 'operational' or 'applied' – but not entirely to 'accepted' yet.

The late-eighteenth and nineteenth centuries were characterized by what we now call the Agricultural Revolution, mostly in Europe: new ways of fertilizing the soil, new rotation systems and new crops and varieties were developed at a fast pace. 'Improvement' was the buzzword of all these revolutions. On all levels, awareness increased that *life* could be improved - including the life of plants. The religious resistance against this concept was slowly declining throughout the nineteenth century. Around 1850, hybridization was widely understood and applied, but not necessarily approved of. And it was applied not only as a crop improvement tool, but (even mainly) as a research tool to study heredity - both in plant and in

[48] Kingsbury, *Hybrid,* 9.
[49] Kingsbury, *Hybrid,* 71.
[50] Kingsbury, *Hybrid,* 73.
[51] Kingsbury, *Hybrid,* 77
[52] Kingsbury, *Hybrid,* 96.

animal breeding. Hybridization had moved to the 'accepted' level on the Pyramid, and would soon become 'vital' for the breeders who further developed this technology.

From Mendelian genetics to hybrid corn

With the works of Gregor Mendel (1822-1884), breeding turned from a mere technology (of which the workings were largely unknown) to an applied *science*, mostly because of a greater level of systematic 'trial and error' work. Mendel's pea plants experiments, conducted in the 1850s and 1860s, produced the necessary evidence that could confirm some long-held hypotheses about heredity and inheritance. However, it would take until the beginning of the twentieth century before the potential relevance and importance of Mendel's theory were recognized by plant scientists and breeders - and even then, those who did not adhere to Mendelism could provide plenty of counter-evidence.[53] Mendelism did not truly change the nature of practical plant breeding, as applying its principles in a practical context ran into difficulties when more than a few character traits were involved. The statistical character of it, however, allowed the scientific 'trial and error' approach to speed up. It turned plant breeding into a formal science, increasingly regulated and administered according to principles that became more and more influential.

'Genetics' was first used to describe the new discipline of 'studying heredity' in 1906.[54] Plant breeding became a discipline in the USA first, with its own infrastructure of schools, teachers, students and materials; and breeders' associations and guilds. Meanwhile in Europe, the first fortress of scientific seed breeding was established in Svälof, Sweden, which would become the world center for genetics in the early twentieth century.[55]

With the rediscovery of Mendelism in the early twentieth century, 'the era of landraces was coming to an end, to be replaced by consistent and predictable varieties' – new crossings, new crops and an important novelty: hybrids.[56] One of the most profound developments in this context is that of hybrid corn - not least because it served as an inspiration for livestock breeding, with far-reaching consequences.[57] 'By the time Mendelian genetics became established,' Kingsbury writes, 'religious scruples concerning hybridization had almost entirely died away, so hybrid corn attracted very little opposition'.[58] What Kingsbury is essentially

[53] Kingsbury, *Hybrid,* 144.
[54] Kingsbury, *Hybrid,* 156.
[55] Kingsbury, *Hybrid,* 160.
[56] Kingsbury, *Hybrid,* 166.
[57] For a detailed history of the influence of hybrid corn production on (Dutch) animal husbandry practices, see Liesbeth van der Waaij and Bert Theunissen, ''De meest efficiënte kip ter wereld'. De Nederlandse legkippenfokkerij in de twintigste eeuw', *Studium* 10:2 (2017), 61–85, 67-71.
[58] Kingsbury, *Hybrid,* 244-245.

showing us is how hybrid corn, considered by contemporary scientists as the ultimate and successful application of Mendelian genetics to a staple crop, has paved the way for the production of more genetically modified crops - and for other methods of genetic modification. We might say that hybrid corn was the 'scout crop' that would explore the different levels of the Pyramid of Technology: in about thirty years time and at what Kingsbury calls 'an almost exponential rate', hybrid corn worked its way up from 'operational' to 'accepted' to 'invisible'.[59] Commercialization has played a large role in this development from the very beginning. Perhaps the most profound historical effect of the rapid development and adoption of hybrid corn in the USA is that the agricultural world became aware of 'just what plant breeding was capable of'.[60] This was also true for the Netherlands: hybrid corn's success in the United States made Dutch breeders curious to investigate the possible positive outcomes of hybridization.[61]

The story of hybrid corn and the rapid developments in breeding that followed, has at least two completely different sides to it. On the one hand, it is seen as one of the greatest revolutions in agriculture in the twentieth century, responsible for increasing harvest yields dramatically. Virtually nothing changed the face of American agriculture more than this high-yielding corn variety that would soon dominate the fields (in that sense, it moved even further from 'invisible' to 'naturalized' – endless fields full of hybrid corn are now a common image of US agriculture). On the other hand, F_1 seeds do not breed true, so a farmer needs to buy new seeds from the seed company for every new round of growing.[62] One can imagine how this negatively affects the finances of small farmers, and this is still a commonly heard criticism of industrial seed breeding: instead of the self-sufficient organic reproduction material they once were, seeds have become industrial, disposable, and also very costly objects. In the context of my research question, we have to keep in mind that an individual seed, even an 'industrial' one, is essentially both: it may be designed and produced by humans in factory-like circumstances, but it is still an organic objects that needs soil, light and water, in order to produce new plant life. And we also have to keep in mind that we are not interested in the agricultural view of seeds (i.e., how farmers and growers feel about certain technological developments) but only in the stories that the producers (i.e. the seed breeding companies) tell about these seeds and the underlying technologies.

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[59] Kingsbury, *Hybrid,* 252. Full quote: 'The discovery of heterosis and its commercial development in the first thirty years of the century was a harbinger for an almost exponential rate of farther development'.
[60] Kingsbury, *Hybrid,* 288.
[61] J.C. Dorst, 'A quarter of a century of plant breeding in the Netherlands', *Euphytica* 7:1 (1958): 9-20, 14.
[62] Kingsbury, *Hybrid,* 218

From nuclear grapefruits to genetic modification

'Just what plant breeding was capable of' extended rapidly in the second half of the twentieth century, also the period that my research is focused on. I will discuss some of the most influential novel technologies here (in terms of output, scientific disputes and public controversy).

'X-ray machines were only the first of a series of strange tools celebrated by breeders in the middle decades of the twentieth century', writes Helen Anne Curry in her history of technological innovations in twentieth century plant breeding in the USA.[63] Apart from X-ray radiation breeding she discusses the chemicals-induced mutations in plants that got into fashion in mid-twentieth century. This 'tinkering with genes' as she calls it is essentially a process of inducing completely random and undirected DNA mutations. Plant breeders

> played around with flowers and pollen, chemicals and radiations, not knowing exactly the route by which improvement would occur or what the end result could or should be [...] hoping to stumble upon a fruitful assemblage of these that would result in a new variety.[64]

Mutagenesis, or radiation breeding, is an interesting example of a new technology that was met with remarkably little resistance; in fact, apart from plant breeders no one really knew what it was.[65] A truly 'invisible' technology behind plant seed breeding in the 1960s and 1970s, nuclear radiation is today treated with more caution, because of the uncertain risks that a large amount of random mutations entails. It was first applied to the production of tobacco plants, but soon the potential for food crops was realized as well. Perhaps the most well-known example of a mutation bred food is the Ruby Red grapefruit. What strikes Kingsbury, and me alike, is that mutation breeding never led to public controversies about health or possible negative consequences of random mutations - while the chances of this are way higher than with GM technology, simply because the technique is so untransparent.[66] In fact, quite the opposite has happened: mutation breeding in the USA has had a very strong PR project from the beginning, for instance through support from the FAO (United Nations Food and Agricultural Organization).[67] Looking at the Pyramid of Technology, we could say that radiation breeding is almost entirely 'naturalized', whereas genetic modification technology still had to climb many steps to get to that first stage. This is interesting, because from a scientific

[63] Helen Anne Curry, *Evolution made to order: Plant breeding and technological innovation in twentieth-century America* (University of Chicago Press, 2016), 3.
[64] Curry, *Evoution,* 79.
[65] Kingsbury, *Hybrid,* 266.
[66] Kingsbury, *Hybrid,* 271.
[67] Curry, *Evolution*, 199.

perspective genetic modification is safer – the mutations are not random as with radiation breeding, but rather directed and controlled.

In the long and complicated history of plant breeding, however, the move from mutation breeding to genetic modification is a quite obvious next step: from unconscious hybridization to highly successful F_1 corn, and via induced mutation-created grapefruits to genetic modification technology. But what do we talk about when we talk about genetic modification, or GMOs? Remember the current definition held by the European Commission: 'Genetically modified organism (GMO) means an organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination'.[68] Genetic modification means inserting genetic material from the DNA of one species to the DNA of another. Without going into the technical details of the process, which are irrelevant in a research project focused on communication, it is important to realize that GMOs can either be *transgenic* or *cisgenic* organisms. Transgenesis is the combination of genetic material of two non-related species - non-related in the sense that they would not, 'naturally' or spontaneously in nature, cross with each other. A cisgenic crop, on the other hand, is also genetically modified, but created by exclusively making use of genetic materials from other crops to which the modified crop could be crossed by normal breeding as well - the same result could be achieved, but the breeding process would take much longer.[69] The combinated species are thus genetically closer to each other.

Mastering or accelerating 'the natural'?

I began this chapter by sketching the 'mastering nature' perspective that could be seen as the *leitmotif* behind the history of plant breeding. Another perspective on the chronology of plant breeding is what I would call the acceleration perspective. According to Niels Louwaars, director of the Dutch plant breeders' sector association Plantum, the history of plant breeding is nothing but a history of increasing speed and efficiency.[70] From this perspective, there were only three real innovations in the history of plant breeding that can be considered the real major breakthroughs. These innovations are: 1) crossbreeding and the realization of sex in plants (seventeenth/eighteenth centuries), 2) Mendelism and the power of mathematical prediction in breeding results, and 3) the discovery of the structure of DNA in 1953. According

[68] *Directive 2001/18/EC* (see footnote 8).
[69] Tjard de Cock Buning, Edith T. Lammerts van Bueren, Michel A. Haring, Huib C. de Vriend, and Paul C. Struik, '"Cisgenic" as a product designation', *Nature biotechnology* 24:11 (2006), 1329. See also: Dennis R. Cooley and Gary A. Goreham, 'Are transgenic organisms unnatural?', *Ethics & the Environment* 9:1 (2004), 46-55.
[70] Interview with Niels Louwaars, May 22, 2018.

to Louwaars, these three basic innovations have not significantly changed the actual *practice* of plant breeding – they have only *accelerated* it. They facilitated nothing but the speeding up of the selection process that is at the basis of plant breeding.

In this view, transgenic modification is really something different. Inserting alien DNA into a species is not a simple case of increasing efficiency. It is not accelerating a natural process. It is a new concept of plant breeding: creating new crops from species that would normally not propagate. It is important to realize that most of the worldwide GMO resistance was, and still is, aimed at the transgenic way of modification. The insertion of 'alien' DNA is commonly seen as unnatural, unnecessary, risky, unpredictable, and dangerous. Cisgenic modification - when explained sufficiently - is usually more prone to acceptance.[71]

The future is here: CRISPR-Cas9 and other (controversial) NPBTs

In order to comprehend seed breeders' communication strategies about the most recent genetic technology, CRISPR-Cas9, we need to have an image of how this technology has made its way to the labs of European and Dutch seed companies, and how these companies have dealt with the introduction of CRISPR and other new plant breeding techniques (NPBTs).

> Although sometimes subjected to exaggerated headlines, the use of CRISPR in agriculture should be best considered as simply 'a new breeding method' that can produce identical results to conventional methods in a much more predictable, faster and even cheaper manner,

is the mild verdict of a scientific article about the implications of CRISPR technology for food production.[72] Clearly, this author places CRISPR in the 'acceleration narrative' about plant breeding that we have heard about in the previous section. But there is more to CRISPR technology than simply producing the same results, only faster and cheaper, as with 'conventional' methods. Not only in the agricultural world but also in many other contexts, such as medical science, CRISPR is presented as a true game changer.[73]

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[71] See e.g. Anne-Cécile Delwaide, Lawton L. Nalley, Bruce L. Dixon, Diana M. Danforth, Rodolfo M. Nayga Jr, Ellen J. Van Loo, and Wim Verbeke, 'Revisiting GMOs: are there differences in European consumers' acceptance and valuation for cisgenically vs transgenically bred rice?', *PLoS One* 10:5 (2015). These findings suggest that not all GMOs are the same in consumers' eyes and thus, from a consumer preference perspective, the differences between transgenic and cisgenic products are recommended to be reflected in GMO labeling and trade policies.

[72] Caixia Gao, 'The future of CRISPR technologies in agriculture', *Nature Reviews Molecular Cell Biology* 39 (2018), 1-2.

[73] For a quick overview of possible applications of CRISPR in agriculture, see: http://www.nbtplatform.org/background-documents/factsheets/fact-sheet---crispr-applications-for-the-agricultural-sector.pdf (accessed September 3, 2018).

CRISPR is a technology that, thanks to the recent discovery of the exact workings of a bacterial immune system, allows for very precise alternations of an organism's DNA. These alterations can be both cisgenic or transgenic: pieces of genetic material may be muted, copied or altered relative to the original DNA, but they may also be completely rewritten, making use of genetic material of another organism. CRISPR can accelerate both cisgenic and transgenic changes in an organism – and that is what complicates the communication about CRISPR to a large extent. As a technology, CRISPR-Cas9 is already quite complex to explain to an uninformed audience. But even its implications are hard to communicate clearly. This may also explain why the European Commission has had so much trouble classifying and regulating these novel technologies. As we now know, the European Court has eventually decided to consider *all applications* of CRISPR-Cas9 as genetic modification – even non-transgenic applications, in which no foreign genetic material is inserted into an organism at all.

We have now drawn some general historical background about seed breeding, and we have seen that new technologies in the sector were usually met with resistance of some kind (religious, societal or political). The recent controversy about CRISPR-Cas9 shows us that genetic engineering is still subject to much debate – and ignorance about what the technology actually entails. We will now have a look at the history of the Dutch seed breeding sector in particular, to find out how these technologies have developed in the Dutch context, especially since the 1980s, when biotechnological applications in seed breeding became available.

Chapter 4

Great expectations again and again: the Dutch seed breeding sector, 1980-today

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'Within a few years, probably half of all seeds in the worlds will be 'transgenic', i.e. genetically modified'.[74]

'The success of the plant breeding sector is not a matter of course, especially when we look at the social unrest regarding certain novel biotechnology related techniques'.[75]

Introduction: the Dutch historical roots of seed breeding

Today, the impressive percentage of 70% of the vegetable seed used worldwide can be traced - directly or indirectly - to Seed Valley (the seed breeding hub around Enkhuizen) and the breeding companies located elsewhere in the Netherlands.[76] Traditionally, the Low Countries have always been among the leading plant seed producers, from the seventeenth century onwards.[77] In the first half of twentieth century, the century that is characterized by many rapid developments in seed breeding, the large-scale implementation of hybrids was the most important.[78] The Dutch seed breeding sector was always highly aware of the importance of 'foreign' plant material to produce the best possible crossings and hybrids: 'the opinion has always prevailed that farmers should have at their disposal the best varieties, no matter whether they are of foreign or of Dutch origin. I don't think there are many countries where foreign varieties are so easily adopted', wrote a plant scientist in 1958.[79]

An important event in the Dutch history of plant breeding is the effectuation of the Plant Breeders Decree (*Kwekersbesluit*) in 1941.[80] This decree made it possible for breeders to patent

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[74] Philip Bueters, 'Pioniers biotechnologie slaan hun slag', *Het Parool,* August 21, 1996, LexisNexis Academic. Original quote: 'Over een paar jaar is waarschijnlijk de helft van alle zaden op de wereldmarkt 'transgeen', ofwel genetisch gemanipuleerd.'
[75] Bakker and Minten, *Historisch overzicht,* 5.
[76] Seed Valley, *Made in Holland. Seed Valley: leading the world of plant breeding* (Development Agency NHN, n.d.), 7, http://edepot.wur.nl/299444.
[77] Kingsbury, *Hybrid,* 61.
[78] Dorst, *Plant breeding,* 12.
[79] Dorst, *Plant breeding,* 12.
[80] For a discussion of the Plant Breeder's Decree see: H. de Haan, 'The Netherlands Plant Breeder's Decree', *Euphytica* 11:1 (1962), 1-4.

their own creations, whereas the genetic material of these creations would always remain available for other breeders to work with. One could argue that with the implementation of this law, plant seeds became definitively 'unnatural' - a breed became an artifact. The Dutch Plant Breeders Decree is unique in the world, and today still, it enables plant breeders and researchers alike to have open access to genetic materials of competitive companies or institutes.

In the second half of the century, Dutch plant scientists and breeders soon realized the potential of novel breeding techniques, such as radiation breeding (mutagenesis). From the same 1958 article:

> In this age of atomic science, it has been investigated to what extent radio-active material can induce hereditary changes. It has been proved that artificial mutation can be induced by irradiation. [...] Opinions still differ as to whether it is possible to produce valuable properties by means of artificial mutations [...] There is no doubt that here a wide and unexploited field is waiting for development.[81]

Interestingly, in this article there is no mention of societal controversy or opposition against this method of breeding. What it does mention, on the other hand, is the fact that '[compared to] the situation of about 1930 it can be concluded that the Dutch breeding establishments have greatly increased in number, area and outfit and that more scientists with a *special education* are being involved in the breeding work'.[82] The fact that the 'special education' is mentioned here, points at the increasing scientific complexity of breeding practices. This becomes even clearer in the concluding remarks:

> Formerly plant breeding used to be an art whereby love, intuition and luck played a large part. In those days breeders achieved great results by using simple means and "armed" only with their famous "breeder's eye". But more and more plant breeding has developed to specialist *knowledge,* and the application of science is greatly on the increase. Greater demands than before are made on equipment and techniques. Besides, modern breeding establishments involve the investment of large sums of money.[83]

[81] Dorst, *Plant breeding,* 15.
[82] Dorst, *Plant breeding,* 16. My emphasis.
[83] Dorst, *Plant breeding,* 19. Original emphasis.

The Dutch seed breeding firms are hailed for 'understanding their task' and '[having] tackled their problems energetically'.[84] In the forthcoming chapters on Bejo and Rijk Zwaan we will see how they actually understood their tasks, how they adapted to the 'greater demands on techniques' and how they communicated their efforts.

The 1980s and 1990s have been an extremely turbulent era for scientists and companies operating in plant breeding and biotechnology. As a result, the seed breeding companies had to make a lot of difficult choices during this period. In the United States, the public turmoil over genetic modification gradually disappears during the 1970s. Meanwhile in Europe, public debate slowly begins to take shape.[85] We will look at some key events in the history of the Dutch seed sector between 1980 and today, that are relevant in the light of my research question about nature and technology. These events range from the acquisition of Rijk Zwaan by chemical multinational BP Nutrition (in 1986), the foundation of Keygene (in 1989), the moratorium on genetically modified foods (1999), the public 'Eten & Genen' debates around the turn of the millennium, to the later image problems of the seed sector and the subsequent foundation of Seed Valley (in 2007). These are some of the crucial events that serve as background to the story that I will tell about the seed breeding companies. For every event, every breakthrough, every period in time, the question is: how did Bejo and Rijk Zwaan respond? Chapters 5 and 6 will provide answers to this question.

Great expectations since the 1980s

At the beginning of the 1980s, 'what to do with biotechnology?' was a central question for Dutch breeding companies. For the first time, the Dutch government had mentioned biotechnology as a priority (in the *Innovatienota* 1979); more and more money was made available for the breeding sector. Rijk Zwaan and Bejo felt they were being 'stimulated' to investigate and apply the possibilities of biotechnology.[86] Furthermore, there was not yet much criticism from NGOs or activists. But as the decade passed, more and more debate and controversy took shape within societal organizations, leading to new dilemmas and difficulties for the seed breeding sector. Biotechnological innovations were still explored as valuable opportunities, yet at the same time the public debate - about safety, politics and ethics of biotechnology - became more visible and could no longer be ignored.

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[84] Dorst, *Plant breeding,* 19.

[85] Bastiaan Zoeteman, Miranda Berendsen, and Pepijn Kuyper, 'Biotechnologie en de dialoog der doven' (Bilthoven: COGEM, 2005), 37.

[86] Bakker and Minten, *Historisch overzicht,* 11. See also: Vincent Lucassen, Piet Schenkelaars, Huib de Vriend, and René Didde, *Oogst uit het lab: biotechnologie en voedselproduktie* (Utrecht: Van Arkel, 1990), 65-66, 69-71.

The 1980s are also characterized by many business acquisitions in the breeding sector: more specifically, large multinationals or chemical concerns taking over Dutch breeding companies. In 1986, for instance, Rijk Zwaan was acquired by BP Nutrition, a British chemical concern. In Dutch press, this acquisition has often been framed as a negative sign of the industrialization of agriculture.[87] The reasons for this acquisition were various, and we will see how Rijk Zwaan itself explained and framed it to the public. (In 2002, Rijk Zwaan became autonomous again through a management buy-out. Just like the acquisition was framed in terms of 'an affair between breeding and biotech', this 'return to the roots' was put forward in a frame about the decoupling of these two.)

1989 is in more than one respect commonly seen as 'the year that would change the world' by historians. In 1990, a revision of a book about technology in food production, entitled *Oogst uit het lab* (*Harvest from the lab),* was published. The authors reflected on 1989 as follows:

> It was the year in which the Agricultural University [now WUR] is caught for executing illegal mice experiments, in which a West German judge forbade the construction of an insulin plant, and in which activist group 'de Ziedende Bintjes' molested a field trial of genetically changed potatoes.[88]

Along with these developments, 1989 was also the year that biotech research company Keygene was founded in Wageningen: 'an independent research company, specialized in the development and application of molecular techniques in plant breeding [...] that conducts research into the improvement of agri- and horticultural crops, mostly commissioned by the breeding industry'.[89] Keygene was founded by Rabobank (the bank that funds most of Dutch agricultural business, and came up with a Biotech Venture Fund in the 1980s) together with five Dutch seed breeding companies.[90] The establishment of Keygene was explicitly framed as a response, or even a counter, to recent acquisitions of seed breeders by chemical or oil

[87] See e.g.: Milja de Zwart, 'Chemie bereidt tuinbouwrevolutie voor', *Trouw,* July 26, 1986, Delpher; Anon., 'Rijk Zwaan in handen van BP; Zaadteelt bijna ingelijfd door chemische industrie', *De Telegraaf*, August 2, 1986, Delpher.

[88] Lucassen et al, *Oogst uit het lab,* 9. Original quote: '1989 was ook het jaar dat de Landbouw Universiteit betrapt werd op illegale muizenproeven, dat een rechter in West-Duitsland de bouw van een insulinefabriek verbood en dat de actiegroep 'de Ziedende Bintjes' een veldproef van genetisch veranderde aardappelen vernielde.'

[89] Quote from a job advertisement in *NRC Handelsblad*, February 19, 1992, Delpher.

[90] Anon., 'Keygene begint met startkapitaal van 2,4 miljoen gulden', *De Volkskrant,* March 25, 1989, Delpher.

multinationals, as a matter of 'joining forces'. One of the involved seed breeders' spokesmen emphasized the increasing importance of biotechnological research for their sector:

> [Other] multinationals [e.g. Shell] are strong and they have a lot of biotechnological knowledge. They will soon exploit that knowledge in the plant breeding sector. For the five seed breeders behind Keygene, biotechnology is of great importance. We are collaborating now, because biotechnological research requires huge investments and qualified staff.[91]

The foundation of Keygene came as a surprise for the Dutch agri sector, and was reportedly 'surrounded by secrecy'.[92] During the first years, Keygene mainly focused their research activities on transgenic potatoes that would be less prone to discoloration.[93] The company would eventually become 'famous' in the sector thanks to the aphid-free (Dutch: *bladluisvrij*) lettuce that they co-developed together with Rijk Zwaan.[94]

Today, Enza and Rijk Zwaan are two of the five shareholders of Keygene, that now describes itself as a research company 'combining [their] cutting edge breeding technologies, bioinformatics & data science expertise and plant-based trait platform'.[95] The initial reason behind the foundation of Keygene - staying ahead of the R&D activities of large multinationals, like Shell - is still reflected in their communication: 'Keygene's partners remain competitors, but they cooperate in the development of genetic technology for plant breeding, in order to be able to compete with large breeders such as Monsanto and Syngenta'.[96] We will learn more about Keygene and its intercommunication with the seed breeding companies in Chapter 7. For now, it is important to understand the foundation of Keygene as a highpoint of the promises of biotechnology for the breeding sector.

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[91] Anon., 'Rabobank in onderzoek biotechnologie: Samenwerkingsverband met vijf plantenveredelingsbedrijven', *NRC Handelsblad*, October 4, 1988, Delpher.
[92] Anon., 'Veredelingsbedrijven en Rabo bouwen biotechnologielab', *De Volkskrant,* October 4, 1988, Delpher. Original quote: 'Tot verrassing van agrarisch Nederland gaan vijf Nederlandse plantenveredelings- en tuinbouwbedrijven samen een biotechnologisch laboratorium bouwen in Wageningen.'
[93] Bert Uri, 'Eerste transgene aardappelen over paar jaar op de markt', *Nieuwsblad van het Noorden,* August 7, 1993, Delpher.
[94] Chris van Alem, 'DNA-technologie - Kroppen sla zonder luizen dankzij Keygene', *De Gelderlander*, June 3, 2005, LexisNexis Academic.
[95] http://www.keygene.com/about-us/ (accessed September 12, 2018).
[96] Anon., 'Japanse zaadveredelaar komt naar Wageningen,' *Trouw,* May 24, 2005, LexisNexis Academic. Original quote: 'De partners in Keygene blijven concurrenten, maar werken samen bij de ontwikkeling van genetische technieken voor de plantenveredeling om de concurrentie aan te kunnen met grote veredelaars als Monsanto en Syngenta.'

From murmurs to a moratorium: the 1990s

In the years 1991, 1993, 1996, 1999 and 2002, a Europe-wide team of social scientists carried out so-called Eurobarometer surveys about biotechnology. It turned out that although 'Europeans are not technophobic [...], a majority of Europeans do not support GM foods'.[97] The 2002 summary shows that over the period 1996-1999, support for GM crops and foods in all of Europe, also in the Netherlands, declined, and opposition increased.[98] Between 1999 and 2002, the support or opposition remained largely the same in the fifteen European countries that were part of the surveys. 1999 is therefore seen as a turning point: '[p]ost 1999, the majority of countries show an increase in support for GM foods with the exceptions of Germany and Finland, which are stable, and Italy, France and the Netherlands which show further declines'.[99] From these Eurobarometer surveys we can thus conclude that in the Netherlands, the opposition against GMOs has only become stronger throughout the 1990s. At the same time, the general Dutch public has never held a truly strong opinion on GM foods like the British or German public did (this will be further discussed in the next section, see 'Eten en Genen').

In 1990, the COGEM (Commissie Genetische Modificatie, formerly known as the 'ad hoc recombinant DNA commissie') was officially founded. This committee was appointed to advise the Dutch government about the approval of all kinds of genetic techniques in research and commercial applications. As becomes clear from their anniversary publication *Dialoog der doven* ('Dialogue of the deaf' – a title that already displays something about the nature of the biotechnology debate), COGEM never really succeeded in the incorporation of 'the public opinion' about genetic modification.[100] Elsewhere I have argued that at the beginning of the 1990s, the Dutch citizen did not actually care about GM foods, because he was not aware of their existence and implications. The debate in the early 1990s was therefore somewhat more relaxed; this is reflected in the newspaper coverage of that period. On the occasion of the market introduction of the Flavr Savr tomato (the first example of genetically modified fresh food) in the United States, for instance, there was no mention of resistance or opposition in the Dutch newspaper coverage. Instead, the expectations for the Dutch people, Dutch supermarket and Dutch economy were actually high. Many newspaper articles have suggested, mostly in an

[97] George Gaskell, Nick Allum, and Sally Stares, 'Europeans and biotechnology in 2002: Eurobarometer 58.0' (Brussels: European Commission, 2003), 1.
[98] Gaskell et al, 'Eurobarometer 58.0', 2.
[99] Gaskell et al, 'Eurobarometer 58.0', 2. See also Joachim Scholderer, 'The GM foods debate in Europe: history, regulatory solutions, and consumer response research', *Journal of Public Affairs: An International Journal 5*, no. 3-4 (2005): 263-274, 263. See also the analysis of 1990s Eurobarometer research outcomes in: Lynn Frewer et al, 'Societal aspects of genetically modified foods', *Food and Chemical Toxicology* 42, no. 7 (2004): 1181-1193.
[100] Zoeteman et al, *Dialoog der doven*.

optimistic tone of voice, the possibility that GM foods (or 'gene foods' as they were called in the very first articles) such as the Flavr Savr tomato would be available to Dutch consumers soon. Refusal, suspicion, opposition and disgust turn out to be responses to GM foods that would not come into play until 1995 or 1996. The very initial response included none of these concerns.[101] According to the tone of newspaper coverage during the early years, GM technology was not seen as a strictly *necessary* addition to modern food technology, but more thought of as a funny and interesting possibility that could be explored.

Then what happened between this first encounter with a transgenic crop, and the eventual turmoil that would come up? The year 1996 is seen as a turning point, because it was the year that Monsanto introduced the first GM staple crop in Europe: Roundup Ready soy, a soy variety that was genetically modified (transgenic – it was made with a bit of bacterial DNA) in order to create plant resistance to Roundup – Monsanto's own herbicide. This introduction 'altered the [seed breeding] competition in one fell swoop, and turned Monsanto into a world famous multinational'.[102] All of a sudden, because of the public introduction of a GMO, seed breeding became an issue of political and societal debate. 'Environmental organizations brace themselves', wrote *De Volkskrant*. And:

> The new, transgenic soy is the first product of modern agro-biotechnology that enters the Dutch market. A test case, but the question is: a test case for what? For the safety of the new product, for the way it is grown, or for the consumer acceptance of products of modern biotechnology?[103]

At this point, Dutch seed breeding companies had to reconsider their communication strategies, because of public non-acceptance of GMOs at large. 'The big question was: how can we maintain or increase our market share, without using GMOs? [...] Most Dutch companies decided to stay in the Netherlands and focus on the development of alternative techniques. These new techniques brought along new discussions about definitions'.[104] In their historical overview of biotechnology in plant breeding, Bakker and Minten argue that the second half of the 1990s is 'characterized by wide resistance in society, and polarization

[101] Suus van de Kar, 'From Superfood to Killer Tomato. Shifts in framing GM foods, the Flavr Savr in particular, in the Netherlands in the 1990s', research paper (Leiden University), December 2017.
[102] Bakker and Minten, *Historisch overzicht,* 15.
[103] Rik Nijland, 'Het verzet tegen transgene soja', *De Volkskrant,* November 2, 1996, LexisNexis Academic. Original quote: 'De nieuwe, transgene soja is het eerste product uit de moderne agrarische biotechnologie dat zijn entree maakt op de Nederlandse markt. Een testcase, maar de vraag is: waarvoor? Voor de veiligheid van het nieuwe product, voor de wijze waarop het wordt geteeld of voor de acceptatie van producten van de moderne biotechnologie?'
[104] Bakker and Minten, *Historisch overzicht,* 18.

between science and society'.[105] Anecdotal evidence for the Dutch opposition in the 1990s is numerous. NGOs and activist protest groups like Greenpeace and the 'Razende Rooiers' and 'Ziedende Bintjes' attracted attention by molesting GM trial fields, or covering them in plastic, for instance in Wageningen, Bant, Rilland, and Schoorldam.[106] In their press releases, these activist groups commonly explained that their deeds were meant to stir up the discussion. For scientists, growers, and companies that saw their trial fields molested, the financial damage was often enormous. Many of the activists were never identified nor arrested.[107]

At the end of the 1990s, more precisely in the summer of 1999, we enter a complex episode in the history of genetically modified foods: the European *de facto* moratorium on the planting, approval, use, commercialization and import of GM foods.[108] Even though the implications of this European (non-official) legislation do not directly relate to my research topic, it is still an important event in the context of communication. Why? Because from 1998 onwards, European food producers – and therefore also Dutch seed breeders – could no longer apply for approval of genetically modified foods. Europe simply abstained from any GM related decisions until 2004, when the moratorium was partly lifted (and transgenic corn from the United States was allowed to be imported again). One can imagine that this decision had at least some consequences for Rijk Zwaan and Bejo – who were doing experiments and field trials with genetically modified crops at the time, with the desire to introduce them to the market one day. And therefore it is relevant to find out whether the seed companies have publicly responded to this moratorium, and if so, how they have framed it.

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[105] Bakker and Minten, *Historisch overzicht,* 16.

[106] For press coverage on trial field molestations, more than once on the front page of the newspapers, see e.g. (all articles were retrieved via LexisNexis Academic): Karel Knip., 'Razende Rooiers vernielden maïs', *NRC Handelsblad,* July 30, 1991; Anon., 'Ook aardappelvelden vernield door 'Rooiers'', *NRC Handelsblad,* July 31, 1991; Anon., 'Proefvelden vernield', *NRC Handelsblad,* August 11, 1992; Anon., 'Vanderhave stopt proef met genetische mais', *De Volkskrant,* July 9, 1997; Anon., 'Greenpeace trekt mais om', *Trouw*, July 27, 1999; Anon., 'Proefveld spruitkool ingepakt', *Trouw,* August 26, 1999; Anon., 'Plastic protest tegen genetisch experiment', *De Telegraaf,* August 26, 1999.

[107] Anon., 'Vernielers GM-gewassen moeilijk grijpbaar', *De Telegraaf,* August 28, 1999, LexisNexis Academic. Original quote: 'Anders dan bij vorige golven groene onrust, zoals tijdens de volksoplopen tegen kerncentrales of wapenwedloop, kunnen de Britse veiligheidsdiensten er nu niet achter komen in welke mate de vernielingen worden geregisseerd en door wie.'

[108] For a concise historical timeline of the European moratorium, I recommend reading: Christopher Ansell and David Vogel (eds.), *What's the Beef? The Contested Governance of European Food Safety* (Cambridge/London: The MIT Press, 2006), especially pages 12-13 and 97-99. This book specifically looks at the impact of European (also Dutch) NGOs on political decisions. For a shorter overview, see also: 'Timeline: the EU's unofficial GMO moratorium', February 8, 2006, https://www.ft.com/content/624a88c6-97db-11da-816b-0000779e2340 (accessed September 3, 2018). See also: Joachim Scholderer, 'The GM foods debate in Europe: history, regulatory solutions, and consumer response research', *Journal of Public Affairs: An International Journal 5*, no. 3-4 (2005): 263-274, 264. As far as I am aware, there is no specific Dutch historiography about the moratorium available – only studies from a European perspective.

By means of a conclusion to the 1990s, we can say that 'despite the technological success of the Dutch breeders, social and policy developments in Europe at the end of the 1990s forced them to end the development of GMO crops'.[109] What did the turn of the millenium bring?

2000s: 'Eten en Genen'

Around the turn of the millenium, expectations for biotechnology were still quite high, despite the moratorium on GM crops. Those working in the sector often argued that the societal anti-sentiments about i.a. genetically modified organisms would wash away soon.[110] Companies such as Genetwister Technologies, Cellscreen, Keygene and Zeneca Mogen expressed their confidence in, and did not hesitate to inform the public about their 'DNA activities'.[111] We must not forget that for biotechnology and breeding companies, the stakes were still really high. 'Within a few years, probably half of all seeds in the worlds will be 'transgenic', i.e. genetically modified', wrote a *Parool* journalist in 1996. 'Now that the political and ethical objections against gene technology are washing away, [...] big money can be earned'.[112] 'Within three to five years, only genetically modified varieties will be available', wrote another journalist in 1998 in *Het Financieele Dagblad*.[113] This was also the gist of several articles in sector magazines like *Boerderij Vandaag* and *Groenten & Fruit*.[114] We just have to be patient, and all resistance will die out soon.

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[109] Bakker and Minten, *Historisch overzicht,* 15.

[110] Marcel aan de Brugh, '"Meer dan genmodificatie"', *NRC Handelsblad,* July 12, 2000, LexisNexis Academic. See also: Martijn van Calmthout, 'Gentech ruimt het veld', *De Volkskrant,* January 19, 2002, LexisNexis Academic. Contrary to what the title suggests, in this article biotech companies' spokespeople are highly optimistic about the future of biotechnology.

[111] I realize that 'DNA activities' refers to more than just genetic modification technology. For the sake of the argument, several different technologies are grouped together here, without further specification. The bigger picture – what is the story about 'technology' told by these companies? – is most important here. Many of the companies that I have mentioned here, did not work with genetically modified seeds in the strict sense. But by a general audience 'altering DNA' would, in any context, probably be understood as such.

[112] Philip Bueters, 'Pioniers biotechnologie slaan hun slag', *Het Parool,* August 21, 1996, LexisNexis Academic. Original quote: 'Over een paar jaar is waarschijnlijk de helft van alle zaden op de wereldmarkt 'transgeen', ofwel genetisch gemanipuleerd. [...] Genetisch gemanipuleerde gewassen zijn sterker en leveren een grotere opbrengst op. Nu politieke en ethische bezwaren tegen de gentechnologie verminderen en de consument langzaam went aan genetisch gemodificeerde producten in de supermarkt, valt er goed aan te verdienen.'

[113] Henk Engelenburgh, 'Biologische landbouw zit in de knel door gentechnologie', *Het Financieele Dagblad,* August 4, 1998, LexisNexis Academic. Original quote: 'Er zullen binnen drie tot vijf jaar uitsluitend nog genetisch gemodificeerde rassen beschikbaar zijn'.

[114] See e.g.: Jan Braakman, '"Biotechnologie zal op termijn onmisbaar zijn"', *Boerderij Vandaag,* January 21, 2000, LexisNexis Academic; Fenneke Wiepkema, '"Er is meer bekend over gentech dan over klassieke veredeling"', *Boerderij Vandaag,* April 13, 2000, LexisNexis Academic. In the floricultural breeding sector, the sentiment about biotechnology seems to have been more negative from the start.

And what about the Dutch citizen? Did he actually care at all? Were his objections indeed washing away – or did he not really have them in the first place? 'Apart from the Ziedende Bintjes molesting GM potato fields and Greenpeace demonstrations at the supermarket, no Dutchman ever took to the streets to call out against the use of genetic technology in his food,' wrote *Trouw*'s science journalist Kees de Vré in 2001.[115] In 2001, the Dutch ministry of agriculture ordered a committee, led by Jan Terlouw, to map and channel the public sentiments about biotechnology in general, and GM technology in food production in particular (mind you: the moratorium was still in place). This resulted in a public debate series over the course of a year, entitled 'Eten & Genen'.[116] Newspaper *Trouw* was the most important media partner, and featured a sevenfold series entitled 'Smakelijk genen' (an untranslatable wordplay in Dutch with 'tasty genes'), in which the aforementioned Kees de Vré discusses various aspects of gene technology in food production.[117] According to the final report that was published in 2002, 'Eten & Genen' was especially aimed at the 'normal' citizen and the 'average' consumer.[118] One of the committee's conclusions was that

> those who are better informed and have thought about it for a longer time, will more explicitly indicate the conditions under which they would accept biotechnological applications in food production. This does not mean that they will have a more positive judgement. [...] The essential condition is that the general public can rely on the institutions in charge: the government, scientists, and the food industry. This condition is now insufficiently met. The better this condition

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See: Tiemen Roos, 'Nieuw is niet genoeg voor veredelaars', *Boerderij Vandaag,* October 28, 2000, LexisNexis Academic. In this article biotech flower breeder Florigene is being ridiculed.

[115] Kees de Vré, ''Eten en Genen' voor 150 burgers. Publieksdebat zonder publiek ontbeert ook publiek nut', *Trouw,* June 21, 2001, LexisNexis Academic. Original quote: 'Afgezien van acties van de Ziedende bintjes bij proefvelden van genetisch versleutelde aardappels en Greenpeace bij supermarkten en voedingsindustrie, is nog nooit een Nederlander de straat op gegaan om iets te roepen tegen het gebruik van gentechnologie in zijn voeding.'

[116] What is a 'public debate' and how can it be organized? In the case of 'Eten en Genen', many different activities were organized over the course of a year. Different types of audiences were invited to different debates. A smaller focus group of 150 selected Dutch citizens was the core of these debates, but next to that, there were discussion and debate programs at around 200 high schools and 65 societal organizations. Furthermore, the debate was instigated by newspaper advertisements, radio commercials, a brochure, and a public final hearing (for a complete overview of organized activities, including the scope of the campaign, see: Commissie Biotechnologie en Voedsel, *Eten en Genen. Een publiek debat over biotechnologie en voedsel* (The Hague: January 9, 2002), 31-35.

[117] The seven parts were published respectively on March 24, (1), March 31 (2), April 7 (3), April 14 (4), April 21 (5), April 28 (6), and May 5, 2001 (7). They are still accessible online via *Trouw*'s website.

[118] Commissie Biotechnologie en Voedsel, *Eten en Genen,* 1. Original quote: 'Het bijzondere van dit publieke debat is dat nu een poging is gedaan om een breder publiek bij het onderwerp te betrekken. Dat was ook de kern van de opdracht die de commissie van het kabinet heeft gekregen: betrek niet alleen de evidente voor- en tegenstanders bij het debat, maar vraag vooral de 'gewone' burger en de 'gemiddelde' consument hoe die de snelle ontwikkelingen beoordeelt die op dit terrein plaatsvinden en hoe die aankijkt tegen de deels nog onbekende gevolgen die zich mogelijk zullen voordoen.'

is met [...] the more willing would the public be to accept biotechnological applications in food.[119]

The main result and recommendation of the entire series can be summarized as: consumer trust. Due to recent food crises (the dioxin crisis, the BSE crisis, swine fever, salmonella, etc.), writes the committee, the food industry has lost a significant part of its credit with the Dutch citizen.[120] What is needed to restore the citizen's faith in food safety, also regarding novel genetic modification techniques, is 'an open and honest attitude of food businesses, for example being transparent about both the interests and the risks of their activities'.[121]

Openness, information and transparency are key - this was the committee's advice for governments, scientists and the food industry. Oddly enough, the industry seems not to have been involved at all in the Eten & Genen debates. As far as I can tell from the reports, no representative of seed breeding or biotech companies ever took session in either the committee or one of its activities.

The debate series has been heavily criticized for other reasons as well. Christian political party ChristenUnie argued that the debate was focused around the wrong questions and arguments - utilitarian and economic arguments only, but no principal discussion about allowing biotechnology in the first place.[122] COGEM complained about the fact that not enough 'normal' citizens did attend the public debates.[123] It was generally argued that the debate series came too late to have any serious impact, because the House of Representatives (Dutch: de Tweede Kamer) discussed an important biotechnology allowance document before the Terlouw committee could have completed their final report.[124] Science journalist Rik

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[119] Commissie Biotechnologie en Voedsel, *Eten en Genen*, 3. Original quote: 'De commissie heeft waargenomen dat mensen naarmate zij beter geïnformeerd zijn en er meer over hebben nagedacht, scherper de voorwaarden aangeven waaronder zij de toepassing van biotechnologie in voedsel aanvaardbaar vinden. Het is niet zo dat zij dan een positiever oordeel krijgen over biotechnologie en voedsel. [...] De belangrijkste voorwaarde is dat het publiek vertrouwen kan hebben in de instanties die er over gaan: de overheid, de wetenschap en het bedrijfsleven. Aan die voorwaarde is nu in onvoldoende mate voldaan. Naarmate beter aan de gestelde voorwaarden wordt voldaan - al naar gelang door wetenschap, bedrijfsleven of overheid – is het publiek meer bereid toepassingen van biotechnologie in voedsel te aanvaarden.'

[120] Commissie Biotechnologie en Voedsel, *Eten en Genen,* 4.

[121] Commissie Biotechnologie en Voedsel, *Eten en Genen,* 21. Original quote: '[Men rekent ook op] een open en eerlijke opstelling van het bedrijfsleven, bijvoorbeeld door duidelijk te zijn over de belangen en risico's die gemoeid zijn met de toepassingen waaraan men werkt.'

[122] Hendrik van de Pol and Cors Visser, 'Commissie Terlouw is te eenzijdig', November 27, 2001, https://wi.christenunie.nl/k/n32076/news/view/42103/170241/commissie-terlouw-is-te-eenzijdig.html

[123] Zoeteman et al, *Dialoog der doven*, 89.

[124] Anon., 'Breed debat gentechvoedsel is laat', *Trouw,* March 21, 2001, LexisNexis Academic. See also: Rik Nijland, 'Uitgekauwde genen', *De Volkskrant,* June 23, 2001, LexisNexis Academic; 'Debat over gentechvoeding mat en laat; Opdracht Terlouw komt als mosterd na de maaltijd', *De Volkskrant,* June 26, 2001, LexisNexis Academic.

Nijland (*De Volkskrant*) wrote that the committee's assignment was 'curious' in the first place; he argues that there was no urgency at all.

> [T]he discussion about transgenic food is already decades old. For years and years, advocates and opponents [of GM foods] have been working hard to influence press and public opinion. Their arguments have been repeated over and over again [....] Furthermore, there is no real national debate. [...] Whoever really wants to give his opinion, can only do so on the Terlouw committee's website.[125]

Looking back at the 'Eten & Genen' series, plant physiology professor Michel Haring thinks the debate made no sense at all, because the examples in the debates and in the questionnaires were too far-fetched. The public was confronted with 'nine partly real, partly fictional examples of [biotech] applications', ranging from a phytophthora resistant GM potato (real) to a GM cow that would produce healthier milk (fictional).[126] 'They asked about examples that were either ridiculous or non-existent', says Michel Haring in an interview in 2018. 'Those who heard about genetic technology for the first time, must have got traumatized by these nonsensical illustrations'.[127] But again, we have to realize that the seed breeding companies were not taking part in the discussions; they could have provided the public with some real illustrations of GM applications in seed breeding and food production.

In the meantime, during the 1990s and 2000s, NGOs and civil initiatives became stronger in their opposition against biotechnology in food. Anti-GM campaigns, especially Greenpeace's, have probably had a large impact on Dutch consumer awareness about genetic modification. The 'Eten & Genen' debate is a crucial event in this context, because the fifteen involved NGOs jointly decided to step out of it: they argued that there was no real debate about the desirability of genetic modification in the first place: do we even *want* it?, instead of: under which conditions would we favour it?[128] As a consequence, they publicly cancelled their

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[125] Nijland, 'Uitgekauwde genen'. Original quote: 'Een opdracht die merkwaardig aandoet, want de discussie over transgeen voedsel is al decennia oud. Sinds jaar en dag zijn voor- en tegenstanders in de weer om media en publieke opinie naar hun hand te zetten. Die argumenten zijn inmiddels uitentreure herhaald en bij elke geïnteresseerde bekend. [...] Van een echt landelijk debat is zeker geen sprake, al is het maar omdat de voedseldiscussie aan veel mensen voorbij zal gaan. Het oorspronkelijke plan, op grote schaal via tijdschriften en bladen van voedingsorganisaties aandacht te vragen voor de problemen rond de moderne biotechnologie, staat inmiddels in de ijskast. Wie staat te popelen om zijn mening te geven, kan alleen op de website van de commissie-Terlouw terecht.'

[126] Commissie Biotechnologie en Voedsel, *Eten en Genen, 1.* Als uitgangspunt voor de informatie en meningsvorming zijn uiteindelijk negen deels reële, deels fictieve toepassingsvoorbeelden ontwikkeld.

[127] Interview with Michel Haring, May 23, 2018.

[128] Kees de Vré, ''Gentechnologie is geen oplossing voor voedseltekorten'; Frankenstein en Magere Hein', *Trouw,* October 30, 2001, LexisNexis Academic. Original quote: 'De organisaties zegden onlangs

confidence in the Terlouw committee.[129] Among these fifteen organizations were Greenpeace, Milieudefensie, Platform Gentechnologie and Platform Biologica. Jan Terlouw was unaffected: 'Too bad that these organizations do not want to cooperate any longer, but I'm not surprised. [...] It doesn't really matter for the debate. We are familiar with their arguments about biotechnology, and we do take them into account'.[130] In 2001, the 'opposition coalition' came up with its own declaration about 'the dark side of gene technology'.[131]

What is remarkable about the organizations that explicitly (and to a large extent successfully) criticized GM technology in food production, is that they never targeted the seed breeding companies themselves. They focused their opposition mostly on policymakers, politicians and the average Dutch consumer. Bejo, Rijk Zwaan and other breeding companies were completely conspicuous by their absence where they were perhaps most welcome or needed: in this 'public debate'. They were not involved in Terlouw's debate series. They were never the targets of activist NGO's anti-GMO campaigns. The average consumer who learned about genetic modification did never hear the names of those who would actually practise it. Unlike 'the Monsantos of this earth', Dutch seed breeding companies never really made it to the public spotlight - in a positive nor a negative sense.

How Enkhuizen became Seed Valley

Apart from the question whether or not the seed companies were applying genetic modification techniques, they continued their standard activities as well. Since the turn of the millennium, the Dutch seed sector was struggling with image problems that will be discussed extensively in Chapter 7. In this context we have to discuss the foundation of Seed Valley in 2007, a sector partnership in which different companies joined forces 'to implement a programme that would boost their image on the labour market and see them partner up with educational institutions'.[132] Among the companies that joined the initiative, either from the beginning or later on, are not only the Dutch firms (Bejo, Enza, Pop Vriend and others), but also the large multinationals ((Monsanto, Syngenta, Pan American Seeds).

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hun medewerking op omdat volgens hen de hamvraag: Willen we wel gentechnologie? niet aan de orde komt.'

[129] Anon., 'Afzeggen tegenstanders maakt voor biotechdebat weinig uit', *Het Financieele Dagblad,* October 4, 2001, LexisNexis Academic.

[130] Ibidem. Original quote: 'Het is jammer dat die organisaties niet meer mee willen doen, maar ik ben er niet verbaasd over. Het contact is van het begin af aan heel moeizaam geweest. Voor het debat maakt het niet zoveel uit. We kennen hun argumenten over biotechnologie, en die nemen we in ons eindverslag gewoon mee'.

[131] Greenpeace NL, 'Gezamenlijke slotverklaring op conferentie De Keerzijde van Gentechnologie', October 29, 2001, http://www.greenpeace.nl/press/releases/gezamenlijke-slotverklaring-op/

[132] 'Ten years of Seed Valley', September 20, 2018, https://www.seedvalley.nl/en/ten-years-of-seed-valley

Seed Valley has given the sector a true 'boost'. Over the last ten years, the name has become a strong brand, and thus far the initiative claims that it has succeeded in attracting more staff and in countering the 'dull image' of the sector. For this research project I will specifically investigate the branding and communication strategy of Seed Valley – which is obviously focused around technology, as for instance reflected in the initiative's name. In Chapter 7 the 'seed story' of Seed Valley will be further explored and analysed.

CRISPR's short career in the Netherlands

In the previous chapter, we have briefly discussed the rise and fall of CRISPR-Cas9 as a useful technology for seed breeders. We know that the European Court of Justice has ruled that CRISPR created organisms should be considered as GMOs, and therefore it is not very likely that Dutch seed breeding companies will (continue to) work with the technology. Since CRISPR-Cas9 is now subject to the same laws, rules and regulations as are GMOs, it is simply not worthwhile for a relatively small Dutch breeding company to invest in trials and application procedures.

But before the ECJ ruled this verdict, CRISPR already had what seemed like a victorious career in the Dutch seed breeding sector, and the future looked bright for the breeders who wanted to work with the technology. In hindsight, CRISPR's short career reminds us strongly of the fate of GMOs in the Netherlands. We see NGOs protesting against an all too quick implementation of CRISPR-Cas9, and pointing at the unknown risks of this new technology: check. [133] We see an advice from COGEM, directed at the Dutch Ministry of Agriculture, *not* to treat CRISPR as a GMO: check.[134] We meet a political key figure, in this case Sharon Dijksma (Secretary of State at the Ministry of Agriculture, responsible for the subject at the time), who advocates for careful implementation of any new technology.[135] And finally, we see the 'career' of this technology coming to an abrupt end, due to a political decision on the European level. In many respects, the public and political debates surrounding CRISPR-Cas9 are a repetition of what we have seen happening to GMOs. We will see, however, that most plant breeders, at

[133] Thieu Vaessen, 'Blokkade van genetische manipulatie wankelt in Europese Unie', *Het Financieele Dagblad,* February 1, 2017, LexisNexis Academic. Original quote: ''Greenpeace en andere kleinere milieuorganisaties hebben zich uitgesproken tegen een welwillende behandeling van Crispr-cas. Ze menen dat de risico's van de nieuwe technologie nog niet goed in kaart zijn gebracht.'

[134] COGEM, 'CRISPR-Cas9 en gerichte mutagenese bij planten (Advies CGM/170308-01)', March 3, 2017, https://www.cogem.net/index.cfm/nl/publicaties/publicatie/crispr-cas-en-gerichte-mutagenese-bij-planten?order=date_desc&q=crispr&category=&from=30-09-1998&to=02-05-2018&sc=fullcontent (accessed September 2, 2018).

[135] Jan Braakman, 'Tik op de vingers voor nieuwe veredelingstechniek', *Boerderij Vandaag,* September 28, 2017, LexisNexis Academic. Original quote: 'Staatssecretaris Dijksma zegt dat ze uiterst behoedzaam moet opereren, om de beperkte politieke ruimte te benutten die er zou kunnen zijn voor aanpassing van de Europese regels.'

least the ones I have talked to, were eagerly waiting for CRISPR technology to be approved legally. Apparently, they did not consider it as a technology that conflicts with their 'natural' values.

Concluding remarks: how can this sector still be successful in 2018?

Looking back in a 2010 LEI report (Wageningen University's economic research institute; the report was commissioned by the Dutch Ministry of Agriculture), the authors conclude that 'the success of the plant breeding sector is not a matter of course, especially when we look at the social unrest regarding certain novel biotechnology related techniques'.[136] This unrest is at the heart of my research - and precisely the question how it is possible that the sector has become so successful *despite* the unrest, is so interesting. The authors of this research report, however, mainly focus on one side of the interaction between the sector and society: how did societal debates influence the breeding companies' strategies? In this research, the focus will be on the other side of that interaction; how did the breeders *themselves* actually communicate about novel technologies?

We have already seen that the breeding companies are largely absent in the public debates as instigated by the Terlouw committee and ngos. They were never a target, nor an active player, in these debates. It is now time to further investigate if this was self-imposed, deliberate restraint – or was there perhaps another reason why the companies did not engage in the public discussions? And apart from their absence in public debates, in what ways did the companies reach out to the general public? What do their discourse and communication strategies tell us about their dealing with the discursive dilemma: do they emphasize either technology or nature, or did they find another way to 'synthesize' the two sides of the dilemma? The next two chapters will provide answers to these and many other questions.

[136] Bakker and Minten, *Historisch overzicht,* 5.

Chapter 5

‘Exploring nature never stops’. Bejo’s communication strategies since the 1980s

> ‘But what could possibly be high tech about a carrot, a cabbage or an onion - crops that Bejo specializes in? Isn’t a carrot just a carrot?’[137]

Introduction

Now that we have looked at the Dutch plant breeding sector from a helicopter perspective, it is time to zoom in on one of the two case studies of this research project: Bejo Zaden in Warmenhuizen, North Holland. The name ‘Bejo’ is the contraction of Beemsterboer and De Jong, the two seed breeding pioneers that decided to join forces in 1963. The foundation of Bejo was a direct result of the need for innovation: both founders realised that cooperation was needed in order to achieve the best results with hybridization (see Chapter 3.4), then still a rather novel breeding technique.[138] Today, Bejo specializes in open field crops such as beetroot, carrot and cabbage. They produce and sell their seeds in over thirty countries with around 1,700 employees.[139]

In this chapter, I will look at Bejo’s different communication channels, aimed at entirely different audiences. First, I will go into Bejo’s communication towards their own customers (vegetable growers) and second, I will look at their communication towards a more general public. For the first section, I have mainly looked at (historical) seed catalogues - sales lists for growers all over the world, in which the available races and varieties are listed, and new varieties are introduced. For the second section, I have looked at (historical) self-representation in the Dutch press, external communication, and how they have managed their public relations (e.g. during events such as open days). Finally, I have interviewed Mirjam Both, Bejo’s marketing manager, about her view on Bejo’s external communication today as well as in the past. During the analysis of all source materials, I have specifically been looking at ‘nature talk’ and ‘technology talk’.

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[137] Jeroen den Blijker, ‘De ene wortel is de andere niet; zaadveredelaar Bejo Zaden groeit met de wereldbevolking mee’, *Trouw,* November 8, 2008, LexisNexis Academic. Original quote: ‘Maar wat is er nu hightech aan een wortel, een kool of een ui, gewassen waarin Bejo Zaden groot is? Een wortel is toch gewoon een wortel?’

[138] ‘Bejo’s History’, www.bejo.com/bejos-history

[139] ‘Exploring nature never stops: About Bejo’, www.bejo.com/exploring-nature-never-stops

Imaginary onions: addressing the client through seed catalogues

I will begin this analysis with a large collection of seed catalogues that Bejo publishes annually, and distributes among their clients – agricultural growers in the Netherlands and abroad (and, until around 2000, also non-professional gardeners). At first glance, Bejo's seed catalogues remind the reader of any other mail order catalogue. They communicate the available types of their products (different crops, different races, different varieties), prices, characteristics, and they come with nice full-colour images of the described crops. The information on the seeds and growing process is accompanied by pictures of the crop that will eventually grow out of it – e.g., a typical 1970s picture of a pan with green beans and a piece of bacon next to it,[140] or a picture of biscuits with butter, cress and lemon next to the cress seed information.[141] When the onion seeds are promoted, we find the picture of an onion processing factory next to a list of available onion varieties.[142] So at first sight ordering seeds looks like ordering clothes, or a new car: you can inform yourself, compare different options, and choose what suits you best. But in many respects, seed catalogues are not just like any other catalogue. As a customer of Bejo's, you buy something that is not yet the eventual product you are looking for. You are not buying onions or asparagus – in fact, you are buying *imaginary* onions, seeds that will eventually *become* onions, and only if you put in your own effort, and if you treat the seeds in the right way. In these catalogues, Bejo displays *promises* about the crops that grow out of their seeds. And even though Bejo's primary wares are plant seeds, their sales catalogues do not display them as such. Apparently, an onion or a carrot is considered to be more photogenic than a handful of seeds.

One of the most striking aspects of these catalogues is their complete emphasis on technology. Even though the words 'technology' and 'nature' are not mentioned anywhere at all, it becomes clear soon enough that these catalogues are showcases for Bejo's state-of-the-art technology in seed breeding. Their main purpose is to inform (possible) clients about the 'already well-known specialties, as well as the new introductions for this season'.[143] Usually, every Bejo crop is displayed on two pages: one with images, one with a list of available varieties. In the descriptions of these different varieties, the focus is clearly on the novelties. 'This catalogue will provide you with interesting information and data about our range of varieties which have been developed to meet the needs of the highly specialised vegetable growing industry', reads the introduction of the 1979 export catalogue.[144] A specialised

[140] Bejo, *Groentezaden,* 1979, 6.
[141] Bejo, *Groentezaden*, 1979, 44-45.
[142] Bejo, *Groentezaden*, 1979, 52.
[143] Bejo, *Exportkatalogus*, November 1977, 0.
[144] Bejo, *Exportkatalogus*, 1979.

vegetable industry calls for specialised seeds, and Bejo eagerly provides information about their specialist seeds.

Whenever it seems relevant, Bejo promotes their seeds by explaining that they have been bred especially for a certain goal. The 'Improved Detroit BIKORES' race (a red beet variety) is for instance touted as follows: 'By intensive breeding work, we obtained an early, non-bolting strain of our selection BIKOR, which we called BIKORES. The quality, internal colour and yield are perfect'.[145] Another beetroot is 'specially bred for late and very late sowings'.[146] Some other examples from the international catalogues, to give a comprehensive image of the characteristics that can be of interest:

- 'Predena F1 is a new hybrid of the Dutch winter type, especially bred for early harvesting'.[147]
- 'Our [Glory of Enkhuizen white cabbage] selection is asked for by many processors and is very wellknown in the countries of the southern hemisphere'.[148]
- '[BEWAMA white cabbage] has been bred specially for marketing and prepacking'.[149]
- 'A new variety bred for harvesting throughout the winter. Will hold well without splitting. Extremely uniform'.[150]
- 'Of this well-known variety [of a cauliflower variety] we introduced a round-headed strain, which is now preferred by most market growers'.[151]
- 'The yield of Hyduro [an onion variety] is slightly lower than ordinary Rijnsburger varieties but skin and keeping qualities are ideal for long term storage. Hyduro is highly adaptable to mechanical harvest and processing. The best financial results with this variety were archieved [sic] after March'.[152]
- 'In the latest official Dutch trials Raket [a white cabbage variety] obtained the hightest marks for its earliness and yield.'[153]

These examples show us that the brochures are mainly designed to communicate the high level of technology that Bejo is working with. Besides, they tell us something about the criteria that underpin Bejo's breeding practices: for instance 'uniformity, productivity [...], machinability'.[154]

[145] Bejo, *Exportkatalogus*, November 1977, 3.
[146] Bejo, *Exportkatalogus*, November 1977, 3.
[147] Bejo, *Exportkatalogus*, November 1977, 15.
[148] Bejo, *Exportkatalogus*, November 1977, 17.
[149] Bejo, *Exportkatalogus*, November 1977, 19.
[150] Bejo, *Exportkatalogus*, November 1977, 21.
[151] Bejo, *Exportkatalogus*, November 1977, 31.
[152] Bejo, *Exportkatalogus*, November 1977, 59.
[153] Bejo, *Exportkatalogus*, November 1977, 9.
[154] Bejo, *Groentezaden 2002-2003,* 25. Original quote: 'Met de komst van de hybriden wil Bejo Zaden meewerken aan de verdere evolutie in de preimarkt. Strikte selectiecriteria zoals uniformiteit,

Natural or ecological factors are hardly mentioned: Bejo breeds for high efficiency, to be achieved through technological innovations. Qualities that are mentioned very often include: uniformity, colour, shape, market use, 'can be stored for a long time', 'can be stored in cold places',[155] productivity, yield, resistance against weather circumstances, disease resistance, and general 'market quality'. (Interesting side note: of all the possible qualities a crop can have according to these sales catalogs, *taste* seems to be the least important. It is very seldom mentioned as a crop quality.)

The catalogues furthermore tend to emphasisize the possibilities that the crops will eventually create for the grower. The seeds come with a great deal of information: when and where to sow it, how to take care of it, when to harvest it. Technical information is provided about the sowing and growing processes of different crops, e.g. about the proper use of fertilizers or the best season or type of soil to sow the seed in.[156] Finally, much information is given about the eventual use of the crop. 'Use: fresh market and processing', or: 'Use: sauerkraut and fresh market', are possible uses of Bejo's different white cabbage varieties.[157] A grower can choose the type that is best suited for his land and his aims and ambitions. The different varieties of seeds will produce very different crops that will in the end have a very distinct use. This is even more visible in special crop catalogues, e.g. a brochure only about carrots or onions. In a recent *Rasinfo Wortelen*, the many different carrot varieties are described in terms like 'middle early B-carrot for fresh market and conservation', or 'refined carrot for the industry'.[158]

Sometimes, general background information is given about trends and developments in the seed breeding sector. For instance, in the 1984-1985 magazine, under the heading 'New developments in seed quality', Bejo explains why they are now coating their seeds and how this improves the quality.[159] This is another example of showcasing state-of-the-art technology, that Bejo is apparently proud of. In the next year's catalogue, they go even further in transparent communication about what happens at their research center in Warmenhuizen. Illustrated with many pictures, the magazine tells us about the research activities (quality control, resistance research and cell tissue culture) and about the difference between 'normal' seed and 'Bejo Precision' seed (the latter are newly calibrated for uniformity - a process that is

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productiviteit en gezondheid liggen hierbij aan de basis. Daarnaast wordt ook veel belang gehecht aan de machinale verwerkbaarheid. Hierbij zijn opgerichtheid, weinig bladbreuk en pelbaarheid prioritair. Tevens gaat ook veel aandacht naar presentatie en houdbaarheid in het handelskanaal.'

[155] Bejo, *Groentezaden*, 1979, 19.

[156] Bejo, *Groentezaden*, 1979, 49.

[157] Bejo, *Exportkatalogus*, November 1977, 11.

[158] Bejo, *Rasinfo Wortelen 2011-2013*, 6 and 18.

[159] Bejo, 'Nieuwe ontwikkelingen in zaadkwaliteit', *Bejo Magazine Groentezaden 84|85*, 1984, 2.

now common for all Bejo seeds).[160] In another catalogue, the advantages of hybrid seeds over true-breeding (non-hybrid, Dutch: *zaadvast*) varieties are explained to growers once again: 'More and more red beet hybrids are conquering the market. We know the advantages of hybrid seeds for many crops, i.e. better uniformity, less tarra, higher production, better colour, smoother skin, etc. Enough reasons to switch from pure races to hybrids'.[161] In a more recent brochure, Bejo explains a new technology called B-Mox, a way of priming seeds that makes them stronger. Several carrot growers are quoted saying that they favor these newly primed seeds over the classic carrot seeds. B-Mox technology is also applied for organic varieties.[162] Once again, Bejo takes pride in technological innovation and showcases this to (and through) their customers.

Bejo and De Groot en Slot, an onion seed breeder, have since long been collaborating in a special onion project: Quality Inside. In a special magazine devoted to new onion races, these onion seeds get 'genetic promotion': 'unique genetics, brought together in the newest races'.[163] 'Unique genetics' is still the tagline on the front page of the most recent Quality Inside brochure.[164] Clearly 'genetics' is not a swear word in the ears of Bejo's audience; it is something honorable, that Bejo proudly promotes.

What does this kind of advertising tell us? First and foremost, as indicated, we can see that the focus is entirely on technology, and on seed novelties that have been 'created' or even 'established' ('Dit nieuw *opgerichte* sla-ras…'[165]). When we define 'technology' as the opposite of 'naturalness' in this context, we can see that in these catalogues naturalness does not seem to be an issue at all. The word 'nature' is not mentioned *at all* in any of the Dutch- or international catalogues. After all, the comparison with a mail order catalogue is not that far-fetched: whether you are choosing a seed or a car, you definitely want to obtain the latest, most modern and high-tech option. In terms of Van Mensvoort's Pyramid of Technology, we could say that the technology behind seed breeding is so vital, that it gets special attention in Bejo's marketing strategy. It is not invisible or naturalized, given the many references to specific technological developments in the sales catalogues.

Almost entirely absent from Bejo's seed catalogues is attention for genetically modified seeds. Since the early 1990s, there is an overview of new technologies in every brochure. In most cases this section deals with coating technologies, such as 'Bejo Precision' and 'Bejo

[160] Bejo, *Groentezaden 85|86*, 4-6.
[161] Bejo, *Groentezaden 1992,* 9.
[162] Bejo, 'B-Mox toont mooie resultaten in de praktijk', *Nieuwighedenlijst 2018*, 11.
[163] Bejo/De Groot en Slot, *Plantuien,* n.d.
[164] See https://www.qualityinside.nl/quality-inside (the brochure is no longer available for download).
[165] Bejo, *Groentezaden*, 1979, 42.

Kote' (precision seeds that are finished with a tiny fungicide or insecticide coating).[166] Just like genetic modification, those technologies are not as innocent anymore today as they were in the beginning days. So if Bejo wanted to communicate something about the use of GM technologies, it would be in these sections of the brochures. But they didn't. This could either mean that they didn't realize it would be an issue, *or* they didn't want to draw attention to it. Even in the most recent novelties catalogue ('Nieuwighedenlijst 2018') there is no mention of discussions surrounding genetic technology – even though public discussions about the topic have flared up again with the introduction of CRISPR and other new plant breeding techniques.

Since around the turn of the millennium, however, the catalogues used to include a non-GMO statement on one of the first pages. In the Dutch brochures, these statements explicitly informed us that Bejo does not produce genetically modified organisms at all.[167] Furthermore, this statement normally included that 'whenever such [genetically modified] varieties become available, they will become clearly recognizable in our sales lists and catalogues'.[168] The last sentence of this disclaimer tells us two crucial things. First, Bejo does not rule out the possibility that they will produce GM seeds in the future. Second, Bejo already realized at the time that these future GM seeds would need to have a *status aparte*. They were already satisfying the hypothetical needs of growers that would want to know whether or not a seed is produced with GM techniques. They realized that genetic modification technologies would require special attention in order to become fully accepted.

In the 2010 catalogue, this disclaimer was not included on the first page anymore. It is 'stashed away' in the general information section on page 4. A small yet meaningful relocation – apparently, Bejo did feel that an eye-catching non-GMO statement was not necessary anymore. In the brochures of the last couple of years, the non-GMO statement was mentioned only in the general terms and conditions, included in the back of the brochure alongside many other general rules and reservations.

In Bejo's export catalogues since 2002, there used to be a disclaimer that states that 'unless the products are specifically indicated as GMO, the seeds of the varieties [...] were obtained without making use of techniques of genetic modification that lead to genetically modified organisms'.[169] None of the seeds displayed in the catalogues that I have looked at, were 'specifically indicated' as such. The fact that this technology is *not* applied at Bejo, is seen

[166] Bejo, *Groentezaden*, 1992.
[167] The non-GMO disclaimer is included in Bejo's brochures since 2002. See for instance: Bejo, *Rasinfo Wortelen 2011-2013*, 3.
[168] Bejo, *Groentezaden 2002-2003*, 1. Original quote: 'Wanneer in de toekomst dergelijke soorten beschikbaar komen, zullen deze in onze catalogus en prijslijst duidelijk herkenbaar zijn'.
[169] Bejo, *Vegetable Seeds 2018-2020*, 71.

as an important fact. That still implies that the technology itself is worthy of communication, that it still has not moved up in the Pyramid of Technology. More recent sales catalogues, both Dutch and international, also usually include a standard sentence that tells us that 'seeds are a natural product'.[170] Seeds may be a natural product according to Bejo's communication department; the breeding process behind the production of seeds is not.

All in all, we can draw some preliminary conclusions about Bejo's sales catalogues as a whole, and what they tell us about Bejo's communication choices in the discursive dilemma of nature and technology. First of all, Bejo communicates with their clients in a truly transparent way, showcasing and explaining research practices and innovations whenever they can. Another indication of this transparancy is the fact that from the 1980s onwards (for the first time in 1983), the catalogues usually include an invitation to Bejo Open Days, with pictures of previous events.[171] In the Dutch '84 catalogue, the open days are described as 'an annual event in the last week of September'[172] - and in 2018, it still is.

Second, technology is clearly the focus of the seed catalogues. As said, the brochures serve as showcases for state-of-the-art innovations and technological developments at Bejo. The seeds are promoted on the basis of the various qualities they have been bred for, such as uniformity and productivity. Notwithstanding the standard sentence saying that 'seeds are natural products', they are thus not presented as natural objects, but rather as highpoints of technology. Perhaps most surprisingly, Bejo did not communicate anything about the GMO controversies during the 1990s and 2000s in their brochures. Even though non-GMO statements were included since 2002, there was never explicit attention for the technology, the political developments surrounding it, and the implications for Bejo's breeders or for their clients: the growers.

The general public: public relations & media coverage

The aforementioned open days that Bejo annually organizes, bridge the gap between their professional, agricultural audience on the one hand, and the general public on the other hand. Traditionally, Bejo has been open and transparent to the public; their open days are normally visited by local residents and other interested non-professionals.[173] In local newspapers, Bejo is traditionally very well represented. Bejo's public events such as the 'penendag' and 'Kassenklas' are communicated quite well through *Noordhollands Dagblad*. There is an air of

[170] Bejo, *Rasinfo Wortelen 2011-2013.*
[171] E.g. Bejo, *Groentezaden '94-'95*, 2.
[172] Bejo, *Bejo Magazine Groentezaden 84|85*, 1984, 1.
[173] See for example: Anon., 'Het wordt druk bij Bejo Zaden', *Noordhollands Dagblad,* September 21, 2007, LexisNexis Academic.

pride and triumph in regional representations of the seed company: horticulture is generally hailed in Noord-Holland, as a local showpiece. In the next chapter, we will find that Rijk Zwaan, in another area of the Netherlands, enjoys a similar type of benevolent local news coverage.

In this section, I will look at the way Bejo managed their public relations: in the press, through external communication channels, and in their own (online) branding choices. External communication is only a very recent project for Bejo, that did not get much attention until about two years ago.[174] 'We find it important that consumers know where their vegetables come from,' says Mirjam Both, Bejo's marketing manager since 2014.[175] At the same time, she admits that consumers are not the primary target audience. It is important to keep this in mind during the analysis of Bejo's (recent) communication directed at a general public. 'Of course, we rather do than do not communicate with this audience', says Both.

In today's press releases, Bejo emphasizes their focus on technological innovation, and they do not hold back from 'DNA discourse' in public. In a recent company profile in *De Volkskrant*, for instance, Bejo's spokesperson tells us about rapid developments in gene technology.[176] He also emphasizes that 15 percent of their revenue is currently invested in R&D.

> Over the last fifteen years, we reap the benefits of huge investments in rapidly developing gene technology. Thanks to the discovery of the plant's genetic map [...] the development process of a new race now takes almost half the time. [...] That saves an incredible amount of production costs and time.[177]

In a controlled media story like this, Bejo seems not to worry too much about giving a 'natural' impression of seed breeding. The emphasis on technology is, again, obvious. Another recent external communication project is Bejo's 'spreekbeurtmagazine', a magazine full of information for primary or high school 'show-and-tells'.[178] And even though this magazine

[174] Interview with Mirjam Both, April 3, 2018.
[175] Interview with Mirjam Both, April 3, 2018.
[176] Carlijne Vos, 'Rassenveredeling zonder bijklank', *De Volkskrant*, April 27, 2015, LexisNexis Academic.
[177] Vos, 'Rassenveredeling'. Original quote: 'De afgelopen vijftien jaar worden de vruchten geplukt van forse investeringen in de snel ontwikkelende gentechnologie. Dankzij de ontdekking van de genenkaart van planten […] is het ontwikkelproces van een nieuw ras bijna gehalveerd. […] Dat scheelt ongelooflijk veel productiekosten en -tijd.'
[178] Bejo, 'Bejo Spreekbeurtmagazine', https://issuu.com/Bejozaden/docs/Bejo_spreekbeurtmagazine_def (accessed September 2, 2018).

contains a sentence about the fact that 'Bejo values nature a lot', the main message of this magazine is the high level of technology at Bejo's labs and production facilities.

In 2015, together with Enza Zaden and Syngenta, Bejo collaborated with Leiden-based science museum Boerhaave, for an exhibition on the 'science of seeds'. They contributed financially to a part of the larger exhibition 'Foodtopia', with photographs of Jos Jansen (whom we have met in the introduction). Just like in Jansen's book *Seeds: On the Origin of Food Crops*, the main message of this exhibition was the high level of technology that surrounds seed breeding.[179] This is clearly one aspect of their activities that they want to emphasize for a non-specialist (museum) audience.

And then there is the 'Opinion' section on Bejo's website, with short statements on genetic modification, patenting and licensing, etc. This is perhaps the most recent project; the opinions have been published online only one year ago.[180] They serve as standard, proactive answers to frequently asked questions: most statements seem to be written with possible critical questions in mind. Interestingly, the focus of these statements is more 'natural' than the tone of voice in client communication. The statements mostly deal with social and environmental issues such as the declining bee population and child labour. When I asked Mirjam Both why these opinions, including a non-GMO statement, were so easy to find, she told me that Bejo wanted to be completely transparent about it. 'We need to take a stance in the public discussions about these topics. We really make an effort to take part. This also has to do with the fact that our company is growing. We want to become visible'.[181] The non-GMO statement has a status aparte: 'We have had it ever since we have a website. Especially on our international website, we have to be very explicit about it. We don't have GMOs, and we don't need them. And even though it is simply not allowed in Europe, there are still so many people who are not aware of that.'[182]

GMO & CRISPR communication

I will now turn to one of the most important historical events in the context of this research, and investigate how Bejo (publicly) dealt with it: the 1999 EU moratorium on GM breeding, that hit the Dutch plant breeding sector quite hard. It is seen as a tipping point for seed companies' communication strategies and one can easily understand why: it makes a

[179] The exhibition in Boerhaave Museum was partly paid for by the Ministry of Economic Affairs, Enza Zaden, Syngenta and Bejo. See: Museum Boerhaave, *Jaarverslag 2015*, 14, https://rijksmuseumboerhaave.nl/over-ons/organisatie/jaarverslagen/ (accessed September 2, 2018).
[180] Interview with Mirjam Both, April 3, 2018.
[181] Interview with Mirjam Both, April 3, 2018.
[182] Interview with Mirjam Both, April 3, 2018.

difference whether a company publicly applauds this ban on GMOs, or condemns it, or perhaps tries to explain what is wrong with it. So how did Bejo deal with the 'sudden' ban on GMO breeding, and with the widespread public non-acceptance of GMO and other new breeding techniques that had preceded it?

Before the moratorium came into effect, Bejo actually had the opportunity to develop, grow and sell a few GMO seeds, such as herbicide resistant endive.[183] Most of these GMO vegetables were never really launched to the Dutch market. Already in November 1992, Bejo applied for field trials of genetically modified chichory (*groenlof* and *roodlof*), in collaboration with the Ghent-based biotech company Plant Genetic Systems. Reportedly, Bejo was the first company at the time that would experiment with GMO vegetables other than potatoes and maize. The company applied for a permit at VROM (*Ministerie van Milieubeheer*). *De Volkskrant* reported that Bejo expected to launch the new GMO product at the earliest within ten years.[184] We now know that would never happen. But we can assume, counter-factually, that Bejo would probably have continued with GMO breeding and experiments, if the moratorium had not thwarted things.

In February 1999, Bejo's head of research Bert Schrijver explained in *Het Parool* why Bejo wanted to experiment with genetically modified crops in the first place, redloof (*roodloof)* in this case. He emphasizes the farmer's advantages of a GM crop:

> Redloof, says Schrijver, is a crop with large genetic variation. As a consequence, farmers can throw away thirty to fifty percent of their harvest, because the plants are not fully grown or they have anomalies. In order to reduce the heterogeneity somewhat, Bejo has created redloof seeds that produce sterile, male plants. These plants do not produce pollen, they do not propagate. […] 'This way we hope to make the crops more uniform, so that only twenty percent of the harvest is wasted,' says Schrijver.[185]

[183] T. Vanlier, 'Nederlands bedrijf mag genetisch gemanipuleerd zaad produceren', ANP press release, May 21, 1996, LexisNexis Academic; Anon., 'Groen licht voor aangepaste zaden', *Het Parool,* May 22, 1996, LexisNexis Academic.

[184] Anon., 'Manipulatie voorkomt inteelt bij lof,' *De Volkskrant*, November 28, 1992, LexisNexis Academic..

[185] Marc Koenen, 'Groentetelers oefenen met Europese wetgeving', *Het Parool,* February 11, 1994, LexisNexis Academic. Original quote: 'Roodloof, vertelt Schrijver, is een groente met een grote genetische variatie. Het gevolg is dat een boer dertig tot vijftig procent van de oogst kan weggooien, omdat de gewassen niet volgroeid zijn, of andere afwijkingen hebben. Om de heterogeniteit enigszins in te dammen, maakte Bejo roodloofzaad dat onvruchtbare mannelijke planten voortbrengt: ze produceren geen stuifmeel en planten zich niet voort. [...] 'We hopen op die manier de gewassen uniformer te maken, zodat niet meer dan twintig procent van de oogst onbruikbaar is,' zegt Schrijver.'

Here we find a public plea for genetic engineering of crops, just a few months before the EU moratorium would come into effect. But when the moratorium was widely announced, in April 1999, Bejo told the public quite a different story. In a *Financieele Dagblad* discussion about the upcoming moratorium (entitled 'Discussion about GM plants is slow to start'), several plant scientists and breeding companies' spokespersons complained about the level of emotionality of the GMO debate.[186] Dick van der Zeijden, Bejo's sales manager at the time, was quoted saying that he would not be opposed to the moratorium, as long as it would be carried out globally.

> Van der Zijden [sic] thinks the anxiety is 'justified and understandable.' "Hitherto, there was no broad discussion in the Netherlands. But we are talking about a technology that directly intervenes in the blueprint of hereditary material. Since so many different developments can be imagined, there will always be unwanted developments. We should avoid those. So if we stumble upon risky business, we won't do it. After all, risky products will harm your image.'[187]

This is a striking quote in more than one respect. First of all, Van der Zeijden gives three completely different arguments in favour of the GMO moratorium: 1) the profound implications of the technology itself, 2) the risk of unwanted effects, and 3) the risk of image damage. Van der Zeijden was responsible for sales at Bejo, so perhaps we cannot expect him to hold an all too informed opinion about genetic modification. But he is mixing up so many different arguments that his statement sounds rather confused. This suggestion is confirmed by the statements of another Bejo spokesperson in another newspaper: Bejo's head of research Bert Schrijver in *De Volkskrant*. In an article about the negative (economic) consequences of the EU GMO moratorium, Schrijver stated that the European decision was 'incomprehensible' and had 'nothing to do with scientific arguments'. Moreover, Schrijver emphasized that genetic modification research hitherto had cost Bejo millions, and that the company would now lag behind compared to the United States, where GM technology was already allowed at the time.[188]

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[186] Henk Engelenburg, 'Discussie genplanten start laat', *Het Financieele Dagblad,* April 15, 1999, LexisNexis Academic.

[187] Engelenburg, 'Discussie genplanten'. Original quote: 'Van der Zijden [sic] vindt de ongerustheid 'terecht en begrijpelijk'. 'In Nederland was tot nog toe geen brede discussie gevoerd. Terwijl het gaat om een techniek die rechtstreeks ingrijpt in de blauwdruk van erfelijk materiaal. Daarbij zijn dermate veel ontwikkelingen denkbaar, dat er altijd ongewenste tussen zullen zitten. Die moet je vermijden. Dus als we riskante zaken tegenkomen, doen we het niet. Een riskant product is immers nooit goed voor je naam.'

[188] Bruno van Wayenburg, 'Besluit EU-milieuministers kost biotechologie miljoenen guldens', *De Volkskrant,* July 1, 1999, LexisNexis Academic. Original quote: 'Biotechnologische bedrijven reageren met onbegrip op de beslissing van de Europese milieuministers om het invoeren van nieuwe genetisch

Clearly, the views of different Bejo spokespersons (Schrijver, Van der Zeijden) were not seamlessly aligned at the time. Head of research Schrijver mainly emphasized that the moratorium would be a sector-wide tragedy; Van der Zeijden, on the other hand, tries to appease the situation a bit by accentuating the different standpoints on GMO that live in society. The fact that this internal discussion on how to externally frame the moratorium became so visible in newspapers, shows us that Bejo had built their public image mostly on technology thus far. Now that genetic modification, a highpoint of technology, had got such a bad image among the general public, they were quick – but not quick enough – to come up with a communication strategy focused around nature and natural values. This new strategy was apparently not prepared sufficiently; why would the two spokespeople otherwise disagree publicly in a newspaper?

After the moratorium came into effect in June 1999, breeding companies were still allowed to continue their already ongoing research into GMOs – only not for commercial purposes. For instance, Bejo was already doing a field trial with brussels sprouts in Schoorldam. In August 1999, this trial field was covered in plastic by Greenpeace activists.[189] Van der Zeijden took the opportunity to point at the fact that VROM had permitted this scientific field trial. The sprouts seeds were not meant for sale on the Dutch market, only abroad.[190] Almost twenty years later, Mirjam Both memorizes the protest action as follows: 'It was not really a problem for us - just unpleasant. We tried to discuss things with Greenpeace, but they didn't want to. And the reason why we did GM field trials at the time, is simply because we wanted to move with the times.'[191]

From August 1999 we make a flashforward to the Summer of 2018, when CRISPR-Cas9 was banished to the same problematic legal domain as GMOs. Before that happened, Bejo had communicated their expectations about CRISPR on their website as follows:

> As a result of rapid innovation in the plant breeding sector, breeding methods have been developed in recent years that can considerably shorten the breeding period for new varieties. In the case of some of these new techniques, such as CRISPR-cas, the European Commission is

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gemanipuleerde zaden en gewassen tot 2002 te blokkeren. 'Onbegrijpelijk. Het heeft niets met wetenschappelijke argumenten te maken', zegt A. Schrijver, onderzoeksleider bij het zaad- en veredelingsbedrijf Bejo Zaden in Warmenhuizen.'[...] 'Het is heel vervelend voor ons. Aan het onderzoek zijn miljoenen uitgegeven,' zegt Schrijver. 'We raken jaren achterop. In het buitenland verliezen we hierdoor marktaandeel'.

[189] Nell Westerlaken, 'Een hoog opgeleide appel', *Volkskrant Magazine,* October 9, 1999, LexisNexis Academic.

[190] Anon., 'Greenpeace: weg met die giftige spruitjes', *De Volkskrant,* August 26, 1999, LexisNexis Academic.

[191] Interview with Mirjam Both, April 3, 2018.

> currently investigating whether they should fall under GMO regulation. Until a decision has been reached, use of the new techniques is subject to GMO-regulations in the EU. Bejo believes that new breeding methods that makes [sic] natural breeding more effective and efficient should be permitted and considered to be non-GMO. It is of essential importance for the competitive strength of the European vegetable breeding sector that there is an international level playing field in this respect. Bejo therefore calls for clarity and supports the standpoint of our industry association, Plantum, in this matter. In principle we follow the same policy for our organic seeds, but we will always consider the point of view from the market.[192]

Several things are notable about this quote. First of all, CRISPR is introduced as a breeding method that can simply 'shorten the breeding period', that can make 'natural breeding more effective' – again, we recognize the acceleration perspective on seed breeding that does not tell the complete story about CRISPR. Second, Bejo is openly hoping for CRISPR to be permitted. Not out of philosophical considerations about what is natural and what is not, but mainly in order to maintain the 'competitive strength' of the European (or: Dutch) breeding sector. Third, Bejo explicitly refers to Plantum as a benchmark of information supply in this complex discussion. From my interview with Mirjam Both, I think that the second reason is most important for Bejo. 'The sector can make it without [CRISPR-Cas9], there are so many other techniques. But the developments are so rapid, and legislation falls behind – that is a threat to the sector'.[193] For Bejo, clarity and an international 'level playing field' were most important in their communication about CRISPR expectations - not a discussion about the technology itself and what it is capable of. The discursive dilemma seems not to be an issue here: the key message of the 'seed story' about CRISPR-Cas9 is Bejo's economic relevance and their competitive position in relation to non-EU breeding companies (as said before, CRISPR-Cas9 is widely applied in the United States and in some South American countries).

[192] http://www.bejo.com/opinion, accessed July 14, 2018. In a more recent (October 2018) version of the statement, Bejo has rephrased it by saying that 'Bejo regrets the decision made by the European Court of Justice'.
[193] Interview with Mirjam Both, April 3, 2018.

Figure 5.1. Screenshot from Bejo's international corporate website

'Exploring nature never stops': Bejo's discursive dilemma today

Since 2017, Bejo's tagline reads *Exploring nature never stops*. Let us consider for a moment: what does that mean? The slogan suggests that Bejo is exploring something 'natural', something that is already out there, in nature. It suggests adventure, serendipity, seeking, unexpected findings. We know this does not appropriately describe Bejo's core business - in the first place, they are a research company, investing significantly (around 15% of their total budget) in R&D.[194] As we know, technological innovation has more or less determined Bejo's existence: Bejo is the joint venture of two highly innovative entrepreneurs in seed breeding and sales. In 1978, their two companies merged into Bejo Zaden, after c. 20 years of collaboration in research and development.[195] The two companies had collaborated especially in hybridization, which was the 'new' technology of the 1960s. So in a way, technology is what constitutes Bejo. The company still takes pride in this leading position, according to the 'Read our story' part on their international website:

> We invest considerably in research. Just as we were ahead in the 1960s in applying modern breeding techniques, we never stop actively exploring all new technologies. The more we learn about plants, right down to the DNA level, the more able we are to develop new varieties faster and more accurately than ever.[196]

[194] Tom Bakker, Youri Dijkxhoorn and Michiel van Galen, *Uitgangsmaterialen. Motor van export en innovatie* (Wageningen: LEI, 2011), 2.
[195] 'The season 1977/1978 will be the last, in which both companies operate separately. From the 1st of September 1978, all activities will be effected by their subsidiary company,' it says in their export catalogue from November 1977 (Bejo, *Exportkatalogus*, November 1977, p. 0).
[196] http://www.bejo.com/exploring-nature-never-stops (accessed February 13, 2018).

Bejo researchers do not simply 'go out' into nature and 'explore' whatever is available there. Seed breeding takes prediction, planning, calculation. Bejo wants to eliminate chance and coincidence in what they do: they discover, to be sure, but then they immediately manipulate and predict and control their discoveries.

Of course we should not expect commercial taglines to honestly represent what a company is doing or aiming at. 'For the last two years, we have been working on our corporate story; this new slogan is part of it since 2017', says Mirjam Both, Bejo's marketing manager since 2014.[197] Yet from a marketing and communications perspective, there must have been another reason to adopt precisely this tagline and not another one. So the right question to ask here is: why the emphasis on nature? Why does Bejo want customers and the public at large to consider them as a 'natural' enterprise? Throughout Bejo's history and historical communication channels, we have seen that this focus on nature or 'the natural' has not always been a matter of course. Now that we have become familiar with Bejo's evident focus on technology, the question arises whether 'exploring DNA never stops' would not have been a more appropriate slogan.

Concluding remarks: exploring DNA never stops?

At the end of my interview with Mirjam Both, I asked her: what is a seed, in your view? Is it mostly natural or technological - or necessarily both? Her answer was clear:

> It's absolutely nature. But it's also… how should I say this? There is so much knowledge, and so much development, in every individual seed. And such a large investment. But in the end, it is still nature. It goes into the soil, it needs rain, and eventually it becomes a healthy vegetable.[198]

In the end, it is still nature. That is true for seeds, but not for the breeding technologies that Bejo is so famous for. Throughout this analysis, we have seen that Bejo's focus on innovation and genetic technology is something they take pride in – not something they try to keep away from their audience. Bejo's sales catalogues are nothing but showcases for technology, trying to be as transparent as possible. Even for a non-specialist audience, e.g. in the Dutch press, Bejo prefers to tell stories about the high level of technology that surrounds their activities. At the same time, Bejo has very recently introduced a tagline that seems to conflict with these proud technological stories. 'Exploring nature never stops'. This is where the discursive dilemma has

[197] Mirjam Both, personal correspondence, May 2, 2018.
[198] Interview with Mirjam Both, April 3, 2018.

become most manifest. Bejo clearly has reason to believe that a 'natural' story is the best public communication strategy. From the easy-to-find information about the fact that Bejo is not creating genetically modified organisms, we can also draw conclusions about their unwillingness to become associated with this particular field of genetic technology. But then again, in more recent communication about CRISPR-Cas9, we did not find any clues for restraint on this topic. CRISPR was hailed for the economic benefits is would have for the entire sector, just like genetic modification technology once was. All in all, we find many paradoxical aspects in Bejo's external communication strategies. We can rightly say that Bejo struggles with a discursive dilemma when they make choices about their seed storytelling. And even though they mostly emphasize the technological part of the story, this choice is not reflected in all areas of Bejo's communication.

Chapter 6

‘Breeding in a natural way…’ Rijk Zwaan’s communication strategies since the 1980s

‘That’s something our sector still needs to learn, to be more transparent, without being anxious, and just tell the story… But it’s a very complex story. Is it nature, is it good, is it technology, is it high-tech, is it expensive, is it even important?’[199]

Introduction

We now have an impression of Bejo’s communication strategies, and the role of nature and technology in their discourse. It has become clear that the discursive dilemma – how do we combine the natural and the technological in our self-presentation? – is very real for Bejo. In this chapter we will find out how Rijk Zwaan, the seed company that is my second case study, has dealt with this dilemma, in general over the last thirty years, and in particular during the rise and fall of genetic modification technology.

Like Bejo, Rijk Zwaan is a family-owned, independent Dutch seed breeding company. Unlike Bejo and many other seed breeders, their headquarters are not located in ‘Seed Valley’ – Enkhuizen and surroundings – but in De Lier, a small village in South Holland, in the municipality of Westland. Westland (in Dutch normally ‘het Westland’) is known as a region of fruit and vegetable growers, with many greenhouses, processing industries, and distribution companies. About 80% of the greenhouse vegtables that are produced in this area, are exported.[200] Rijk Zwaan has its historical roots in this area: founder Rijk Zwaan started his activities as a seed salesman in Rotterdam. Soon enough he expanded his activities to seed breeding and processing as well. De Lier has been the company’s main location since the 1960s.[201] Today, around 3,000 employees work for Rijk Zwaan in 30 different countries.[202]

[199] Interview with Steven van Paassen, April 24, 2018.
[200] Annemarie Breukers, Olaf Hietbrink and Marc Ruijs, ‘The power of Dutch greenhouse vegetable horticulture. An analysis of the private sector and its institutional framework’ (The Hague: LEI Wageningen UR: 2008), 7.
[201] Hans Warmerdam, *Stoer doorgaan. 75 jaar Rijk Zwaan* (De Lier: Rijk Zwaan (corporate publication), 1999), n.p.
[202] https://www.rijkzwaan.com/about-us (accessed September 2, 2018).

As with the analysis of Bejo's communication strategies in the previous chapter, I will analyse Rijk Zwaan's communication on different levels, aimed at different audiences: Rijk Zwaan's own clients (professional growers), and the 'general public', who are further away for the company when it comes to communication. We will see that Rijk Zwaan's transparent public communication about their activities is only very recent. Over the last thirty years, Rijk Zwaan never put much effort into communication with the general public, the end 'consumers' of their vegetables. Towards their own customers and employees, however, they have always been very transparent. And high technology, research & development and innovation have always been key elements of their message. That this message has become public as well, is a new step in their communication strategies. To illustrate this shift, I will first discuss the historical communication with direct customers (vegetable growers) and Rijk Zwaan's internal communication. Second, I will go into Rijk Zwaan's public communication and statements about their business, seed breeding in general, and GMO and other new breeding techniques in particular.

Addressing the client: building trust

When Mr. Rijk Zwaan founded the company that still bears his name, back in 1924, he wrote in the foreword to the first price list: 'There needs to be mutual trust between the seed breeder and the grower. I will spare no effort to win that trust'.[203] Almost a century later Rijk Zwaan still keeps the promise of their founder. Much effort is put into communication with growers, not least in the period that my research focuses on, since the 1980s.

First and foremost, Rijk Zwaan of course distributes information through seed catalogues that are very similar to Bejo's. I will discuss them only briefly here, because their analysis would be more or less the same as that of Bejo's brochures. Furthermore – and contrary to Bejo's – the catalogues never came with an introduction or 'editorial'. No explicit information about either technology or 'naturalness' can be drawn from it, at least not in the brochures of between 1985 and 1995. Or perhaps the correct analysis would be that Rijk Zwaan's communication department never felt the need to be explicit toward their clients about technology, nature, genetic modification or anything in between.

Just like Bejo's, Rijk Zwaan's catalogues contain beautifully photographed vegetables and crops, with all necessary information right next to it. (In one of the English language catalogues, I found a disclaimer about these pictures: 'All varieties shown were grown under

[203] Rijk Zwaan, 'Voorwoord', *Prijscourant Rijk. Zwaan's Zaadteelt en Zaadhandel 1924-1925*. Original quote: 'Tusschen zaadhandelaar en tuinder moet wederzijdsch vertrouwen bestaan. Mijnerzijds zal niets onbeproefd gelaten worden, dat vertrouwen te winnen'.

favourable conditions, identical results are not guaranteed nor implied for all growing conditions'.)[204] For every variety, there is a list of its good qualities, so the grower can select the race that suits him best. The novel varieties naturally get most attention, in the first few pages. If we were to draw a conclusion about nature and technology from these catalogues, it would be the same conclusion as in the previous chapter: innovation, novelties and high-tech research and development are Rijk Zwaan's core activities. They are proud of the newly 'invented' varieties; the brochures serve as showcases of their technological highlights. The catalogues do not explicitly discuss any natural aspects of seed breeding. Rijk Zwaan is selling *products*.

Aside from the seed sales catalogues, another example of building 'customer trust' deserves attention in this analysis. Between 1987 and 2011, Rijk Zwaan used to publish *RZ Select*, an information magazine especially for vegetable and fruit growers.[205] The contents of this magazine went beyond plain marketing information about seeds; rather, it was focused on the everyday practices of the actual growers, and how Rijk Zwaan seeds could help to optimize these practices. *RZ Select* mainly contains news items about new varieties, interviews with professional growers (e.g., 'why do you prefer RZ seeds?') and insights from the companies that eventually process the vegetables ('the industry'), and tips to improve growing practices. Furthermore, there are items about field trials of new races, and other news from the Rijk Zwaan research center, such as reports of meetings with growers of a certain variety ('Successful lettuce night in Limburg', for instance).[206]

The main topic of *RZ Select* is vegetable growing, rather than seed breeding. But the articles that *are* about seed breeding are striking, since they almost never deal with the actual (genetic) techniques behind breeding. When *RZ Select* discusses seed breeding, it is mostly about new qualities of crops and how these serve the grower's or the industry's purposes. Just like we saw in Bejo's communication, efficiency is the key asset: varieties are hailed for their earlier harvest dates or higher yields. There is hardly a word about the way the new varieties come into being, from a technical perspective. This seems to make sense: why would a grower need to understand the technical aspects of seed breeding? He just wants to learn how he may profit from the new variety. And for Rijk Zwaan, this was essentially the purpose of publishing *RZ Select.* From the minutes of the editorial meeting following the publication of the first *RZ Select* issue we read: 'Responses from the market are positive, e.g. 'this is good advertising'. But

[204] 'Product Specifications', *Rijk Zwaan 1996/1997,* 63.
[205] Steven van Paassen, communication specialist at Rijk Zwaan, explained why they stopped publishing *RZ Select* after 2011: the amount of small, independent growers diminished. Since the magazine was aimed at growers and normally contained interviews with them, there were no longer enough 'new' growers that could be interviewed and displayed in the magazine.
[206] Anon., 'Sla-avond in Limburg geslaagd', *RZ Select* 7:18 (1993), 16.

RZ Select being 'good advertising' only is not enough. We do need to sell more seed on the basis of information in *RZ Select*'.[207]

Some articles do deal with the more technical background of seed breeding. In a 1992 article about lettuce, for instance, detailed information is given about the genetic diversity that was needed to create a low-nitrate lettuce variety.[208] But again, the focus is on the profit for the grower: 'The results of our breeding activities now become available for the lettuce grower'.[209] In an interview with some of Rijk Zwaan's cucumber breeders, they explain why it is so hard to create mildew resistant varieties in every season – but they do not go into their breeding methods in more detail.[210] 'Harvest security is our top priority,' says a Rijk Zwaan lettuce breeder in a background story about lettuce breeding. 'We do everything we can to achieve it'.[211] Again, the focus is on what is best for the grower. And any technology that may help contribute to that goal will be applied without the grower knowing all the details.

In a background article from 1987, a distinction is made between 'traditional' and 'new' seed breeding methods, the latter including chemical analysis methods and cell tissue culture breeding.[212] The developments in seed breeding are described as an answer to grower's demands:

> The grower's requirements for a variety change rapidly, and with every change these demands become heavier. Breeders face the task of meeting these demands. *Traditional crossbreeding is no longer sufficient.* Over the last few years, great progress has been made in the laboratory: traditional methods of crossing and selection have been extended, novel quicker methods have been developed.[213]

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[207] Original quote: 'RZ select 1 is duidelijk beter van opmaak als het nul-nummer. De reakties uit de markt zijn zeer positief, in de trent van "Dit is goede reklame". RZ Select alleen als 'goede reklame' is echter niet voldoende. Er moet op basis van de informatie in RZ Select zaad worden verkocht'. (Bespreking RZ Selekt, maandag 26 oktober [1987]. Aanwezig J. Kloet, S. Van Paassen, P. Eenhuizen).
[208] Anon., 'Nitraat vooral onder glas een probleem', *RZ Select* 6:15 (1992), n.p.
[209] Anon., 'Nitraat'. Original quote: 'De resultaten van deze veredelingsactiviteiten komen nu stap voor stap voor de slateler beschikbaar'.
[210] Anon. '"We streven naar jaarrond meeldauwtolerante rassen"', *RZ Select* 38 (October 1996), 14.
[211] Anon., 'Slaveredeling volop in ontwikkeling', *RZ Select* 39 (December 1996), 10. Original quote: '"Oogstzekerheid staat bij ons op de eerste plaats. We doen er alles aan om dat te bereiken", zegt Jan Jansen, hoofdselecteur voor [sla].'
[212] Anon., '"Met beperkingen in veredeling nemen wij geen genoegen"', *RZ Select* 1 (1987), 13.
[213] Anon., '"Met beperkingen"'. Original quote: 'De eisen die de teler aan een ras stelt, veranderen snel en bij elke verandering worden deze eisen zwaarder. De verdeling staat voor de taak om aan deze eisen te voldoen. Het traditionele kruisen is hiervoor ontoereikend. In het laboratorium is de afgelopen jaren een grote vooruitgang geboekt: traditionele methoden van kruisen en selecteren zijn uitgebreid, nieuwe, snellere methoden zijn ontwikkeld'. My emphasis.

Sonja ten Lohuis, one of Rijk Zwaan's laboratory employees, is cited about how laboratory work may support the work of seed breeders. 'Especially biotechnology will offer many possibilities. We are already working hard to make this technology applicable for our research. We won't settle for restrictions in breeding'.[214] An interesting quote in the context of Rijk Zwaan's situation in the late 1980s: the company was bought by BP Nutrition in 1986, an acquisition that we will learn more about in the next section. What are these restrictions in breeding that biotechnology may help overcome? Could this interview be part of an effort to internally introduce, or pave the way for genetic modification techniques?

More than once in *RZ Select*'s content, the vegetable growers and industry are in a way held responsible for the rapid developments in seed breeding: their demands become higher, so the need for new technologies becomes more urgent. 'These demands constitute a major challenge for us', reads the editorial of a 1997 issue.[215] What follows is an explanation about genetic variety, and how the qualities of wild crops can be crossed into existing Rijk Zwaan varieties. 'This is a time-consuming activity that requires high investments'.[216] Rijk Zwaan also puts this argument forward in order to defend increasing seed prices.[217] They point out that 'strong price increase of seeds, for example of tomato varieties with new resistance properties, has led to incomprehension among growers' and they want to provide an explanation for this.[218] The explanation comes down to the growers' own responsibility: 'Never before have the demands on varieties been changing as quickly as today'.[219] (These 'demands' are of course not entirely the growers' own; what the grower wants, is influenced by the demands of retailers and eventually consumers.) It turns out that in this grower's magazine, Rijk Zwaan mainly portrays itself as a company just serving the needs and demands of the customers - both when it comes to their successes (mildew resistant cucumbers, especially for the growers) as well as to the 'bad news' (high seed prices due to complex demands of the growers).

In the context of communication about genetic modification, we have to take a look at some interesting announcements in *RZ Select* during the late 1990s. In November 1997, Rijk

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[214] Anon., '"Met beperkingen"'. Full original quote: "Met name de bio-technologie biedt in de toekomst veel mogelijkheden. Wij zijn al druk bezig om deze techniek voor het onderzoek toepasbaar te maken. Met beperkingen in de veredeling nemen wij geen genoegen."

[215] Anon., 'Hogere eisen zijn uitdaging Rijk Zwaan', *RZ Select* 2 (January 1997), 1. Original quote: 'Voor ons, veredelaar Rijk Zwaan, zijn al deze eisen een grote uitdaging.'

[216] Anon., 'Hogere eisen'. Original quote: 'Het is een tijdrovende bezigheid die hoge investeringen vergt'.

[217] Anon., 'Eisen aan rassen veranderen sneller dan ooit', *RZ Select* 6:16 (1992), 1.

[218] Anon., 'Eisen aan rassen'. Original quote: 'Sterke prijsverhoging van zaden, o.a. bij tomatenrassen met nieuwe resistentie-eigenschappen heeft bij telers voor onbegrip gezorgd. Rijk Zwaan geeft in dit artikel tekst en uitleg over de achtergrond hiervan.'

[219] Anon., 'Eisen aan rassen'. Original quote: 'Nog nooit waren de eisen die aan rassen worden gesteld zo snel aan verandering onderhevig als nu.'

Zwaan has created the world's first 'aphid free lettuce', an iceberg variety that is resistant against aphids (*bladluis*). *RZ Select* publishes a series of articles about this major breakthrough (and in Chapter 7, we will find that it was discussed in Dutch national newspapers as well). After discussing the great profit that this lettuce will bring, the authors explicitly state that 'all breeding has been done by conventional methods. No genetic modification techniques were applied'.[220] This statement indicates two things. First: Rijk Zwaan possibly *was* applying these techniques to other crops – or at least expected their customers to think so. And second: the fact that this lettuce has been produced non-GM, is presented as a good thing. It is 1997 and the moratorium still has to come into effect, but Rijk Zwaan already presents their novel crops, proudly and openly, as non-GMO. In the next issue of *RZ Select*, two lettuce breeders talk about 'the years of research, the windfalls and setbacks, and the feeling of satisfaction after this extraordinary result'.[221] And about how the results were perceived by their clients in Germany:

> [Wilderman]: "They were extremely positive. They could hardly believe their eyes. One race without any aphids at all, the other severely infected. That is almost unbelievable. Many people, especially from Germany, asked if the breeding was achieved with genetic modification techniques. But that is absolutely not the case." Reinink: "All breeding has been done without GM techniques. Guaranteed."[222]

The same phrase is used when a new fysio-5 resistant spinach variety is developed, in November 1998. Spinach breeder Leen Baas explains how this resistance has been found and crossed into a Rijk Zwaan race, and how lucky Rijk Zwaan breeders have been because they could rely on the extensive gene bank that the company had built up over the previous 75 years. And he adds: 'The five new spinach varieties that are resistant to fysio's 1 to 5 [typical crop diseases] originated through traditional crossing methods. No genetic modification was applied'.[223]

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[220] Anon., 'Wereldprimeur: Ijssla met resistentie tegen slaluis', *RZ Select* 3 (November 1997), 6. Original quote: 'Alle veredeling is volgens conventionele methoden verlopen. Er is geen genetische modificatie aan te pas gekomen'.

[221] Anon., '"Na jaren onderzoek geeft dit enorme voldoening"', *RZ Select* 45 (December 1997), 9. Original quote: '[...]vertelt over het jarenlang onderzoek, de mee-en tegenvallers en het gevoel van voldoening na dit buitengewone eindresultaat'.

[222] Anon., '"Na jaren onderzoek"'. Original quote: '[Wilderman]: "De mensen waren zeer, zeer positief. Ze konden bijna niet geloven wat zij voor zich zagen. Het ene ras zonder een enkele luis, het andere flink aangetast. Dat is bijna niet te geloven. Veel mensen, vooral uit Duitsland, vroegen of de veredeling met genetische modificatie tot stand is gekomen. Maar dat is dus absoluut niet het geval." Reinink vult aan; "Alle veredeling is gegarandeerd volgens de conventionele methoden verlopen".'

[223] Anon., ''We zijn blij ons snelle antwoord op fysio 5"', *RZ Select akkerbouwmatige tuinbouw* (November 1998), 8. Original quote: 'De vijf nieuwe spinazierassen die resistent zijn tegen de fysio's 1 t/m 5 zijn ontstaan via traditionele kruisingsmethoden. Daarbij is geen genetische modificatie gebruikt'.

There is another event's coverage in *RZ Select* that I want to discuss here: the rise of organically bred seeds. Rijk Zwaan has produced and marketed an organic assortment since the turn of the millenium. 'The first in Europe, Rijk Zwaan has achieved to produce a wide range of races organically', they write in December 1999.[224] In the following issue, they explain why organic seed is more expensive than non-organic: because the risk of failed harvests is higher.[225] Organic seed breeding is commonly understood as the complete counterpart of genetic modification. In that respect, it is remarkable that there is so little attention for the topic of genetic modification – with some exceptions that explicitly mention non-GMO seeds.

All in all, we can draw some preliminary conclusions about the contents and tone of voice of *RZ Select*. The magazine primarily focuses on growers and their needs. Rijk Zwaan creates an image of their work as merely serving other companies. In some cases, this leads to statements in which the growers are in part held responsible – for their rapidly changing demands, for the urgency of innovation, for the pace at which new varieties have to be developed. New varieties are announced proudly; the advantages for the growers and the vegetable industry are emphasized over and over again. But the origins of a new variety - e.g., how the breeding process works, the time it took, the wild varieties that were used to cross into it - are hardly ever mentioned. Paraphrasing Koert van Mensvoort, seed breeding technology seems to be completely naturalized: apparently, growers either know how it works, or they do not know, nor care. There are some exceptions, where novelties are explicitly discussed as non-GMO varieties. That tells us something about Rijk Zwaan's attitude towards GMOs in the late 1990s: they were already 'over it'. They would not promote a genetically modified variety; they took pride in their non-GMO crops already. The announcement of the production of organic seeds is in line with this message. At the same time, (non)-GMO and organic seeds are the only topics where the technology behind seed breeding becomes visible or 'de-naturalized'. It is only when Rijk Zwaan explicitly steps away from a certain technology, that the readers of *RZ Select* might realize that seed breeding involves so much technology.

And so it turns out that even in the 1990s, the era of the most heated public debates about GMO, Rijk Zwaan did not really bother to discuss it explicitly in their internal and external communication channels. I was expecting more references to it in Rijk Zwaan's communication, especially towards the growers. 'It was, and is, barely discussed,' said Steven

[224] Anon., 'Primeur: Biocrop, voor biologisch vanaf het begin', *RZ select industrie* (December 1999), 9. Original quote: 'Rijk Zwaan is er als eerste in Europa in geslaagd op biologische wijze zaden te produceren van een breed assortiment rassen'.
[225] Anon., 'Hogere risico's maken biologisch zaad duurder', *RZ Select akkerbouwmatige tuinbouw* (February 2000), 3.

van Paassen, Specialist Communication at Rijk Zwaan since 2002, when I asked him about it.[226] *RZ Select* and the Rijk Zwaan seed brochures seem to confirm that statement.

Apart from genetic modification being an untouched topic, innovation has always been key in Rijk Zwaan's communication among experts - not only in their own channels such as *RZ Select* but also in journals like *Boerderij Vandaag* and horticultural publications. When the company became autonomous again through a management buy-out in 2002 (reversing the acquisition by BP Nutrition), *Boerderij Vandaag* published a short profile of the company and its ambitions for future growth:

> The intended growth derives in part from general growth of the market for high-quality vegetable seeds. These are seeds that cannot simply be propagated by everyone. In most cases these are hybrid varieties, of which the parent lines are owned by the seed company. Varieties of which the development took years, and for which growers need specialist knowledge. That knowledge is brought to the growers by consultants of the seed breeding company.[227]

This implies a highly 'unnatural' conception of what fruit and vegetable breeding actually entails. It is not something that any horticultural grower could do; breeding Rijk Zwaan's special hybrid seeds requires specialist knowledge and training. Rijk Zwaan makes no effort to disguise this; on the contrary, the company takes pride in it. This is their business, this is what they are good at. The discursive dilemma does not seem to be a dilemma at all on this level of communication: technology is the key topic, obviously and unproblematically.

Addressing the (future) employee

In Chapter 7, we will learn more about the image problems that the seed sector is dealing with, resulting in struggles for the breeding companies to find qualified staff. Rijk Zwaan is dealing with this issue too, but at the same time they are extremely good at HR management. Anecdotal evidence: the company has won the 'Best Employer Award' in the category Production & Industry more than once – in 2017/2018, they were again selected as the best employer.[228] The company publishes a special staff magazine, titled *Intermezzo,* that features

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[226] Interview with Steven van Paassen, April 24, 2018.

[227] T. Roos, 'Kilo zaad geeft negen miljoen winkelomzet', *Boerderij Vandaag,* July 2, 2002, LexisNexis Academic. Original quote: 'De beoogde groei komt deels uit de algemene groei van de markt voor 'hoogwaardige' groentezaden. Hoogwaardige zaden zijn zaden die niet zomaar door iedereen te vermeerderen zijn. Meestal gaat het om hybride rassen, waarvan het zaadbedrijf de ouderlijnen in eigendom heeft. Rassen waarvan de ontwikkeling jaren heeft geduurd en waarvan de teelt professionele kennis vergt. Die kennis wordt door adviseurs van het zaadbedrijf aan de tuinders overgebracht.'

[228] 'Rijk Zwaan gekozen tot Beste Werkgever 2017/2018', February 6, 2018, https://www.werkenbijrijkzwaan.nl/rijk-zwaan-gekozen-tot-beste-werkgever-20172018

both HR related issues (such as birthdays, newborns, marriages, anniversaries) and substantive stories about the ins and outs of the company itself. I will discuss the coverage about two topics: seed breeding technology 'for dummies', and the production of organic seeds. From the way these subjects are discussed in *Intermezzo* we can tell that Rijk Zwaan thought they were important for their employees.

In July 1993, staff member Leo Woudenberg kicked off a series of six short articles about biotechnology within Rijk Zwaan. 'More and more often the media pay attention to applications of plant biotechnology. [...] Also within our company, some of these technologies are applied'.[229] In every forthcoming edition of *Intermezzo,* Woudenberg discusses one aspect of biotechnology. As an introduction, he beautifully close-reads the word itself:

> The word *biotechnology* consists of two parts: BIO, that indicates that it has to do with life, and TECHNOLOGY, that shows that there's human art and skill to it. We do realize that there are quite some questions and ambiguities about what the term means.[230]

In the six episodes, topics like in vitro breeding, cell tissue culture, haploids, crossing and selection, and finally genetic modification, are discussed on a very basic level.[231] The short series is revealing in more than one respect. It indicates that many of the (at the time around 1800) Rijk Zwaan employees were partly or completely ignorant of some of the core activities of their company. It also shows that Rijk Zwaan, or at least Woudenberg, thought it was important to educate these colleagues about technology. And the final article of the series gives tells us something about the status of genetic modification mid-1990s:

> In some places on the world, attention is paid to the development of genetically modified crops. Especially in the USA this development is already well advanced. Rijk Zwaan, too, will soon have to pay attention to this in order to secure a future prominent place within the plant breeding sector.[232]

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[229] Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan', *Intermezzo* (July 1993), 8.
[230] Woudenberg, 'Biotechnologie'. Original quote: 'Het woord biotechnologie bestaat uit de delen: BIO, wat aangeeft dat het met het leven te maken heeft en TECHNOLOGIE, wat laat zien dat er menselijke kunst en vaardigheid aan te pas komen. We zijn ons ervan bewust dat er nogal wat vragen en onduidelijkheden zijn over de inhoud van dit begrip'.
[231] Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan (2)', *Intermezzo* (October 1993), 16 [in vitro, cell tissue culture]; Jack de Wit en Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan (3)', *Intermezzo* (December 1993), 15 [haploids]; Jack de Wit en Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan (4)', *Intermezzo* (April 1994), 17 [crossings, protoplast fusion, embryo rescue]; Jack de Wit en Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan (6)', *Intermezzo* (Oktober 1994), 12 [genetic modification].
[232] Jack de Wit en Leo Woudenberg, 'Biotechnologie bij Rijk Zwaan (6)', *Intermezzo* (Oktober 1994), 12. Original quote: 'Op een aantal plaatsen ter wereld wordt aandacht besteedt [sic] aan de ontwikkeling van genetisch gemodificeerde gewassen. Met name in de U.S.A. is deze ontwikkeling reeds ver

The message about genetic modification, even though it is only a small and internal message, is optimistic.

Apart from the corporate magazine *Intermezzo*, Rijk Zwaan has many communication channels for their employees, and for their *future* employees as well. What is interesting about the recruitment procedures at Rijk Zwaan today, is the complete focus on innovation and technology. When you apply for a job at Rijk Zwaan, you apply for a job at a cutting-edge, high-tech research and development company – not at, say, an agricultural firm, let alone a *natural* one. According to Steven Van Paassen, this recruitment strategy is a recent one. Only ten years ago Rijk Zwaan did still profile itself as a 'farmer's company'. 'We don't want to position ourselves as an all too high tech company. But we are!' This paradox, another example of the discursive dilemma, will be further explored in the next chapter, about image problems that hinder seed companies in their quest for the best employees.

Addressing the general public: news coverage about BP Nutrition

'Fifteen years ago, I used to say: when a grower walks in here, we can tell him stories all day long, we can overwhelm him with information. But if a citizen would walk in - we had no clue. We really didn't,' says Steven van Paassen. 'Today we do know where to start. We tell them that seeds are the foundation of healthy vegetables. Our key message is 'healthy''. Van Paassen tells me how he normally explains seed breeding on the basis of a metaphor: hard- and software. The seeds are the hardware; the DNA is the software.

> That way, the general public can envision it. If I'd explain to them that we bring male and female plants together to create seed… well, they'd have no clue. The best way to illustrate something so natural, is by using a technological metaphor. It's bizarre.[233]

We will see that Rijk Zwaan has indeed mostly used technological metaphors in their external communication - and that 'nature' is hardly ever mentioned, apart from a recent series of movies on their corporate website, and some other very recent examples of public communication. In public communication and press coverage alike, Rijk Zwaan has always focused on the high-tech and innovative aspects of their business. To illustrate this, I will first have a look at the news coverage of an important moment in Rijk Zwaan's history: the

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gevorderd. Ook Rijk Zwaan zal hieraan aandacht moeten besteden om ook in de toekomst een vooraanstaande plaats binnen de plantenveredeling zeker te stellen.'

[233] Interview with Steven van Paassen, April 24, 2018.

acquisition by BP Nutrition. How was this event - that increased associations with technology, chemicals - in other words: everything unnatural - represented by the Dutch press? And what position did Rijk Zwaan take in the discussions? Second, I will discuss the general corporate profile that Rijk Zwaan has created through public relations and press coverage during the last c. 25 years.

> For Rijk Zwaan as for many of its competitors, the 1980s were times of enormous changes. The seed companies recognised the opportunities which biotechnology had to offer, but realised that the investments would be exorbitant. At the same time the outside world, and especially the large oil, chemical and pharmaceutical companies, became interested in seeds. In their view, diversification was vital to their own businesses in order to spread risks. In a nutshell, their reasoning was: "The population will always increase and people have to eat". Moreover, both parties would profit from uniting activities, as they share in-depth knowledge of molecular biology.[234]

An important moment in Rijk Zwaan's company history is their acquisition by BP Nutrition in 1986.[235] From Chapter 4, we know that the acquisition did not go unnoticed in the Dutch press, and that it was usually framed in a negative sense. Two narratives can be distinguished here: one about the family business falling prey to the multinational, and another about the worrying contours of a dangerous liaison between oil and/or chemical companies and seed breeders. This latter development was already taking place in the United States at the time, and was accompanied by protests from many activists groups (this explains, in part, where the long-lasting public aversion to Monsanto, Syngenta and the like finds its origin). In the Dutch press, much emphasis was put on the possible consequences of the alliance between chemical and seed breeding companies.[236] Some of the coverage is characterized by outright anxiety about 'so-called biotechnology' and the fear of an agricultural 'Big Brother' who would control all of the world's food production.[237] In hindsight this response seems to have been exaggerated in

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[234] Monique Krinkels, 'Rijk Zwaan - Leaving the corporate fold to become again a family owned business', *Seed Quest* (October 2005), https://www.seedquest.com/forum/k/KrinkelsMonique/oct05.htm (accessed August 4, 2018).

[235] In July 1989, Rijk Zwaan was sold again. It was taken over by Cebeco Handelsraad for 70% and by the directors of the company for 30%. In that same year, Shell also sold her seed breeding companies, because developing GMO hr-seeds was no longer Shell's focus. (Anon., 'Shell stopt met zaadveredeling', *NRC Handelsblad,* December 15, 1989, LexisNexis Academic. See also Anon., 'Multinationals keren zaadveredeling de rug toe', *De Telegraaf,* January 13, 1990, Delpher.)

[236] Anon., 'Rijk Zwaan in handen van BP. Zaadteelt bijna ingelijfd door chemische industrie', *De Telegraaf,* August 2, 1986, Delpher.

[237] J. Beerman, 'Met 't oog op de boer: tussen twee vuren', *Nieuwsblad van het Noorden,* June 13, 1987, Delpher.

the case of the Dutch companies, since the main ones (Rijk Zwaan, Bejo, Enza, Pop Vriend) are now still characterized by their autonomy and independence from the chemical sector.

The company itself has framed the acquisition in a slightly different manner: first and foremost, as a matter of survival. According to Rijk Zwaan's 75th anniversary publication *Stoer doorgaan,* the pressure to sell the company was increasing in the 1980s, partly because the incumbent CEO's were near retirement age and there was no successor available in the Zwaan family.[238] Besides, biotechnology was 'knocking at the door'. 'Breeding was now definitely no longer a matter of 'intuition''.[239] Jaap Zwaan, CEO of Rijk Zwaan at the time, explained the benefits of the acquisition in terms of innovation opportunities:

> [...] the development of new breeding technologies. Thanks to BP Nutrition, Rijk Zwaan now has access to a huge research laboratory [...] Important developments are ahead, even though we do not know what they will entail exactly. We want to stay in the forefront in the field of plant breeding. Plant biotechnology will perhaps play an important role in the future.[240]

What is interesting about this public quote is that Zwaan acknowledges that he does not know what to expect from biotechnology, only that there will be 'important developments'. Yet at the same time, he claims to be happy with the possibilities that the acquisition by BP has created for him - an extra research laboratory, so Rijk Zwaan can remain 'in the forefront'. The reader might wonder what is going to happen in that laboratory, if CEO Zwaan has no precise idea yet. The bottom line in news coverage in the 1980s about Rijk Zwaan and the acquisition by BP is that biotechnology opens up a lot of opportunities for (alliances between) oil/chemical multinationals and seed breeding companies.[241] Rijk Zwaan does not really respond to increasing public concerns about this alliance.

General press coverage: how is Rijk Zwaan profiling itself?

In the more general press coverage about Rijk Zwaan, two narratives can be distinguished: first, there is a lot of pride about Rijk Zwaan's technological ingenuity, and second, the company has always been trying to explain seed breeding in a 'for dummies' manner. In the context of this first narrative, already in the 1970s, Rijk Zwaan's founder was described in *Trouw* as the man 'especially known for his success in breeding non-bitter cucumbers'. Another remarkable

[238] Warmerdam, *Stoer doorgaan*.
[239] Warmerdam, *Stoer doorgaan,* chapter 'Roerige tijden' (n.p). Original quote: 'De tijd dat veredeling een zaak van 'gevoel' was, is in de jaren '80 voorgoed voorbij. Na hybridisering en weefselkweektechniek staat nu de moderne biotechnologie voor de deur.'
[240] Milja de Zwart, 'Chemie bereidt tuinbouwrevolutie voor', *Trouw,* July 26, 1986, Delpher.
[241] Anon., 'Unilever slaat slag in biotechnologie', *Trouw,* August 7, 1987, Delpher.

achievement that is memorized is Rijk Zwaan's 1960s lettuce seeds that enable winter cultivation.[242] Negative press coverage about Rijk Zwaan is hard to find. Today still, whenever the company makes the news, there is a positive, proud or amazed twist to it. We already saw that Bejo had its own public relations channel in a local newspaper (*Noord-Hollands Dagblad*). The same goes for Rijk Zwaan - they are mostly hailed in the local press. 'Not just another vegetable seed breeding company', writes *BN/DeStem* in 2004. It sums up Rijk Zwaan's distinctive features and greatest achievements: being the fifth largest seed breeder in the world yet being entirely autonomous; and it mentions the aphid-resistant iceberg lettuce they have developed.[243] Below is another example of the local news coverage about their new settlement in Fijnaart, in 1999. The title ('Super lettuce coming from Fijnaart') and the tone of voice are totally enthusiastic and excited about the arrival of the company to the region:

> Hundreds of different races. Their foliage will give a completely different but beautiful face to the wide polder. Lettuce alone exists in 150 different versions. Green to red. And the improvement of every race still continues. There is no end to it. […] Manager external communication Piet Eenhuizen and manager Bas van Kuijk are updating your reporter. They explain that it took 20 years to create aphid-resistant iceberg lettuce. […] They closely follow the build-up of new varieties, sometimes making use of the computer. […] A few kilograms of seed is sufficient for the vegetable production of a complete business, producing tons of money. Earlier this year, the people from Fijnaart wonderingly touched a bag of seeds. […] Awe and respect were growing for Rijk Zwaan's brave breeders.[244]

It is tempting to say that 'look at our high level of technological achievements' has always been the core message of the company's PR. Whenever Rijk Zwaan's breeders are interviewed about their daily work, for instance in newspapers or branche magazine *Boerderij Vandaag*, they generally emphasize the high-technological aspects, and the endurance and patience that seed breeding requires. 'Breeding is an old craft with modern tools', said Jan den Braber at the

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[242] Anon., 'Zaadhandel in De Lier breidt uit', *Trouw,* October 7, 1970, Delpher.
[243] H. Schenk, 'Luizen haten ijsbergsla uit Fijnaart', *BN/DeStem*, September 25, 2004, LexisNexis Academic.
[244] Anon., 'Supersla komt straks uit Fijnaart', *Dagblad voor Zuidwest-Nederland,* September 21, 1999, LexisNexis Academic. Original quote: 'Honderden verschillende rassen. De bladertooi die ze gaan vertonen, moet een volstrekt ander maar prachtig gezicht gaan opleveren van de weidse polder. Alleen sla is er al in 150 verschillende uitvoeringen. Van groen tot rood. […] Manager externe communicatie Piet Eenhuizen en bedrijfsleider Bas van Kuijk praten de verslaggever bij. Ze vertellen dat het 20 jaar vergde om ijsbergsla te krijgen die resistent is tegen luis. [...] Ze volgen de opbouw van de nieuwe rassen op de voet, onder andere met de computer. […] Een zak van een paar kilo zaad is voldoende voor de groenteproductie van een compleet bedrijf en brengt dan tonnen op. Verwonderd lieten Fijnaarters eerder dit jaar een zak met zaden door hun handen glijden. [Op een informatiebijeenkomst in de Witte Roos] groeide ontzag en respect voor de vermetele kruisbestuivers van Rijk Zwaan.'

official opening of a new Rijk Zwaan building in 2004. 'Example: spinach. Traders and consumers want spinach with a round leaf, without diseases. In that case we cross a wild spinach variety with round leafs with a cultivated variety. [...] After years of selecting and crossing we reach our goal.'[245]

In this context, the 1997 introduction of Rijk Zwaan's cherry tomato (a novelty at the time) is interesting. 'Cherry tomato should make the Germans forget the *Wasserbombe*' headlines *Trouw* in June 1997.[246] In an interview with this newspaper, Rijk Zwaan's researcher Jan Doldersum argues that the horticultural sector has focused too much on production, and too little on taste. 'We get punished for that'.[247] They also got punished for a lack of transparency, according to Doldersum: consumers did not know a thing about the Dutch seed breeding sector, which resulted in an image problem for Dutch tomatoes. I will quote at length here because Doldersum illustrates a key problem that affects the entire sector: consumer ignorance, followed by strong opinions nevertheless. (Note that the main topic of this article was German consumers, who are traditionally seen as the most critical.)

> Doldersum: "When a [German] consumer sees 'Canary Islands' on a tomato crate, he will think about sun and heat and taste. [...] But the production of these tomatoes is identical to ours. What's more: on the Canary Islands, they often use Dutch tomato seeds". [...] Not only had the Dutch tomato a reputation of being watery, it was also associated with questionable production methods. The Dutch have the most efficient agri- and horticulture in the world, so they will most likely use pesticides, or irradiate their produce, or apply genetic modification. Germans, always very keen on their health, are highly sensitive to that. Doldersum: "But even some retailers do not know that irradiation of fresh fruits and vegetables is forbidden by law in the Netherlands. [...] It's going better now, but we have to stay cautious. We need to keep providing the German consumer with information about our production methods and be frank about it. We are not there yet."[248]

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[245] C. Mol, 'De kunst van veredelen is veel geduld en een repeterende breuk', *Boerderij Vandaag,* October 6, 2004, LexisNexis Academic. Original quote: 'Veredelen is een oud ambacht met modern gereedschap', stelt Den Braber tijdens de officiele opening van het nieuwe onderkomen van het zaadveredelingsbedrijf Rijk Zwaan in Fijnaart. [...] eem bijvoorbeeld spinazie. Handel en consument willen spinazie met een rond blaadje en er mogen geen ziekten op voorkomen. In dat geval wordt een wilde spinaziesoort met ronde blaadje gekruist met een cultuurras. Dat resulteert in een enorme variatie. Door selecteren en inkruisen bereik je na jaren het gewenste doel.'

[246] Co Welgraven, 'Cherrytomaat moet Duitsers 'Wasserbombe' laten vergeten', *Trouw,* June 7, 1997, LexisNexis Academic.

[247] Welgraven, 'Cherrytomaat'. Original quote: '"De tuinbouw heeft zich te veel op de productie gericht", zegt Jan Doldersum, werkzaam bij het zaadteelt- en zaadhandelbedrijf Rijk Zwaan. "Er is te weinig aandacht geweest voor bijvoorbeeld smaak. Daarvoor zijn we bestraft."'

[248] Welgraven, 'Cherrytomaat'. Original quote: '[Doldersum:] "Als een consument op het kistje tomaten 'Canarische eilanden' ziet staan, dan denkt-ie: 'Lekker, zon, warmte'. Daar kunnen wij moeilijk tegen concurreren. Terwijl de productie van tomaten op de Canarische eilanden vrijwel identiek is als bij ons. Sterker nog: ze gebruiken daar vaak zaaizaad uit Nederland.' [...] De Nederlandse tomaat had niet alleen

Already in 1997, Rijk Zwaan's researcher described a communication problem accurately. The German consumer did not know much about seed breeding; yet at the same time held a strong opinion about it.

Around the turn of the millennium, the aphid-free lettuce that we learned about in the previous section was a truly hot topic among Rijk Zwaan spokespeople. Rijk Zwaan's breeders were very proud of this achievement and especially of the technology that was involved. It was clearly a breakthrough that should be communicated externally as well as to their own clients.[249] Research lab Keygene had co-developed this variety and was also seeking media attention for it, always emphasizing that the lettuce variety was a joint project (see also Chapter 7.2). Some examples of this enthusiastic news items:

> Washing a head of lettuce for minutes and pleating on aphids. That's how it used to be. Today, this is no longer necessary - at least not with lettuce growing from seeds that have been produced with Keygene technology in Wageningen. "Aphids in the lettuce, that was a huge problem [...]" says Johan Peleman, director of applied research of Keygene. '[...][Rijk Zwaan] had tried to cross their lettuce with wild, aphid-free variety. But in those cases, negative traits were also crossed in. [...] Aphid-free, but unmarketable. Thanks to our DNA research, we could disconnect the 'aphid-free-ness' [...] and cross it into the cultivated variety.' Rijk Zwaan was the first to introduce the aphid-free lettuce in 2001.[250]

'Rijk Zwaan is most proud of their discovery of the iceberg lettuce that aphids don't like. Highlight in eighty years of company history,' writes *BN/de Stem* in an overview article about

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de naam waterig te zijn, maar werd bovendien geassocieerd met bedenkelijke productiemethoden. Nederlanders hebben de meest effectieve land- en tuinbouw ter wereld, dus ze zullen wel bestrijdingsmiddelen gebruiken, bestralen, of genetische veranderingen toepassen. Duitsers, altijd al bedacht op hun gezondheid, zijn daar uiterst gevoelig voor. Doldersum: "Winkelchefs weten soms niet dat bestraling van verse groenen en fruit in Nederland bij wet verboden is. [...] Doldersum: "Het gaat weer wat beter, maar we moeten blijven oppassen. We moeten de Duitse consument steeds informatie geven over onze productiemethoden, open kaart spelen. We moeten niet denken dat we er al zijn."'

[249] See e.g. Anon., 'DNA-TECHNOLOGIE - Kroppen sla zonder luizen dankzij Keygene', *De Gelderlander,* June 3, 2005, LexisNexis Academic; Chris van Alem, 'Luisvrije kropsla dankzij Keygene', *Rotterdams Dagblad,* July 14, 2005, LexisNexis Academic.

[250] Van Alem, 'Luisvrije kropsla'. Original quote: 'Minutenlang een krop sla uitwassen en navlooien op luizen. Zo ging dat vroeger. Vandaag de dag is dat niet meer nodig. Althans met sla die groeit uit zaden die met technologie van Keygene in Wageningen onder handen zijn genomen. "Luis in de sla, dat was een enorm probleem. [...]" zegt Johan Peleman, directeur toegepast onderzoek van Keygene [...] "Het zaadbedrijf had zelf al geprobeerd te kruisen met wilde sla die luisvrij was. Maar behalve luisresistentie werden andere, negatieve eigenschappen meegekruist. [...] Luisvrij, maar niet te verkopen. Dankzij ons DNA-onderzoek konden we de erfelijke eigenschap die een luisvrije krop garandeerde loskoppelen en door middel van kruisingen overbrengen van de wilde sla op de gecultiveerde soort.[...]" Zaadbedrijf Rijk Zwaan was de eerste die in 2001 de luisvrije sla introduceerde.'

Rijk Zwaan, at the event of their open days in Fijnaart.[251] Note the use of the term 'discovery' (*vinding* in Dutch), which suggests that the development of a new crop is an accidental event rather than a process of research and breeding that took years. This is quite different in a more recent article in which a Rijk Zwaan breeder explains his profession as follows:

> "It is creating something out of almost nothing", says Moor about the breeder's profession. When he first started with the so-called one cut ready-lettuce, there was not yet a lettuce with 200 leaves. A traditional head of lettuce has about 50 leaves. This was in the nineties, pre-cut and prepacked lettuce was far from common, but Moor felt it would be an untapped market. He found a wild lettuce variety that grew more leaves naturally already. For years, he crossed this variety with existing varieties. Time and again he selected the progeny that had most leaves, and continued to cross these. Generation after generation he came closer to 'Salanova'. Now Rijk Zwaan is the market leader with this type of lettuce.[252]

The development of Salanova, explained in 'for dummies' terms here, takes the narrative of perserverance in a scientific quest: from the discovery of a wild plant to becoming the market leader. Patience, accuracy and a strong vision about the future are presented as core elements of the breeder's profession. Breeding is presented as a truly human, or technological, effort. This seems to be the image that the seed sector today prefers to create for itself - and Rijk Zwaan is successfully creating it here.

'The good guys': Rijk Zwaan and GMO communication

Looking at Rijk Zwaan's PR, in the Dutch press and other public channels, it appears that the company always took pride in the high level of their technology. Things are quite different, however, when it comes to GMOs in the strict sense. We already saw this in *RZ Select*, where breeders explicitly mention that their new varieties have been realized without using GM technology. Today, just like Bejo, Rijk Zwaan has published an easy-to-find non-GMO

[251] H. Schenk, 'Luizen haten ijsbergsla uit Fijnaart', *BN/DeStem,* September 25, 2004, LexisNexis Academic. Original quote: 'Het meest trots zijn ze bij Rijk Zwaan op de vinding van de ijsbergsla waar de luis niet op wenst te gaan zitten. Hoogtepunt in tachtig jaar bedrijfsgeschiedenis.'

[252] Liedewij Loorbach, 'Kruistocht', *De Volkskrant*, February 11, 2016, LexisNexis Academic. Original quote: '"Het is van bijna niets iets maken", zegt Moor over het vak van veredelaar. Toen hij begon met de zogenaamde one cut ready-sla was er nog helemaal geen sla met 200 blaadjes. Een traditionele krop sla heeft ongeveer vijftig bladeren. Het was in de jaren negentig, voorgesneden en voorverpakte sla was nog lang niet gangbaar, maar Moor voelde dat het een gat in de markt zou worden. Hij vond een wilde slaplant die van nature al meer blaadjes had. Jarenlang kruiste hij deze soort met bestaande soorten. Steeds selecteerde hij de nakomelingen met de meeste blaadjes, om daarmee verder te kruisen. Generatie na generatie kwam hij dichter bij de Salanova. Nu is Rijk Zwaan marktleider in dit type sla.'

statement on their website, in which the company promises that none of the seeds they will supply in 2018 are in any way genetically modified:

> Rijk Zwaan does not develop any varieties that fall under GMO regulation and believes that GMOs are unnecessary in vegetable varieties. Thanks to our planet's huge biodiversity, there are more than enough opportunities for us to *continue our breeding work in a natural way*.[253]

Note the contrast that is suggested between GM breeding and 'breeding in a natural way': Rijk Zwaan seems to follow the European Commission's definition of GMOs here, in which nature marks the boundary between what is acceptable and what is not. Furthermore, this quote is also a claim of naturalness: our breeding has always been 'natural', and we will continue accordingly. According to Steven van Paassen, this statement has been published online 'somewhere between 2000 and 2005'. When I asked Van Paassen why this statement is so prominent, he told me that the company still receives questions about GMO on a regular basis. 'Rijk Zwaan is is sensitive about its reputation. In the first place for our company, in the second place for the entire sector. So, we do not want to be associated with genetic modification at all'.[254] Moreover, he explained, GMOs are almost non-existent in the vegetable seed sector today - it is simply too expensive to create them, test their safety and market them. Apart from permission issues, there is the consumer who would always prefer a non-GM cucumber over a GM one. Van Paassen: 'Such investments will never pay off. We always say: we are not, in principle, against the technology - but in practice, it just makes no sense. We do keep an eye on the technology, we make sure we know how it works, because otherwise we'll be outflanked by other companies, if the social and political climate ever change'. It is hard to verify if this really was Rijk Zwaan's stance on genetic modification (not principally opposed, but pragmatically holding back), since there is so little public communication about the topic.

Van Paassen explained to me how the non-GMO statement is also a response to the persistent misunderstanding among 'normal citizens', who, according to Van Paassen, have tended to associate seed breeding with GMOs. 'People who know nothing about vegetables, not even that they grow out of a seed, still know about GMOs'. It has surprised him how strongly engrained this misconception is; we already learned about this association in the Chapter 2.2, about Plantum's sector image research and the Monsanto effect. This strong association, based on a misconception, may also be a reason behind the focus on 'natural breeding' in the non-GMO statement.

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[253] https://www.rijkzwaan.com/opinion, accessed July 2018. My emphasis. Note how a contrast is created here between GM breeding and 'natural breeding'.
[254] Interview with Steven van Paassen, April 24, 2018.

Even though Rijk Zwaan's non-GMO statement is so easy to find today, the company seldomly communicated anything explicitly about the fact that they are *not* doing genetic modification activities. 'For Leo Woudenberg it would be the ultimate nightmare,' as *Trouw* even had it in 2010,

> He is watching the eight o'clock news and suddenly tomatoes come into the picture. "Today, Albert Heijn took all tomatoes from the shelves, for it turns out that they are genetically modified", says the anchorman. And the nightmare seeds come from Rijk Zwaan, where Leo Woudenberg is research manager. "It would mean the end of Rijk Zwaan," he says.[255]

For Rijk Zwaan, apparently tempers have run so high that even an accusation of 'doing GMO' would mean it's curtains for the company. The article further discusses the problematic situation that many Dutch seed breeding companies found themselves in: 'New and promising breeding technologies are at their disposal, but they cannot be sure if the EU would consider the produced seeds as 'genetically modified'.'[256] This problem is described as 'typically Dutch', because the companies are so innovative, but at the same time there is so little legal and political room for new genetic technologies.[257] In the meantime, large multinationals are adopting the technologies, leaving the Dutch companies in an awkward position. 'Too bad, is what his managers told Leo Woudenberg, but as long as it's unclear whether a vegetable, produced with those novel breeding techniques, is a GMO or not, it will not leave the Rijk Zwaan premises - however promising it may be.'[258]

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[255] Marianne Heselmans, 'Kansloze komkommers', *NRC Handelsblad,* December 4, 2010, LexisNexis Academic. Original quote: 'Voor Leo Woudenberg zou het de ultieme nachtmerrie zijn: terwijl hij rustig naar het acht uur journaal zit te kijken komen er opeens allemaal tomaten in beeld .'Albert Heijn haalde vandaag alle tomaten uit de schappen omdat ze genetisch gemodificeerd blijken te zijn', vertelt de nieuwslezer. En het zaad in die nachtmerrie komt van Rijk Zwaan in Fijnaart. Leo Woudenberg is daar onderzoeksmanager. "Het zou het einde van Rijk Zwaan zijn", zegt hij in een onderzoekslaboratorium van Wageningen UR, waar zijn bedrijf promotieonderzoek financiert.'

[256] Heselmans, 'Kansloze komkommers'. Original quote: "Rijk Zwaan, een groentezaadbedrijf waar 1800 mensen zaden voor 900 groenterassen produceren met wereldwijde afzet, kampt zoals meer Nederlandse zaadbedrijven met een probleem. Ze hebben nieuwe, veelbelovende veredelingstechnologieën in huis, en weten niet of de EU de hiermee gemaakte zaden beschouwt als 'genetisch gemodificeerd'."

[257] The technologies discussed here, are not genetic modification technologies in the strict sense. The question if they are considere as such, is precisely the issue. The article discusses, for example, *reverse breeding* techniques, and 'breeding techniques […] that involve the insertion of DNA via Agrobacterium once. This piece of DNA, however, is not present in the eventual commercial crops.' At the time, European legislation was ambiguous about these techniques, and that is exactly the gist of this article.

[258] Heselmans, 'Kansloze komkommers'. Original quote: 'Jammer, heeft de directie tegen Leo Woudenberg gezegd, maar zo lang niet duidelijk is of een groente, gemaakt met die nieuwe veredelingstechniek een GMO is, blijft hij bij Rijk Zwaan op de plank liggen, hoe veelbelovend hij ook is.'

Reading between the lines of this article, Woudenberg - hence, Rijk Zwaan - is essentially telling us that the company is eagerly waiting for allowance to use new genetic technologies. What is holding them back is not their own concerns about the safety or ethics, but rather the fear of public rejection of their products. '[Until the European Commission decides about the new plant breeding techniques] we are missing out on that ideal Rijk Zwaan tomato', suggests the journalist. '"Yes, it's absurd", says Leo Woudenberg. "But genetic modification is such a heavily charged issue in Europe. We really cannot take any risk of having our seed framed as GMO"'.[259]

Van Paassen also told me how important Rijk Zwaan's 'good guys' image is, and how carefully they try to maintain it. 'We were never as aggressive in our external positioning as, say, Monsanto. We are not a chemical company. We are more or less considered as the 'good guys'.'[260] An important historical moment in this respect is the foundation of Wageningen-based research lab Keygene in 1989 (see Chapter 7.2 for a more detailed analysis of Keygene's communication strategies and the interplay with Rijk Zwaan's public image). Rijk Zwaan has been involved in this research collaboration since the very beginning. Keygene's activities were always characterized by high tech DNA research. Today, they do essentially non-GMO research and development (due to the irrelevance of developing GMO technology for Dutch breeders), but in 2005 still, Keygene proclaimed they would use the technology to work on GMO crops as soon as it would be accepted.[261] The fact that Rijk Zwaan is one of their most important shareholders is openly communicated. For instance, the aphid-free lettuce that Rijk Zwaan was so proud of, is the result of their collaboration.

CRISPR communication

Recalling the prologue to this research project, we have seen that history has repeated itself in one respect: Rijk Zwaan will not use CRISPR-Cas9 techniques as long as 'Europe' is holding back about its status. What role did CRISPR-Cas9 and its regulation play in the more recent history of the nature-technology dilemma in Rijk Zwaan's communication strategies? When I

[259] Heselmans, 'Kansloze komkommers'. Original quote: "Tot zo lang lopen we dus die ideaal smakende tomaat van Rijk Zwaan mis. "Ja, het is absurd", zegt Leo Woudenberg. "Maar genetische modificatie is zo'n beladen onderwerp in Europa, we willen nu echt geen enkel risico lopen dat onze zaden als GMO worden gezien."'

[260] Interview with Steven van Paassen, April 24, 2018.

[261] Chris van Alem, 'DNA-technologie: Kroppen sla zonder luizen dankzij Keygene', *De Gelderlander,* June 3, 2005, LexisNexis, Academic. Research director Peleman was quoted saying: "Wij zijn daar [genetische modificatie] niet superactief in vanwege de slechte acceptatie in Europa en de dure regelgeving waaraan je moet voldoen als je een product met een gemanipuleerd gen introduceert. Nu is het geen optie, maar we zorgen ervoor dat we de technologie in huis hebben, zodat we klaar zijn op het moment dat het acceptabel is en betaalbaar wordt."

talked to Steven van Paassen, back in April 2018, no decision had yet been made about the question whether CRISPR and related technologies would fall under GMO legislation. So I could still ask Van Paassen: what will Rijk Zwaan do in the event that the European Commission will allow the use of CRISPR? And what will Rijk Zwaan do until that moment comes - wringing their hands while waiting for the verdict? 'If it's allowed, we will just do it,' was Van Paassen's response. 'And no, we're not wringing our hands - we are watching it very closely. This is one of the greatest technological developments in our field since Mendel - even since the discovery of DNA'. [262]

This would most probably not have been the company's official response to my hypothetical question. Just like the non-GMO statement, Rijk Zwaan has published statements on their website about new breeding techniques and specifically CRISPR-Cas9. Before the ECJ commissioned its decision, Rijk Zwaan's statement said:

> CRISPR is of societal interest. The CRISPR variants currently known to us result in a clear acceleration of the breeding process and also in higher efficiency. The application of certain CRISPR variants enables the development of the same improved varieties as can be developed using the more conventional breeding methods, *only faster*. It is for the regulatory authorities in Europe to decide whether these CRISPR variants and the varieties obtained from them can be qualified as safe. In our opinion, it is important for this matter to be clarified quickly. Until that happens, we will not be developing any varieties using CRISPR.[263]

Two aspects of this message are important. First, according to this statement, what Rijk Zwaan desires most is clarity. The European authorities should decide *quickly*. Bejo used the same argument: we don't mind if it will be allowed or not, as long as we know where we stand as soon as possible. Second, Rijk Zwaan emphasizes that CRISPR is a tool to *accelerate* the conventional breeding process *only*. Technically speaking, CRISPR is capable of much more - for instance, accelerating the breeding of genetically modified crops. That is what makes CRISPR communication inherently complicated: the applications are so diverse and various, and it requires specialist knowledge to distinguish between the different applications and their implications. Some of them will meet resistance; some of them will get away with it. As a seed breeder, or as any scientist who wants to work with CRISPR, it is quite complex to make the distinction understandable for an untrained audience. Rijk Zwaan has made the choice not to go into this too deeply, and to present CRISPR in the 'acceleration narrative' about seed

[262] Steven van Paassen, interview with the author, April 24, 2018.
[263] https://www.rijkzwaan.com/opinion, accessed 21 June 2018. My emphasis.

breeding: every new genetic technique is simply a way to speed up the inherently 'natural' processes of seed breeding. Again, Rijk Zwaan follows the same strategy as Bejo in this respect.

When I suggested creating an active, and completely honest, external communication strategy for CRISPR, focused around positive aspects of the technology, Steven van Paassen told me that it was actually a good idea. But: 'CRISPR communication is so complicated because the technology is. Where to begin to explain what it entails?' Nevertheless, he was optimistic about the public debate that would probably arise when the European Commission decides not to label CRISPR as a GMO.

> Very slowly I've come to believe that the discussion that surrounded GMOs, the 'welles-nietes' polemic, can be avoided in the case of CRISPR-Cas9. CRISPR-Cas9 can be framed as a health benefit, as something that will cure diseases. If scientists put it forward like that, it can be explained in a very positive way. And if our seeds get in that slipstream, we're on the right track. And finally, if no crazy, iconic pictures will be spread around, we will be fine.[264]

In hindsight we can assume that Rijk Zwaan, like Bejo, was unpleasantly surprised by the ECJ verdict. Regarding the complexity of communicating the benefits of CRISPR and related technologies to a wide audience, we will learn more about that in Chapter 7.3 - this is essentially the most problematic communication issue that sector organization Plantum was facing.

Rijk Zwaan's discursive dilemma today

We can begin to understand the discursive dilemma that Rijk Zwaan indeed has to deal with. On the one hand, they tend to emphasize their high level of technology and innovation: like Bejo's, Rijk Zwaan's sales catalogues are full of high-tech showcases. Furthermore, Rijk Zwaan's communication department has always considered it important to discuss technological developments internally. And in order to attract new staff, Rijk Zwaan tells a predominantly technological story, too. On the other hand, we have seen the panicky dealing with the 'doing GMO' accusation. Clearly, there is a 'genetic borderline' that Rijk Zwaan does not want to cross in their external communication: we only do *so much* technology, we never cross the boundaries of nature. Today, Rijk Zwaan is still struggling to find the right tone of voice in this discussion, to use the right discourse when it comes to the discursive dilemma. To further illustrate this paradox, let us have a look at some of Rijk Zwaan's online corporate movies about seed breeding. These movies are aimed at an interested, yet possibly lay

[264] Interview with Steven van Paassen, April 24, 2018.

audience: people may visit Rijk Zwaan's website for various reasons. In the first short film that website visitors come across, the voice-over tells us: 'Vegetable seeds are *natural products*. Every seed is unique, both inside and outside. Therefore, seed breeding is a complex process'.[265]

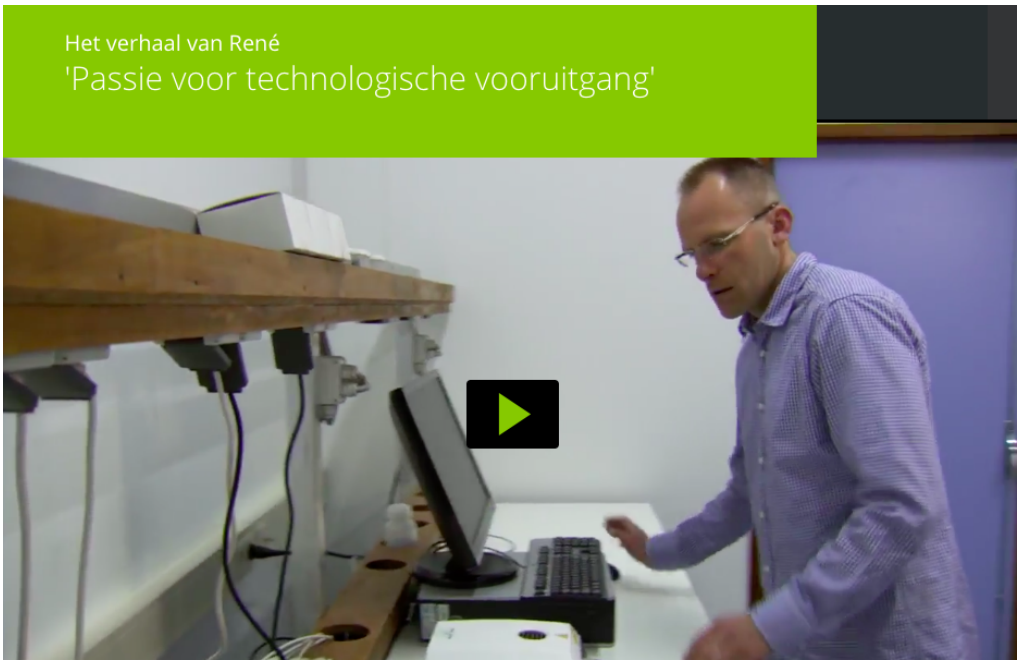

Figure 6.1. Still from Rijk Zwaan's corporate movie about René Jansen, specialist process automation

Another movie focuses on René Jansen, who is introduced by the voice-over as 'specialist process automation'.[266] The movie is entitled 'A passion for technological innovation' (see Figure 1.2). Again, the voice-over wants us to understand that seeds are essentially natural products, when he says that '[even] though René eventually turned out to have a passion for technology, the gardener's son still likes to work with a *natural product*'.[267] René himself explains it as follows:

> At Rijk Zwaan we work with natural produce. Basically every seed is different both on the inside and the outside. A factory that produces nuts and bolts is making industrial products; every

[265] Corporate movies Rijk Zwaan, via https://www.rijkzwaan.com/nl/activiteiten (accessed 26 February 2018). Original quote: 'Groentezaden zijn een natuurproduct. Elk zaadje is van binnen en van buiten uniek. Zaadteelt is dan ook een ingewikkeld proces.'

[266] Corporate movie Rijk Zwaan, 'Passie voor technologie vooruitgang', https://www.rijkzwaan.com/nl/activiteiten#story=/nl/verhaal/passie-voor-technologische-vooruitgang (accessed February 26, 2018).

[267] Original quote: 'Hoewel zijn hart uiteindelijk bij techniek bleek te liggen, vindt de tuinderszoon het nog altijd mooi om met een natuurproduct te werken.'

individual product is alike. Sorting these seeds, however, is a more complex challenge, since they are all different.[268]

Despite these references to naturalness and uniqueness, Rijk Zwaan's communication department clearly focuses on technology in these short movies. They show René working on a computer, René sketching models for his colleagues, and some impressive machines in a laboratory. 'René loves to cooperate with colleagues in order to get the maximum efficiency out of a machine', says the voice-over. If you work hard to get your machines more and more efficient, and at the same time emphasize that you work with a natural product - does that perhaps indicate that you are exploiting that product? *We share René's passion for technology* is the slogan that is shown in the end. The only 'nature' we get to see in this movie, is when René cycles home (which sparks new brilliant ideas). These corporate movies are beautiful illustrations of the discursive dilemma; and indeed, Rijk Zwaan seems to have found a way to incorporate both the natural and the technological discourse into the public message that these movies were made for distributing.

Concluding remarks: the underdog's dilemma

Now that we have analysed several aspects of Rijk Zwaan's communication strategies between the 1980s and today, several findings are relevant in order to answer my research question, about the company's dealings with the discursive dilemma of nature and technology.

Communication aimed at Rijk Zwaan's direct clients, professional growers, is characterized by a high level of transparency. Even more than Bejo, Rijk Zwaan has actively been investing in informing their clientele, for instance through marketing magazine *RZ Select.* Apart from transparency, these communications strategies are characterized by technological storytelling. Just like Bejo's, Rijk Zwaan's catalogues are mere showcases of technology. Towards the professional market, Rijk Zwaan does not seem to deal with any discursive dilemma at all: the emphasis on technology is evident. Sometimes Rijk Zwaan even takes the 'underdog position', explaining how their activities have been hampered by an anti-technological, anti-innovative zeitgeist (for instance in the *Trouw* interview with Leo Woudenberg, about the 'nightmare' that GMO accusations would cause). In internal communication, something that Rijk Zwaan seems to be doing more than Bejo, there is no real discursive dilemma either. In employee magazine *Intermezzo*, the editors mainly feel the need

[268] Original quote: 'Bij Rijk Zwaan werken we aan biologische producten. Eigenlijk elk zaadje is van buiten, maar ook van binnen, verschillend. Bij een boutjes- en moertjesfabriek heb je het over industriele producten, dan zijn eigenlijk alle producten, als het goed is, hetzelfde. Om toch die zaden, die allemaal dus verschillend zijn, op een goede wijze te kunnen sorteren, dat is een grotere uitdaging [...]'

to give information and explanation about several developments within the company, including the emergence of biotechnology and what this may mean for the company. On the Pyramid of Technology, the breeding technologies that are explicitly discussed will find a convenient place: accepted, applied, or even invisible. Like Bejo, Rijk Zwaan is mostly proud of the high level of (bio)technology that they work with – genetic modification being the exception to the rule.

The dilemma does rear its head, however, in two other domains of Rijk Zwaan's communication: in external communication with the general public (see the corporate movies on the website), and in communication strategies for recruiting new staff. Towards a non-specialist audience, Rijk Zwaan feels the need to emphasize the naturalness around seed breeding (for instance in their non-GMO statement, in which a radical difference between genetic modification and 'natural breeding' is suggested). Towards future employees, Rijk Zwaan's seed story becomes all the more technological. Pulling all these different communication strategies together, we can thus tell that the discursive dilemma is real, and that it becomes extremely visisble at times – for instance in the first impression of Rijk Zwaan's online presence today. The focus on *nature*, on the naturalness of seed breeding, is rather recent. This resembles the situation at Bejo, who adopted the tagline *Exploring nature never stops* no more than two years ago.

Chapter 7

Telling the story, selling the seeds: Keygene, Plantum and Seed Valley

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'But however great our story might be - bringing it into the limelight in a good and consistent way requires a lot of brainpower, perseverance and also money'.[269]

'Seed companies are not sexy. [...] People have no idea what we're doing here. This is high-quality industry with strong international marketing. But that's not the image we have'.[270]

Introduction

The Dutch seed breeding sector is characterized by cooperation and partnerships on many levels. Of course, the different seed companies are healthily competitive with one another, but they also acknowledge that the practice of 'working with genetics' benefits from a gene pool that is as large as possible, and therefore cooperatively guarantee easy access to and exchange of knowledge and materials. Examples of cooperations and consortia between different Dutch and international seed breeders are numerous: think of the national gene bank (located in Wageningen) that supplies all the companies with necessary plant reproduction material, and Wageningen University that collaborates with seed breeders in many research and development projects, and for instance a consortium of several Dutch breeders, collectively mapping the genomes of different crops.[271] Furthermore, both Bejo and Rijk Zwaan were taking part in the establishment of the International Licensing Platform Vegetable, a platform that

[269] Niels Louwaars, 'Voorwoord', in: *Een blik over de schutting. Jaarplan Plantum 2017-2018* (https://plantumjaarplan.nl/), 1. Original quote: 'Maar, hoe goed ons verhaal ook is, het goed en consistent over de bühne brengen ervan vergt heel wat denkkracht, doorzettingsvermogen en ook financiën.'

[270] Anon., 'Zaadteelt schreeuwt om mensen', *Noordhollands Dagblad,* April 1, 2008, LexisNexis Academic. Original quote: 'De zaadbedrijven zijn niet sexy, denkt Jan Baas. En dat moet veranderen., "Mensen hebben geen idee wat wij hier doen. Dit is allemaal hoogwaardige industrie met stevige internationale marketing. Maar dat imago hebben we niet", zegt Piet Karemaker. Dus wordt het zaak om belangstelling te wekken bij studenten en scholieren.'

[271] About the Dutch seed breeders' consortium, a joint effort to map the genome of different crops, see: Sander Peters, 'Bedrijven kunnen veel, maar niet alles', *Kennis Online*, January 1, 2013 (http://edepot.wur.nl/258506).

guarantees its members access to genetic materials, even if these materials are patented by one of the seed companies.[272]

During the interviews I conducted, it became clear that at least three of those cooperative organizations required further investigation and should be included in the analysis of the nature-technology dilemma in seed storytelling: Keygene, Plantum and Seed Valley. To create a more comprehensive overview of the ways the seed breeding sector presents itself, a closer look at the communication strategies of these three initiatives is necessary. Since all three are related to or collaborating with Bejo and/or Rijk Zwaan, or indeed represent one or both of them, these companies do effectively contribute to the image of the Dutch seed breeding sector.

Keygene

As mentioned in Chapter 2, Keygene is a research collaboration project that was initially founded (and financed) by the Rabobank in 1989, together with five seed breeding companies - Rijk Zwaan was one of them. From the beginning, biotechnological research has been their core business, and it still is today. In the Dutch and international press, Keygene usually presents itself as part of the 'secret' behind the Dutch seed breeding sector, for instance when Rijk Zwaan, in collaboration with Keygene, had created a aphid-free lettuce variety (see Chapter 6.5). Or, as CEO Arjen van Tunen describes it: 'Thanks to our work, companies like Rijk Zwaan and Enza can compete with other companies. What's more: [...] they own a huge share of the vegetable seed market'.[273]

In a 2013 *Trouw* article, the work of Keygene's researchers is summarized as 'improving the seeds, by making use of the natural qualities of a plant'.[274] Notwithstanding the use of the term *natural* in this context, the possibilities that Van Tunen mentions in this article seem to derive from a conception of plant breeding that mostly builds on using technology for human's sake:

> Van Tunen: "What does a grower want? He wants seed with the best possible qualities. You can only sell vine tomatoes in a package if they all ripen at the same time. A head of lettuce whose leaves all fall off with just one cut - that's convenient. A producer can cut the leaves more easily

[272] https://www.ilp-vegetable.org/about-ilp/ (accessed August 18, 2018).
[273] Jan Brandsma, '"Technologie in voedsel is niet eng"', *Trouw,* February 21, 2013, LexisNexis Academic. Original quote: "Door de manier waarop wij werken kunnen bedrijven zoals Rijk Zwaan en Enza meedoen in de concurrentiestrijd. [...] Zij hebben een flink deel van de markt voor groentezaad."
[274] Brandsma, '"Technologie"'. Original quote: 'De onderzoekers van Keygene verbeteren het zaad door gebruik te maken van de natuurlijke eigenschappen van een plant.'

> and pack them in a bag, and what's even more important is the fact that less cutting surfaces means less waste [...]. The possibilities are by far not exhausted yet.[275]

We have seen this kind of seed-storystelling before: in the sales catalogues of both Bejo and Rijk Zwaan. In this type of discourse, the seeds serve a purpose: they grow into a vegetable that is *convenient* for people, or reduces waste, or… This focus on the possiblities of seed breeding is clearly aimed at showing the public just what the sector is capable of. This is the kind of 'pride in technology' that we have seen before in press releases and interviews with Rijk Zwaan as well as Bejo. In high-tech storytelling, Keygene goes further than any of the breeding companies. Keygene specializes in digital phenotyping - trait mapping that can be helpful in marker assisted breeding - but also in precise molecular breeding techniques, including CRISPR-Cas9.[276]

Once again, we should not confuse genetic modification with 'technology' in general. Just like the seed breeding companies today, Keygene has always been alert to explain the difference - and the fact that their business has nothing to do with GM. Today, you'll immediately find information about Keygene's 'non-GM approach' on their website. In 2000, Keygene's director Hans Dons was interviewed in an article about several genetic technology start-ups. The gist of this article was: the expectations for genetic modification are still high, and consumers will accept the technology soon. Dons however took the opportunity to emphasize the non-GM charachter of Keygene's activities:

> Hans Dons, director of Wageningen-based Keygene, says the debate is very one-sided. 'We only talk about genetic modification. But there's more to biotechnology'. His company is developing technologies to map the hereditary traits of crops, which may help simplify 'old-school' breeding (crossing). 'On the basis of these maps, breeders are able to make a better selection of the crossing materials, so breeding programs become more efficient'. Thanks to this technology, for instance, Rijk Zwaan has developed and produced a lettuce variety that is aphid-resistant'.[277]

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[275] Brandsma, '"Technologie"'. Original quote: '[Van Tunen:] "Wat wil een tuinder? Die wil zaad met de beste eigenschappen. Trostomaten kan je alleen verkopen in een pakketje als de tomaten allemaal tegelijk rijp zijn. Het is handig dat een krop sla zo groeit dat de blaadjes met één snee allemaal loslaten. Een fabrikant kan de blaadjes makkelijker snijden en in een zakje doen, en belangrijk is vooral dat er door minder snijvlakken minder bederf is. […] De mogelijkheden zijn nog lang niet uitgeput".'

[276] https://www.keygene.com/technology/, accessed September 3, 2018.

[277] Marcel aan de Brugh, '"Meer dan genmodificatie"', *NRC Handelsblad,* July 12, 2000, LexisNexis Academic. Original quote: 'Hans Dons, directeur van het in Wageningen gevestigde Keygene, noemt de discussie erg eenzijdig. "Het ging alleen over genetische modificatie. Maar biotechnologie is meer dan dat." Dons' bedrijf ontwikkelt technologieen om erfelijke eigenschappen van gewassen in kaart te brengen, wat het 'ouderwetse' veredelen (kruisen) makkelijker maakt. 'Veredelaars kunnen op basis daarvan een betere selectie maken van het kruisingsmateriaal, waardoor veredelingsprogramma's minder

Dons makes an interesting change of perspective: emphasizing the non-GM technology that his company is good at, in an article about the future of genetic modification. In 2005 Keygene communicated that they would use GM technology as soon as it would be accepted by the public at large, but they emphasized: 'we are not really active [at GM technology] because of the low acceptance in Europe'.[278]

So how does the association between Keygene and the Dutch seed breeding companies influence the public image of the latter? Keygene's activities, language use and overall appearance invoke associations with highly complex technology, science, innovation. There is no mention of the natural aspects of seed breeding at all. Their slogan is not about 'exploring nature', but about 'crop innovation'. Keygene is telling a story about the seed breeding sector that is focused on science, high-tech research and development, and complex technology. In terms of Koert van Mensvoort's pyramid of technology, in Keygene's communication strategy, the technologies associated with seed breeding are vital. But the technologies would actually need a new level on the Pyramid: a level that could be called 'extremely emphasized'. And as long as so much attention is drawn to a technology *as a technology,* I believe it will not become 'invisible' nor 'naturalised'.

Plantum: bridging the gap of the discursive dilemma

If Keygene is the research partner of the Dutch seed breeding sector, Plantum is their representation partner. Everyone in the sector I have been talking to emphasizes the role of Plantum, the sector organization that was officially founded in 2001. Plantum has around 350 members, including both flori- and agricultural breeders.[279] At Plantum they take care of public relations, political lobby, marketing, communication, and general information and education campaigns for the seed breeding sector. Their main goal can be summarized as 'generating public attention for a sector that is now too invisible'. In Plantum's *Jaarplan 2017-2018,* director Niels Louwaars writes: 'Citizens are important actors in policymaking**.** Therefore this has become on of our priorities in the communication plans that Plantum has developed lately,

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tijd in beslag nemen.' Zaadveredelaar Rijk Zwaan heeft via deze techniek bijvoorbeeld een slasoort ontwikkeld en op de markt gebracht die resistent is tegen luis.'

[278] Chris van Alem, 'DNA-technologie: Kroppen sla zonder luizen dankzij Keygene', *De Gelderlander,* June 3, 2005, LexisNexis Academic. Research director Peleman was quoted saying: "Wij zijn daar [genetische modificatie] niet superactief in vanwege de slechte acceptatie in Europa en de dure regelgeving waaraan je moet voldoen als je een product met een gemanipuleerd gen introduceert. Nu is het geen optie, maar we zorgen ervoor dat we de technologie in huis hebben, zodat we klaar zijn op het moment dat het acceptabel is en betaalbaar wordt."

[279] http://plantum.nl/hoofdnavigatie/over-plantum/organisatie, accessed September 19, 2017.

kicking off in 2017'.[280] Unlike Bejo and Rijk Zwaan, whose communication departments explained to me why consumer marketing is no priority, Plantum really makes an effort to reach the 'end of the chain' of seeds: the consumer, the citizen, the general audience. As noted in the introduction, the people working at Plantum seem to be very aware of the discursive dilemma in seed storytelling.

First and foremost, Plantum is so relevant in the context of communication within the seed sector because this organization more or less determines the opinion on different topics in the sector. Whenever a sector- or even society-wide discussion becomes really complex - for instance, in the case of new breeding techniques and intellectual property discussions - seed breeding companies can conveniently fall back on the phrase that they 'support the standpoint of our industry association, Plantum, in this matter'.[281] 'Plantum is more than the sum of its parts', according to Rijk Zwaan's spokesperson Steven van Paassen. 'If we have to formulate an opinion that affects the entire sector, we rely on Plantum'.[282]

One recent example of Plantum's importance and visibility in the public debate is, once again, the ECJ's verdict that CRISPR-Cas9 and related new breeding technologies should be considered genetic modification techniques, and should be regulated accordingly. Plantum officially responded with a statement saying that the regulation is a 'missed opportunity', and that the industry was 'strongly disappointed'.[283] Plantum's director Niels Louwaars repeated these words in different media, such as *NOS Journaal*, *RTL Nieuws, NRC, De Volkskrant, Radio 1* and sector-related media such as *Boerderij Vandaag* and *Nieuwe Oogst*.[284] Clearly, Plantum chose to tell a story about disappointment, about an unexpected setback, about political wrangling that outweighed the stakes of an important Dutch sector. (Interestingly, when I interviewed Louwaars back in May, when the European Court had not yet made her decision, he told me that Plantum still had to prepare a communication strategy for after 'the decision'. Their eventual public response looked anything but unprepared.)[285]

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[280] Niels Louwaars, 'Voorwoord', in: *Over de schutting. Jaarplan Plantum 2017-2018,* 1. Original quote: 'De burger is ook een belangrijke spreker in beleidsontwikkeling. Deze is daarom één van de speerpunten in de communicatieplannen die Plantum ontwikkeld heeft de afgelopen tijd en waar we in 2017 een flinke start aan het maken zijn.'

[281] Identical phrases used on both https://www.rijkzwaan.com/opinion and http://www.bejo.com/opinion, accessed September 17, 2018.

[282] Interview with Steven van Paassen, April 24, 2018.

[283] Plantum, 'Uitspraak Europese Hof nieuwe veredelingstechnieken gemiste kans voor innovatie in land- en tuinbouw', July 25, 2018, https://www.plantum.nl/hoofdnavigatie/actueel/nieuws-detail?newsitemid=2111733760

[284] See for example: https://www.rtlnieuws.nl/geld-en-werk/artikel/4306091/strop-voor-zadenbusiness-eu-rechter-remt-ontwikkeling and https://www.volkskrant.nl/wetenschap/europees-hof-vindt-subtiele-gentech-gewoon-manipulatie-gemiste-kans-zeggen-plantkundigen~b12fe98c/.

[285] Interview with Niels Louwaars, May 22, 2018.

At Plantum they are naturally concerned about the public image of the sector. They realize that positive framing of seed breeding is only possible for an educated audience. 'Public image' is even a separate committee within the organization, tasked with 'providing the right information and good stories [in order] to create a factual image of our sector'.[286] In March 2017, Plantum commissioned a research agency to conduct research into the public image of the Dutch seed breeding sector among the general population (see also Chapter 2, on the alleged invisibility of the Dutch seed industry and Plantum's image research). One of the conclusions that the research team came up with is that knowledge and a positive image of the sector are strongly correlated. 'Those who are less familiar with the sector will sooner associate it, negatively, with genetic modification. They have less understanding for the social importance of the sector'.[287] The reseachers advised Plantum to invest in an active communication strategy, to increase awareness, to emphasize the importance of the sector, and finally to 'create a positive counter-message in the media on behalf of the sector, so as to avoid that the image of the general public will turn into something negative'.[288] In other words: the researchers told Plantum that the public image of seed breeding is always at risk, partly due to 'the Monsanto effect'. In order to stay ahead of a negative image, Plantum should proactively create a more positive one. (If this sounds familiar: it reminds us of the final conclusions in the report of the 'Eten & Genen' debate – see Chapter 4.4.)

So unlike many of the seed breeding companies themselves, their industry organization realizes very well how important 'seed storytelling' is in order to create a favorable image of the sector. That being said, what kind of story does Plantum actually tell? What role do technology and nature play in their discourse? In Plantum's communication about seeds, the aspects that are highlighted are mostly political or economic. They represent seed breeding not as either a natural or technological business, but rather in the context of the entire *sector* - a sector that provides employment, evokes international value and respect, and constitutes an important part of the Dutch economy.

But whenever Plantum speaks up for the entire sector on issues related to the either natural or technological aspects of seed breeding - such as new breeding techniques - they are

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[286] Anon., 'Ambities Imago', in: Plantum, *Een blik over de schutting. Jaarplan 2017-2018,* 44. Original quote: 'Het geven van juiste informatie en goede verhalen is belangrijk om een reëel beeld van onze sector weer te geven'.

[287] Jaap Bouwmeester and Romany Titre, *Rapport Imago-onderzoek Plantum* (Amsterdam: I&O Research, 2017), 30. Original quote: 'Personen die minder bekend zijn met de sector associëren deze sneller in negatieve zin met genetische modificatie en hebben minder zicht op het maatschappelijk belang van de sector.'

[288] Bouwmeester and Titre, *Imago-onderzoek*, 31. Original quote: 'Aanbeveling: Creëer een positief tegengeluid vanuit de sector in de media, waardoor kan worden voorkomen dat de beeldvorming van het groet publiek over de sector in negatieve zin omslaat.'

clearly on the 'technological team'. For instance, since its official foundation in 2001, Plantum has actively lobbied against the ban on the use of certain chemicals in the sector (e.g. for the use of methyl bromide in strawberry cultivation and for the allowance of pesticide coatings for export seeds, with pesticides that were not allowed in the Netherlands).[289] In discussions about genetic modification and transgenic techniques, Plantum usually took a stance opposite to anti-GM lobbyists such as Platform Biologica. Plantum generally stands for, and defends, the innovative and necessarily technological aspects of the breeding sector.[290]

In some cases, a complicating factor for Plantum is the diversity of their members. Plantum represents virtally all seed breeding companies that have offices in the Netherlands - this includes large multinationals such as Monsanto and Syngenta, who are also developing business in the Netherlands. At the same time, Plantum's member file includes diametrically opposed types of seed breeders, such as the completely organic seed breeding company De Bolster. Director Niels Louwaars acknowledges that Plantum has a very diverse group of members, but at the same time he does not consider that problematic in the context of creating one vision, one message that applies to the entire sector. Clearly, the 'technological perspective' has been prevailing in Plantum's external communication - and probably also in their lobby work.

The 'bad image' that representatives of the seed breeding sector refer to seems to have two very different meanings. Some companies want to present themselves as 'natural' enterprises and fail (e.g. Monsanto), but others want to show the world how high-tech and important their business is and fail, too.[291] For Bejo and Rijk Zwaan, the latter type of 'failure' is what concerns them most. But what constitutes the image problems exactly? The following is from a *Trouw* article about the public image of Bejo in 2008:

> Outsiders will marvel at the quality control department of seed breeding company Bejo from Warmenhuizen. Above all, a trader in vegetable seeds invokes associations with heavy clay, dirty fingernails, and farmers plodding on their knees. But this is a laboratory where seeds are studies in silence, with great dedication. [...] Kees Mosch, responsible for HR matters at Bejo, confirms: "The image of the seed breeding sector does not correspond with reality. Breeding

[289] Regarding the methyl bromide issue, see e.g.: Anon., 'Aardbei heeft methylbromide nodig', ANP press release, March 25, 2004, LexisNexis Academic; Anon., 'Plantum: eind deze week toelating methylbromide', *Boerderij Vandaag*, April 1, 2004, LexisNexis Academic. Regarding the use of pesticides and the defensive stance that Plantum took in this issue, see: Hans Maarsen, 'Zaadindustrie ageert tegen regelgeving; veredelaar Rijk Zwaan dreigt activiteiten naar buitenland te verplaatsen', *Het Financieele Dagblad,* August 9, 2006, LexisNexis Academic.

[290] See e.g.: Tim Zandbergen, 'Innovatie stimuleren, niet wurgen', *Forum,* September 14, 2018, LexisNexis Academic.

[291] For an entertaining analysis of Monsanto's image struggles (in their attempts to redefine their activities as 'life sciences company'), see: Richard Jones and Roger Jenkins, 'Dilemmas of Self: Image and Identity in Monsanto's Struggle with Genetically Modified Organisms for Agriculture' (conference paper, 2002).

> and developing vegetable seeds is high tech business, and we have clients all over the world." [...] But what could possibly be high tech about a carrot, a cabbage or an onion - crops that Bejo specializes in? Isn't a carrot just a carrot? Not at all, says Hennie Tesselaar, working at the sales and marketing department.[292]

The first thing that these few sentences show is the assumed knowledge level (about seeds and the technological aspects of it) of the general Dutch newspaper reader: zero. 'Outsiders will marvel'; the image does not correspond with reality; the writer rhetorically asks himself what could possibly be 'high tech' about vegetables, and so on. Second, the two sides of the discursive dilemma are beautifully resonating in this short phrase: on the one hand the 'heavy clay' (Dutch: *zware klei*) and farmers plodding in nature; on the other hand the laboratories, the high level of complexity, the fact that Bejo serves clients all over the world. Mosch and Tesselaar, the interviewees, both feel the need to correct a certain view that they suspect the readers will have: they expect the natural paradigm will be dominant over the technological paradigm. For Bejo, this is what constitutes their image problem most.

Another unintended yet beautiful showcase of the discursive dilemma is found in a 2004 article about Rijk Zwaan in local newspaper *BN/de Stem*. 'Iceberg lettuce that aphids sniff at. Purple cauliflower, tomatoes on the vine and 'child-friendly' chicory. These are all products that result from vegetable seed breeding,' the journalist writes in awe.[293] Some paragraphs down, after 'PR-man' Maurice Wubben has listed some of Rijk Zwaan's major achievements, the technology behind seed breeding is briefly discussed: 'It is almost too complex to explain how that works exactly. It is not just a matter of crossing pollen and everything will be fine'.[294] In other words: the journalist has probably not understood what seed breeding is really about, and does not bother to explain it to her readers either. Again, the knowledge level of the average newspaper reader is presumed to be very low.

Seed Valley, the initiative that will be further discussed in this chapter, was brought into being to actively combat both this low level of knowledge and the 'primitive' associations that seed breeding apparently invokes. One of Seed Valley's (greatest?) achievements was the appearance of Jan-Willem Breukink, CEO of the Dutch 'seed enhancement company' Incotec, in the television talk show *De Wereld Draait Door* in September 2012. Incotec is one of the world's leading seed selection and coating companies, and Breukink was invited to talk about the importance and the enormous

[292] Jeroen den Blijker, 'De ene wortel is de andere niet; zaadveredelaar Bejo Zaden groeit met de wereldbevolking mee', *Trouw,* November 8, 2008, LexisNexis Academic. Original quote: 'Voor buitenstaanders biedt de afdeling kwaliteitscontrole van zaadveredelaar Bejo Zaden uit Warmenhuizen een vreemde aanblik. Bij een zaadhandel in vollegrondsgroenten, denk je toch vooral aan zware klei, rouwrandnagels en boeren die op hun knieën ploeteren. Maar dit is een laboratorium waar in gepaste stilte en met grote toewijding zaden worden bestudeerd. [...] Inderdaad, bevestigt Kees Mosch, verantwoordelijk voor onder andere personele zaken bij Bejo. "Het imago van de sector voor zaden klopt niet met de werkelijkheid. De veredeling en ontwikkeling van groentenzaad is hightech en de wereld is onze klant. [...] Maar wat is er nu hightech aan een wortel, een kool of een ui, gewassen waarin Bejo Zaden groot is? Een wortel is toch gewoon een wortel? Niks daarvan, zegt Hennie Tesselaar, medewerker sales en marketing.'

[293] H. Schenk, 'Luizen haten ijsbergsla uit Fijnaart', *BN/DeStem*, September 25, 2004, LexisNexis Academic.

[294] Schenk, 'Luizen haten ijsbergsla'. Original quote: 'Het is bijna te ingewikkeld om uit te leggen hoe dat precies in zijn werk gaat. Het is niet alleen een kwestie van stuifmeel kruisen en dan komt het wel goed.'

prosperity of the Dutch seed breeding sector in general. The most important question for talk show host Matthijs van Nieuwkerk: 'How come we didn't know about this?'[295]

Figure 7.1. Image from Seed Valley's website, related to a news item about the DWDD talk show with Jan-Willem Breukink (Incotec)

The interview, including some footage from the machinery and processes at Incotec, is basically a minute-long commercial on prime time television. 'We should be really proud of our sector', says Breukink. '50 to 60 percent of all vegetables that are grown in the world originate in seeds from Dutch companies. We are leading in the world. Our international clients are all very happy with us. Devising and developing these seeds, it all happens in the Netherlands.' Without having to transcribe the complete interview, these are some of the words and terms that dominate the conversation: software, machines, technology, uniformity, top secret/black box technology (in analogy with the recipe of Coca-Cola), unique in the world, training and education, investments, being clever, entrepeneurship, selling knowledge, innovation, specialization, green high-tech. Van Nieuwkerk finally concludes: 'You're the owner of a technical company'. All in all, Breukink's appearance in *De Wereld Draait Door* can be considered a succesful element of Seed Valley's communication strategy to represent the technological aspects of the seed breeding sector.

On the tenth birthday of Seed Valley

We now know about some of the image problems that the seed sector is dealing with - awareness problems with the general public, or the constant risk of invoking the 'wrong' associations. But the awareness issue does not apply to 'the public' only - after all, they are not

[295] *De Wereld Draait Door,* September 26, 2012, https://dewerelddraaitdoor.bnnvara.nl/media/186735 (accessed September 13, 2018).

the direct clients of the seed breeding companies. It is understandable that raising awareness among this audience was never a top priority, since there is no direct benefit at first sight. What *does* disserve the seed companies though, is the lack of qualified personnel and the struggles in recruitment - in part a result of image and awareness issues.

Recruitment issues in the seed breeding sector were very real approximately since the turn of the millenium, and the problems already began on the level of education: too few students applied for the bachelor Plant Science at Wageningen University, the most obvious education to become a plant breeder. The low number of students was in part attributed to the dull image of the plant breeding sector, 'which is unfair, because we do research on such a high level', according to Enza Zaden's CEO at the time.[296] Another article tells us that the problems with finding qualified breeding professionals begin already on the level of education: in 2011, only five students applied for the bachelor Plant Sciences at Wageningen University. 'During the 1970s, we used to welcome 200-250 new students per annum', says a Wageningen University spokesperson.[297]

In 2007, several key figures in the seed breeding business decided to join forces and laid the foundations for what would become Seed Valley. The difficulty to find qualified staff was one of the main reasons behind its foundation. Jan Baas, mayor of Enkhuizen at the time, was one of the initiators. 'This is a gold mine, but we're not sufficiently aware of it', Baas told the local newspaper.[298] 'Baas is hoping that in the future, West-Friesland will be known as 'Seed Valley''.[299] That hope has been realized; today, Seed Valley is not only the name for a partnership, but an actual institution with its own headquarters in Hoorn.

In this anniversary article we meet some key figures behind Seed Valley whose names we have heard before:

> Board member Kees Mosch (management Bejo) remembers the misery very well: 'In biology education, other subjects were emphasized. The 'green sector' [plant breeding - SK] was neglected and disappeared from view. Therefore, the interest was zero.' Jan Willem Breukink (former CEO Incotec) nods yes: 'Green was something old-fashioned, it was associated with wheelbarrows full

[296] Anon., 'Gebrek aan veredelaars zadensector', *Het Financieele Dagblad,* January 28, 2005, LexisNexis Academic. See also: Anon., 'Tuinsector zoekt 'knappe' koppen: duizenden vacatures voor wetenschappelijk opgeleiden en hbo-ers', *De Telegraaf,* June 4, 2011, LexisNexis Academic.
[297] Jan Verbeek and Ilse Zeemeijer, 'Voor groeiend Seed Valley ziet toekomst er rooskleurig uit', *Het Financieele Dagblad,* November 10, 2017, LexisNexis Academic.
[298] Anon., 'Baas: "Plannen zaadindustrie opeens in stroomversnelling"', *Noordhollands Dagblad,* July 3, 2007, LexisNexis Academic. Original quote: 'We zitten op goud, maar dat hebben we zelf nog onvoldoende door.'
[299] Anon, 'Baas: "Plannen zaadindustrie"'. Original quote: 'Baas hoopt dat West-Friesland in de toekomst bekend komt te staan als 'Seed Valley'.'

> of manure. Not sexy enough.' Incotec, Bejo, Enza Zaden, Syngenta and Pop Vriend are the founders of Seed Valley. It was Jan Baas (former mayor of Enkhuizen) who, in analogy with Silicon Valley, introduced the term Seed Valley.[300]

In the context of my research question, we need to consider the name 'Seed Valley' for a moment. Obviously, this name was chosen in order to invoke associations with Silicon Valley - the information technology hub around San Francisco in the United States, where companies such as Amazon, Apple and Google find their origins (and their headquarters, still). In Seed Valley's own communication strategy, they emphasize that the name is not chosen coincidentally:

> Seed Valley is where 'green software' is developed, the genetic programming that determines how vegetables taste, the color and size of a flower, and a plant's level of resistance to diseases. Here, specialists work continually on new plant varieties with higher yields and optimum growth under specific climate conditions.[301]

Seed Valley, green software, programming vegetables - there is no doubt about which side of the nature-technology 'dilemma' Seed Valley has chosen in their communication strategy. Seed breeding is all about technology, innovation and progress - and 'nature' seems to have been moved to the background entirely. In none of Seed Valley's communication, the word nature is ever mentioned. And of course one does not call an initiative 'Seed Valley' if you want to appeal to natural connotations. The focus on high-tech is evident. 'Nature' is not framed this way or another, it is simply not there.

But from Chapter 3, we know that Bejo, which is one of the member companies of Seed Valley, that the partnership is seeking to represent externally, executes an entirely different

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[300] Coen van de Luytgaarden, 'Seed Valley voedt de wereld', *Noord-Hollands Dagblad,* July 24, 2018, https://www.seedvalley.nl/seed-valley-in-noord-holland-voedt-wereld/ (accessed September 7, 2018). Original quote: 'Bestuurslid Kees Mosch (management Bejo) herinnert zich de malaise maar al te goed: ,,In het onderwijs lag het accent tijdens biologielessen op andere zaken. De groensector was verwaarloosd en praktisch uit beeld verdwenen. Daardoor was de belangstelling nihil.'' Jan Willem Breukink (oud-directeur Incotec) knikt: ,,Groen was iets van vroeger, dat werd geassocieerd met kruiwagens vol mest. Dus niet sexy genoeg.'' Incotec, Bejo, Enza Zaden, Syngenta en Pop Vriend zijn de grondleggers van Seed Valley. Het was Jan Baas (oud burgemeester van Enkhuizen) die als eerste, analoog aan Sillicon Valley, de term Seed Valley introduceerde'. Note that Rijk Zwaan is not officially a founder of Seed Valley, but this is only due to the geographical location: as indicated, Rijk Zwaan's headquarters are not located around Enkhuizen, but south of Rotterdam.

[301] https://www.seedvalley.nl/en/who-we-are/ (accessed March 19, 2018). On the notion of seeds as containers of software, see also: J. Stallen, ''Nederlands groentenzaad als Zwitsers horloge'; Erwin Cardol trekt aan Seed Valley', *Groenten en Fruit,* September 19, 2014, LexisNexis Academic, and: J. Stallen, 'Meer aandacht voor Seed Valley: groene software in een zaadje', *Boerderij Vandaag,* September 19, 2014, LexisNexis Academic.

external communication strategy. We know that Bejo does not focus on technology too much, but rather presents seed breeding as an activitiy in close association with nature - *exploring nature never stops*. This framing of seed breeding as a natural enterprise is reflected in the entire 'look and feel' of Bejo's public image: in language, visual appearance, logos, and so on. Could this produce any tension between Bejo and Seed Valley? I submitted this question to Mirjam Both, Bejo's marketing manager. She told me that she had never actually thought about it as a problem before. 'Seed Valley has an enormous task creating more visibility among students and future employees. They need to tell a story that fits the entire sector, and they do so very enthusiastically. I don't think their story is a mismatch with ours… They tell a story everyone wants to hear. And at Bejo, we indeed focus on nature. It just suits us'.[302]

Seed Valley recently celebrated its tenth birthday - the initiative is still young, yet really succesful in terms of creating awareness and interest among the target audience: young professionals in plant science, data science or IT. Carolien Wagenaar, program manager at Seed Valley, told me that after higher education, secondary education would be the next 'target' to create more awareness of and interest in the seed sector. According to Seed Valley, 'green education' should be increasingly integrated in high school lessons.[303]

A last remark should be made here about Rijk Zwaan in relation to Seed Valley. Observant readers may have noticed that Rijk Zwaan is not a member of Seed Valley, for geographical reasons. The question arises whether Seed Valley's recruitment strategy, that is a communication strategy in itself, applies to Rijk Zwaan as well. The answer is yes, and we have already seen this during the analysis of Rijk Zwaan's communication strategy. The high-tech paradigm that Seed Valley exploits in order to attract new employees, is also exploited by Rijk Zwaan's recruitment department. Because Rijk Zwaan is growing so rapidly, they have a lot of job openings lately - and they put a lot of effort in effective recruitment and HR management. When you apply for a job at Rijk Zwaan, you will receive an introductory magazine that illustrates the corporate culture. 'The average consumer will not give it much thought, but the development of a new bell pepper race usually requires four different types of laboratory research', is one of the statements that Rijk Zwaan seeks to impress their future employees with.[304] It is precisely this strange paradox – the consumer does not seem to know nor care; but the breeder is really proud of it - that forces the companies to choose either a natural or a technological framing of their activities. Once again, we see that Rijk Zwaan chooses the high-tech paradigm in their communiation towards future employees.

[302] Interview with Mirjam Both, April 3, 2018.
[303] Interview with Carolien Wagenaar, February 11, 2018.
[304] http://magazine.rijkzwaan.com/nl/magazine/5289/722627/hightech_paprika.html (accessed July 2018, no longer available online).

Concluding remarks

If we look at these three overarching seed breeding partnerships or initiatives, what do their communication strategies teach us about 'seed storytelling' on a more general level? What kind of position do Keygene, Plantum and Seed Valley take in their representation of the entire sector? Other than the breeding companies themselves, these overarching institutes seem to face no real discursive dilemma at all: they have all chosen to tell a technology-centered story, deliberately or not, and they maintain this narrative consistently. In their external communication, at least Keygene and Seed Valley do not seem to bother about representing something 'natural' about seed breeding in any way, at all. Only in Plantum's projects and external communication we sometimes find references to the natural character of seed breeding – but rather in communication about *plants* than about seeds themselves.

This conclusion may tell us something about the direction in which the seed breeding companies' own communication strategies could (or should) move. Does it even make sense if they choose to preserve *any* natural elements in their story about seed breeding? A tentative conclusion of this chapter would be that if the Dutch seed breeding sector, as a whole, wishes to become more visible among the general public, it might be useful if they would align all their communication strategies. In other words: if they would all choose to tell the technological story. In the chapters on Bejo and Rijk Zwaan, however, we have seen that there are still enough reasons for the companies to try to maintain a somewhat 'natural' image. This inevitably leads them to a position in which they face the discursive dilemma in their communication strategies.

Chapter 8

Conclusions (and sowing the seeds for further research)

Introduction: what was I trying to find out?

The aim of this research project was to explore the communication strategies of two large Dutch seed breeding companies – Bejo and Rijk Zwaan – and to find out whether these companies choose to tell either a natural or a technological story about their activities. Behind the quest for either nature or technology in Dutch seed breeders' communication, Koert van Mensvoort's Pyramid of Technology has served as a theoretical model to support my own findings and intuitions. I have argued that the seed breeding companies are continuously facing a 'discursive dilemma' in the communication choices they have to make. What is the story about seed breeding that they want a large public to be aware of? How does this story relate to what they are telling their clients? In the introduction to this thesis, I dubbed some questions that personally fascinated me and that have inspired me along my investigations of these two companies (and the rest of the sector): *what is a seed, according to someone whose greatest effort is to improve it? What is breeding, according to those who make big money out of it? What is a food crop in the eyes of those who have developed it, in a laboratory, behind a computer screen, or in the field?*

In this concluding part of my thesis, I will provide some final answers to these questions, as well as recommendations for further research. The topics that I have begun to disclose and investigate within this research project are by far not exhaustively examined. Many new assocations have been summoned; many new interesting relations and connections have been delineated; and many new research questions have come up.

Limitations of this research project

Before we draw conclusions and discuss possibilities for further research, let us have a look at some of the limitations of this research project's scope. A critical remark could be made about at least one major limitation of my research as a whole: the fact that only two seed breeding companies have been analysed. Are Bejo and Rijk Zwaan representative of the sector as a whole? In the introduction I have laid out the reasons behind this choice of companies: they are two of the largest originally Dutch seed firms; they are both family-owned businesses; and

they are strongly locally embedded.[305] As such, they certainly form a representative unit for the entire Dutch seed breeding sector (excluding the non-Dutch firms such as Syngenta and Monsanto, who are also active in the Netherlands). They represent a significant part of the Dutch seed breeding market and therefore these results can be considered significant for the entire sector. For a more complete analysis, however, other Dutch breeders like Enza Zaden, Pop Vriend and Nunhems should have been included as well. In many respects, these firms are very similar to Bejo and Rijk Zwaan, and during my investigations I did not find any information about the other companies that was in conflict with what I have written about Bejo and Rijk Zwaan. There is thus no indication that the analysis of the other firms would be very different. But still, on the basis of this research project I cannot conscientiously answer questions about the sector at large. For the sake of legibility, however, I will discuss the outcomes of my research project as if they apply to the entire sector.

Five general conclusions

On a general level, ignoring the differences between Bejo and Rijk Zwaan, at least five conclusions can be drawn when we try to answer the question: *how do seed breeders deal with the discursive dilemma?* These conclusions apply for the entire Dutch seed breeding sector and were backed up historically by the sources and materials used in this research project.

Conclusion one: the discursive dilemma is real. At first sight, seed breeding companies seem not to consider themselves as continuously struggling with what I have called a discursive dilemma. Of course their communication departments make many conscious or unconscious – remember the 'black box' metaphor – choices that relate to either a natural or a technological narrative about their activities. But the discursive dilemma is not something the seed breeding companies think about very actively. Their sector organization Plantum, however, *is* highly aware of the existence of this dilemma. They help the seed companies build a strategy that tells a consistent and positive story about seed breeding. So even though the discursive dilemma may be seen as something 'academic' or hypothetical at first sight, the dilemma is very real. If Plantum is struggling with a certain communication issue, this must be an issue that affects the entire sector.

Conclusion two: the seed breeding sector in the Netherlands is characterized by a considerable lack of external communication. As with the discursive dilemma, one could ask if this is really a problem, since we do not find the seed companies worrying explicitly about this issue. But again, the issue is real, since at least two seed breeding related initiatives draw

[305] I have also laid out the reasons why Enza Zaden, which would be the obvious third case study for this research project, is unfortunately not included. See footnote 15.

attention to exactly this issue. Plantum aims at a higher level of knowledge among the general public, and Seed Valley was set up in order to create awareness among a specific target audience: future employees for the seed sector that now experiences a lack of qualified personnel. Over the last couple of years, the latter mission seems to have succeeded at least partly. The 'green sector' is growing and increasingly attracting young and IT-wise specialists. But we have to acknowledge that the sector as a whole is still fairly invisible. If we recall the image research that Plantum conducted, we remember that in 2017, less than a quarter of the respondents could name any seed related company in the Netherlands. The general public simply does not know. And if they know, they probably do not care too much. The seed breeding companies themselves are very aware of this issue: recall how reputation sensitive Rijk Zwaan was in the 'cherry tomato' case, and how well researcher Jan Doldersum realized that the image problems were a consequence of their own non-visible external strategy.

At the same time – and here we encounter the third conclusion – I have found that whenever the seed breeding companies *do* get the chance to create an image of themselves for a large audience, they generally tell a strategic story about the positive (e.g., economic) aspects of seed breeding. Or they create a proud narrative about why the Netherlands has such an exceptionally strong seed breeding sector. Once you pay attention to the public relations of seed breeding companies, you will discover this narrative over and over again. Very recently, *Stand van het Land* (a tv program about 'the stories behind the economics') broadcasted an item about the huge economic dimension of seed breeding in the Netherlands.[306] Clearly, the editors did not make an effort to go too deeply into the 'nature' of seed breeding. No critical questions were asked. Rijk Zwaan, who was one of the protagonists of the episode, had the chance to create a twenty-minute commercial for their activities, including imagery of high-tech labs and a greenhouse full of tomato plants. This indicates not only that the editor on duty did not know anything about seed breeding himself, but also that it is simply not a controversial topic among the Dutch population. And it also shows us that even though external communication is not a top priority for Dutch seed breeders, they actually *do* have a strong and apparently well-advised strategy that emphasizes the positive aspects of seed breeding, such as the economic benefits for the Netherlands.

Time for conclusion four – and here we get to the core of the answers to my research questions. We now want to know: since the discursive dilemma is real, what does this research tell us about seed breeders' dealing with it? What side of the dilemma do they commonly choose – be it a deliberate choice or not? Let us take in mind a hypothetical Dutch citizen, let's

[306] See: https://www.npostart.nl/stand-van-het-land/POW_03435480

call her Anna, who has become interested in seed breeding after seeing a talk show on television. Before seeing this talk show, Anna had never spent a thought on the question where vegetables come from, and she did not realize that the Netherlands is such a large player in the world business of seed breeding. If Anna looks up Rijk Zwaan, or Bejo, the first impression she will get from their corporate websites, is a green, natural, healthy image. The focus of language and imagery is healthy vegetables, coming from nature. 'Exploring nature never stops', says Bejo, showing a picture of a breeder in a green field. 'Sharing a healthy future', is Rijk Zwaan's tagline; the first picture Anna gets to see is a man leaning on crates full of fresh, red, healthy tomatoes. In general, the very first impression that these seed breeding companies want to give is an image of *nature providing healthy foods*. If we have to connect that to one side of the discursive dilemma, it would obviously be the natural side.

When the subject gets more complex, however, Dutch seed breeders soon switch to the other side of the dilemma. Whenever they get a chance to explain what seed breeding actually is, or whenever they have to answer questions from journalists, the companies' spokespeople tend to use technological metaphors. In general, we have seen that in their external communication projects, Dutch seed breeding companies are never explicitly stressing the natural character of their activities – only on a basic level, for an audience that thinks about seed breeding for the very first time. Rather, the companies like to present a highly technological, innovative, science-based image of seed breeding. They take any opportunity to explain how complex and scientific the discipline has become. And there is one specific target audience for whom they really need to follow this communication strategy: their future staff. In order to attract the right people for the many job openings that Rijk Zwaan and Bejo have (mostly research, IT, and data analysis jobs), the high-tech communication strategy is probably the *only* sensible choice. Technical university graduates do not want to work 'with their feet in the mud', they want to work in a sophisticated lab, with complex data systems, with IT challenges – or so the reasoning behind this recruitment communication strategy could have been. We know that this is in part the reason behind the foundation of Seed Valley.

Recapitulating what is perhaps the most important conclusion of my research, we can say that the seed breeding companies prefer to keep their external audience a bit ignorant in their first introduction to the business, by emphasizing the 'natural' side of seed breeding. They avoid 'tech talk' in this very first communicative moment. But the seed breeding companies know very well that in order to explain the true nature of their activities, they will have to focus on technology and innovation nevertheless. For a more informed audience, they have created a communication strategy in which the technological side of the discursive dilemma is dominant. We recognize this strategy in Bejo's and Rijk Zwaan's communication with direct clients (seed

brochures, marketing magazines), or whenever seed breeding companies communicate externally, for instance in Dutch newspapers, or when their spokespeople get interviewed in public on or television. Bejo's and Rijk Zwaan's seed catalogues and magazines are showcases of technology, demonstrating how much effort their breeders put into the development of a new variety. How much time, technological skills and knowledge it requires. Now that we have analysed the 'key message' of Dutch seed breeding companies and the side of the discursive dilemma this message is connected to, can we still attach much meaning to a slogan like 'Exploring nature never stops'? After all, we can perhaps see it for what it truly is: a marketing slogan, a nice sounding tagline that should invoke positive (yet perhaps irrelevant) associations with seed breeding among a very large, mixed audience.

So far, I have mainly spoken about the current state of affairs in seed breeding companies' communication strategies. But in order to understand where they have historically come from, we need to zoom out for a bit and look at the shifts and changes in communication strategies throughout the historical scope of this research project (c. 1985-today). For conclusion five, we need to know whether the self-presentation of the companies, as either 'natural' or 'high-tech' businesses, did change over time - and why. If we recall the seed catalogues and sales lists of Bejo and Rijk Zwaan, we remember that during the 1980s and 1990s, the focus on technology was, at least towards their direct customers, completely evident. In Koert van Mensvoort's words, technology behind seed breeding was completely naturalized. No in-depth explanations of the technologies – or why they were used in the first place – were apparently needed. If we look at the communication strategies today, something different can be observed: the focus on the high-tech discourse is *either* very explicit (in Seed Valley and Keygene's communication strategies), *or* a bit 'stashed away' (in the communications of the breeding companies themselves). Oddly enough, the communication strategies of the latter, the Dutch seed breeding companies at large, seem to have been developing in a 'natural' direction over the last thirty years. This is odd, because it completely moves in the opposite direction of the technical and technological developments that the companies have gone through. Historically, they (publicly) embraced the new technologies that became available in the 1980s and 1990s. They took pride in the high level of technological innovation that their companies strove for. But the more high-technological seed breeding has become, the more the companies' communication departments have put (public) emphasis on nature. This paradoxal shift is at the heart of the discursive dilemma that seed breeding companies face.

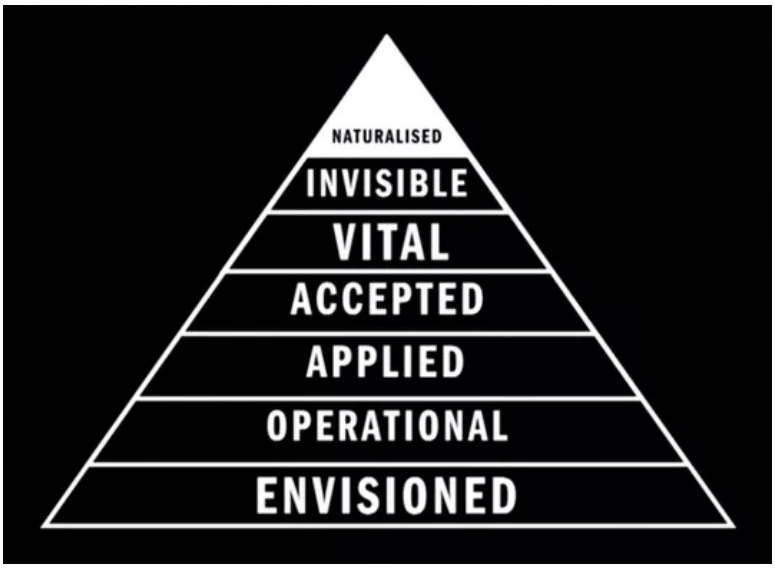
It is very likely that the public and political discussions about genetic modification in the 1990s, that we have read about in Chapter 2, have played a large role in this shift towards

'the natural', a shift that would otherwise be somewhat illogical. Reverting to nature – including an explicit 'nature' focus in storytelling and imagery – is relatively novel in seed breeding companies' communication strategies. During and after GMO controversies, and even though Bejo and Rijk Zwaan never actively dealt with public anxiety, the companies probably realized that they had to reconsider their communication strategies, because seed breeding in itself was not an innocent activity anymore. The marketing and communication departments of the seed firms have of course followed these discussions closely, and may have come to think that 'simplicity' would be the right approach to seed storytelling. They may have concluded that telling a 'natural' story about seed breeding would take the heat off the genetic technology debates, and would perhaps plead the companies free from the negative associations around GM ('the Monsanto effect'). But we have also seen that this 'natural' story does not attract the right kind of future employees to the companies – so, the discursive dilemma remains topical and real.

A part of conclusion five, about the shift in communication strategies that seed companies went through, is an interesting phenomenon that was gradually becoming clear from Chapter 4, about the specific Dutch historical context. Public and political unrest about genetic modification technologies (including CRISPR-Cas9) were constantly present in the background of my research - and precisely the question how the sector has become so successful *despite* this unrest, was triggering me to look into the sector's own communication. It was striking to find out that the seed breeding companies themselves have always *escaped* the debates and discussions related to this public unrest. They were never the targets of anti-GM campaigns; they were hardly ever mentioned in the Dutch press wherever genetic modification was concerned; and they were completely absent from the 'Eten & Genen' debate that was organised around the turn of the millennium. We cannot be sure if they *deliberately* stayed out of the public debate or not, but it is evident that the companies never actively sought to participate in the public debates. Their sector organization Plantum was founded officially only in 2001, so there was not one clear, representative story about the Dutch seed sector available in the 1980s and 1990s. Today, Plantum is still occupied with repairing the image damage that has been done in this era. They realize very well that the lack of a coherent story about seed breeding in the Netherlands has caused ignorance, unwillingness and negative associations about the seed sector among the general public. Perhaps even more than with a discursive dilemma, the Dutch seed sector is still struggling with a general communication problem.

Seed breeding on the Pyramid of Technology: results and critical remarks

Throughout this research, the Pyramid of Technology by Koert van Mensvoort has been used as a theoretical background model for the analysis and interpretation of 'seed storytelling' in all kinds of sources. In this conclusion, some concluding remarks about the outcomes of the use of this model are in place. In all the different examples of seed storytelling we have encountered, 'seed breeding' as a technology has been on almost every level of this Pyramid of Technology.



For the seed breeding companies themselves, seed breeding is their core business. Their spokespeople tend to see seed breeding as vital (for it is their company's main activity) and in many cases also as naturalised. In the sales catalogues of the companies, the fact that the seeds ever had to be bred, is completely obvious. These brochures hardly ever discuss the technologies behind seed breeding; the technology is literally invisible in these brochures, which is in itself an indication of a high level of 'naturalisation' of the technology. When I say 'naturalised' in this respect, I mean that the technology is packed away in the 'black box' of communication, and that no one really bothers to take it out. As soon as there are no more questions asked about a technology, eventually no one will be aware any longer that it was ever considered as such, as a technology. It is simply not in question. That is the point where a breeding technology may become naturalised.

We have seen a more 'visible' discussion of seed breeding technology in Rijk Zwaan's communication. These are moments when the 'black box' is opened, either by those who send out the communication or by those who receive it. Both in *RZ Select* (external communication) and in *Intermezzo* (internal communication), explicit attention was paid to the technologies behind Rijk Zwaan's produce. *RZ Selected* was informing agricultural growers about the

newest genetic technologies, or about the fact that a new variety had *not* been created with genetic modification. In *Intermezzo,* Rijk Zwaan's employees were explicitly informed about new biotechnological developments in seed breeding. These articles and discussions imply that those technologies were not yet on the 'accepted' level; information was needed to embed them into Rijk Zwaan's activities. You could even argue that through these explicit discussions, the technology behind seed breeding becomes visible again, or 'de-naturalized'. It is only when a seed breeder explicitly steps away from a certain technology (saying: we do *not* produce GMOs, or: from now on, we are going to produce organic seeds as well), that the public might realize how much technology is actually involved in seed breeding.

Some critical reflection on the Pyramid of Technology is in place. I realize that I have applied this model quite uncritically. It provided me with a theoretical background to intuitive findings about discourse, language use and reputation management issues. Wherever I had to demonstrate an emphasis on either nature or technology, the pyramid was never far away. As is probably the case with every theoretical model, however, this Pyramid of Technology has some flaws. The model has proven to be not completely sufficient to cover all aspects of seed breeding that were reviewed in this research project.

In Van Mensvoort's model, a new technology becomes increasingly invisible as it becomes more succesfully adopted by society. This seems to be a correct analysis for many newly invented and introduced technologies and tools, ranging from communication technologies (e.g. telephony, the Internet, artificial intelligence…) to mobility technologies (e.g. horse carriages, cars, self-driving cars…) to food technologies (e.g. pasteurization, packaging…) and beyond. In the context of seed breeding, there is not one clear technology that is slowly climbing the levels of the Pyramid. Seed breeding falls apart in many different technological categories, of which genetic engineering technologies have been most relevant in this research.[307] But what is striking about these techniques, for instance genetic modification, is that they have not exactly become less visible after successful adoption. The more use seed breeders made of these technologies throughout time, the more these technologies have become subject to heated debates and public discussions. Genetic modification technology has taken a different 'route' along the Pyramid. At least in Europe, the technology never made it to the upper level successfully. Somewhere between 'applied' and 'accepted' in the 1990s, genetic modification suddenly drew so much attention that it could never move upward. It became very controversial and thus very visible. What this essentially shows, is that the 'upward track' through the Pyramid does not benefit from too much communication about the

[307] I have made the deliberate choice to pile all these categories together in this research project; 'technology' is seen as one designated object.

technology. The more emphasis is put on a certain technology, in this case genetic modification, the more suspicion and aversion it normally attracts.

The same thing, but not in a negative sense, is happening in the communication strategies of Seed Valley, Keygene and, to a lesser extent, Plantum. By drawing explicit attention to the high-tech level of seed breeding, to the sophisticated and innovative technologies behind it, the technology itself does not become more 'invisible' – of course not. An explicit focus on technology seems to be a manner of naturalizing it -– naturalizing in the sense of 'making us forget that it is technology'. Some technologies can (only?) become successfully adopted and embraced by society, and eventually become 'naturalized', by constantly drawing explicit attention to it. Keygene, Seed Valley and Plantum all tell a highly technological story about seed breeding, drawing lots of attention to these non-natural aspects of it, *in order to eventually naturalize the technology*. And so the technology does eventually not get accepted through a process of naturalization (becoming invisible), but through an opposite process of emphasis, attention, pride and explicit visibility.

Therefore I would argue that Koert van Mensvoort's Pyramid of Technology could be extended with a new level, a level called 'extremely emphasized'. As long as a new technology resides on this level, it is more or less 'blocked'. And this can be either positive or negative: Seed Valley benefits from the explicit emphasis on technology in seed breeding, but for the sector as a whole, the explicit attention for GMOs in the 1990s was certainly not what breeders were waiting for. Perhaps this is what happened to CRISPR-Cas9 as well: too much emphasis, too much media attention, too many promises, too many questions – enough for the European Court of Justice to decide that the technology should be (temporarily) 'blocked' as well.

Suggestions for further research

Before concluding this research project with a bit of advise for 'seed storytellers', some recommendations and suggestions for further research are in place. During the investigations, interviews and source analyses I have done, many new perspectives have come up, and even more new questions have arisen.

At least one development in the corporate history of both Bejo and Rijk Zwaan has remained underexposed in this project: their movements in the direction of organic seed breeding, as a separate branch of activities. In the context of the nature-technology debate, the story behind organic breeding, and the reasons why these essentially non-organic breeders chose to incoporate it in their activities, is highly relevant. I have chosen not to include the organic/non-organic discussion in this research project, because the explicit attention for organic seed breeding is only quite recent. But organic seed breeding, invoking explicit

'natural' associations, should definitely be included in a comprehensive analysis of seed breeders' discourse strategies. We have briefly discussed this in the analysis of Rijk Zwaan, but it also applies to Bejo – and of course to the rest of the Dutch seed breeding sector.

What is organic seed breeding? In short, the 'organic' part applies to all aspects of the seed breeding process: what breeding techniques are (not) used, how are plants grown, how are seeds harvested, cleaned, processed, and so on. Organic seed breeding results in seeds that can be used by organic vegetable growers (who are, by EU law, not obliged to use organic seeds now, but only have to make sure that their own growing process is organic – an obligation to use certified organic *seeds* as well is on its way). Most large seed breeding companies, including Rijk Zwaan and Bejo, have a separate production line of organic seeds, aimed at the growing market of organic farmers and growers (and of course *consumers*). Bejo's marketing manager Mirjam Both started talking about Bejo's organic seed production when I asked her about the 'naturalness' of seeds – an interesting commixture of 'organic' and 'natural' in itself. She told me that Bejo produces around 1200 'conventional' (non-organic) varieties, next to 150 organic varieties. And she framed the choice for organic seed breeding in different ways: 'We're selling organic seeds, in the first place because we thought it was an interesting development, twenty years ago. And in the second place, we wanted to learn from it'.[308]

Not only would it be interesting to make a comparative analysis of De Bolster (the only 100% organic seed breeding company in the Netherlands), the organic activities incoporated in Bejo and Rijk Zwaan's business are also valuable for further research. When I interviewed plant breeding professor Michel Haring, he informally suggested that the organic seed production of Bejo (since approximately 20 years) was mainly a response to the feeling that their 'technological toys had been taken away'. From that perspective, it looks like an overdone response: now that we cannot 'play' with genetic modification technology anymore, we will go back to 'basics' even further. It is a slightly impertinent, yet interesting suggestion that deserves further exploration and investigation. Is it true that Bejo added organic seeds to their product range mainly as a result of 'reputation management' decisions? We can never say for sure, but it would be worthwile to further analyse the internal and external framing and communication of the introduction of this organic product range, both for Bejo and Rijk Zwaan. Did they introduce it as a move towards 'the natural'? Did they deliberately play into a 'non-technological' discourse about seed breeding?

With this historical background to these companies I hope to have paved the way for further comparative research into organic seed breeding. What kind of story does De Bolster

[308] Interview with Mirjam Both, April 3, 2018.

tell about seed breeding? Does this breeder explicitly stand out against his non-organic competitors? From their corporate website, it looks like it:

> At De Bolster we only apply 'classic' breeding techniques. Our varieties are 100% organic, and guaranteed non-GMO. Genetic modification means an artificial intervention on the DNA of a variety; a technology that we oppose completely. We only use the natural qualities of a plant and we do not intervene with novel genetic technologies. We believe that CRISPR-Cas9 does not fit in the organic vision either.[309]

But when I asked Bart Vosselman, founding director of De Bolster, whether he thought his seeds were more 'natural' than non-organic seeds, he told me: 'Seeds are essentially unnatural. There is so much human, manual work involved. And most importantly: inbreeding. You make plants do something that they really wouldn't do without human intervention'.[310] This quote alone can instigate new research questions: is 'without human intervention' synonomous with 'natural', according to different seed breeders? If an organic breeder does not even think of seeds as 'natural', what does that tell us about seed breeding as a whole? I still care about finding an answer to these questions, because they are intimately connected with the nature-technology dilemma. This phrase from philosopher Sebastien Valkenberg (in an article about Seed Valley) gives voice to the problematic popularity of 'organic' in the meaning of 'non-technological', 'purely natural' food:

> Agriculture has become high-tech – thank goodness. Otherwise we would not achieve the super harvests that we need to feed more than seven billion people. Yet the valuation is low. Popular thought has it that food ought to be 'untreated', whatever that may mean. It is certain that 'organic' is a very strong brand. We can understand why Ekoplaza, the country's largest organic supermarket chain, writes on their website: 'We go for pure natural foods!' For sure this is mediagenic, agriculture without artificial tools. But how attractive is this perspective, really?[311]

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[309] Website De Bolster. Original quote: "Alle veredeling bij De Bolster wordt uitgevoerd met 'klassieke' technieken. Onze rassen zijn 100% biologisch en gegarandeerd vrij van genetische modificatie (GMO). Bij genetische modificatie wordt kunstmatig ingegrepen op het DNA van het ras; een techniek waar wij groot tegenstander van zijn. Wij gebruiken uitsluitend de natuurlijke eigenschappen van de plant en grijpen niet in nieuwe gen-technologieën. Ook de nieuwste techniek 'CRISPR-cas9' past wat ons betreft niet in de biologische visie."

[310] Interview with Bart Vosselman, May 1, 2018.

[311] Sebastien Valkenberg, 'Hoogstaande innovatie in kop van Noord-Holland', *Juist magazine*, n.d., https://juistmagazine.nl/seedvalley-innovatie-noord-holland/ (accessed July 11, 2018). Original quote: 'Landbouw is hightech geworden en gelukkig maar. Anders zouden we de superoogsten niet halen die nodig zijn om ruim zeven miljard aardbewoners te voeden. Toch is de waardering gering. De populaire

Another underexposed topic in this research project is the question of 'how Dutch' these issues are. From the beginning of this research I was very interested in a comparison with other countries in which seed breeding is big business, especially in the United States. In situations where they are legally or politically forced to be cautious with new technology, Dutch seed breeders often refer to the States as if there are no restrictions there: the allowance for the use of biotechnology has traditionally always been larger. It was not a coincidence that the first genetically modified food crop (the Flavr-Savr tomato) was introduced to the American, and not the European, market. During the 1990s, when the application of GM technology became increasingly difficult for Dutch companies, some of them 'threatened' to relocate their activities abroad. Among the Dutch (and perhaps other European) companies there has always been a sense of jealousy: American breeders can do whatever they want, whereas we are limited by too strict legislation. It would be worthwile to investigate whether this is indeed the case in the legal sense (the answer is probably yes), but even more exciting to follow some of the (biotech) seed companies that announced their relocation in the 1990s (or today, after the CRISPR-Cas9 setback) and to find out how they have fared afterwards.

In many other respects, a comparative analysis with other both European and non-European countries would be very interesting. Germany, for instance, is known for citizens who are more activist, outspoken and influential in public debates about genetic modification (and other food technologies). I wonder how this is reflected in seed breeders' external communication towards the German market. Would the emphasis on 'naturalness' be stronger, or would German citizens not buy that? Do seed breeding-related companies participate more openly in the public debates in Germany? Regarding the United States, where the non-GMO lobby seems to be less activist and less influential, it would be interesting to further investigate how seed breeding companies present themselves. Linguist Guy Cook, who reckons the controversy over GMOs mostly as a 'war of words', has studied the genetic modification debate in the US and has mapped how biotech seed companies are voicing their opinions about GM technology. In his words: '[W]e find acres of ponderous prose, as dull as a GM field, stretching for miles, much of it containing little information. [...] the biotech companies send us to sleep with a sermon.'[312] Cook mainly analyzed Monsanto and Syngenta web pages. This could not

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gedachte is dat voedsel onbehandeld moet zijn, hoewel nooit precies duidelijk wordt wat dit inhoudt. Maar het staat vast dat 'biologisch' een ijzersterk merk is. Begrijpelijk dat Ekoplaza, 's lands grootste biologische supermarktketen, op zijn website zegt: 'Wij gaan voor puur natuur!' Mediageniek is het zonder meer, landbouw zonder hulpmiddelen. Maar hoe lonkend is dit perspectief daadwerkelijk?'

[312] Guy Cook, *Genetically modified language: the discourse of arguments for GM crops and food* (London/Oxford: Routledge, 2004), 68.

easily be translated to the Dutch situation at all; my impression is that Dutch companies do not 'send us to sleep' but try to be as open and transparent as possible on their websites. A seemingly small difference, but it shows the need for a comprehensive comparison between the Dutch debate (and seed companies' role in it) and, especially, the American situation.

A final question that I would like to explore further is perhaps the question that Plantum struggles with most: how is it possible that the general Dutch consumer cannot be bothered with plant and seed breeding, whereas citizens in other countries seem to be more interested intrinsically? Why is the topic of seed breeding, a truly Dutch, truly innovative business with an enormous sector in the Netherland that provides many employment opportunities, so invisible in Dutch culture? In the words of Matthijs van Nieuwkerk: 'how come we don't know this?' And following from this, a more urgent question comes up: how can we change this ignorance among a general audience? How can Plantum and others make seed breeding interesting and relevant for a large audience? What are 'best practices' in communication strategies so far? What sticks? What works well? How can we draw attention to seed breeding as the necessary basis of our food supply system?

A personal reflection intermezzo

The latter questions eventually bring me back to the discursive dilemma that lay at the very basis of this research project. This project unfortunately cannot solve the dilemma or tell the companies exactly what strategy they should follow, or should have followed. I can, however, give my personal reflection on 'seed storytelling' over the last thirty years – and provide some personal recommendations for the future. After more than a year of research, reading, interviewing and writing I am still amazed by the topic of seed breeding in general, and the difficult relationship between nature and technology in particular. Now I want to go through some of my personal thoughts about several of the themes that were discussed in this project.

As Sebastien Valkenberg wrote, 'agriculture has become high-tech, yet the valuation is low'. Ever since the very beginning of this investigation, and especially since my first encounter with the massive, high-tech character of the Dutch seed breeding sector, I have felt confused and frustrated by this low valuation. And if there is one thing that I wanted to demonstrate with this thesis, it is the level of complexity of effective communication for those working in this 'green sector'. As we have seen, the discursive dilemma is real: on the one hand, the Dutch seed companies seek to impress new colleagues with a high-tech (true) story, on the other hand, they struggle to create a green, 'natural', and just as well 'true' image among a large and ignorant audience. Seeds are a product of nature, yes, but at the same time *Dutch plant seeds* are the product of so much technological effort, innovation, scientific research, and years and

years of development. Why would you emphasize the natural aspects of seeds, if it is your core business to breed and process them in the most efficient, innovative and high-technological ways? It has become clear that this is a struggle for all seed breeding companies, as well as for the overarching organizations. 'We don't want to position ourselves as an all too high tech company. But we are!' (Rijk Zwaan). 'We have to deal with so many *feelings*. That is a complicating factor for our communication strategy' (Plantum).[313] 'Yes, we notice there's a tendency towards natural eating – a growing awareness of what people eat and where it comes from. That's a good thing. But in general, people underestimate how much we owe to technological progress' (Bejo).

When the European Court of Justice finally decided that CRISPR creates GMOs, I was baffled. Based on all the conducted interviews, I had become convinced that the seed breeding lobby in Europe would be strong enough to persuade the public and political opinion about genetic technology. I had expected that the Court would include exceptions for non-transgenic techniques – CRISPR-Cas9 technology that allows breeders to make meticulous adjustments to a crop's DNA, without having to insert 'foreign' DNA. Not so long ago, a biotech scientist who was excited about the possibilities of CRISPR-Cas9 wrote an article about how it could best be implemented. Under the heading 'Avoiding past mistakes', he wrote:

> The biggest potential pitfall for the use of CRISPR technologies in agriculture is not scientific but public acceptance and government regulation. The majority of expected uses would produce 'nature-identical' traits, that is, traits that could also be derived by conventional plant breeding [...] Nature-identical CRISPR applications would not need to be equated with genetically modified organisms.[314]

What I think is so interesting about this quote, as well as about the eventual decision of the European Court, is the fact that 'nature' is again a keyword, more or less automatically nominated for approval. Whatever is 'nature-identical' is fine. From this quote it follows that the true question behind allowing or restricting CRISPR technology should be: are the results of this technology 'natural' enough? But that question is hardly ever asked about the daily practices of today's seed breeders. I find that remarkable: in Bart Vosselman's definition of nature, no crop we eat is 'natural' in the first place. Without human intervention we would not have the beetroots, carrots, tomatoes and cucumbers from the Bejo and Rijk Zwaan catalogues. Let alone their cherry tomatoes, yellow pepper bells and cute small snack cucumbers.

[313] Interview with Nanja Stams, May 22, 2018.
[314] Gao, 'The future of CRISPR', 2.

Why do I care about this so much? Because if 'nature' is a decisive value in the process of approval of new plant breeding techniques, such as CRISPR, we should talk about the same kind of 'nature' in the rest of the breeding business. But we don't. We rather talk about the high level of technology that the Dutch breeding companies have achieved. In Seed Valley, they do not care for nature-identical applications of breeding technologies. They care about creating an image that invokes associations with Silicon Valley, with state-of-the-art (DNA) technologies, in order to attract the right employees. They made a very clear choice in their communication strategy; of all seed companies and initiatives I have discussed, Seed Valley is certainly least bothered by the 'discursive dilemma'.

Recommendations for seed storytelling, from sector-wide to corporate communication

Apart from my personal ideas and intuitions about the seed sector and how storytelling could be improved, I will end this thesis with three recommendations that were inspired by this research.

1. *Actively invest in image research and take your external communication strategy seriously – before others will do it for you*

Niels Louwaars told me that long before CRISPR 'went to court', he already realized that Plantum had to come up with a solid communication strategy around the technology.

> How could we avoid the same mistakes that had been made with GM food? The opponents of GM, and I have to congratulate them with that, were so good at their communication. I have admired the term 'Frankenstein food': so well chosen. Framing is so influential, but our sector is not good at it. NGOs are way more creative, way better at it.[315]

Indeed, the opposition against a certain technology can be very forceful: remember, for instance, how fifteen NGOs at once withdrew from the 'Eten & Genen' debate, and how much media attention they were able to attract with it. We have seen that seed breeding companies are not actively participating in public debates; they tend to follow a very reactive media strategy. Only when they are asked for their input, they will give it. But since the companies claim to be sensitive about their reputation, I would advise them to invest in a more proactive media strategy. Do not wait until press, NGOs or politicians say the 'wrong' things about you, do not give them the opportunity to harm your image – step forward before they can do so, and

[315] Interview with Niels Louwaars, May 22, 2018.

actively tell your own story. And in order to know what kind of story that should be, I think it is of great importance to research your own image. We have seen that Plantum did this for the entire sector: I think the results of this image survey should be a big stick for communication departments of Bejo, Rijk Zwaan and the others to take their external communication strategies more seriously.

2. *Be visible*

Nanja Stams rhetorically asked me: 'How do you explain something so complex to an ignorant audience? Well, you don't. But you have to make sure that people are talking about it.'[316] The only way to make sure that your communication is effective, is by becoming and staying visible. In public debates, in media, in talkshows… It is quite simple and highly effective to be *present*. At the beginning of this research project, I suspected that the seed breeding sector would not be very open or transparent to the public. But essentially, they are willing to. What speaks from my research results is that they just do not manage their public relations actively enough. If you want a large public to be aware of your existence, visibility is important. And I think the companies do want to create that awareness, simply because 'unknown' can easily become 'unloved'. I am convinced that as a company, you can reduce the risk of sudden controversy or resistance by being as visible as possible. Of course, initiatives like Seed Valley and Plantum are convinced of this, too. And they already work hard to create that awareness. This advise is therefore specifically addressed to Bejo and Rijk Zwaan.

3. *Choose a single story (e.g. a story about necessity)*

Throughout this entire project it has become clear that seed breeding companies are struggling with many different communicative challenges, the discursive dilemma of nature and technology being one of them. Communication about seed breeding inevitably takes place on so many different levels, with so many completely incomparable properties, that it can be the pitfall for a lot of discussions. In an example about GMO controversy, Niels Louwaars dubbed the discussion a 'three-headed monster': its three heads are food safety, concerns about economic power, and philosophical concerns such as 'the cell's integrity'.

> The moment you begin to defend yourself in a discussion about food safety, then someone will throw in 'Monsanto' or the integrity of the cell. And then you have to start over again, on a

[316] Interview with Nanja Stams, May 22, 2018.

> completely different note. These aspects are completely incomparable, they require separate discussions. This is what I see happening at every debate night on this topic, and this is what complicates the debate so much.[317]

Louwaars' recommendation: focus. Create different conversations about the different aspects that apparently require a discussion. Indeed, we have seen that those who stick to a clear choice in their communication, who try not to deal with all these different aspects at once – Seed Valley in particular – suffers less from the communicative challenges. The story they tell is openly proud of the high technology behind seed breeding, and that relieves them from the obligation to deal with economic, philosophical or safety concerns *too*.

Perhaps the best advise is thus not to choose the technological story per se, but at least to choose one single story, to focus on one particular element of seed breeding that you want to highlight. And for Michel Haring, the plant physiology professor, it was very obvious what kind of story that should result in: a story about the necessity of seed breeding. 'You have to show the public why we need breeding, and that breeding is not a matter of letting nature run its course'.[318] In other words: if you are able to convince the world of the importance of your activities, it may be easier to incorporate a message about necessary technologies – for example with CRISPR-Cas9. Clearly, seed breeding companies have not invested enough in positive communication about CRISPR-Cas9. But when we look at, for instance, the framing of CRISPR in the medical sector, we can see that it is completely built around the highly promising aspects of the technology: CRISPR will help us cure cancer, CRISPR will enable personalized medication, CRISPR will change medicine for good… Perhaps the seed breeding sector should choose a similar strategy, emphasizing the indispensability of the new technology for worldwide food production. Open the black box, show the world what you are so good at, and why it is so important. If breeding companies can make the public aware of what seed breeding in the twenty-first century *really* looks like (and perhaps that is not 'exploring nature'), the public may automatically become more willing to accept technological developments.

Of course, none of these recommendations are revolutionarily new. They are echoes of, for instance, what Plantum's image researchers have advised in 2017. And before that, the final report of the 'Eten & Genen' debates already stated that the seed breeding sector would benefit from 'an open and honest attitude of food businesses, for example being transparent about both

[317] Interview with Niels Louwaars, May 22, 2018.
[318] Interview with Michel Haring, May 23, 2018.

the interests and the risks of their activities'.[319] The fact that my recommendations do fit in so well with those of the last twenty years, does not mean that the storytellers in the seed breeding sector have failed in their dealing with communicative issues. Rather, it means that they just have to keep going, try harder, and do better.

[319] Commissie Biotechnologie en Voedsel, *Eten en Genen,* 21. Original quote: '[Men rekent ook op] een open en eerlijke opstelling van het bedrijfsleven, bijvoorbeeld door duidelijk te zijn over de belangen en risico's die gemoeid zijn met de toepassingen waaraan men werkt.'

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